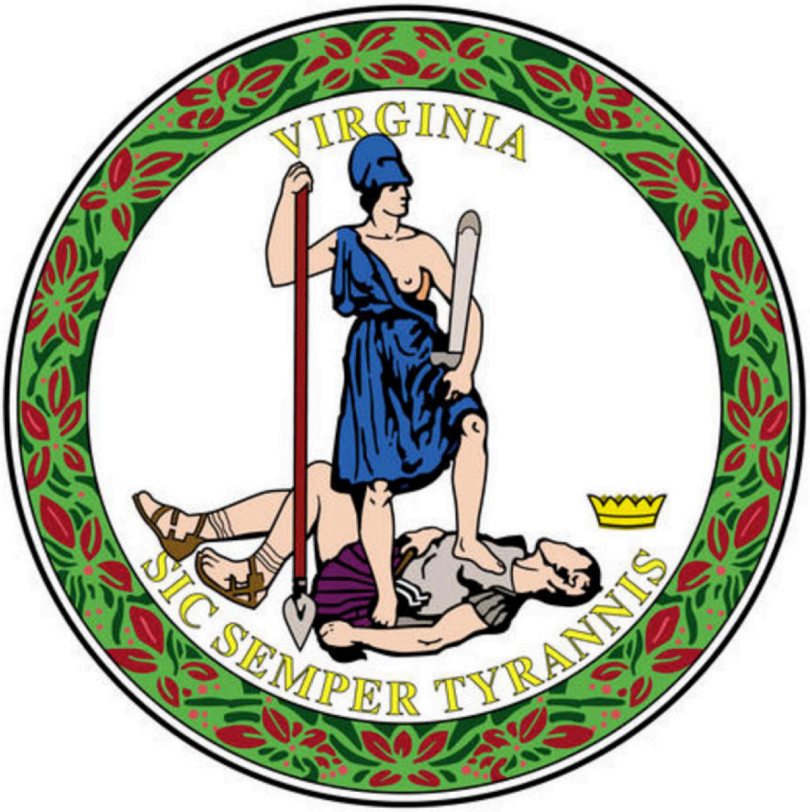
STRONGER

State Review of Oil & Natural Gas Environmental Regulations

Commonwealth of Virginia

2016 Follow-Up State Review Report



State Review of Oil and Natural Gas Environmental Regulations, Inc.
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Introduction

In 1990, the Interstate Oil Compact Commission (IOCC), later renamed the Interstate Oil and Gas Compact Commission (IOGCC), and the U.S. Environmental Protection Agency (USEPA) jointly published a Study of State Regulation of Oil and Gas Exploration and Production Waste, which contained guidelines for the regulation of oil and gas exploration and production wastes by the IOCC member states (the "1990 Guidelines"). The published guidelines, developed by state, environmental, and industry stakeholders, provided the basis for the state review process, a multi-stakeholder review of state oil and gas waste management programs against the guidelines. The initial purposes of the state review process were to document the successes of states in regulating oil and gas wastes, to identify gaps in regulation, and to offer recommendations for program improvement.

In 1999, administration of the state review process shifted to a nonprofit, multi-stakeholder organization named State Review of Oil and Natural Gas Environmental Regulations, Inc. (STRONGER). STRONGER again updated and expanded the guidelines, which were accepted by the IOGCC and published in June 2000 as "Guidelines for the Review of State Oil and Natural Gas Environmental Regulatory Programs" (the "2000 guidelines"). Since 2000, STRONGER has expanded the scope of the guidelines to address additional issues including Stormwater Management, Hydraulic Fracturing, Air Quality, and Reused and Recycled Fluids.

Virginia volunteered for an initial review in 2003 under the 2000 guidelines. The technical criteria for oil and gas waste management practices associated with the Virginia program were extensively examined during the 2003 review. The report of that review was published in April 2004 and contained six sections according to the structure of the 2000 Guidelines: General Criteria, Administrative Criteria, Technical Criteria, Abandoned Sites, Naturally Occurring Radioactive Materials (NORM), and Performance Measures. In March 2016 Virginia volunteered for a follow-up review under the 2015 Edition STRONGER Guidelines ("the guidelines"), which include the Stormwater Management, Hydraulic Fracturing, Air Quality, and Reused and Recycled Fluids topics that were not present in the 2000 guidelines. The focus of the 2016 follow-up review was to identify and evaluate implementation of recommendations resulting from the 2004 report; to evaluate if the Virginia program meets the criteria of the 2015 guidelines; and to evaluate the effectiveness of the Virginia program with regards to potential oil and gas development within the Tidewater region of the state.

The review team for the 2003 initial review included Leslie Savage, Railroad Commission of Texas, representing the state stakeholders; Don Garvin, Trout Unlimited, representing the environmental stakeholders; and Frank Henderson, Appalachian Energy, Inc., representing the industry stakeholders. Mark Carl, IOGCC; Jim Erb, Pennsylvania Department of Environmental Protection (PADEP); and Jim Kaiser, Wilhoit & Kaiser, participated as official observers.

The review team for the 2016 follow-up review included Scott Perry, PADEP, representing the state stakeholders; Gus Janson, EnerVest, representing the industry stakeholders; and Bruce Baizel, Earthworks, representing the environmental stakeholders. Bruce Moore, USEPA Headquarters; Mark Nelson, USEPA Region 3; Kevin Elkins, CONSOL Energy; and Ruby Brabo, King George Country Board of Supervisors, served as official observers. A full list of attendees of the interview portion of the review is included at the end of this report in Appendix C.

The 2016 review began with a questionnaire based on the guidelines that was sent to Butch Lambert at the Virginia Department of Mines, Minerals, and Energy (DMME). The Air Quality portion of the questionnaire was sent to the Virginia Department of Environmental Quality (DEQ) Air Division. STRONGER intended the questionnaire to capture the status of the DMME Division of Gas and Oil (DGO) and DEQ Air Division programs relative to the guidelines. DMME and DEQ staff prepared responses to the questionnaire, which were then returned to the STRONGER review team.

In August 2016 the review team traveled to Abingdon, VA to conduct an interview with DMME and DEQ staff. The interview was an open meeting held on August 8-10 at the Southwestern Virginia Higher Education Center. The interview was also webcast. DEQ and DMME staff gave presentations on their respective programs, and responded to questions from the review team and official observers, as well as questions from other attendees submitted in writing to the review team. Following the interview, and after

review of the written materials provided by the DMME and DEQ, the review team members compiled this report.

This report contains the review team's findings and recommendations based on their analysis of the questionnaire and supporting information provided by the DMME and DEQ, as well as information provided during the interview in Abingdon. This report is intended to capture a "snapshot in time" of Virginia's oil and gas management programs. At the time of the interview, the DMME had already been developing new proposed regulations that may satisfy some of the recommendations of this report if the proposed regulations are adopted. This report acknowledges the DMME's proposed regulations where appropriate and relevant. Future follow-up reviews would more fully examine the DMME's proposed regulations that were adopted after the 2016 review, and evaluate their adequacy against the criteria of the guidelines and the recommendations of this report. Note: while the report proper refers to oil and gas activity as "oil and gas", the questionnaires use the terms "E&P" (exploration and production) and "O&G" (oil and gas) interchangeably.

Topic headings, findings, and recommendations are noted in a numbered format that corresponds to the relevant section of the guidelines. Multiple findings and/or recommendations under a single subject are denoted ".a, .b", etc. For example, report section "4.2.4 Financial Assurance" contains "Finding 4.2.4" as well as "Recommendation 4.2.4.a" and "Recommendation 4.2.4.b"; all of which pertain to Section 4.2.4 of the 2015 Edition STRONGER Guidelines. Recommendations from the 2004 report are included in their respective sections with commentary on actions taken by the state, and new findings and recommendations, where appropriate.

Appendix A is a glossary of acronyms used in this report. Appendix B contains DMME and DEQ's responses to the questionnaire. Appendix C contains a list of attendees at the interview in Abingdon. Appendix D contains the 2015 Edition STRONGER Guidelines.

Executive Summary

A multi-stakeholder review team has completed an in-depth review of the Virginia Department of Mines, Minerals, and Energy Division of Gas and Oil and Virginia Department of Environmental Quality Air Division regulatory programs against the criteria of the 2015 Edition STRONGER Guidelines. Review team members and official observers were granted full access to staff of the southwestern region DMME DGO and DEQ Air Division, and all questions were answered in a responsive and open manner.

The review team has concluded that the DMME DGO and DEQ Air Division programs are well managed, professional, and generally meet the criteria of the 2015 Edition STRONGER Guidelines. The review team identified a number of program strengths that warrant special recognition. The review team also identified specific recommendations for improvements to the programs based on the guidelines.

Key Findings

- Finding 4.1.1.b
  The review team finds that the 48-hour notice from the operator to the DGO for all significant activities is a strong and commendable standard that exceeds the criteria of the guidelines.

- Finding 4.2.3
  The review team commends the DGO for its quarterly strategic planning data analysis meetings and finds that such administrative planning efforts exceed the criteria of the guidelines.

- Finding 4.2.7
  The DGO is to be commended for their improved electronic data management systems.

- Finding 6.8
  The review team finds that the DGO has taken action to avoid problems with future abandoned sites, and is to be commended for taking effective action to address the recommendation from 2004.

- Finding 9.2
  The review team finds that the DGO adequately evaluates the potential risks associated with hydraulic fracturing, taking into account varying reservoir characteristics as well as regional variations.

Key Recommendations

- Recommendation 4.1.2
  The review team recommends that the DGO consider developing a publicly accessible complaint database on the DGO website that allows the public to track both the type and resolution of public complaints.

- Recommendation 4.2.4.b
  If development begins in the Tidewater region, the DGO should evaluate whether additional bond requirements should be implemented for that area above and beyond what is required in the southwest region of the state.

- Recommendation 4.4
  The review team recommends that the DGO consider developing mechanisms and agreements with local governments in order to make communications and understanding more robust and transparent.

- Recommendation 6.4
  The General Assembly should take action to raise the DGO's orphan well permit fee, and allocate additional resources in order to plug the remaining orphaned wells in a more timely fashion before they become environmental hazards or become more difficult and expensive to plug. The DGO should also consider seeking additional funding through the federal Oil Pollution Act of 1990 to remediate any leaking oil wells should that event occur.

- Recommendation 7.2.a
  The Review Team recommends that the DGO verify that there is no need for an oil and gas NORM program. The DGO should collaborate with other State/Federal agencies and industry to develop an initial field monitoring data collection program and scientific study to facilitate the determination of need.

SECTION 4 | Administrative Criteria

Finding 4.1
The review team finds that the Commonwealth of Virginia continues to have in place a significant oil and gas regulatory program that meets the administrative criteria of the guidelines.

4.1.1 Permitting
The DGO requires permits, cradle to grave, for wells (including access roads), pipelines (including gathering lines), compressor stations, and stand-alone tank batteries. An operator has two years to begin permit activities. If not activated within two years, the system triggers an electronic notice that the permit will expire. The DGO receives 48-hour notice from the operator of construction, drilling, hydraulic fracturing, flowback, plugging, and restoration activities. Based on internal risk guidance policy, DGO staff tries to witness 100% of construction and drilling activity, and most cement jobs.

> The 2004 report contained a recommendation that the DGO obtain the statutory or regulatory authority to refuse to issue or reissue permits or authorizations if the applicant has outstanding, finally determined violations or unpaid penalties, or if a history of past violations demonstrates the applicant's unwillingness or inability to comply with permit requirements. The DGO has not seen this to be an issue in Virginia at current levels of exploration and production. The DGO does have the authority to withhold permits until any deficiencies are corrected.

Finding 4.1.1.a
The review team finds that the DGO's electronic filing and data management system comprehensively covers permitting and reporting for oil and gas facilities. The review team commends the DGO for being proactive in developing this system.

Recommendation 4.1.1.a
The review team recommends that the DGO should consider clarifying its authority to refuse to issue or reissue permits or authorizations.

Finding 4.1.1.b
The review team finds that the 48-hour notice from the operator to the DGO for all significant activities is a strong and commendable standard that exceeds the criteria of the guidelines.

4.1.2 Compliance Evaluation
All required notices are sent electronically are retained in the DGO database, as well as automatically copied to the electronic permit file. At reasonable times and under reasonable circumstances, the DGO has authority to enter upon any property and take action to administer and enforce regulations, and to inspect and review all properties and records thereof as are necessary. Inspectors undertake most of their inspections unannounced. All inspections are based on the condition of the permit area and are described in the frequency policy. Follow-up inspections for violations are contained in the violation notice. Depending upon the seriousness of the violation and the effort/expense required rectify it, the DGO can increase the civil penalty for a confirmed violation.

Public complaints are given priority by the DGO. The complainant is contacted within 24 hours and the investigation must be initiated within five days. If the public complaint is regarding water impacts, the DGO's informal policy is to respond immediately, with follow-up reports on the investigation sent to both the operator and the complainant. If replacement water were necessary, the DGO would require the operator to supply that water while the investigation was ongoing.

Quarterly statistical reports are prepared for these activities, including complaints and inspections. The DGO management team reviews these reports. The DGO currently has no specific complaint database on the public portion of its website, but expressed willingness to consider developing such a database.

Finding 4.1.2
The review team finds that the DGO staff has an impressive awareness of current field conditions for oil and gas sites and operations in the historically and currently active southwestern region of the state.

Recommendation 4.1.2
The review team recommends that the DGO consider developing a publicly accessible complaint database on the DGO website that allows the public to track both the type and resolution of public complaints.

4.1.3 Enforcement

> The 2004 report recommended that the DGO evaluate the need for statutory or regulatory authority to assess administrative penalties. DGO inspectors have full statutory authority to enforce the provisions of the Virginia Gas and Oil Act and all DGO regulations. The DGO can assess penalties, and refer more grievous violations to the Oil and Gas Board.

All enforcement actions are recorded and tracked in the DGO electronic database for each permit. From 2014 to 2016 the DGO issued 16 Notices of Violations. No other formal enforcement actions or penalties have taken place during that time period. If civil penalties are necessary, they are based on a point system outlined in agency policy documents.

Finding 4.1.3
The review team finds that DGO meets the criteria of this section of the guidelines.

4.2. Additional Program Requirements

Virginia has a formal, written contingency plan to deal with hazardous waste spills and incidents. The DGO participates with several other agencies that are coordinated by Virginia Department of Emergency Management (VDEM). Together, the departments will form an emergency response team. To date, the interagency team has conducted two tabletop exercises involving responses to certain types of emergencies. The Virginia Brownfields Restoration and Economic Redevelopment Assistance Fund, regulated by the Virginia Department of Environmental Quality, contains funds to enable the state to respond to spills and releases in the event a responsible operator cannot be located or is unwilling or unable to respond.

Operators are required to take all reasonable steps to prevent, minimize, or correct any spill or discharge of fluids on a permitted site that has a reasonable likelihood of adversely affecting human health or the environment. All tanks are required to have a containment dike that will hold 1.5 times the amount of fluid held in the largest tank. The DGO inspects the condition of tanks during routine inspections, and operators are required to inspect their tanks at least annually and present the inspections to DGO upon request. Operators are required to maintain records of inspection results for three years.

In the event of a spill, the operator submits an incident report to the DGO. Spill cleanup, sampling, and remediation are handled by DGO inspectors on a case-by-case basis. The DGO's incident and inspection reports contain the final reporting and/or other on-site monitoring requirements. Incident reports are submitted electronically and stored in the DGO's database. The spills data are analyzed and reported to management on a quarterly basis.

> The 2004 report contained a recommendation that the DGO pursue regulatory changes that contain criteria for the size or amount of a spill requiring reporting, so that the regulations are meaningful and not overly burdensome. The DGO stated that they intend to clarify spill reporting thresholds through future regulations, which will contain definitions of spills and reporting procedures.

Finding 4.2.1.2
The review team finds that DMME requires reporting of all spills, regardless of quantity. Spill response is handled on a case-by-case basis that, under current levels of oil and gas activity, allows for oversight and environmental protection consistent with the criteria of the guidelines.

4.2.2 Public Participation

Virginia statute and DGO regulations require public notification during every stage of the permit process. Regulations require a 15-day public notice period before a permit can be issued. Notices are published in local newspapers and sent directly to county administrations. Notice to the surface, coal and mineral owners must be provided by certified mail, and the operator must provide proof of notice with return receipts. Regulations also allow for waiver of the notice period, but only if all affected parties sign-off.

All DGO records, except those that meet the statutory requirements for confidentiality, are made readily available for public review. Regulations are reviewed and developed in accordance with the Virginia Administrative Process Act, which requires that all regulations be reviewed every 5 years. The DGO has utilized workgroups when regulations or laws are being proposed. In addition to the electronic permitting and reporting database, which is accessible and searchable by the public, DGO posts information to the agency web site as a public outreach tool to inform the public about specific issues.

> The 2004 report contained a recommendation that the DGO consider developing a simple, basic brochure – a sort of citizens guide to the Virginia gas and oil industry and the Virginia gas and oil regulatory program – for use in public education and outreach. The DGO has utilized its website and social media to publish gas and oil information pertinent to the public and industry, including an issue page specifically focused on hydraulic fracturing. The DGO, in cooperation with the office of public relations, has developed brochures, as well as PowerPoint programs, describing and illustrating different issues and activities in the industry.

The DGO stated it intends to have a dual reporting system for hydraulic fracturing reporting. The proposed system would require operators to submit both to FracFocus and to a state database, which would be searchable by the public.

<u>Finding 4.2.2</u>
The review team finds that the DGO has made commendable efforts to upgrade its public-facing website, and to add issue-specific information to that website.

<u>Recommendation 4.2.2</u>
The review team recommends that the DGO continue to actively look for opportunities – on its public-facing website, and in its outreach to local governments and emergency responders, for example – to educate all stakeholders on its regulations and on issues related to oil and gas development.

4.2.3 Program Planning and Development

The DGO continues to utilize an annual strategic planning process. Goals and strategies for performance are established annually and reviewed quarterly by the strategic team and at operational planning sessions.

<u>Finding 4.2.3</u>
The review team commends the DGO for its quarterly strategic planning data analysis meetings and finds that such administrative planning efforts exceed the criteria of the guidelines.

4.2.4 Financial Assurance

> The 2004 report recommended that the DGO continue to assess the adequacy of its bonding program and make changes as necessary. The DGO reports that no changes have been made to the bonding program.

At the current level of exploration and production activity, the DGO believes that the Director's authority to invoke additional bonding requirements on a case-by-case basis is sufficient. The DGO regulations allow both individual cost bonds and pool bonding options, with most operators utilizing the pool-bonding program. Bonding of either type can be satisfied through CD's, surety, or cash bonds.

Finding 4.2.4
The review team finds that the DGO's financial assurance requirements meet the criteria of the guidelines.

Recommendation 4.2.4.a
The review team recommends that the DGO should reevaluate the adequacy of its bond requirements if oil and gas activity increases significantly over current levels.

Recommendation 4.2.4.b
If development begins in the Tidewater region, the DGO should evaluate whether additional bond requirements should be implemented for that area above and beyond what is required in the southwest region of the state.

4.2.5 Waste Hauler Certification

Finding 4.2.5
The Virginia Department of Transportation (VDOT) and the Virginia State Police have regulatory authority for waste hauler training and certification. The majority of oil and gas waste is handled by contracted haulers. There currently are no DGO certification requirements. If oil and gas activity were to take place in the Tidewater region, VDOT would have oversight of certification and other trucking-related issues. The DGO would consider having joint hearings with VDOT in that instance.

4.2.6 Location of Closed Disposal Sites
4 VAC 25-150-420 requires the site plan contained in the permit application show the pit location(s). Permit files can be viewed on the DGO website.

4.2.7 Data Management

The 2004 report recommended that the Commonwealth of Virginia provide the DGO with additional funding for updating the DGO's electronic data management system. Today, all DGO permitting, reporting, inspection reports, and completion reports are handled electronically and all information provided is stored in an enterprise database.

All information technology (IT) is handled within the department by DMME staff. The DGO has access to these technical staff for electronic data management issues. Much of the information contained in the DGO database system is made available to the public through the DGO Data Information System, accessed through the DGO website. Information regarding Notice of Violations, Complaint Investigations, and Incident Reports is currently available only upon request.

Finding 4.2.7
The DGO is to be commended for their improved electronic data management systems.

4.3.1 Personnel
The DGO currently employs six full-time inspectors and has two open inspector positions. DMME currently employs over 60 field inspectors. As workloads increase within the DGO, adjustments can be made within the agency to provide assistance to DGO. DGO inspectors have responsibility for all aspects of gas and oil activities within their assigned area, including the oil and gas environmental regulatory program. The DGO inspection staff handles technical issues. DGO staff are able to address most technical issues through internal discussions.

The nine inspector positions, if fully staffed, are considered adequate by the Director for the current level of gas and oil activity in Virginia. The DGO provides training in oil and gas regulatory matters through in-house training, staff meetings, public meetings and interagency meetings. DGO stated that as funding becomes available, additional training in this area would be implemented. If oil and gas development increased in existing areas, or if development were to begin in the Tidewater region, the Director believes the DGO would need additional staffing to handle the workload adequately.

Finding 4.3.1
The review team commends the DGO for the technical competence and field knowledge of the agency's inspectors.

Recommendation 4.3.1
The review team recommends that the DGO fill its open inspector positions, and, if oil and gas development levels increase, evaluate its need for additional staff positions.

4.3.2 Funding
The annual budget for the DGO is just under one million dollars. Funding is obtained through Virginia's general fund and DGO permit fees. Funding obtained from permit fees is used by the DGO for vehicle acquisition, upkeep, etc. The Director believes that the current level of funding is adequate for current activity levels.

4.4 Coordination Among Agencies
The DGO currently has two memorandums of understanding (MOU) with the DEQ: one related to water and NPDES permits, the other related to air quality regulations. The DGO also has an MOU on worker safety with the Department of Labor and Industry, and coordinates with the Virginia Department of Emergency Services on a regular basis.

As part of recent discussions about the possibility of exploration and production activity in the Tidewater region, DGO staff have had discussions about the need to communicate with local governments, and specifically, to consider ensuring that the appropriate conversations regarding emergency response have taken place. DGO's 'table top' training efforts have also addressed this issue. DGO's proposed regulations will include sections that address emergency responses. Spills or accidents related to trucks would be handled by VDOT. At the wellhead, DGO would prioritize containment, disposal and remediation, utilizing DEQ's guidelines on petroleum spills. The DGO is also considering development of an MOU with the Virginia Department of Health.

Finding 4.4
The review team finds that the DGO meets the criteria of section 4.4 of the guidelines, and is to be commended for the active coordination the agency has pursued with other agencies on issues such as inspections, emergency response, and water quantity and quality.

Recommendation 4.4
The review team recommends that the DGO consider developing mechanisms and agreements with local governments in order to make communications and understanding more robust and transparent.

SECTION 5 | Technical Criteria

5.1 General

The DGO issues a permit for all aspects of a particular drilling/well site, including production and gathering pipelines and considers site-specific conditions when determining additional technical criteria for siting, construction, and operation. The DGO's program includes technical criteria for oil and gas waste management practices that address general waste characterization, pits, land application, and tanks. The DGO has established specific performance standards and design specifications based on site-specific or regional differences in geology, hydrology, climate, and waste characteristics. The DGO requires that facilities and sites used for storage or disposal of oil and gas wastes are operated and managed at all times to prevent contamination of groundwater and surface water, soil and air, protect public health, safety and the environment, and prevent property damage. The DGO requires that an operator handle all fluids from a well, pipeline, or corehole in a "properly constructed pit tank or other type of container" approved by the Director. The DGO requires that the operator submit an application for either on-site or off-site permanent disposal of fluids.

No fluids may be disposed of without Director approval of the operator's plan for permanent disposal of the fluids. The application must be accompanied by maps and a narrative describing the method to be used for permanent disposal of fluids if the operator proposes to land apply any fluids on the permitted site. The application, maps, and narrative become part of the operator's operations plan. The DGO requires that any waste other than cuttings and liquid to go to a disposal facility certified to accept that kind of waste. Used lubricating oil usually goes to an oil recycler permitted by the USEPA. For waste disposed of off-site, the DGO requires the applicant to submit a copy of a valid permit for the disposal facility to be used and documentation that the facility will accept the waste.

5.1.e Siting Criteria

Virginia's statutes and the DGO's regulations incorporate siting requirements for gas and oil facilities, pits, landspreading, and burial. Individual permits for well sites may include additional siting restrictions as deemed appropriate by the Director. All aspects of the location are considered during permit application review, including depth to and quality of groundwater, wetlands, floodplains, topography, proximity to existing drinking water supplies and wells, geology, geologic hazards, and other environmentally sensitive areas.

The DGO requires setbacks of 200 feet from any inhabited building, unless site conditions as approved by the director warrant the permission of a lesser distance, and there exists a lease or agreement between the operator and the owner of the inhabited building. The DGO has implemented a 'Red Zone' review policy that requires all permits to identify issues that can adversely affect the public, homes, roads or places where people congregate related to the well or facility location.

Finding 5.1

The review team finds that the DGO's program includes technical criteria for oil and gas waste management practices that address general waste characterization, pits, land application, and tanks. The DGO has established specific performance standards and design specifications based on site-specific or regional differences in geology, hydrology, climate, and waste characteristics that meet the criteria of the guidelines.

5.2 Waste Characterization

The DGO requires waste characterization, including sampling and testing, of oil and gas wastes prior to disposal by land spreading or burial without a cap for such characteristics as organic content, pH, salinity, and sulfur compounds, including hydrogen sulfide content, as appropriate for the type of waste, method of disposal, and the potential for adverse health and environmental effects.

The DGO requires operators to submit information on any additives to be used, and to identify actions to be taken to ensure use of the additives will not cause a lessening of groundwater quality. The DGO prohibits operators from using an oil-based drilling fluid or other fluid that has the potential to cause "acute or chronic adverse health effects on living organisms" unless a variance has been approved by the Director. Operators must explain the need to use such materials and provide the material safety data sheets. In reviewing any request for a variance, the Director considers the concentration of the material, the measures to be taken to control the risks, and the need to use the material.

Prior to commencing drilling and before the water-protection casing string is set, permit applicants must provide documentation that the water to be used in drilling is from a water well or a spring, or is of equal or better quality than the groundwater within 500 feet of the drilling location or meets constituent limits in the DEQ's Water Quality Criteria for Groundwater for chlorides, total dissolved solids, hardness, iron, manganese, pH, sodium, and sulfate.

Finding 5.2
The review team finds that DGO meets the criteria of this section of the guidelines, with the exception of NORM assessment. DGO has no regulatory action levels specified for NORM. See Section 7 of this report for discussion of NORM.

5.2.3 Quality Control

The 2004 Review Team recommended that the DGO consider whether or not its program would benefit by requiring the use of certified laboratories for analysis. The DGO has developed proposed regulation, pending final approval, that requires samples be analyzed and tested by a laboratory certified or accredited under the Virginia Environmental Laboratory Accreditation Program. The DGO receives copies of the analyses to review before authorizing disposal for land spreading and reviews quality assurance/quality control information at that time to determine whether the test methods used produce data that are valid for the purpose intended.

Finding 5.2.3
The review team commends the DGO for requiring certified laboratory analysis in its proposed regulations

Recommendation 5.2.3
The review team recommends the DGO adopt the proposed regulation requiring certified laboratory analysis.

5.3 Waste Management Hierarchy

DGO stated that with current activity levels and methodologies, the volume of all wastes other than produced water is low. DGO stated they have sufficient regulatory flexibility to employ the elements of the waste management hierarchy when appropriate.

Finding 5.3
The review team finds that DGO has not fully incorporated the waste management hierarchy criteria of the guidelines.

Recommendation 5.3
The review team recommends that, when appropriate, DGO identify opportunities for source reduction in oil and gas waste management, establish policies that encourage recycling and sources reduction opportunities, and develop training and education programs along with technical assistance to encourage industry participation.

5.4 Quantitative Elements

The DGO has developed quantitative limits for certain waste constituents that have been determined to be the controlling constituents for waste management. The DGO requires that every waste disposed of on-site be permitted in the operational plan. The DGO has adopted the DEQ's criteria for protection of groundwater. The DGO strictly regulates what can be stored in a drilling pit.

Finding 5.4
The review team finds that the DGO meets the criteria of this section of the guidelines.

5.5 Technical Criteria for Pits

All aspects of pits, including siting, construction, operation, and closure, are addressed in the well site permitting process. Pits are to be temporary structures associated with specific drilling, completion or plugging operations, and are to be properly drained and closed when those operations are complete. Pits must be lined with a liner of at least 10-mil thickness, and must be of sufficient size to maintain a two-foot

freeboard. DGO stated that the majority of operators use 20-mil liners. The DGO requires that requiring operators to divert flow-back to a tank and then to the pit operate pits in a manner that ensures liner integrity. DGO inspectors visit active sites on a frequent basis to ensure that pits meet all operating and structural integrity requirements and to ensure that pit contents do not adversely impact groundwater or surface water. Operators may move fluid from one pit to another to maintain the required freeboard, or dig another pit to store the fluid; however, this action requires Director approval and may require a permit modification. If a pit is found to be leaking, the operator is required to shut down operations until the problem is rectified, and must report the leak to the DGO.

Solid waste other than cuttings are not to be placed in pits, and any hydrocarbons that accumulate in pits must be collected and properly disposed of. Operational pits may not be used as drainage or erosion control structures. The DGO has developed a proposed regulation (pending final approval) requiring pits be enclosed by adequate fencing to secure the pit from access by the public and wildlife in Red Zone areas.

Operators are required to submit a description of how drill cuttings and solids will be disposed of in their operational plan. The DGO maintains records of all pit locations, and these records are available to the public. The DGO regulations allow on-site disposal of drill cuttings and solids in an approved pit without testing of the material, provided the drill cuttings and solids are covered with a liner meeting the standards of 4 VAC 25-150-300, or a low-permeability clay cap, and covered by soil. Upon closure, all free fluids must be removed from the pit, any solids (cuttings) are to be covered by liner and/or low-permeability soil, and the site is to be drained, sloped and vegetated. The combination of soil and liner or cap must be at least four feet thick, capable of shielding the cuttings and solids remaining in the pit, suitable for supporting vegetation, and sloped to prevent ponding. All other solid waste from gas, oil or geophysical operations must be disposed of in a facility permitted to accept that type of waste.

If drilling were to take place in the Tidewater region, the DGO would take extra precautions during the permitting process to ensure that pits were appropriate for the types of drilling muds that would be used, and waste constituents that would be produced.

The 2004 Review Team recommended that DGO consider establishing a specific time limit for pit closure. The DGO has implemented a regulation that requires pits to be reclaimed within 180 days after completion. The DGO closure requirements for pits also address how they are capped, compacted, contoured, and vegetated.

Finding 5.5a
The review team finds the Virginia DGO meets the criteria of this section of the guidelines.

Finding 5.5.b
DGO stated that their regulations currently require 10-mil thick pit liners, but industry practice is generally to use 20-mil thick liners.

Recommendation 5.5.b
The review team recommends that the Virginia DGO revise its pit liner thickness requirement from 10-mil to 20-mil thickness to be consistent with industry practice for enhanced environmental protection.

5.6 Technical Criteria for Landspreading

The DGO's regulations allow disposal of pit liquids and produced fluids by landspreading only after the fluids are tested and found to fall within DEQ's prescribed water quality criteria for groundwater, and after approval of the disposal plan by DGO. Fluid disposal by landspreading is restricted to permitted areas, and may not be applied in a manner that would cause erosion or runoff. DGO defines buffer zones between the area to be landspread and highways, property lines, surface water (including wetlands, natural rock outcrops, sinkholes, water supply wells or springs), as well as weather conditions that limit landspreading unless a variance has been granted by the Director. Operators must monitor vegetation for two years after the last fluid has been applied to a site. If any adverse effects are found, the operator must report the adverse effects in writing to the DGO. The Director may require monitoring of groundwater quality on sites used for landspreading of fluids to determine if the groundwater has been degraded.

Finding 5.6
The review team finds that DGO meets the criteria of this section of the guidelines.

5.7 Technical Criteria for Burial and Landfilling
Drill cuttings are the only wastes that are allowed to be directly buried on permitted areas. The cuttings must be contained in a lined drilling pit. All free fluids must be removed, and the cuttings covered with a liner and/or a low-permeability clay cap. The combination of soil and liner or cap must be at least four feet thick, capable of shielding the cuttings and solids remaining in the pit, suitable for supporting vegetation, and sloped to prevent ponding. The land over the pit area must be contoured so as to have positive drainage and must be vegetated for stability. The DGO's records of burial are permanently maintained.

Finding 5.7
The review team finds that DGO meets the criteria of this section of the guidelines.

5.8 Technical Criteria for Roadspreading

In 2004 DGO did not allow roadspreading of produced fluids; however, the DGO's authority and rules were broad enough to allow a case-by-case review of such a proposal and approval of such a proposal provided the roadspreading could be performed in a manner that would protect human health and the environment. The 2004 review team recommended that the DGO evaluate the feasibility of developing standards for roadspreading of produced fluids for beneficial uses such as dust suppression and de-icing in a manner that would still be protective of human health and the environment. DGO has since applied the standards for fluids that are landspread to roadspreading.

Produced fluid can be processed to melt ice and snow and utilized as a dust suppressant on non-paved state roads, as long as the road is permitted and identified in the operator's plan. Maps and a narrative describing the method to be used for permanent disposal of fluids must accompany the application if the operator proposes to land apply any fluids on the permitted site. This has been approved but is no longer being utilized. The produced fluids generally required chemical supplements to meet standards to be considered an effective dust suppressant or de-icing agent. The processing methodology proved to be cost prohibitive.

Finding 5.8
Roadspreading of produced fluids is allowed only under conditions and requirements identical to the DGO's landspreading requirements. The roads must be under DGO permit (i.e., well or pipeline access roads), and disposal is subject to the same testing, buffer zone and other requirements as fluids disposed of by landspreading.

5.9 Technical Criteria for Tanks
The DGO regulations require tank storage for any oil and gas waste that is generated on a continuous basis, and has information in each permit file as to the location and use of all tanks. Tanks are subject to construction, spill-prevention, preventive maintenance and inspection requirements. Every permanent tank or battery of tanks must have secondary containment. The surrounding containment dike or firewall must have a capacity of 1½ times the volume of the single tank or largest tank in a battery of tanks. Dikes and firewalls shall be maintained in good condition, and the reservoir be kept free from brush, water, oil or other fluids. Operators must inspect the structural integrity of tanks and tank installations at a minimum annually, and maintain the inspection report for a minimum of three years. The DGO requires removal of tanks and above ground equipment upon cessation of production.

Finding 5.9
The review team finds that DGO meets the criteria of this section of the guidelines.

5.10 Technical Criteria for Commercial and Centralized Disposal Facilities

The 2004 review team recommended that Virginia and the DGO evaluate the effect of the lack of commercial disposal facilities for brine and determine whether DGO regulations and/or state law should be amended to facilitate future commercial disposal capacity. The DGO has had no requests for commercial disposal facilities since 2004. USEPA, which permits the Class II disposal wells in Virginia, requires that waste injected into the Class II UIC wells is characterized, and performs an annual analysis.

5.10.2.3 Waste Tracking

The DGO tracks all exploration and production wastes to their point of final disposal. Most drill cuttings are disposed of on-site. On-site disposal is permitted by the DGO through the permit's operational plan, and the operator is responsible for tracking it, including reporting the final disposal location. Regulations specific to the Tidewater region prohibit on-site disposal of oil and gas wastes.

Virginia currently has no commercial or centralized disposal facilities; however, some wastes are trucked to commercial facilities out of state. As part of the permit application for well operations, the DGO requires submittal of a waste management plan. Any deviation from an approved plan must be reported to, and approved by, the DGO. In addition, for off-site disposal of pit or produced fluids, the operator must submit an application to the DGO for disposal of pit or produced fluids, on which the applicant must provide the waste volume, the permit number of the disposal facility and proof that the facility's permit allows acceptance of fluid waste from the gas and oil operations.

The DGO's regulations require each operator using an off-site facility for disposal of fluids to use a waste-tracking system to document the movement of fluids off of a permitted site to their final disposition. Operators are required to submit waste tracking records on an annual basis through the DGO electronic permitting system. All records are maintained in perpetuity. Furthermore, the DGO requires all coalbed methane (CBM) gas well operators to report monthly the total produced waters withdrawn from CBM wells, in barrels, on a well-by-well basis. The report must also indicate cumulative produced water withdrawals.

> The 2004 report recommended that the DGO amend its rules to establish a record retention period for waste tracking records, with a provision that the record retention period be automatically extended for any person who is the subject of an unresolved enforcement action regarding the regulated activity from the date such person receives notice of the enforcement action until it is resolved. The DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that tracking records be submitted to the DGO on an annual basis. The DGO maintains these records in their e-form system. Operators now report volume, origin, transport and final disposal location of the waste as part of this annual reporting and must retain tracking records until a site is fully reclaimed.

<u>Finding 5.10.2.3.a</u>
The review team finds that DGO meets the criteria of this section of the guidelines.

<u>Finding 5.10.2.3.b</u>
The review team commends the DGO on the implementation of an electronic waste tracking system.

SECTION 6 | Abandoned Sites

6.2 - .3 Definition and Identification of Abandoned Sites
DGO defines an "orphaned well" as any well abandoned prior to July 1, 1950, or for which no records exist concerning its drilling, plugging or abandonment. Wells drilled and abandoned after July 1, 1950 without being properly plugged are considered to be “bond forfeiture wells”. All wells drilled after July 1, 1950 are bonded.

> The 2004 report found that DGO did not have a classification system in place that makes a distinction between orphaned wells that are plugged, wells that are converted to water wells or other uses, or those that are not plugged. The report recommended that DGO classify orphaned wells as plugged, not plugged, or converted to water wells or other uses. The DGO has implemented an inventory process to classify the orphaned wells as recommended. DGO does not have regulatory authority over wells that have been converted to water wells.

Finding 6.2 - .3
The review team finds that the DGO has an effective program for identifying orphaned well sites, and preventing new abandoned well sites in conformance with the criteria of these sections of the guidelines.

6.4 Funding for Abandoned Sites
Funding to plug improperly abandoned wells includes the operator’s bond and the Gas and Oil Plugging and Restoration Fund established under section 45.1-361.32 of the Virginia Gas and Oil Act of 1990. Money available from this fund is capped at $100,000. The Act authorizes the DGO to, “supplement bond proceeds for the full cost of plugging and restoration in the event of a blanket bond forfeiture.” The Director is also authorized to collect any debts including collection and legal fees, attributed to plugging from the operator of the well.

Orphaned well plugging is funded through a $50.00 fee on each permit application, and pursuant to § 45.1-361.40, “the Orphaned Well Fund shall consist of such moneys as are appropriated to it by the General Assembly.” The permit fee cannot be changed by regulation; legislation would be required to increase the fee.

Due to low permit volumes, accruing sufficient funds to plug orphaned wells can take considerable time. According to DGO, it required 15 years to accumulate enough money to plug eight orphan wells. DGO has identified 25 orphaned wells that have not been properly plugged. None of these wells have been identified as posing an imminent threat to public safety or the environment, and none of these wells are in the Tidewater region.

> The 2004 report recommended that the Commonwealth of Virginia evaluate mechanisms for providing DGO with additional resources necessary to accomplish its mission.

Finding 6.4
The review team finds that the DGO’s funding to plug orphaned wells is inadequate, and would require legislative action to correct.

Recommendation 6.4
The General Assembly should take action to raise the DGO’s orphan well permit fee, and allocate additional resources in order to plug the remaining orphaned wells in a more timely fashion before they become environmental hazards or become more difficult and expensive to plug. The DGO should also consider seeking additional funding through the federal Oil Pollution Act of 1990 to remediate any leaking oil wells should that event occur.

6.5 Criteria for Prioritizing Remediation
The DGO field staff inspect each abandoned site every 1-2 years to determine if the site constitutes a threat to public health, safety or the environment. The DGO inspection report documents any deficiencies and problem wells are prioritized for remediation. In addition, all known orphaned wells have been

photographed and evaluated on an informal orphan well inventory form. The DGO abandoned site inspections include specific criteria to evaluate site conditions, well conditions, soil and erosion, and site contamination. The DGO prioritizes orphaned well plugging on the threat the well poses to public safety, the well's location (proximity to structures or streams) and whether the well is leaking gas or fluids.

According to the 2004 report, DGO had planned to adopt a ranking system to prioritize orphan well plugging.

Finding 6.5
The review team finds that the DGO has a prioritized list of known orphaned wells that will be refined as additional wells are identified.

6.5.1 Goal for Remediation
The DGO has the following goals for remediation of abandoned sites: The primary goal is to plug any leaking well or a well that poses imminent danger to the public health or the environment. The secondary goal is to cost effectively continue plugging orphaned wells, beginning with wells located in watershed areas. The third goal is to prevent the future abandonment of inactive bonded wells.

Finding 6.5.1
The review team finds that the DGO plugs orphan wells and reclaims orphan well sites to the same standards as newly plugged wells and reclaimed well sites.

6.5.2 Liability for Remediation
The DGO requires operators to maintain a bond that can be accessed in the event that a well is improperly abandoned. In addition, DGO is authorized to collect any debts including collection and legal fees, attributed to plugging from the operator of the well. Orphan wells that have no known operator are the liability of the Commonwealth of Virginia.

Finding 6.5.2
With respect to plugging orphaned wells, the plugging/reclamation contractor is financially liable for the successful remediation of orphaned well sites. A performance bond is established as part of the procurement process. The contractor must hold a Class A license issued by the Commonwealth of Virginia.

6.6 Standards for Remediation
Orphaned well sites must be plugged and the land restored in the same manner as newly abandoned and restored sites. These requirements are specified in 4 VAC 25-150-435 and 4 VAC 25-150-260. During site restoration, consideration is given to landowner preferences for site grading seed mixtures.

Finding 6.6
The review team finds that the DGO meets the criteria of this section of the Guidelines.

Finding 6.6.3
Plugging and remediation records are kept in the DGO electronic file system and provided to the public upon request. The DGO is considering putting these records on the web.

6.7 Public Participation

The 2004 report recommended that the DGO consider publishing a report that lists abandoned sites and orphaned wells, and make this report available to the public. The DGO stated that they have published news releases about orphaned wells, as well as publishing information on their website. The DGO also stated they are working to increase the amount of information available on their website.

The DGO invites public participation in the regulatory development process that pertains to well plugging and site restoration. The DGO also welcomes information from the public on the location of potential abandoned well sites. Public notification is provided by the DGO via local newspapers when well plugging activities are scheduled to take place. Most abandoned wells are located on private property, and affected landowners are involved in the reclamation planning process.

Finding 6.7
The review team finds that the DGO meets the criteria of this section of the guidelines.

Recommendation 6.7
The review team recommends that DGO continue to increase the amount of information available on its public-facing website, including orphan well plugging records. DGO should also develop outreach to inform citizens of the ways they can help the DGO identify potential orphaned wells.

6.8 Avoid Future Abandoned Sites

During the 2004 review the DGO Director expressed concern that approximately 300 wells, which were bonded and had been inactive for two years or more, had the potential to become a liability to the Commonwealth. The team recommended that the DGO evaluate methods to prevent inactive wells that are under bond from becoming the plugging responsibility of the Commonwealth, and consider working with industry to develop criteria for temporary inactive status for those inactive wells with a bona fide future use. In response to this recommendation, the DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that requires operators to report the status of inactive wells. The regulation requires operators to justify a well's inactive status or plug the well.

Finding 6.8
The review team finds that the DGO has taken action to avoid problems with future abandoned sites, and is to be commended for taking effective action to address the recommendation from 2004.

SECTION 7 | Naturally Occurring Radioactive Materials

7.2 General

In the 2004 review the DGO stated that consideration of regional geology and available information had given the DGO no reason to expect that NORM was present at levels that would require regulatory action, and therefore the DGO had adopted no NORM regulations.

Finding 7.2
No official study or survey has been performed as recommended in the 2004 Stronger Review to verify whether NORM is present at levels requiring regulatory action within the active oil and gas areas of the state, or within the potential oil and gas area in the Tidewater region. The deficiency is attributable to a lack of funding to implement a preliminary investigation.

Recommendation 7.2.a
The Review Team recommends that the DGO verify that there is no need for an oil and gas NORM program. The DGO should collaborate with other State/Federal agencies and industry to develop an initial field monitoring data collection program and scientific study to facilitate the determination of need.

Recommendation 7.2.b
The Review Team recommends that the DGO verify the need for an oil and gas NORM program in the Tidewater Region by partnering with the DEQ to require a NORM investigation as a core element of the EIA study currently required by regulation.

Recommendation 7.2.c
The Review Team recommends that the DGO consider utilizing section 7 of the guidelines along with the State NORM program (if implemented) as the basis for developing the elements of an oil and gas NORM Program in the event preliminary investigations warrant future implementation.

SECTION 8 | Stormwater Management

8.1 General

The DGO tracks and analyzes incidents and trends, and considers this data in revisions to its stormwater program regulations. DGO has a benchmark for the number of off-site impacts, which relates directly to their most critical environmental issues – sediment, erosion, and produced fluids.

> The 2004 report found that the DGO had a system of performance measures in place that included input and output analysis and evaluation of off-site impacts. The report recommended that the DGO consider using additional environmental indicators as a basis for performance measurement. The DGO has developed an MOU with the DEQ to monitor volatile organic compounds (VOC).

Finding 8.1
The review team finds that DGO meets the criteria of this section of the guidelines.

8.2 - .3 Regulatory Elements and Criteria
DGO's stormwater management program requires operators to develop a plan to protect against erosion and minimize the environmental impacts caused by stormwater. The regulation contains provisions on vegetation clearing and brush management, time periods when disturbed areas must be temporarily and permanently stabilized, sediment basin requirements, cut and fill slope management, stormwater conveyances, road construction standards, public road protections, and reclamation standards.

Areas downstream from permitted sites must be protected from sediment disposition, erosion and damage due to increases in volume, velocity and peak flow rates of stormwater runoff. Stormwater runoff that has been contaminated must be managed in accordance with a plan approved by the Director.

The Director has the authority to waive or modify any of the stormwater management and erosion and sediment control requirements if they are deemed inappropriate or too restrictive for site conditions. Operators must make a written request, demonstrate the need for the variance, and describes the alternate measures or practices to be used to be granted a variance.

The erosion, sediment control, and stormwater management practices employed by DGO are the same as those employed by the Virginia DEQ in its regulation of other construction activities. DGO conducts cross training with DEQ on these management practices. Well development activities in the Tidewater area would require more stringent erosion, sediment control and stormwater management practices.

Finding 8.2 - .3
The review team finds that the DGO's stormwater management program meets the criteria of this section of the guidelines.

SECTION 9 | Hydraulic Fracturing

9.2 General
The Virginia regulations have established requirements for well casing and cementing including a water protection string cemented to surface. Proposed regulations require a cement bond log on the water protection string. A background groundwater survey is required to characterize pre-drilling groundwater quality. Permits are evaluated to a radius of 1500' where the depth of the hydraulic fracturing must be either 500' below the lowest surface point or 500' below the lowest groundwater identified within the 1500' radius. Oil and gas activity in the Tidewater area is also subject to significantly more stringent requirements. Casing must be set and pressure grouted from the surface to a point at least 2500 feet below the surface or an additional 300 feet below any groundwater identified. An EIA of the area delineating the groundwater characteristics is also required.

Finding 9.2
The review team finds that the DGO adequately evaluates the potential risks associated with hydraulic fracturing, taking into account varying reservoir characteristics as well as regional variations.

9.2.1 Standards
The DGO's regulations require that all well casings have a working pressure of a minimum of 110% of the maximum anticipated pressures. The DGO identifies potential conduits for fluid migration during the permitting process. The operator is required to immediately notify the DGO and address any unanticipated operational or mechanical change that could cause an imminent environmental problem, a danger to the public, or present any safety issues to the workers. Dikes, pits and tanks are operated and maintained in accordance with operational requirements. Contingency plans and spill risk management are addressed in operators' Spill Prevention, Control and Countermeasure plan. Any other spills would be covered in the proposed Virginia regulations under the Emergency Response Plan. Hydraulic fracturing waste is contained in onsite pits and is considered and disposed of as pit fluid. Fluids taken to an approved injection well for disposal are tracked and reported in the DGO electronic information system. Complaints related to hydraulic fracturing are handled the same as other types of complaints. The DGO has the authority to inspect and conduct necessary investigations at gas and oil facilities involved in the complaint. Complaints can be received by phone, mail, e-mail, or through the DMME website. The DGO's policy is to make an initial response with the complainant within 24 hours and follow-up within 5 days. Proposed regulations require post-drilling sampling to identify any groundwater degradation due to well drilling and completion activities.

Finding 9.2.1.a
The review team commends the DGO for reconsidering pre/post baseline groundwater monitoring protocols and expanding the radius of testing requirements currently pending as part of regulation update process.

Recommendation 9.2.1.a-1
The review team recommends that DGO adopt the proposed rules requiring baseline groundwater monitoring.

Recommendation 9.2.1.a-2
The review teams recommends that the DGO consider clarifying the extent to which offsetting active and abandoned wells are considered during the evaluation process to mitigate potential risk of communication during hydraulic fracturing.

Finding 9.2.1.b
The review team finds that the DGO has a procedure by which it determines surface casing setting depths to ensure protection of fresh groundwater.

Finding 9.2.1.c
The DGO's program has enhanced casing and cementing standards to address issues related to hydraulic fracturing.

Recommendation 9.2.1.c
The review team recommends that the DGO consider clarifying its requirements for operators to monitor for operational and mechanical changes, including annular pressures, during hydraulic fracturing in accordance with this section of the guidelines.

9.2.2 Reporting
Operators are required to notify the DGO and the DEQ electronically through the DGO electronic filing system prior to and after completion of hydraulic fracturing operations. Volumes, proppants used, pressures, and zones fractured are recorded on the completion report and available to the public. The proposed regulations require the operator to submit the chemicals utilized in the fracturing process with mandatory participation in FracFocus and a State based database.

The DGO has proposed regulations that will require public disclosure of information on type and volume of base fluid and additives, chemical constituents, and actual or maximum concentration of each constituent used in fracturing fluids by mandatory participation in FracFocus and a State based database. The regulations have a mechanism to allow for confidentiality. The proposed regulations require the operator to provide and maintain the Chemical Abstracts Service (CAS) number. Any chemical component classified as a trade secret can only be released in the event of an emergency.

Finding 9.2.2
The review team finds that current DGO regulations meet part of the criteria of section 9.2.2 of the guidelines, while proposed regulations will meet the guidelines criteria in their entirety.

Recommendation 9.2.2.a
The review team recommends that DGO adopt the proposed regulations for public disclosure.

Recommendation 9.2.2.b
The review team recommends that the DGO continue to develop its website to enhance transparency of public disclosure.

Recommendation 9.2.2.c
The review team recommends the DGO examine the Pennsylvania program reporting requirements related to confidential trade secrets.

9.2.3 Staffing and Training
DGO stated that staffing levels are adequate to respond and investigate complaints and incidents related to hydraulic fracturing at current oil and gas activity levels. The DGO has two open inspector positions that could be filled if funding becomes available.

Finding 9.2.3
The review team commends DGO on its efforts to maintain appropriate technical knowledge related to developing hydraulic fracturing technology.

Recommendation 9.2.3
The review team recommends that DGO fill its open inspector positions, and ensure that staff continues to receive adequate training to stay current with new and developing hydraulic fracturing technology.

9.2.4 Public Information
Finding 9.2.4
The DGO disseminates educational information concerning hydraulic fracturing and other issues through career fairs, energy seminars, tours, brochures and public meetings. Educational information on hydraulic fracturing is available on the DMME website.

Recommendation 9.2.4
The review team recommends that the DGO continue to develop and disseminate educational information regarding well construction and hydraulic fracturing related to potential development in the Tidewater region.

9.3 Water and Waste Management

Current gas and oil operations require relatively little water for hydraulic fracturing in Virginia (generally less than 100,000 gallons). The availability of water has not been an issue in Virginia. Water use reporting is regulated by the DEQ if withdrawals from surface or groundwater sources exceed an average of 10,000 gallons per day during any single month per 9VAC25-200. Hydraulic fracturing waste is handled as pit fluid and a proper disposal plan is required in order to obtain a well permit. Operators are required to track fluids to an off-site disposal well. Tracking information is submitted to DGO utilizing the electronic permitting system.

Finding 9.3.a

DGO does not currently encourage the use of alternative water sources.

Recommendation 9.3.a

The review team recommends that the DGO develop guidelines that encourage the use of alternative water sources, including recycled water, acid mine drainage and treated wastewater in the hydraulic fracturing process.

Finding 9.3.b

The State program has no requirements for reporting the treatment methods utilized in the management of hydraulic fracturing fluids/wastes.

Recommendation 9.3.b

The review team recommends that the DGO develop requirements for reporting the treatment methods utilized in the management of hydraulic fracturing fluids/wastes.

SECTION 10 | Air Quality

10.1 Background
Due to the recent drop in oil and natural gas prices, DMME staff report that oil and gas activity in Virginia is largely stable, with exploration and production activity largely confined to the southwest region. The DMME is currently processing about 300 permits annually, as compared to roughly 1500 annually two to three years ago. Wells in this region are predominantly coalbed methane, and "dry" gas in composition. There have been about 100 new wells drilled since September 2015; all of these wells have emissions leak detection requirements. DEQ staff stated that these new wells are in compliance or very close to it, in terms of leak detection.

According to DEQ staff, Virginia has one nonattainment area, the Northern Virginia Ozone Nonattainment Area, and a State Implementation Plan, originally submitted by the DEQ to USEPA in 1972, for that area. The DEQ is not aware of any oil and gas sites within that nonattainment area.

The DEQ stated that the primary source of oil and gas-related emissions in the southwest region are compressors, with 443 active centralized compressors and another 27 wellhead and idle compressors. Most of these are associated with gathering systems, rather than transmission pipelines.

10.2 Administrative
The DEQ, through the Air Division, is responsible for implementing the federal Clean Air Act and the Air Pollution Control Law of Virginia (and regulations thereunder) in the Commonwealth of Virginia. The Air Division, broken into two sections – permitting and compliance - includes the Central Office, six regional offices and the Air Monitoring office. To this end, powers and duties of the DEQ are set forth in laws including the following:

- Clean Air Act (42 U.S.C.A. §§ 7401—7642) (CAA)
- Air Pollution Control Law of Virginia (Code of Virginia § 10.1 Chapter 13)
- Virginia Administrative Code, Title 9, Agency 5 (9VAC5)

The Air Pollution Control Law of Virginia authorizes the Air Pollution Control Board to adopt rules and promulgate regulations for the prevention, control, reduction and abatement of air pollution. Sections 1307 and 1308 of the APCL specifically grant the Board its powers for oversight and ability to develop regulations to meet state obligations under federal law. In accordance with Subsection A of Section 1308, the board shall provide a description of provisions of any proposed regulation which are more restrictive than applicable federal requirements, together with the reason why the more restrictive provisions are needed.

The DEQ is empowered to implement the provisions of the federal Clean Air Act in the Commonwealth of Virginia. To this end, DEQ is authorized to accept delegation of federal programs including New Source Performance Standards (NSPS) and the National Emission Standards for Hazardous Air Pollutants (NESHAP).

<u>Finding 10.2</u>
The review team finds the DEQ meets the administrative criteria of this section of the guidelines.

10.2.1 Scope of Authority
The DEQ is empowered to accept delegation of federal air quality programs specific to oil and gas. Virginia accepted delegation for conventional oil and gas sites on July 1, 2014. The DEQ has a mechanism for promulgating regulations stricter than Federal CAA standards, in accordance with Section 1308 of the APCL. The DEQ's statutes and implementing regulations adequately and clearly define necessary terminology, as outlined in the following regulations:

- The Federal Clean Air Act, (42 U.S.C.A. §§ 7401—7642) and regulations adopted under the CAA;
- Virginia Air Pollution Control Act (APCL) and regulations adopted under the APCL. Code of Virginia § 10.1 – 1300, 9VAC5-10-20 and 9VAC5-80.

The DEQ has the authority to consider cost effectiveness in setting air emission standards when appropriate, as well as to exempt facilities or sources based on criteria such as de minimis emissions or by type of source or facility, pursuant to 9VAC5-80-720. The DEQ requires new sources to control emissions to the maximum extent, consistent with Best Available Control Technology (BACT). The DEQ has mechanisms for coordination among stakeholders under the Virginia Administrative Process Act. The Air Pollution Control Board has authority to receive monies and collect fees, including permit application, maintenance and emissions fees.

Finding 10.2.1a
The review team finds that the DEQ's scope of authority meets the criteria of this section of the guidelines.

Finding 10.2.1b
The DEQ has accepted delegation for NSPS Subpart OOOO. Although the DEQ has not yet accepted delegation from USEPA for the recently finalized (June 2016) NSPS Subpart OOOOa, the DEQ's Southwest Regional Office has conducted training sessions specific to the oil and gas sector that explains the requirements of Subpart OOOOa. The review team commends the DEQ for conducting this training in advance of requesting delegation of NSPS Subpart OOOOa.

Recommendation 10.2.1.b
The review team recommends that the DEQ request delegation of NSPS Subpart OOOOa.

10.2.2 Jurisdiction and Cooperation Between Agencies
The DEQ has six air compliance staff in the southwest region – including three full-time inspectors, and one dedicated report reviewer. Their work includes not only the oil and gas industry, but all permitted and registered sources in southwest Virginia. Currently, DEQ staff use USEPA's Nonpoint Oil & Gas Emission Estimation Tool to calculate emissions inventories, in combination with review of DMME's records of permitted oil and gas facilities.

The DEQ and the DMME signed a MOU in 2014 regarding the coordinated review of the environmental impact assessments and potential effects of proposed oil or gas drilling activities in the coastal plan of Tidewater Virginia. The agreement provides, among other things, that DMME would not issue a permit authorizing oil or gas drilling activities in Tidewater Virginia until DEQ has completed a coordinated review of environmental impact assessment of such activities and provided DMME with the findings and recommendations resulting from that review. A Memorandum of Agreement (MOA) between DEQ and DMME also signed in 2014 addresses the facilitation of efficient and effective administration of applicable state and federal environmental laws, regulations, and policies for oil and natural gas production, transmission and distribution facilities, along with a mechanism for coordination between the agencies.

DMME and DEQ coordinate in the southwest region on database management, and DEQ staff may coordinate some subpart OOOO inspections in the southwest region with DMME staff. The DEQ receives email notifications from the DMME regarding gas well notifications. The DEQ would consider developing similar coordination with other DMME regional offices if wells were to be drilled in another region of the state.

Finding 10.2.2.a
The DMME and the DEQ coordinate in the southwest region on both database management and inspections. The review team commends the agencies for this close coordination.

Finding 10.2.2.b
The review team finds that the DMME and the DEQ have a mechanism in place for coordinated review of impacts and potential effects of any future oil and gas development in the Tidewater region.

Recommendation 10.2.2.b
The review team recommends that DMME and the DEQ consider, if oil and gas development is proposed in the Tidewater region, modifying the MOA with specific reference to addressing any emissions issues as part of their interagency collaboration, including health-related issues.

10.2.3 Permits, Authorizations, and Exemptions
Virginia has adopted a minor stationary source pre-construction permit rule - 9VAC5-80 Article 6 – which requires permits for new sources and projects at sources after 1) comparing the emission units size or rating to categorical exemption thresholds, and/or 2) comparing the source or project's uncontrolled emission rates to exemption thresholds in the regulation. Most of the DEQ's work on emissions is in this minor source permitting, with roughly 75% of work being for statewide permits.

Of the Article 6 exemptions, the only one categorically relevant to the oil and gas sector is flaring. DEQ staff has found that the current well site operations for sites that have been evaluated fall below the exemption threshold. If an oil and gas facility were to exceed the threshold, the DEQ would permit the facility like a synthetic minor source, with similar emission level limits.

Virginia has also adopted a major stationary source pre-construction permit rule - 9VAC5-80 Article 8 – under which applicability is determined for new sources and modifications by comparing potential or projected future actual emissions to significant emission increase thresholds in the rule.

The DEQ stated that there only a couple of major source pipeline compressor stations anywhere in the state that are subject to Title V; additionally, there are a couple of other compressors that are synthetic minor sources.

In addition to the regulatory citation for registered/permitted sources, oil and gas facilities in Virginia submit annual reports in accordance with subpart OOOO and other applicable regulations. Virginia requires any stationary source to notify the DEQ if there unplanned emissions from oil and gas operations. For permitted sources, the operator notifies the agency based upon the requirements in the permit. If the source is an unpermitted source, the operator is required to report in compliance with general standards based upon the size of the source.

Finding 10.2.3
The review team finds that the DEQ's current air quality permitting program for emission sources in the oil and gas industry generally meets the criteria of this section of the guidelines.

10.2.4 - .5 Compliance Monitoring, Demonstration and Assurance; Enforcement
Virginia's emissions permitting and environmental data system is comprehensive. All well notifications are housed in the DMME database with information accessible through their website. The DEQ is provided with immediate electronic notification of such notices and reports. Other oil and gas sources of compressors, glycol dehydrators, etc. may be permitted or registered based on potential emission estimates.

The DEQ has the basic enforcement tools in place. The agency considers the operator's compliance history if an enforcement action is necessary. A notice of violation would typically be followed by a consent order and a civil penalty. The DEQ uses a matrix to determine any penalties, and this is consistently applied. The DEQ staff stated that they typically are able to handle compliance issues in-house, and do not have to rely on the Attorney General's office.

Finding 10.2.4 - .5
The review team finds that the DEQ's compliance monitoring and enforcement program elements meet the criteria of these sections of the guidelines.

10.2.6 Staffing
The DEQ stated that its current level of staffing and funding is adequate to meet the current level of oil and gas activity in Virginia. If that activity level were to increase, or new regions of the state were to experience oil and gas exploration and production activity, the agency would not have sufficient staffing or resources to receive, record and respond to complaints of human health impacts and environmental damage resulting from air emissions.

10.2.7 Data Management
The DEQ maintains an enterprise database system known as the Comprehensive Environmental Data System (CEDS). CEDS is a multimedia internal tracking system used by the agency to record and monitor minimum data requirements to meet the needs of federal and state reporting obligations, emissions

inventory tracking and planning, financial billing, and overall status of facilities around the Commonwealth. CEDS has undergone an update to allow the DEQ to facilitate the data tracking needs of agency staff to meet these requirements in a more efficient and standardized way across all media programs. This update will ensure that necessary geographic information about stationary sources with contacts for the responsible party, emission rates, etc. is accessible, so that the DEQ will be able to determine almost instantly if an affected stationary source is in compliance.

The data available in CEDS is available upon request via specific queries from local, state, and federal entities, the public, and the regulated community, and is also made public through federal EPA data systems including their Emissions Inventory System (EIS), Integrated Compliance Information System (ICIS), and Enforcement and Compliance History Online (ECHO). As resources allow, the DEQ has plans to continue modernizing CEDS, by incorporating additional programs into the database, and integrating CEDS data with the Virginia Environmental Geographic Information Systems (VEGIS)[1] to make additional information available to the public online.

Finding 10.2.7
The DEQ is modernizing its data management system. CEDS data is available by request, and online via a variety of federal data management applications. The DEQ does not utilize an electronic reporting system.

Recommendation 10.2.7
The review team recommends that the DEQ continue its efforts to upgrade the CEDS system, increase the amount of data available to the public online via the VEGIS website, and develop an electronic reporting system.

10.2.8 - .9 PUBLIC INVOLVEMENT AND OUTREACH
Virginia's emissions permitting and environmental data system is not available to the public. The DEQ maintains a separate Enterprise Content Management records system (ECM) that is available to the public on paper or by electronic data transfer. If the public can bring DEQ a facility identifier – site #, operator name or address, for example – the DEQ can access the documents, notices and reports for that site. Additionally, the public can submit open records requests for all records that are not confidential. The DEQ has a public outreach program that can address program specific needs on an ad hoc basis[2].

10.3 AIR QUALITY MONITORING AND INVENTORIES

Finding 10.3
DEQ currently has a minimal number of ozone and 10-micrometer particulate matter (PM10) monitors in place. The DEQ has not looked specifically at emissions during oil and gas drilling and completion operations – in part, due to the location and level of current oil and gas development in Virginia, but also because the staff believes that the overall trend on emissions is downward. In the absence of emissions data, Virginia utilizes the oil and gas emission estimates calculated with the USEPA's "Nonpoint Oil & Gas Emission Estimation Tool" for emission inventory and air quality planning purposes.

Recommendation 10.3
The review team recommends that the DEQ consider establishing baseline data for ambient air quality for the southwestern region of Virginia and developing its own emission estimates for emission inventory and air quality planning purposes.

[1] http://www.deq.virginia.gov/ConnectWithDEQ/VEGIS.aspx
[2] http://www.deq.virginia.gov/connectwithdeq/environmentalinformation.aspx

SECTION 11 | Reused and Recycled Fluids

The 2015 Edition STRONGER Guidelines identify a need for state oil and gas environmental regulatory programs to define fluids that may be reused and recycled, and encourage operators to develop water management plans that consider reuse and recycling options.

The purpose of this section of the guidelines is to promote the use of fresh water alternatives for the drilling and hydraulic fracturing of wells where available sources are feasible, and where environmental risks can be adequately identified and controlled.

DGO stated that hydraulic fracturing operations in the Commonwealth typically use between 100,000 and 300,000 gallons of water, and that shortages of source water have not been an issue in the state. However, DGO acknowledged that water is a precious resource, and that it will consider the development of a program that addresses fluid reuse and recycling.

Finding 11
The DGO does not currently encourage the development of water management plans that consider reuse and recycling options.

Recommendation 11
The review team recommends that the DGO should, in conjunction with relevant stakeholders, develop a water management program that encourages source water reduction and promotes reuse and recycling of fluids.

Appendix A – Acronyms

Term	Acronym
Air Pollution Control Law	APCL
Best Available Control Technology	BACT
Chemical Abstracts Service	CAS
Clean Air Act	CAA
Coalbed Methane	CBM
Comprehensive Environmental Data System	CEDS
Emissions Inventory System	EIS
Enforcement and Compliance History Online	ECHO
Enterprise Content Management	ECM
Integrated Compliance Information System	ICIS
Interstate Oil and Gas Compact Commission	IOGCC
Interstate Oil Compact Commission	IOCC
Memorandum of Agreement	MOA
Memorandum of Understanding	MOU
National Emission Standards for Hazardous Air Pollutants	NESHAP
Naturally Occurring Radioactive Material	NORM
New Source Performance Standards	NSPS
Pennsylvania Department of Environmental Protection	PADEP
State Review of Oil and Natural Gas Environmental Regulations	STRONGER
U.S. Environmental Protection Agency	USEPA
Virginia Department of Emergency Management	VDEM
Virginia Department of Transportation	VDOT
Virginia Environmental Geographic Information Systems	VEGIS
Volatile Organic Compounds	VOC

Appendix B – Questionnaire Responses

DMME Follow-Up Review Questionnaire

State: Virginia **Initial Review:** 2004

Initial Review Topics: 2000 Edition Guidelines – General Criteria, Administrative Criteria, Technical Criteria, Abandoned Sites, Naturally Occurring Radioactive Material (NORM), Performance Measures

Current Review Topics: 2015 Edition Guidelines – General Criteria, Administrative Criteria, Technical Criteria, Abandoned Sites, Naturally Occurring Radioactive Material (NORM), Stormwater Management, Hydraulic Fracturing, Reused and Recycled Fluids

Questionnaire Coordinator/State Contact: Butch Lambert, Deputy Director, Virginia DMME

Telephone: 276-523-8145 **Email:** Butch.Lambert@dmme.virginia.gov

Completed By:

INSTRUCTIONS: The primary basis for this follow-up review is the document, Guidelines for State Review of Oil and Natural Gas Environmental Regulatory Programs, 2015 Edition. The purpose of this questionnaire is to obtain information that will provide a fair and balanced characterization of the state's regulatory program. Terms used in this questionnaire have meanings consistent with those contained in the Guidelines. Citations which appear in brackets (e.g., [5.3]) following each question refer to the applicable section(s) of the Guidelines.

The focus of this review is to identify changes that have taken place since the Initial Review. On questions for which the answer has changed since the 2004 Review, please provide context for the change(s). If the answer to a question is unchanged from the 2004 Review, it is not necessary to answer that question. Indicate that the information requested is unchanged from the 2004 Review.

Please provide the requested information in a brief manner that describes the program in sufficient terms for the review team to understand, but does not go into excessive detail. During the interview the review team will ask for additional detail or clarification on points which they feel merit further discussion. To the extent possible, provide hyperlinks to state web pages where the review team can access statutes, rules, policies, guidance, reports and other related information used to support your responses.

RECOMMENDATIONS FROM INITIAL REVIEW

Please briefly explain actions taken as a result of the following recommendations from the 2004 Initial Review:

RECOMMENDATION 3.1: *The Review Team recommends that the Commonwealth of Virginia evaluate mechanisms for providing the DGO with the additional resources that will be necessary in the near future.*

The DGO has three open positions. The DGO requests the positions as necessary. The DGO is in the process of filling one of the three positions.

RECOMMENDATION 4.1.1: *The Review Team recommends that* the *DGO obtain the statutory or regulatory authority to refuse to issue or reissue permits or authorizations if the applicant has outstanding, finally determined violations or unpaid penalties, or if a history of past violations demonstrates the applicant's unwillingness or inability to comply with permit requirements.*

This has not been an issue in Virginia. The DGO does have the authority to withhold permits until deficiencies are corrected. Also, administrative deficiencies can be addressed to the Virginia Gas and Oil Board for Civil penalties.

RECOMMENDATION 4.1.3.1: *The Review Team recommends that the DGO evaluate the need for statutory or regulatory authority to assess administrative penalties.*

The DGO can implement penalties through the Virginia Gas and Oil Board.

RECOMMENDATION 4.2.1.2: *The Review Team recommends that the DGO pursue regulatory changes that contain criteria for the size or amount of a spill requiring reporting, so that the regulations are meaningful and not overly burdensome.*

The DGO will recommend changes to address this issue during the next regulatory review.

RECOMMENDATION 4.2.2.2: *The Review Team recommends the DGO consider developing a simple, basic brochure – a sort of citizens' guide to the Virginia gas and oil industry and the Virginia gas and oil regulatory program – for use in public education and outreach.*

The DGO has utilized the website and social media to publish gas and oil information pertinent to the public as well as the industry. DGO in cooperation with the office of public relations developed brochures as well as PowerPoint programs describing and illustrating different issues and activities in the gas and oil industry.

RECOMMENDATION 4.2.4: *The Review Team recommends that the DGO continue to assess the adequacy of its bonding program and make changes as necessary.*

No changes have been implemented regarding bonding.

RECOMMENDATION 4.2.6.b: *The Review Team recommends that the DGO amend its rules to establish a record retention period for waste tracking records, with a provision that the record retention period be automatically extended for any person who is the subject of an unresolved enforcement action regarding the regulated activity from the date such person receives notice of the enforcement action until it is resolved. A three-year record retention program is recommended by the Guidelines.*

The DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that tracking records be submitted to the DGO on an annual basis. The DGO maintains these records in their E-form system.

RECOMMENDATION 4.2.8.2: *The Review Team recommends that the Commonwealth of Virginia provide the DGO with additional funding for updating the DGO's electronic data management system.*

The DGO has fully implemented electronic management systems. All permits, modifications, transfer, etc. are handled electronically.

RECOMMENDATION 4.3.2: *The review team recommends that the DGO continue to seek the additional funding necessary to provide all the essential elements of an effective E&P waste regulatory program. The DMME, the Secretary of Commerce, and the state legislature should take a hard look at the impacts that inadequate funding of state regulatory programs can have on human health and the environment, as well as a prosperous industry.*

The DGO has not addressed this issue through regulations but the industry has taken steps to contain E&P waste.

RECOMMENDATION 5.2.3: *The Review Team recommends that the DGO consider whether or not its program would benefit by requiring the use of certified laboratories for analysis.*

The DGO now requires each laboratory analysis to be certified through the Virginia Environmental Laboratory Accreditation Program (VLAP).

RECOMMENDATION 5.5.5.b: *The Review Team recommends that the DGO consider establishing a specific time limit for pit closure in its rules or in permits.*

The DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that requires the pits to be reclaimed within 180 days.

RECOMMENDATION 5.8*: The Review Team recommends that the DGO evaluate the feasibility of developing standards for roadspreading of produced fluids for beneficial uses such as dust suppression and de-icing in a manner that would still protective of human health and the environment.*

The DGO has implemented and approved this process under specified conditions.

RECOMMENDATION 5.10*: The Review Team recommends that the Commonwealth and the DGO evaluate the effect of the lack of commercial disposal facilities for brine and determine whether DGO regulations and/or state law should be amended to facilitate future commercial disposal capacity.*

The DGO has had no requests for commercial disposal facilities.

RECOMMENDATION 6.2.b: *The Review Team recommends that the DGO classify orphaned wells as plugged, converted, or unplugged.*

The DGO is continuously evaluating the orphan well program. The orphan wells are classified as plugged or unplugged. DGO has implemented an inventory process to classify the orphaned wells as recommended. Once a well is converted to a water well the DGO no longer has regulatory authority.

RECOMMENDATION 6.3: *The Review Team recommends that DGO consider developing and implementing definitions and criteria for the temporary inactive status of wells.*

The DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that requires the operator to report the status of inactive wells. The regulation requires the operator to justify the inactive status or plug the well.

RECOMMENDATION 6.7: *The Review Team recommends that the DGO consider publishing a report that lists abandoned sites and orphaned wells and make this report available to the public.*

The DGO has utilized a new release and the DGO website to publish orphan well information.

RECOMMENDATION 6.8: *The Review Team recommends that the DGO evaluate methods to prevent inactive wells that are under bond from becoming the plugging responsibility of the Commonwealth, and consider working with industry to develop criteria for temporary inactive status for those inactive wells with a "bona fide future use."*

The DGO revised the Virginia Gas and Oil Regulations in October 2013 to include a provision that requires the operator to report the status of inactive wells. The regulation requires the operator to justify the inactive status or plug the well.

RECOMMENDATION 7.2: *The Review Team recommends that the DGO verify that there is no need for a NORM program.*

The DGO agrees with the review team but has taken no action to date to verify no need for a NORM program.

RECOMMENDATION 8.1: *The Review Team recommends that the DGO consider using additional environmental indicators as a basis for performance measurement. Examples might include the Clean Water Act 305b list of impaired streams, reporting data required under the UIC program for protection of groundwater, confirmed water supply contamination incident trends, and formal tracking and graphic representation of performance data/measures to support trend line analysis.*

The DGO has a memo of understanding with the Department of Environmental Quality to monitor Volatile Organic Compounds. The proposed regulations require base line ground water monitoring before and after drilling.

BACKGROUND INFORMATION

I. Please provide a brief history or description of the oil and natural gas industry in your state, its regulation by state agencies, and recent industry trends.

In 1898 the first well was drilled in Virginia. The first commercially drilled well began producing in Washington County in 1931.

II. Please include the following documents[3]:

A. Organization chart(s) showing the structure of all agencies responsible for the management and disposal of exploration and production (E&P) wastes, abandoned oil and gas sites, oil-field NORM (naturally occurring radioactive materials), storm water management and hydraulic fracturing.

DGO org chart 04-25-16.pdf

B. All statutes, rules, regulations and orders applicable to the management and disposal of oil and gas E&P waste, abandoned oil and gas sites, NORM from oil and gas production), storm water management and hydraulic fracturing.

4VAC25-150-80. Application for a Permit.

[3] These documents may be included as appendices at the end of this questionnaire. If included as such, please indicate a reference on this page. For example, "Organizational chart – see appendix A, Rules and Regulations – see table in Appendix B."

Article 2. Permitting

9. The location where the Spill Prevention Control and Countermeasure (SPCC) plan is available, if one is required

4VAC25-150-300. Pits.

A. General requirements.

4. Pits shall be constructed of sufficient size and shape to contain all fluids and maintain a two-foot freeboard.

4VAC25-150-310. Tanks.

4VAC25-150-330. Swabbing, Perforating and Wireline Operations.

A. All wells and coreholes shall be cleaned into properly constructed pits or containers at a safe distance from the rig floor and from any potential fire hazard.

4VAC25-150-340. Drilling Fluids

B. Drilling muds. No permittee may use an oil-based drilling fluid or other fluid which has the potential to cause acute or chronic adverse health effects on living organisms unless a variance has been approved by the director. Permittees must explain the need to use such materials and provide the material data safety sheets. In reviewing the request for the variance, the director shall consider the concentration of the material, the measures to be taken to control the risks, and the need to use the material. Permittees shall also identify what actions will be taken to ensure use of the additives will not cause a lessening of groundwater quality.

4VAC25-150-350. Gas, Oil or Geophysical Operations in Hydrogen Sulfide Areas

4VAC25-150-380. Incidents, Spills and Unpermitted Discharges

A. Incidents. A permittee shall, by the quickest available means, notify the division in the event of any unplanned off-site disturbance, fire, blowout, pit failure, hydrogen sulfide release, unanticipated loss of drilling fluids, or other incident resulting in serious personal injury or an actual or potential imminent danger to a worker, the environment, or public safety. The permittee shall take immediate action to abate the actual or potential danger. The permittee shall submit a written or electronic report within seven days of the incident containing:

4VAC25-150-410. Venting and Flaring of Gas; Escape of Oil

4VAC25-150-420. Disposal of Pit and Produced Fluids

A. Applicability. All fluids from a well, pipeline or corehole shall be handled in a properly constructed pit, tank or other type of container approved by the director.

A permittee shall not dispose of fluids from a well, pipeline or corehole until the

director has approved the permittee's plan for permanent disposal of the fluids. Temporary storage of pit or produced fluids is allowed with the approval of the director. Other fluids shall be disposed of in accordance with the operations plan approved by the director.

4VAC25-150-430. Disposal of Solids

4VAC25-150-500. Application for a Permit, Conventional Well or Class II Injection Well

4. If the proposed work is for a Class II injection well, a copy of either the permit issued by, or the permit application filed with the Environmental Protection Agency under the Underground Injection Control Program.

C. Any memoranda of understanding or similar agreements between state agencies or between the state and any other governmental entities (BLM, EPA, Indian Tribes, local jurisdictions) pertaining to the management and disposal of E&P wastes, abandoned sites, NORM from oil and gas production), storm water management and hydraulic fracturing.

None

D. Any written mission statement(s), goals, objectives and policies applicable to oil and gas E&P waste management and disposal activities, abandoned sites, NORM from oil and gas production), storm water management and hydraulic fracturing.

None

III. Please also include on a separate page any other relevant practices, program measures, guidelines or controls applicable to your state.

IV. The next pages contain a matrix that should be used to summarize E&P waste management practices. It is recognized that further explanation will likely be necessary. Don't try to capture everything - give only the big picture in the matrix. Please provide explanation, as appropriate, when answering questions I.5 and I.6.

E&P Waste Management Matrix

Waste Management Practices	Number of Facilities	Volume Managed Annually	Basis for Volume Determination
Pits:			
Drilling		920,964 BBLS (peak 2008) 396,467 BBLS (avg since 2006)	Volume from pit disposal notifications
Production	0	0	Although it is allowed, pits are typically are not utilized for produced fluids in VA
Special Use	n/a	n/a	Not tracked separately
Landspreading	618 (peak 2008) 212 (avg since 2006)	788,000 BBLS (peak 2008) 301,210 BBLS (avg since 2006)	Volume from pit disposal notifications
Roadspreading	n/a	n/a	Considered same as landspreading
Tanks	n/a	n/a	Tanks included as part of well or facility permit. System does not distinguish permits with tanks.
Commercial Facilities:	0	0	No operators in VA utilize in-state commercial disposal at this time.
Multipractice	n/a	n/a	n/a
Landfarms	n/a	n/a	n/a
Tank Bottom	n/a	n/a	n/a
Reclaimers	n/a	n/a	n/a
UIC Surface Facilities	12	n/a	n/a
Oil-Field NORM	n/a	n/a	n/a
Centralized Facilities (non-NORM)	n/a	n/a	n/a
Oil-Field NORM	n/a	n/a	n/a
Municipal Landfills	n/a	n/a	n/a
Accepting E&P Waste	n/a	n/a	n/a
Underground Injection	12	Regulated by EPA	Regulated by EPA
Surface Facilities	12	n/a	n/a
Abandoned Sites	1	n/a	n/a
Other	n/a	n/a	n/a

E&P Waste Management Matrix (cont.)

Waste Management Practice	Principal Agency	Primary Statute	Primary Rules, Regulations, or	Applicable Guidelines
Pits:	DGO	§ 45.1-361.27	4 VAC 25-150-300	n/a
Drilling	DGO	Same	4 VAC 25-150-420 4 VAC 25-150-430	n/a
Production	DGO	Same	Same	n/a
Special Use	DGO	Same	Same	n/a
Landspreading	DGO	Same	4 VAC 25-150-420	n/a
Roadspreading	DGO	Same	Same	n/a
Tanks	DGO	Same	4 VAC 25-150-310	n/a
Commercial Facilities:	DEQ		9VAC20-81	
Multipractice	Same		Same	
Landfarms	Same		Same	
Tank Bottom	Same		Same	
Reclaimers	DGO/ EPA	§ 45.1-361.27	4 VAC 25-150-260 D	n/a
UIC Surface Facilities				
Oil-Field NORM	n/a	n/a	n/a	n/a
Centralized Facilities (non-NORM)	n/a	n/a	n/a	n/a
Municipal Landfills Accepting E&P Waste	DEQ		9VAC20-81	
Underground Injection Surface Facilities	EPA			
Abandoned Sites	DGO/EPA	§ 45.1-361.40	9VAC20-81	n/a
Other				

I. GENERAL CRITERIA (Guidelines Section 3)

1. What is the **statutory authority** upon which your E&P environmental regulatory program is based? What powers and duties are provided in the statute(s)? [3.1.a]

   Statutory authority given in Chapter 22 45.1-361

   § 45.1-361.27. Duties, responsibilities and authority of the Director.

   A. The Director shall promulgate and enforce rules, regulations and orders necessary to ensure the safe and efficient development and production of gas and oil resources located in the Commonwealth. Such rules, regulations and orders shall be designed to:

   1. Prevent pollution of state waters and require compliance with the Water Quality Standards adopted by the State Water Control Board;

   2. Protect against off-site disturbances from gas, oil, or geophysical operations;

   3. Ensure the restoration of all sites disturbed by gas, oil, or geophysical operations;

   4. Prevent the escape of the Commonwealth's gas and oil resources;

   5. Provide for safety in coal and mineral mining and coalbed methane well and related facility operations;

   6. Control wastes from gas, oil, or geophysical operations;

   7. Provide for the accurate measurement of gas and oil production and delivery to the first point of sale; and

   8. Protect the public safety and general welfare.

   B. In promulgating rules and regulations, and when issuing orders for the enforcement of the provisions of this article, the Director shall consider the following factors:

   1. The protection of the citizens and environment of the Commonwealth from the public safety and environmental risks associated with the development and production of gas or oil;

   2. The means of ensuring the safe recovery of coal and other minerals without substantially affecting the right of coal, minerals, gas, oil, or geophysical operators to explore for and produce coal, minerals, gas, or oil; and

   3. The protection of safety and health on permitted sites for coalbed methane wells and related facilities.

   C. In promulgating rules, regulations and orders, the Director shall be authorized to set and enforce standards governing the following: gas or oil ground-disturbing geophysical exploration; the development, drilling, casing, equipping, operating

and plugging of gas or oil production, storage, enhanced recovery, or disposal wells; the development, operation and restoration of site disturbances for wells, gathering pipelines and associated facilities; and gathering pipeline safety.

D. Whenever the Director determines that an emergency exists, he shall issue an emergency order without advance notice or hearing. Such orders shall have the same validity as orders issued with advance notice and hearing, but shall remain in force no longer than thirty days from their effective date. After issuing an emergency order, the Director shall promptly notify the public of the order by publication and hold a public hearing for the purposes of modifying, repealing or making permanent the emergency order. Emergency orders shall prevail as against general regulations or orders when in conflict therewith. Emergency orders shall apply to gas, oil, or geophysical operations and to particular fields, geographical areas, subject areas, subject matter or situations.

E. The Director shall also have the authority to:

1. Issue, condition and revoke permits;

2. Issue notices of violation and orders upon violations of any provision of this chapter or regulation adopted thereunder;

3. Issue closure orders in cases of imminent danger to persons or damage to the environment or upon a history of violations;

4. Require or forfeit bonds or other financial securities;

5. Prescribe the nature of and form for the presentation of any information and documentation required by any provision of this article or regulation adopted thereunder;

6. Maintain suit in the city or county where a violation has occurred or is threatened, or wherever a person who has violated or threatens to violate any provision of this chapter may be found, in order to restrain the actual or threatened violation;

7. At reasonable times and under reasonable circumstances, enter upon any property and take such action as is necessary to administer and enforce the provisions of this chapter; and

8. Inspect and review all properties and records thereof as are necessary to administer and enforce the provisions of this chapter.

2. Does this statutory authority include authority for the **promulgation of rules and regulations?** Please provide reference to the appropriate section(s). [3.1.b]

Yes

§ 45.1-361.27. Duties, responsibilities and authority of the Director.

A. The Director shall promulgate and enforce rules, regulations and orders necessary to ensure the safe and efficient development and production of gas and

oil resources located in the Commonwealth.

3. Do the statutes and regulations contain **definitions** of terms as necessary for program implementation? Please provide reference to the appropriate sections. [3.1.c]

   Yes

   § 45.1-361.1 Definitions

   Chapter 150. Virginia Gas and Oil Regulation

   4VAC25-150-10. Definitions

4. Are the **levels of funding and staff** provided adequate for full E&P environmental regulatory program implementation? Please provide funding levels and total staff complement for E&P environmental regulatory activities for the past 3 years. Please differentiate between UIC and non-UIC program funding and staffing levels if such differentiation is applicable to your program. [3.1.d, 4.3.2]

Year	Funding Level	Staff Level
2013	$887,700	10
2014	$910,844	10
2015	$853,341	10

5. Discuss mechanisms in place in your state for the **coordination** of E&P environmental regulatory program activities among the public, government agencies and the regulated industry. [3.1.e, 4.4]

   DGO provides Electronic notification of drilling to Division of Mines (Mine safety agency), Division of Mined Land Reclamation. DGO also provides electronic notification of flowback operations after completion to the Department of Environmental Quality. Regulations and data pertaining to E&P environmental programs are readily available on our website for public, government, and industry use.

6. What are the **goals or objectives** of the E&P environmental regulatory program? How do the goals and objectives of your E&P environmental regulatory program relate to protection of human health and the environment? Please provide reference to the appropriate document(s). [3.2]

   From our Operation plan:

   Mission Statement: We enhance the development and conservation of energy and mineral resources in a safe and environmentally sound manner to support a more productive economy.

   OUR PLAN

   GOAL NO. 1: Provide for environmentally sound and safe mineral and energy resource production.

   OBJECTIVE: To eliminate adverse environmental conditions and public safety hazards associated with DMME regulated sites.

7. Does your program provide for **flexibility** in determining the criteria applicable to E&P environmental regulation (e.g., variation in criteria dependent on region of the state or other factors; authorization of site-specific waivers for good cause shown and consistent with program goals and objectives)? If so, please provide reference to the appropriate document(s). [3.3]

   Laws and regulation for the Virginia's Tidewater area have different criteria.

   § 62.1-195.1. Chesapeake Bay; drilling for oil or gas prohibited.

II. ADMINISTRATIVE CRITERIA (Guidelines Section 4)

1. Briefly describe the **permitting** requirements for E&P facilities. Give reference to any statutory or regulatory requirements, including the permit terms and renewal procedures and the authority to refuse to issue or reissue permits or authorizations. Indicate whether the waste management practices listed in the matrix at the beginning of this questionnaire are authorized by individual permit, by rule, by general permit, through registrations or notices, verbally, or not at all. [4.1.1]

   DGO requires permits for wells, pipelines, compressor stations, and stand-alone tank batteries. The operator has two years to begin permit activities. If the permit has not been activated in two years, it will expire. The company can request a two year extension.

   § 45.1-361.33. Expiration of permits

   All permits issued pursuant to this chapter shall expire 24 months from their date of issuance unless the permitted activity has commenced within that time period. An operator may renew the existing permit for an additional 24 months by submitting a

written request containing the coal operator's approval and remitting a $325 renewal fee no later than the expiration date.

2. Do E&P—related permits provide **notice of the permittee's obligation** to comply with other federal, state or local requirements? If so, please provide a copy of (or hyperlink to) the form(s). [4.1.1]

   No

3. Briefly describe your **compliance evaluation program** with regard to the following activities (give reference to any statutory or regulatory requirements for each):

   a. Procedures for receipt, evaluation, retention, and investigation of required notices and reports. [4.1.2.1]

      All notices are sent electronically and they are retained in our database as well as automatically copied to the electronic permit file.

   b. Inspection, sampling and surveillance procedures for facility monitoring, periodic inspections, comprehensive surveys, and violation investigation. [4.1.2.1.b]

      All inspections are based on the condition of the permit area and are described in the frequency policy. Follow-up inspections for violations are contained in the violation.

      Quarterly statistical reports are prepared for these activities. These reports are reviewed by the management team.

   c. Public complaint and follow-up, including response times. [4.1.2.1.c]

      Complaints are given priority. The complainant is contacted within 24 hours and the investigation must be initiated within five days.

      Quarterly statistical reports are prepared for these activities. These reports are reviewed by the management team.

   d. Authority to conduct unannounced inspections and investigations. [4.1.2.1.d]

      45.1-361.27. Duties, responsibilities and authority of the Director.

      7. At reasonable times and under reasonable circumstances, enter upon any property and take such action as is necessary to administer and enforce the provisions of this chapter; and

      8. Inspect and review all properties and records thereof as are necessary to administer and enforce the provisions of this chapter.

e. Right of entry for inspection and copying of records. [4.1.2.1.e]

Same as above.

f. Chain of custody/evidence gathering. [4.1.2.1.f]

No change of custody laws or regulations.

4. Indicate which **enforcement actions** can be taken for violations of E&P environmental requirements. Give the reference for statutory authority for each option. Also, provide the number of times these enforcement actions have been taken by the state over the past two years (number or frequency). If numbers or frequencies are not available, indicate which of these actions the state uses more often. [4.1.3.1]

Yes/No	Action	Reference	Frequency
Yes	notice of violation	§ 45.1-361.27 E 2	16
No	compliance schedule		
Yes	restraining orders	Closure Orders § 45.1-361.27 E 2	0
No	emergency response		
Yes	injunctive action	Included in NOV	
Yes	administrative orders	Included in NOV	
Yes	court action	§ 45.1-361.27 E 6	0
Yes	permit revocation	§ 45.1-361.27 E 1	0
Yes	permit suspension	4 VAC 25-150-200	0
No	permit modification		
Yes	civil penalties	§ 45.1-361.8	0
Yes	bond forfeiture	§ 45.1-361.27 E 4	0
No	criminal sanction		
No	Field Order		

5. Do you have a formula for calculation of penalties? If so, what are the factors on which it is based? Give reference to any statutory or regulatory basis for such formula or provide a copy of any policy on which it is based. Indicate the penalties assessed and collected over the past two years. [4.1.3.2]

   Yes. Civil penalties are based on a point system. No penalties have been assessed and collected over the past two years.

   VGOB Civil Charge Procedural.pdf

6. Does your program include a **right of appeal** for review of actions? If so, please describe the appeals process and give reference to statutory or regulatory provisions governing appeals. [4.1.3.3]

   Violation can be appealed within 10 days of issuance (4VAC25-150-180. F.)

7. Has the state adopted a **state contingency plan** for response to spills and releases? If so, briefly describe, including volumes that trigger a response, time in which notification and clean-up is to occur, and criteria (i.e., cleanup standards) used to assure that remediation was accomplished. Please provide reference to applicable portions of the state plan. [4.2.1.1.a]

   The Spill Prevention Counter Control (SPCC) measures plan would contain the contingency plan in accordance with EPA regulations. Current proposed regulations contain definitions of spills and reporting procedures.

8. Describe any **funding** provisions to enable the state to respond to spills and releases in the event a responsible operator cannot be located or is unwilling or unable to respond and any provisions for reimbursement of the state for monies so expended. [4.2.1.1.b]

   Regulated by the Virginia Department of Environmental Quality (DEQ). § 10.1-1237. Virginia Brownfields Restoration and Economic Redevelopment Assistance Fund.

9. Describe any mechanisms provided by the state for the operators or public to **report spills and releases.** Please indicate if these mechanisms include telephone access 24 hours a day, 7 days a week, a 1-800 telephone number and telephone answering capabilities. [4.2.1.2]

   The company calls the DGO inspector's cell phone number or a message can be left on the phone at the office.

10. Describe any interagency **coordination of actions** between agencies having jurisdiction for response to spills and releases, including clear designation of on-site spill responsibilities. [4.2.1.3]

    Emergency Services will relay oil or gas related spill to DGO as will the Department of Environmental Quality (DEQ). DGO will contact DEQ as necessary.

11. Describe any **requirements for operators** to take measures prevent and respond to spills and releases at E&P facilities. Indicate if these requirements are spelled out in regulations or guidance or if they are included in operator-specific or site-specific plans. [4.2.1.4]

    4VAC25-150-380. Incidents, Spills and Unpermitted Discharges requires a permittee to take all reasonable steps to prevent, minimize, or correct any spill or discharge of fluids on a permitted site which has a reasonable likelihood of adversely affecting human health or the environment. The operator describes his response a spill in the incident report or through verbal communications.

12. Describe any **general state contingency program elements,** including those that address:

    a. Facilities, materials and equipment that may pose a significant threat to human health or the environment. [4.2.1.4.1.a.i]
    b. The various environments at risk, including surface and groundwater and land (environmentally sensitive areas, special soil or geologic conditions, urban areas, cultural and special resource areas). [4.2.1.4.1.a.ii]
    c. Measures to address public and responder safety concerns, including training for response personnel. [4.2.1.4.1.a.iii]
    d. The operator's incident command structure, including emergency contact information for key personnel. [4.2.1.4.1.b.i]
    e. Equipment, manpower and contracted services to respond to spills and releases.[4.2.1.4.1.b.ii]
    f. Opportunities for coordination of joint response actions. [4.2.1.4.1.b.iii]
    g. Procedures for communication with impacted or threatened parties. [4.2.1.4.1.b.iv]
    h. Methods of containment of spills and unauthorized releases. [4.2.1.4.1.b.v]
    i. Methods of disposal of materials of concern. [4.2.1.4.1.b.vi]
    j. Responder training. [4.2.1.4.1.c]

    DGO participates with several other agencies that are coordinated by Virginia Department Emergency Management (VDEM). Together they will form an emergency response team. So far the team has conducted two table top exercises involving responses to certain types of emergencies.

13. Describe any **spill prevention measures,** including those that may include:

a. Secondary containment measures such as dikes, berms, firewalls or equivalent measures. [4.2.1.4.2.a]
b. Tertiary containment or monitoring systems in high risk areas. [4.2.1.4.2.b]
c. Inspection, testing and maintenance schedules and procedures for facilities and equipment. [4.2.1.4.2.c]
d. Site security measures as necessary. [4.2.1.4.2.d]
e. Periodic review of opportunities to reduce future spills and releases. [4.2.1.4.2.e]

All tanks are required to have a containment dike that will hold one and a half the amount of fluid held in the largest tank. DGO inspects the conditions of tanks during routine inspections and the operator is required to inspect the tanks at least annually and present the inspections to DGO upon request. The operator is required to hold the inspection results for three years.

14. Describe any **spill response measures,** including those that may include:

a. Agencies and parties to be notified in the event of a spill or unauthorized release. [4.2.1.4.3.a.i]
b. Type of reporting (verbal, written) required. [4.2.1.4.3.a.ii]
c. Reporting time requirements. [4.2.1.4.3.a.iii]
d. Reporting thresholds. [4.2.1.4.3.a.iv]
e. Type of information to be reported, such as operator name, a description of the incident including date and time of discovery, the type and volume of material released, the location of the incident, the apparent extent of the release, damage or threat to groundwater, surface water and land, and weather conditions.. [4.2.1.4.3.a.v]

All the above information is contained in the incident report that is submitted to DGO in accordance with 4 VAC 25-150-380.

15. Describe any **state guidance for containment, abatement and remediation** of spills and releases including:

a. Clean-up standards. [4.2.1.4.3.b.i]
b. Required sampling and analyses. [4.2.1.4.3.b.ii]
c. Any approved non-mechanical response actions. [4.2.1.4.3.b.iii]

These situations are handled on a case by case basis. The inspector has the authority to determine clean-up requirements including sampling and remediation actions as necessary.

16. Describe any requirements for **final reporting, site monitoring requirements and necessary agency approvals** following the response to spills and releases. [4.2.1.4.3.c]

DGO's incident report and inspection report will contain the final reporting requirements or other on-site monitoring. 4VAC25-150-380.

17. Describe any **follow-up actions by the state** for the failure of an operator to report or respond to spills and unauthorized releases, including enforcement, assessment of damages, and reimbursement of costs for responding to spills and releases. [4.2.1.5]

    Such incidents would be handled under the Notice of Violation and Civil Penalties authority. We do not have a reimbursement procedure or authority.

18. Describe any **database** that includes information on spills and releases, and indicate whether such database is analyzed as part of a program effectiveness evaluation [4.2.1.6]

    Incident reports are submitted electronically and stored in our enterprise database. The data are analyzed and reported to management on a quarterly basis.

19. Describe the **public participation** activities related to E&P environmental activities, including public notice and comment requirements prior to permit issuance, availability of agency records for public review, public outreach to affected parties, and the use of any advisory groups. Give reference to any statutory or regulatory provisions controlling such activities. [4.2.2]

    Surface and mineral owners can object to proposed permits. 4VAC25-150-140. Objections to Permit Applications.

    Permits, drilling and completion reports, geo physical logs are all available on the DGO web site.

    DGO develops work groups when regulations or laws are being proposed.

    DGO posts information on our web site as a public outreach strategy to inform public about specific issues.

20. Describe any **regulatory development process,** including mechanisms for obtaining best available scientific and technical information and economic and energy impacts. [4.2.3]

    Regulations are reviewed and developed in accordance with the Virginia Administrative Process Act, § 2.2-4007 through 4017.

21. Describe the **program planning** and **performance measurement**

processes, including the following:

a. Strategic or short-term planning for regulatory development purposes. [4.2.3.1]

   It is mandated in Virginia that all regulations are reviewed every 5 years. DGO has an annual strategic planning process.

b. Evaluation of program effectiveness related to the **protection of human health and the environment.** [4.2.3.2.a]

   Quarterly Statistics and Performance Measures are prepared and provided to the management team for review.

c. Use of data management capabilities to assess program effectiveness and timeliness. [4.2.3.2.b]

   Quarterly Statistics and Performance Measures are prepared and provided to the management team for review.

d. Establishment of a baseline against which to compare future performance. [4.2.3.2.d]

   Goals and Strategies for performance are established annually and reviewed quarterly by the Strategic Team and at Operational Planning sessions.

22. Describe any **financial assurance** requirements for E&P environmental regulatory activities or facilities. Include the activities for which financial assurance is required, the purpose of the assurance (penal or performance), the scope of coverage (i.e., pit closure, well plugging, water supply replacement), the types of financial assurance instruments accepted (i.e., surety, letters of credit, CD's, non-refundable fees, self-insurance), and procedures to access the assurance funds when necessary. Give reference to any statutory or regulatory provisions governing financial assurance amounts. [4.2.4]

    DGO regulations allow cost bond and pool bonding options. Most companies bond their permits though the pool bonding program. Bonding can be satisfied through CD'S, surety or cash.

23. Describe any **waste hauler training and certification** requirements for commercial transportation of E&P wastes in your state. Give reference to any statutory or regulatory provisions relating to this activity. [4.2.5]

    No requirements.

24. Describe any program relating to identification of the **location of closed disposal sites,** including any provisions making this information available for public review. Give reference to any relevant statutory or

regulatory provisions regarding such identification. [4.2.6]

The site plan contained in the permit application shows the pit location. Permit files can be viewed on the DGO web page. 4VAC25-150-420.

25. Provide a brief description of the **data management** systems in place in your state for information related to E&P environmental regulatory activities. Include a description of the data elements (e.g., permitting, operating, monitoring) that are included in the system. Please describe the extent to which the program utilizes and/or has considered the utilization of electronic data management systems, and what information is or is not made available to the public. [4.2.7]

    All permitting and reporting are now handled electronically and all information provided is stored in an enterprise database. Much of the information of interest contained in the DGO database system is made available to the public through the DGO Data Information System accessed through the DGO website. Information regarding Notice of Violations, Complaint Investigations, and Incident Reports is currently available only upon request.

26. Describe the **administrative support** assigned to the E&P environmental regulatory program. If some of these personnel are also responsible for non-E&P program activities, please provide the percent of time or equivalent full-time support related to E&P matters. Include the number, classifications, functions and duties, and minimum experience and training requirements for these positions. Describe any additional training that is made available to them. Indicate whether this level of administrative staffing is considered adequate. [4.3.1.1]

    DGO currently employs six full-time inspectors and three open inspector positions. All inspectors have responsibility for all aspects of gas and oil activities within their assigned area, including the E&P environmental regulatory program. There are no staff members assigned full-time to the E&P environmental regulatory program. The nine inspector positions are considered adequate for the current level of gas and oil activities in Virginia. Required training and qualification of the inspection staff is outlined in the Employee Work Profile. As funding comes available, additional training in this area will be implemented.

27. Describe how **legal support** is provided to the E&P environmental regulatory program (e.g., in-house lawyers, state attorney general, independent counsel). Indicate the level of support provided and compare it to the level of support considered necessary. [4.3.1.2]

    Legal support is provided through the Commonwealth Attorney General's office.

28. Describe the **technical staff** assigned to provide geological or engineering

support to the E&P environmental regulatory program. If some of these personnel are also responsible for non-E&P program activities, please provide the percent of time or equivalent full-time support related to E&P matters. Include the number, classifications, functions and duties and minimum experience and training requirements for these positions. Describe any additional training that is made available to them. Indicate whether this level of technical staffing is considered adequate. [4.3.1.3]

The DGO inspection staff handles technical issues. Through internal discussions we are able to address most technical issues. DGO has a diversified staff with training in a variety of fields that address these issues. Training in these areas is always recommended and made available with available funding.

29. Describe the **field personnel** assigned to conduct inspections and assure compliance with the E&P environmental regulatory program. If some of these personnel are also responsible for non-E&P program activities, please provide the percent of time or equivalent full time support related to E&P matters. Include the number, classifications, functions and duties and minimum experience and training requirements for these positions. Describe any additional training that is made available to them. Indicate whether this level of field staffing is considered adequate. [4.3.1.4]

    The DGO inspection staff handles all field activities. Through internal discussions we are able to address most technical issues. DGO has a diversified staff with training in a variety of fields that address these issues. Training in these areas is always recommended as funding becomes available.

30. Describe your program for **training** agency personnel on the regulations, policies and criteria applicable to E&P environmental regulatory matters. [4.3.1.5]

    We handle these types of training through in-house training, staff meetings, public meetings and interagency meetings.

31. Describe the methods used for **funding** the E&P environmental regulatory program in your state (general appropriations, special funds, fees, etc.). If you feel that current funding levels are inadequate, describe the levels of funding needed and the activities that would be conducted. [4.3.2]

    Funding is obtained through Virginia's general fund and permit fees.

    Describe any mechanisms (e.g., memoranda of understanding (MOU), periodic meetings, or coordinated permit review) which are in place to ensure **coordination among state agencies** on E&P environmental regulatory issues. If your state has large tracts of federally administered public lands and/or tribal lands, describe any formal or informal mechanisms in which E&P environmental regulatory programs are coordinated with federal and/or Indian agencies. [4.4]

    We have an MOU with the DEQ in regard to air quality regulations.

Communications with federal agencies are handled informally and infrequently though we do have wells on federal land.

III. TECHNICAL CRITERIA (Guidelines Section 5)

A - GENERAL

1. Describe any **general performance or design standards** applicable to E&P waste management practices used in your state. Describe how these standards prevent contamination of ground water, surface water, soil or air; protect public health, safety and the environment; and prevent property damage. [5.1.a]

   Drilling water must be approved by DGO.
   Surface casing must extend down to at least 300' and be cemented to the surface.
   Any groundwater wells used for domestic purposes located with 750' of the well must be replaced if the well was adversely affected by gas well operations.
   Drilling fluid must be contained in a properly line pit.
   Frack fluid must be contained in a pit.
   DGO must approve the removal of pit fluid.
   DGO must approve the disposal of produced fluid.
   The operator is required to submit their tracking mechanism of produced fluid.
   The use of drilling mud is required to be approved in the permitting process.

2. Is disposal of E&P waste in **municipal solid waste landfills** allowed? If so, describe the conditions under which such disposal is allowed. [5.1.c]

   This type of disposal is very rare in Virginia. When is has occurred, DGO required the operator to submit documentation from the owner of the facility that it was permitted to handle the waste and they agreed to take the operator's waste. DGO also required a manifest to account for the amount taken to the landfill.

3. Describe any provisions in the siting, construction or operation criteria for **variances, waivers, or other flexibility** to address site specific or regional conditions. Discuss the circumstances under which such flexibility can be applied. [5.1.d]

   A well or corehole cannot be placed within 200' of an inhabited building unless a wavier is approved by the Director. Same for any pipeline placed within 100' of an inhabited building. These requirements apply to waste disposal well facilities.

4. Provide the **siting** criteria for E&P waste management facilities. If they vary for different types of facilities (pit, landspreading, burial, roadspreading, tank, commercial facility) please list the criteria that apply to each type of facility. [5.1.e]

   DGO reviews well or facility locations for any Red Zone issues or those issues that can adversely affect the public, homes, roads or places where people congregate.

5. Describe any **waste characterization** requirements, including sampling, analysis and quality control procedures. Discuss the purpose and use of the information resulting from the characterizations. Please provide reference to any statutory, regulatory, guidance or policy basis for waste characterization requirements. [5.2]

   DGO requires drilling water to be sampled and pit fluid to be sampled and analyzed. The analysis is compared to the legal limits for each parameter sampled. DGO has required soil to be sampled when a substantial amount of oil has been spilled. Upstream and downstream samples are requested by DGO in the event of a spill into a waterway. The form below is taken from a DGO application to dispose pit fluids.

	Analysis	BDL *	Standard Limits
Acidity		☑	<alkalinity
Alkalinity	15.9	☐	>acidity
Chlorides	53	☐	5,000mg/l**
Iron	0.053	☐	<7 mg/l
Manganese	0.015	☐	<4 mg/l
Oil and Grease		☑	< 15 mg/l
pH	6.85	☐	6-9 Standard Units
Sodium Balance		☑	SAR of 8-12***

** BDL = Below Detectable Limits*

*** For chlorides above 5,000 mg/l, the application will be reviewed to determine whether a permit would be required from DEQ.*

**** The sodium absorption rate shall be determined on the soils to which the liquid is to be applied.*

   http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-10502

6. Are there any **air emission control** requirements applicable to E&P waste management facilities? If so, please describe and provide appropriate references. [5.1.a and 5.10.2.2.c]

   http://files.dep.state.pa.us/PublicParticipation/Citizens Advisory Council/CACPortalFiles/Meetings/2013_03/CAC_GP-5_Exempt_38_Presentation_3_19_2013.pdfNo. Air quality is handled by DEQ.

7. Describe any programs promoting a **hierarchy of waste management practices**, including the following in preferred order:

   a. **Source reduction** to reduce the quantity and/or toxicity of waste. [5.3.a]
   b. **Recycling or reuse** to reclaim waste. [5.3.b]
   c. **Treatment** to reduce the volume or toxicity of the waste. [5.3.c]
   d. **Proper disposal** of remaining waste. [5.3.d]

   We do not have any promotion programs.

8. Describe any E&P waste **source reduction opportunities** promoted by the state, such as equipment modifications, procedure changes, product substitution, reduction in use of fresh water, good housekeeping and preventative maintenance, planning, training, and selection of contractors. [5.3.1]

   None promoted by the state.

9. Describe any E&P **waste recycling or reuse** opportunities promoted by the state.

[5.3.2]

None promoted by the state.

10. Describe any **program elements** that encourage E&P waste source reduction and recycling through policy, training, technical assistance or incentives. [5.3.3]

None promoted by the state.

B - PITS

11. Do you have specific technical criteria in place in your state for the following **types of pits?** If so, please cite the reference for such criteria. [5.5.1]

Yes/No	Type	Reference
Yes	Reserve pits	4VAC25-150-300. Pits
Yes	Production pits	Same
No	Skimming/settling pits	
Yes	Produced water pits	Same
No	Percolation pits	
No	Evaporation pits	
Yes	Special purpose pits	Same
Yes	Blowdown pits	Same
No	Flare pits	
Yes	Emergency pits	Same
Yes	Basic sediment pits	4VAC25-150-270. Stormwater Management.
Yes	Workover pits	Same as reserve pit.
	Other	

12. Describe briefly how pits are **permitted** in your state. If any types of pits are distinguished or defined separately in the permitting process (e.g., reserve pits, production pits, emergency pits), describe how permit application differs for the different types. [5.5.2.a]

Pits are not classified or distinguished in Virginia. Pits are permitted in the original plan and additional pits can be added through other permitting avenues

(supplements or modifications). Pits are to be reclaimed within 180 days of completion unless a variance has been approved.

13. Are pits **permitted by rule** in your state? If so, what requirements or limitations (e.g., geographic, geologic, topographic) are included? Give reference to the applicable statutory or regulatory sections. [5.5.2.b]

    Pits are to be reclaimed within 180 days of completion unless a variance has been approved.4VAC25-150-300.

14. Are pits **permitted individually** and/or as part of **facility, operational or general permits?** Give reference to the applicable statutory or regulatory sections. [5.5.2.c]

    Pits can be permitted individually but they are generally contained in the permit application along with the well location per 4VAC25-150-300.

15. What **notification** is required prior to construction and operation of rule-authorized pits? [5.5.2.d]

    The operator is required to give 48 hours' notice for construction activities. This notice is submitted electronically and approved by the inspector.

16. Briefly describe any provisions concerning the issuance and use of **emergency permits** for pits. Give reference to the applicable statutory or regulatory sections. [5.5.2.e]

    Emergency pits may be orally approved for construction and followed up in the permitting process within 7 days 4 VAC 25-150-110.

17. What requirements are included in statewide regulations regarding the size, depth, berm height and other **construction** parameters for pits? What is the permit review process to assure that these requirements are met? Give reference to the applicable regulatory sections. [5.5.3.a]

    We do not have any size criteria. The pit is to be large enough to handle the anticipated fluid volume. We do require that all pits maintain a 2 foot freeboard 4VAC25-150-300. The requirements to meet the permit conditions are enforced by the assigned inspector.

18. What requirements are in place to assure that there is no adverse **impact to ground water or surface waters** from use of the pit? Give reference to the applicable statutory or regulatory sections. [5.5.3.b]

    The operator is required to install at least a 10 millimeter liner 4VAC25-150-300. Pits. Pits shall have a properly installed and maintained liner or liners made of 10 millimeter or thicker high-density polyethylene or its equivalent. Parameters to

discharge fluids are defined in 4 VAC 25-150-420 Disposal of pit and produced fluids.

19. What requirements are in place to assure **structural integrity** of pits? Give reference to the applicable statutory or regulatory sections. [5.5.3.c]

    Fluid level in the pit must maintain a 2 foot freeboard. 4VAC25-150-300.4. Pits shall be constructed of sufficient size and shape to contain all fluids and maintain a two-foot freeboard. The assigned inspector will inspect the structural integrity of the pit.

20. In what ways do construction requirements assure that pits are designed to accommodate fluids which are intended to be contained in them such as oil-based drilling muds or cuttings from salt sections? [5.5.3.d]

    The operator will permit and construct two pits in case one pit cannot handle the fluids or the operator anticipates a need for an additional pit(s). The use of drilling mud is approved in the permitting process.

21. Do construction standards for pits differ depending on the **waste characteristics** of materials they are to receive? If so, describe the circumstances under which variances or special conditions are used. [5.5.3.e]

    No.

22. Under what conditions are **pit liners** required or **tanks** required in lieu of pits? What are the requirements for liner construction and installation? Give reference to the applicable statutory or regulatory sections. [5.5.3.e]

    A pit liner of a least 10 mil is always required. Tanks can be used as a supplement to a pit or when additional pit space is not available 4VAC25-150-300.

23. What are the requirements for **fencing, netting and caging** of pits? Give reference to the applicable statutory or regulatory sections. [5.5.3.f]

    Fencing around pits is a safety requirement. DGO has a MOU with the Department of Labor and Industry to inspect sites for safety.

24. What are the requirements for the **placement of reserve pits** relative to drilling equipment? [5.5.3.g]

    No requirements for placement of pits in relation to drilling equipment.

25. What restrictions are placed on the **type and characteristics of wastes** that can be placed in pits? Please specify the requirements by type of pits. Give reference to the applicable statutory or regulatory sections. [5.5.4.a]

Drill fluid, produced fluid and drill cuttings are the only material that can be placed in a pit.

4VAC25-150-300. Pits

A.2. Pits may not be used as erosion and sediment control structures or stormwater management structures, and surface drainage may not be directed into a pit.

B.2. Motor oil and, to the extent practicable, crude oil shall be kept out of the pit. Oil shall be collected and disposed of properly. Litter and other solid waste shall be collected and disposed of properly and not thrown into the pit.

26. What **security** guidelines or requirements are in place regarding pits? Give reference to the applicable statutory or regulatory sections. [5.5.4.b]

    The proposed regulations state: Pits shall be enclosed by adequate fencing to deter the site from access by the public and wildlife.

27. What are the requirements for maintaining a **freeboard** level in pits and how is this level calculated? Give reference to the applicable statutory or regulatory sections. [5.5.4.c]

    Two-foot freeboard is required. 4VAC25-150-300. A.4. Pits shall be constructed of sufficient size and shape to contain all fluids and maintain a two-foot freeboard.

28. How is **liner integrity** maintained and assured in lined pits? [5.5.4.d]

    Liners are required to be maintained through the life of the pit. Liners are checked during routine inspections by the DGO inspectors.

29. What routine **inspections or monitoring** are required by the operator to assure that pit operational and structural integrity requirements are being met? Are results of these inspections reported? [5.5.4.e]

    There is no formal inspection requirement for the operator. It is the ultimate responsibility of the operator to assure the structural integrity is maintained.

30. What are the requirements for **removal/disposal/recycling of hydrocarbons** that accumulate in pits? Give reference to the applicable statutory or regulatory sections. [5.5.4.f]

    Most of our wells drilled in VA are gas wells and sometimes they do make a little oil. The oil can be removed by soaks or removed by suction into a truck.

    4VAC25-150-300. Pits.

2. Motor oil and, to the extent practicable, crude oil shall be kept out of the pit. Oil shall be collected and disposed of properly. Litter and other solid waste shall be collected and disposed of properly and not thrown into the pit.

31. What are the requirements for **removal of separated oil or wastes** from unlined skimming/settling pits? [5.5.4.g]

    All pits are lined. Virginia does not allow an unlined pit. No settling pits are being utilized in Virginia.

32. Are **produced water pits** allowed in your state? If so, what are the requirements for disposal of the water? [5.5.4.h]

    If an operator needs a pit to store produced fluid, it would be handled like any other pit. All produced fluids shall be disposed into an approved facility/location.

33. Describe any restrictions concerning the use of **percolation pits.** [5.5.4.i]

    Virginia has not utilized this method.

34. Describe maintenance requirements for **evaporation pits.** Give reference to the applicable statutory or regulatory sections. [5.5.4.j]

    We do not have any. Virginia has not utilized this method.

35. What restrictions are placed on the use of **emergency pits?** Are notification of the regulatory agency and removal of fluids required when they are used? [5.5.4.k]

    If an operator needs another pit he would notify DGO before construction starts. Emergency pits may be orally approved for construction and followed up in the permitting process within 7 days 4 VAC 25-150-110. The DGO must approve the removal of fluids.

36. Is there a prohibition against the use of **unlined basic sediment pits** for oily wastes? Give reference to the applicable statutory or regulatory sections. [5.5.4.1]

    All pits must be lined in accordance with the Virginia Gas and Oil Regulations.

37. What limitations are placed on the operation of **workover pits?** [5.5.4.m]

    Pits must be lined and two-foot freeboard maintained. The pits must be maintained as all other pits in Virginia.

38. What time limit is placed on the **closure of reserve pits?** Give reference to the applicable statutory or regulatory sections. [5.5.5.b]

All pits must be eliminated within 180 days of completion unless a variance has been issued. 4VAC25-150-300. 1. Pits are to be temporary in nature and are to be reclaimed when the operations using the pit are complete. All pits shall be reclaimed within 180 days unless a variance is requested and granted by the field inspector.

39. What **testing of pit liquids is required before pit closure?** When is on-site disposal of pit liquids authorized and what criteria apply to such disposal? Give reference to the applicable statutory or regulatory sections. [5.5.5.c]

The pit fluid is tested until the analyzed parameters meet certain limits. Then the pit fluid can be land applied in the area approved in the permit application.

4VAC25-150-420. Disposal of Pit and Produced Fluids.

D. On-site disposal. The following standards for on-site land application of fluids shall be met:

1. Fluids to be land-applied shall meet the parameters listed in the Department of Environmental Quality's "Ground water criteria," (9VAC25-280-70), following criteria:

Acidity: <alkalinity

Alkalinity: >acidity

Chlorides: <5,000 mg/l

Iron: <7 mg/l

Manganese: <4 mg/l

Oil and Grease: < 15 mg/l

pH: 6-9 Standard Units

Sodium Balance: SAR of 8-12

2. Land application of fluids shall be confined to the permitted area.

3. Fluids shall be applied in a manner which will not cause erosion or runoff. The permittee shall take into account site conditions such as slope, soils and vegetation when determining the rate and volume of land application on each site. As part of the application narrative, the permittee shall show the calculations used to determine the maximum rate of application for each site.

4. Fluid application shall not be conducted when the ground is saturated, snow-covered or frozen.

5. The following buffer zones shall be maintained unless a variance has been granted by the director:

a. Fluid shall not be applied closer than 25 feet from highways or property lines not included in the acreage shown in the permit.

b. Fluid shall not be applied closer than 50 feet from surface watercourses, wetlands, natural rock outcrops, or sinkholes.

c. Fluid shall not be applied closer than 100 feet from water supply wells or springs.

6. The permittee shall monitor vegetation for two years after the last fluid has been applied to a site. If any adverse effects are found, the permittee shall report the adverse effects in writing to the division.

7. The director may require monitoring of groundwater quality on sites used for land application of fluids to determine if the groundwater has been degraded.

40. Under what conditions must pit **liquids be removed** before closure? What are the requirements for disposal of these liquids? [5.5.5.d]

    Pit fluids must always be removed to the extent possible prior to closing/reclamation. The DGO must approve the disposal of the pit fluids.

41. What are the requirements for **closure and reclamation** of pit sites? Give reference to the applicable statutory or regulatory sections. [5.5.5.e]

    180 days 4VAC25-150-300.

42. What **records** are kept of pit sites and what is their availability to the public? Give reference to the applicable statutory or regulatory sections. [5.5.5.f]

    Pit locations are contained in the permit plan and the plan is available for viewing through the DGO Data Information System on our web site.

C - LANDSPREADING (Non-Commercial)

43. Do you have specific **criteria for landspreading** of E&P wastes? If so, give reference to the applicable statutory or regulatory sections. [5.6.1.b]

Virginia allows landspreading for pit fluids. Landspreading of solids may be allowed if an acceptable plan was proposed.

landfarming policy.pdf

44. Is on-site **landspreading of waste containing NORM** above action levels prohibited? [5.6.1.c]

    This issue is not addressed in Virginia's program.

45. Briefly discuss each of the following **operational requirements** as they apply to landspreading (give reference to any statutory or regulatory requirements): [5.6.3]

    a. Removal of free oil

       Pit water must meet water quality requirements listed in question 39 above.

    b. Allowable pH range of waste being disposed

       6-9 Standard Units

    c. Spreading of solids and incorporation into the soil

       Not allowed unless a plan is approved.

    d. Application rates, methods and practices for liquids

       Fluids shall be applied in a manner which will not cause erosion or runoff. The permittee shall take into account site conditions such as slope, soils and vegetation when determining the rate and volume of land application on each site. As part of the application narrative, the permittee shall show the calculations used to determine the maximum rate of application for each site.

    e. Addition of nutrients for biodegradation

       N/A no regulations pertaining to this issue.

    f. Waste limitations (e.g., EC, ESP, SAR)

       Between 8-12, the sodium absorption rate is determined on the soils to which the liquids are to be applied.

g. Limitations on waste-soil ratio by oil and grease content

Oil and Grease ≦ 3.0%

h. Limits on salt and hydrocarbon content in final waste-soil mixture

Exchangeable Sodium Percentage ≦ 15%

i. Enhanced techniques available to meet final criteria for salt and hydrocarbons

N/A no regulations pertaining to this issue.

j. Soil analysis required prior to landspreading and/or after site closure

Soil analysis only performed if necessary to perform discharge rate calculations for disposal of pit fluids.

k. Any additional criteria for landspreading special wastes

N/A no regulations pertaining to this issue.

D - BURIAL AND LANDFILLING (Non-Commercial)

46. Do you have specific **regulatory requirements** for burial or landfilling of E&P wastes? If so, give reference to the applicable statutory or regulatory sections. [5.7.2]

Drill cuttings can be disposed of in place when a pit is backfilled.

4VAC25-150-430. Disposal of Solids.

A. Applicability. All drill cuttings and solids shall be disposed of in the on-site pit as provided in subsection C of this section or as approved by the director. All other solid waste from gas, oil or geophysical operations shall be disposed of in a facility permitted to accept that type of waste.

B. Plan. Each operator shall submit a description of how drill cuttings and solids will be disposed of in the operations plan.

C. Disposal in a pit. Drill cuttings and solids may be disposed of on-site in an approved pit, without testing of the material.

The drill cuttings and solids shall be covered with a liner meeting the standards of 4VAC25-150-300, or a low-permeability clay cap, and shall be covered by soil. The combination of soil and liner or cap shall be at least four feet thick, capable of shielding the cuttings and solids remaining in the pit, suitable for supporting vegetation, and sloped to prevent ponding.

All pit reclamations and material transfers are tracked in the DGO E-forms system.

47. Briefly discuss each of the following **operational requirements** as they apply to burial or landfilling (give reference to any statutory or regulatory requirements): [5.7.3]

    a. Criteria under which waste may be buried or landfilled (if different than landspreading criteria)

    This type of disposal is very rare in Virginia. When is has occurred, DGO required the operator to submit documentation from the owner of the facility that it was permitted to handle the waste and they agreed to take the operator's waste. DGO also required a manifest to account for the amount taken to the landfill.

    b. Liner requirements where salt or hydrocarbon content exceeds allowable limits

    N/A no regulations pertaining to this issue.

    c. Requirements for record keeping or recording of locations

    Pit locations are contained in the electronic permit file.

E - ROADSPREADING

48. Do you have specific **regulatory criteria** for roadspreading of E&P wastes? If so, give reference to the applicable statutory or regulatory sections. [5.8.2]

    Yes. Pit fluid can be applied to an access road as long as the road is permitted and identified in the operator's plan per 4VAC25-150-420 B. Maps and a narrative describing the method to be used for permanent disposal of fluids must accompany the application if the permittee proposes to land apply any fluids on the permitted site. The rate and volume of the dispersal is included in the approved plan. Produced fluid can be processed to melt ice and snow and utilized as a dust suppressant on non-paved state roads. This has been approved but is no longer being utilized.

    EMATS brine disposal.pdf

49. Briefly discuss each of the following **operational requirements** as they apply to roadspreading (give reference to any statutory or regulatory requirements): [5.8.3]

a. Testing criteria that are applicable for wastes proposed for roadspreading (e.g., ignitability, density, metal content, consistency with approved road oils)

Pit fluid is tested for: Fluids to be land-applied shall meet the parameters listed in the Department of Environmental Quality's "Ground water criteria," (9VAC25-280-70), following criteria:

Acidity: <alkalinity

Alkalinity: >acidity

Chlorides: <5,000 mg/l

Iron: <7 mg/l

Manganese: <4 mg/l

Oil and Grease: < 15 mg/l

pH: 6-9 Standard Units

Sodium Balance: SAR of 8-12

b. Application rates

Fluids shall be applied in a manner which will not cause erosion or runoff. The permittee shall take into account site conditions such as slope, soils and vegetation when determining the rate and volume of land application on each site. As part of the application narrative, the permittee shall show the calculations used to determine the maximum rate of application for each site.

c. Buffer zones

The following buffer zones shall be maintained unless a variance has been granted by the director:

a. Fluid shall not be applied closer than 25 feet from highways or property lines not included in the acreage shown in the permit.

b. Fluid shall not be applied closer than 50 feet from surface watercourses, wetlands, natural rock outcrops, or sinkholes.

c. Fluid shall not be applied closer than 100 feet from water supply wells or springs.

d. Produced water testing (for similarity to approved commercial products)

Virginia does not (typo) have any separate regulations to test produced water to compare to approved commercial products/fluids.

F - TANKS

50. Describe any requirements pertaining to the **location, use, capacity, age and construction of E&P waste tanks,** including registration, inventories, etc. [5.9.2.a]

    4 VAC 25-150-310. Tanks.

    A. All tanks installed on or after September 25, 1991, shall be designed and constructed to contain the fluids to be stored in the tanks and prevent unauthorized discharge of fluids.

    B. All tanks shall be maintained in good condition and repaired as needed to ensure the structural integrity of the tank.

    C. Every permanent tank or battery of tanks shall be surrounded by a containment dike or firewall with a capacity of 1½ times the volume of the single tank or largest tank in a battery of tanks.

    D. Dikes and firewalls shall be maintained in good condition, and the reservoir shall be kept free from brush, water, oil or other fluids.

    E. Permittees shall inspect the structural integrity of tanks and tank installations, at a minimum, annually. The report of the annual inspection shall be maintained by the permittee for a minimum of three years and be submitted to the director upon request.

    F. Load lines shall be properly constructed and operated on the permitted area.

51. Describe any state program pertaining to **pollution prevention requirements relating to tanks.** [5.9.2.c]

    DEQ handles tank emissions. Per 4 VAC 25-150-310 operators are required to provide secondary containment, perform adequate maintenance, and prevent unauthorized discharge of fluids.

52. Briefly discuss each of the following **operational requirements** as they apply to E&P waste tanks (give reference to any statutory or regulatory requirements): [5.9.3]

    a . Corrosion protection

    4VAC25-150-310.

    A. All tanks installed on or after September 25, 1991, shall be designed and constructed to contain the fluids to be stored in the tanks and prevent unauthorized discharge of fluids.

b. Structural integrity

4VAC25-150-310.

A. All tanks installed on or after September 25, 1991, shall be designed and constructed to contain the fluids to be stored in the tanks and prevent unauthorized discharge of fluids.

c. Protection against overtopping

4VAC25-150-310.

A. All tanks installed on or after September 25, 1991, shall be designed and constructed to contain the fluids to be stored in the tanks and prevent unauthorized discharge of fluids.

d. Secondary containment/leak detection

4VAC25-150-310.

C. Every permanent tank or battery of tanks shall have secondary containment achieved by constructing a dike or firewall with a capacity of 1-1/2 times the volume of the largest tank when plumbed at the top, or all tanks when plumbed at the bottom, utilizing a double wall tank or another method approved by the division.

D. Dikes and firewalls shall be maintained in good condition, and the reservoir shall be kept free from brush, water, oil or other fluids.

E. Permittees shall inspect the structural integrity of tanks and tank installations, at a minimum, annually. The report of the annual inspection shall be maintained by the permittee for a minimum of three years and be submitted to the director upon request.

e. Covers or measures to prevent entry of wildlife

No requirement.

f. Hydrogen sulfide emission control

4 VAC 25-150-350. Gas, oil or geophysical operations in hydrogen sulfide areas.

D. Materials and equipment.

1. For new construction or modification of facilities, including materials and equipment to be used in drilling and workover operations, permittees shall only use metal components, approved by the director, which have been selected and manufactured so as to be resistant to hydrogen sulfide stress cracking under the operating conditions for which their use is intended. This requirement may be met

by use of components that satisfy the requirements of NACE Standard MR-01-75 and API RP-14E, §§ 1.7(c), 2.1(c) and 4.7. The handling and installation of materials and equipment used in hydrogen sulfide service are to be performed in such a manner so as not to induce susceptibility to sulfide stress cracking.

2. Other materials and equipment, including materials and equipment used in drilling and workover operations, may be used for hydrogen sulfide service provided such materials and equipment are proved, as the result of advancements in technology or as the result of control and knowledge of operating conditions such as temperature and moisture content, suitable for the use intended and where such usage is technologically acceptable as good engineering practice, and the director has approved a variance for the materials and equipment for the specific uses.

3. In the event of a failure of any element of an existing system as the result of hydrogen sulfide stress cracking, the compliance status of the system shall be determined by the director after the operator has submitted a detailed written report on the failure to the director.

E. Reporting. The permittee shall report the hydrogen sulfide concentrations of the hydrocarbon in any well or corehole where the hydrogen sulfide concentration is equal to or exceeds 100 parts per million with the drilling report under 4 VAC 25-150-360 or with the plugging affidavit for coreholes under 4 VAC 25-150-460.

53. Describe any tank **removal and closure** requirements and provide reference to statutory or regulatory requirements. [5.9.4]

    4 VAC 25-150-260. Erosion, sediment control and reclamation.

    D. Final reclamation standards.

    1. All equipment, structures or other facilities not required for monitoring the site or permanently marking an abandoned well or corehole shall be removed from the site, unless otherwise approved by the director.

G - COMMERCIAL AND CENTRALIZED DISPOSAL FACILITIES

54. What agency (agencies) in your state has (have) regulatory **jurisdiction** over these facilities? [5.10.1]

    EPA has jurisdiction over injection wells. DEQ has jurisdiction over landfill facilities.

55. Do you have any centralized or commercial E&P waste disposal facilities? **How many, and of what type?** Does this include any surface facilities at UIC sites? If so, how many are associated with UIC sites? [5.10.1]

    Yes we have 12 UIC wells and we inspect the surface facilities.
    Virginia has no commercial disposal facilities.

56. Discuss each of the following **regulatory requirements** as they apply to commercial and centralized disposal facilities. Give reference to any statutory or regulatory requirements: [5.10.2]

Virginia has no commercial disposal facilities.

a. Permit requirements

A Virginia waste disposal well permit is required in addition to an EPA UIC permit. A copy of the EPA permit is required as part of the Virginia waste disposal well permit application.

b. Acceptable types and volumes of wastes

Set by EPA

c. Waste characteristics and disposal facility compatibility

Handled by EPA

57. **What wastes are acceptable** for disposal? Do any of these facilities accept RCRA nonexempt wastes or wastes from other than oil and gas exploration and production activities? [5.10.2]

Virginia UIC wells only accept E&P wastes including pit and produced fluids. These facilities do not accept RCRA nonexempt wastes.

58. What are the **disposal and treatment methods** employed at these facilities? [5.10.2]

There are no treatment methods at these facilities. E&P waste fluid is placed directly into the well. Well pressures are measured unless the fluid is disposed of in an abandoned mine (gravity flow injection wells).

59. What elements are required as part of the **permit** application (e.g., siting plan, construction plan, operating plan, closure plan, etc.)? [5.10.2.2.a]

Erosion and Sediment Control, Site and Road location and cross sections. associated pipeline details.

60. If permit applications are required for **siting,** do they include: [5.10.2.2.b] Names, addresses and phone numbers of the owners or operators of the facility?

Owner and/or operator must register with DGO and provide this information prior to obtaining a well permit in Virginia. This information is required on the permit application as well.

61. Describe any **construction** requirements that will minimize or prevent releases to surface water, ground water, soil and air. In the case of reclamation facilities, describe any such requirements that apply to waste before and after reclamation. [5.10.2.2.c]

Secondary containment is required for tanks per 4VAC25-150-310.

62. If permit applications are required for **operating,** do they include: [5.10.2.2.d]

Regulated by EPA.

_____ An operating plan?

_____ Volume, rate and type of material to be disposed?

_____ Identification of the specific facilities that will be used to dispose of each waste stream (e.g., unlined or lined pits, tanks, etc)?

_____ Contingency plan for reporting, responding to and cleaning up spills, leaks and releases of wastes or waste byproducts, including provisions for notifying emergency response authorities and for taking operator-initiated emergency response actions?

_____ Ground water monitoring where wastes are managed on the land?

____ Plan for routine inspection, maintenance, and monitoring to ensure and demonstrate compliance with permit requirements, and in the case of land farming, ensure that organic wastes are effectively treated?

____ Specific engineering plans for preventing or minimizing the generation or emission of hydrogen sulfide gas?

____ A plan for the onsite sampling and/or testing to assure that RCRA Subtitle C or other wastes prohibited by the regulatory agency for disposal are not disposed at such a facility?

_____ Characterization of wastes accepted at the facility?

____ Plan for periodic removal and subsequent handling of free oil?

____ Security plan for the facility?

63. Describe the **closure and post-closure monitoring** and maintenance

requirements applicable to commercial facilities, including duration of post-closure care and financial assurance release schedules. [5.10.2.2.e]

All facilities would need to be removed and the well plugged. Site must be reclaimed and monitored for site stability. A stable site, as determined by the inspector, must be achieved before the permit may be released from bond.

64. For wastes not moved by pipeline, is there a requirement for **waste tracking?** If so, does it require: [5.10.2.3]

Operators are required to submit waste tracking records on an annual basis.

Yes A multi-part form that contains the names, addresses and phone numbers of the waste generator (producer), hauler, and disposal facility operator?

Hauler information is not required. But the waste generator's information and the disposal facility name and permit are required.

Yes Description and volume of the waste?

Yes Time and date it was collected, hauled and deposited at the disposal facility? Time requirement for maintenance of the form?

Time is not required. Must be submitted on an annual basis.

Yes Attesting that no illegal dumping occurred?

Operator must account for and provide the disposal facility utilized for all fluid wastes.

_n/a_ Certification by the hauler and disposal facility operator that no wastes were dumped illegally or at a location or facility not designated by the generator or permitted to receive the waste, and that no prohibited or hazardous wastes were mixed with the waste during transport?

_n/a_ Reporting of any discrepancies in waste descriptions, volumes or place of origin based on personal observations or information contained in the multi-part form?

65. Are **waste haulers** permitted or licensed based on a showing of basic knowledge of regulatory requirements? [5.10.2.3]

No. These are regulated by the Virginia Department of Transportation (VDOT).

IV. ABANDONED SITES (Guidelines Section 6)

1. Does your state have a program to **inventory, prioritize and remediate** (as necessary) abandoned oil and gas sites? [6.1]

   Yes, as funding allows.

2. Please provide reference to any **definitions** pertaining to abandoned sites or your abandoned well site program, including the types of facilities included in the definitions. [6.2]

   "Orphaned well" means any well abandoned prior to July 1, 1950, or for which no records exist concerning its drilling, plugging or abandonment.

3. Briefly describe your program for **identification, inventory and ranking** of abandoned sites. [6.3]

   Many of the wells are identified on a map that DGO utilizes to locate the wells. DGO obtains information from the public and DGO files, determines location coordinates using GPS, takes pictures and writes an inspection report that explaining the well's status. Wells are prioritized based on their location and if any fluids are escaping.

4. Briefly describe **funding** mechanisms available to the state for abandoned site remediation. [6.4]

   Funding is 100% provided by a $50.00 fee on each permit application. § 45.1-361.40. Orphaned Well Fund; orphaned wells.

5. Briefly describe the criteria used in your **abandoned site prioritizing** system. [6.5]

   Location (is it near a stream, house, etc.)

   If fluid escaping from the well.

   Is it close to other orphaned wells?

6. What are the state's abandoned site remediation **goals? How** is progress measured? [6.5.1]

   DGO plans to plug all orphaned wells so that the groundwater is protected and the site is reclaimed. Progress is measured during the cementing operation and by the success of revegetation and stabilization.

7. Briefly describe the state's program relating to establishing **liability** for the remediation of abandoned sites. Provide references to any statutory or regulatory

allocation of responsibility. [6.5.2]

The plugging/reclamation contractor is financially liable for the successful remediation of orphaned well sites. A performance bond is established as part of the procurement process. The contractor must hold a Class A license issued by the Commonwealth of Virginia.

8. Please provide reference to any **standards for abandoned site remediation.** [6.6]

   There are no separate standards for orphan wells. The reclamation requirements outlined in 4 VAC 25-150-260 apply.

9. Briefly describe the state's **abandoned well remediation** program, including any flexibility allowed in plugging procedures. [6.6.1]

   DGO plugs and reclaims the well to meet the requirements of 4 VAC 25-150-435.

10. Briefly describe the state's program for **surface remediation** of abandoned sites, including any requirements regarding present or future land use and consultation with surface owners. [6.6.2]

    DGO consults with the landowner to determine their preference for reclamation standards and seed mixtures.

11. What is the program for **maintenance of records** of remediated sites? How is public access assured? [6.6.3]

    Records are kept in the DGO electronic file system. It is provided to the public upon request.

12. Describe any **public participation** activities associated with the abandoned sites program, including public access to information, public participation in rulemaking associated with the program, and participation regarding the priority of sites on the inventory and level of remediation. [6.7]

    The public is involved in the regulatory review process. Public notification is provided when well plugging activities are scheduled to take place. Affected landowners are involved in the reclamation planning process.

V. NATURALLY OCCURRING RADIOACTIVE MATERIAL (Guidelines Section 7)

1. Discuss any activities the state has undertaken to determine the **occurrence and need for regulation** of NORM. [7.2]

   None to date.

2. Briefly discuss each of the following **program elements** as they apply to the NORM regulatory program (give reference to any statutory or regulatory requirements): [7.3]

   n/a

   http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-48961/250-3100-001.pdf

   a. Definitions [7.3.1]
   b. Action levels [7.3.2]
   c. Surveys [7.3.3]
   d. Worker protection [7.3.4]
   e. Licensing/permitting [7.3.5]
   f. Removal/remediation [7.3.6]
   g. Storage [7.3.7]
   h. Transfer of land and equipment for continued use [7.3.8]
   i. Release of sites, materials, and equipment [7.3.9]
   j. Disposal [7.3.10]
   k. Interagency coordination [7.3.11]
   l. Public participation [7.3.12]

VI. STORMWATER MANAGEMENT (Guidelines Section 8)

1. Describe any state program requirements for the **management of storm water** and the basis for its development. [8.1]

   All permits have a soil and erosion procedures identified in the plan. Storm water management is part of the plan.

2. Describe any state regulatory **program mechanisms** for storm water management or erosion control such as permits/authorizations, compliance evaluation, outreach and training, and program evaluation. [8.2]

   4VAC25-150-270. Stormwater Management.

   A. This section shall apply whenever an applicant or permittee must complete an erosion and sediment control plan under 4VAC25-150-260. The erosion and sediment control plan shall also describe how stormwater runoff will be managed in accordance with the standards of this section.

   B. Areas downstream from permitted sites shall be protected from sediment disposition, erosion and damage due to increases in volume, velocity and peak flow rates of stormwater runoff for the stated frequency storm of 24-hour duration in accordance with the following:

1. Increased volumes of sheet flows or concentrated flows that may cause erosion and sedimentation on adjacent property shall be diverted to a stable outlet, adequate channel or a sediment control, detention or retention facility.

2. Adequacy of all channels and pipes shall be verified in the following manner:

a. The applicant shall demonstrate that the total drainage area to the point of analysis within the channel is 100 times greater than the contributing drainage area of the site in question; or

b. The receiving channel or pipe shall be analyzed as follows:

(1) Natural channels shall be analyzed using data for a two-year storm to verify that stormwater will not overtop channel banks or cause erosion of the channel bed or banks.

(2) All previously constructed man-made channels shall be analyzed using data for a 10-year storm to verify that stormwater will not overtop its banks and using data for a two-year storm to demonstrate that stormwater will not cause erosion of the channel bed or banks.

(3) Pipes and storm sewer systems shall be analyzed using data from a 10-year storm to verify that stormwater will be contained within the pipe or system. A downstream stability analysis at the outfall of the pipe or storm sewer system shall also be performed.

3. All hydrologic analyses shall be based on the existing watershed characteristics and the ultimate development condition of the site.

4. If the applicant chooses an option that includes stormwater detention or retention, then the plan must provide for maintenance of the detention or retention facilities. The plan shall set forth the maintenance requirements of the facility and the person responsible for performing the maintenance.

5. Outflows from a sediment basin, stormwater management facility or other concentrated runoff leaving a permitted site shall be discharged into an adequate channel.

C. Stormwater runoff which has been contaminated by or come into contact with overburden, raw material, intermediate products, finished products, byproducts or wastes from gas, oil or geophysical operations located on the permitted site shall be managed in accordance with a plan approved by the director.

D. The director may waive or modify any of the requirements of this section that are deemed inappropriate or too restrictive for site conditions. The permittee's written request for a variance shall document the need for the variance and describe the alternate measures or practices to be used. Specific variances allowed by the director shall be documented in the operations plan. The director shall consider variance requests judiciously, keeping in mind both the need of the applicant to maximize cost effectiveness and the need to protect off-site properties and resources from damage.

3. Describe any regulatory **program criteria,** including:

   a. Planning requirements with respect to site development. [8.3.1]

      A site plan map and an operation plan narrative are included with the permit application.

   b. Construction standards or management practices appropriate for the area. [8.3.2]

      The operator is required to construct the site to prevent any off-site disturbances. Sediment control is to be established before ground is disturbed.

   c. Operation and maintenance measures to control sediment until the site is restored. [8.3.3]

      The operator is required to maintain sediment control until the site is stable and vegetation is adequately established.

   d. Restoration and reclamation standards. [8.3.4]

      The site is to be vegetated with a diverse permanent stand of vegetation. All facilities must be removed. The access road is to be reclaimed with the culverts removed and cross bars established.

VII. HYDRAULIC FRACTURING (Guidelines Section 9)

1. Has the state evaluated potential **risks associated with hydraulic fracturing,** taking into account factors such as depth of the reservoir to be fractured, proximity of the reservoir to fresh water resources, well completion practices, well design, and volume and nature of fluids? [9.2]

   Permits are evaluated to a radius of 1500' where the depth of the frack must be either 500' below the lowest surface point or below the lowest groundwater well within 1500'.

   Operators use frack focus to document the chemicals used in the frack.

Regulations are proposed to make this mandatory or submit the chemicals to a state data base.

A background groundwater survey is required to characterize pre drilling groundwater quality. Proposed regulations require post drilling sampling to identify any groundwater degradation due to well drilling and completion activities.

4 VAC 25-150-530 and 4 VAC 25-150-610 establish requirements for well casing and cementing including a water protection string cemented to surface. Proposed regulations require a cement bond log on the water protection string.

2. Has the state developed **standards to prevent the contamination** of groundwater and surface water from hydraulic fracturing? [9.2]

   4 VAC 25-150-530 and 4 VAC 25-150-610 establish requirements for well casing and cementing including a water protection string cemented to surface. Proposed regulations require a cement bond log on the water protection string.

   §45.1-361.44 of the law requires the company to replace any domestically used groundwater that has been affected by a gas well operation.

3. Describe how state standards for **casing and cementing** meet anticipated pressures associated with hydraulic fracturing to protect other resources and the environment. [9.2.1]

   DGO requires that all casing have a working pressure of a minimum of 110% of the maximum anticipated pressures.

4. Discuss how the program identifies and, where deemed appropriate, manages risks associated with **potential conduits for fluid migration** in the area of hydraulic fracturing. [9.2.1]

   Fluid migration is rare but it has occurred when a Coalbed Methane (CBM) well is fracked near an old conventional or deeper well and the older well was not cemented to today's standards. DGO identifies these scenarios to the gas operator during the permitting process.

5. Describe program requirements that address actions to be taken in **response to unanticipated operational or mechanical changes** encountered during hydraulic fracturing that may cause concern. [9.2.1]

   The operator is to immediately notify DGO of any incident that could cause an imminent environmental problem, a danger to the public or present any safety issues to the workers.

6. Briefly describe how **surface controls** associated with hydraulic fracturing, such

as dikes, pits or tanks, meet Sections 5.5 and 5.9 of the guidelines. [9.2.1]

Dikes, pits and tanks are operated and maintained in accordance with operational requirements that are noted in 5.5 and 5.9. All methods utilized in Virginia meet the standards of 5.5 and 5.9.

7. Briefly describe how **contingency planning and spill risk management** procedures related to hydraulic fracturing meet Section 4.2.1 of the guidelines. [9.2.1]

   Contingency plan would be contained in the company's Spill Prevention, Control and Countermeasure plan. Any other spills would be covered in the proposed Virginia regulations under the Emergency Response Plan.

8. Briefly discuss how hydraulic fracturing **waste characterization requirements,** including, as appropriate, testing of fracturing fluids, are consistent with Section 5.2 of the guidelines. [9.2.1]

   Fracturing waste characterization is required only when land application is requested. Fluid to be disposed by land application must meet the requirements of 4VAC25-150-420.

   4VAC25-150-420. Disposal of Pit and Produced Fluids.

   D. On-site disposal. The following standards for on-site land application of fluids shall be met:

   1. Fluids to be land-applied shall meet the parameters listed in the Department of Environmental Quality's "Ground water criteria," (9VAC25-280-70), following criteria:

   Acidity: <alkalinity

   Alkalinity: >acidity

   Chlorides: <5,000 mg/l

   Iron: <7 mg/l

   Manganese: <4 mg/l

   Oil and Grease: < 15 mg/l

   pH: 6-9 Standard Units

   Sodium Balance: SAR of 8-12

   2. Land application of fluids shall be confined to the permitted area.

3. Fluids shall be applied in a manner which will not cause erosion or runoff. The permittee shall take into account site conditions such as slope, soils and vegetation when determining the rate and volume of land application on each site. As part of the application narrative, the permittee shall show the calculations used to determine the maximum rate of application for each site.

4. Fluid application shall not be conducted when the ground is saturated, snow-covered or frozen.

5. The following buffer zones shall be maintained unless a variance has been granted by the director:

a. Fluid shall not be applied closer than 25 feet from highways or property lines not included in the acreage shown in the permit.

b. Fluid shall not be applied closer than 50 feet from surface watercourses, wetlands, natural rock outcrops, or sinkholes.

c. Fluid shall not be applied closer than 100 feet from water supply wells or springs.

6. The permittee shall monitor vegetation for two years after the last fluid has been applied to a site. If any adverse effects are found, the permittee shall report the adverse effects in writing to the division.

7. The director may require monitoring of groundwater quality on sites used for land application of fluids to determine if the groundwater has been degraded.

9. Briefly describe how the **waste management hierarchy** contained in Section 5.3 of the guidelines (source reduction, recycling, treatment and disposal), including the provisions relating to toxicity reduction, are promoted for hydraulic fracturing. [9.2.1]

   Currently there is no promotion of the waste management hierarchy in Virginia.

10. Briefly describe how the **tracking of hydraulic fracturing waste** disposed at commercial or centralized facilities meets the requirements of Section 5.10.2.3 of the guidelines. [9.2.1]

    Hydraulic fracturing waste is contained in onsite pits and is considered and disposed of as pit fluid per 4VAC25-150-420. Disposal of Pit and Produced Fluids.

    There are no special requirements specific to hydraulic fracturing waste.

    If taken to an approved injection well, the fluids are tracked and reported in the DGO electronic information system.

11. Briefly describe how procedures in place for receipt of **complaints** related to hydraulic fracturing are consistent with Section 4.1.2.1 of the guidelines. [9.2.1]

    Complaints related to hydraulic fracturing are handled the same as other types of complaints. DGO has the authority to inspect and conduct necessary investigations at gas and oil facilities involved in the complaint. Complaints can be received by phone, mail, e-mail or through the DMME website. The DGO policy is to make an initial response with the complainant within 24 hours and follow-up within 5 days.

12. Describe any required **notification** prior to, and reporting after completion of hydraulic fracturing operations. [9.2.2]

    The notice is sent to the DGO and DEQ electronically through the DGO electronic filing system.

    Forty-eight hours' notice is required before the completion operation.

    Forty-eight hours' notice is required before the well is flowed back to the pit.

13. Is notification sufficient to allow the **presence of field staff** to monitor hydraulic fracturing activities? [9.2.2]

    Yes, the e-form filing process is working adequately.

14. Describe **reporting requirements** for hydraulic fracturing activities and whether they include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded. [9.2.2]

    Volumes, proppants used, pressures, and zones fracked are recorded on the completion report.

    The proposed regulations require the operator to submit the chemicals utilized in the fracturing process in the permit.

15. Describe any mechanisms for **disclosure of information on chemical constituents** used in hydraulic fracturing fluids to the state in the event of an investigation or to medical personnel in the event of a medical emergency. [9.2.2]

    MSDS sheets are maintained on the site, chemical disclosure is currently handled through frac focus and DGO could also contact the company directly if necessary.

The proposed regulations require the operator to provide and maintain the Chemical Abstracts Service (CAS number). Any chemical component classified as a trade secret can only be release in the event of an emergency.

16. Briefly describe how hydraulic fracturing information submitted that is of **a confidential business nature,** is treated consistent with Section 4.2.2 of the guidelines. [9.2.2]

    Most information submitted to DGO is available to the public.

    § 45.1-361.6. Confidentiality.

    The Director shall hold confidential all logs, surveys and reports relating to the drilling, completion and testing of a well which are filed by gas or oil operators under this chapter for a period of ninety days after the completion of the well or eighteen months after the total depth of the well has been reached, whichever occurs first. Upon receipt of a gas, oil, or geophysical operator's written request, the Director shall hold confidential this information concerning an exploratory well or corehole for a period of two years after completion of the well or four years from the date such well or hole reaches total depth, whichever occurs first. The Director, for good cause shown by the gas, oil, or geophysical operator, may annually extend the period of time for which information regarding exploratory drilling is held confidential. However, the Director shall upon request provide a copy of any survey or log for strata through the lowest coal seam to the coal owner.

    The proposed regulations require the operator to provide and maintain the Chemical Abstracts Service (CAS number). Any chemical component classified as a trade secret can only be release in the event of an emergency.

17. Briefly discuss if, in addition to the personnel and funding recommendations found in Section 4.3 of the guidelines, **state staffing levels** sufficient to receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing. [9.2.3]

    Staffing levels are adequate to respond and investigate complaints and incidents related to hydraulic fracturing. The DGO has three open positions that could be filled if funding comes available.

18. Describe staff **training** to stay current with new and developing hydraulic fracturing technology. [9.2.3]

    DGO constantly seeks opportunities to receive training and information related to developments in hydraulic fracturing, including collaboration with IOGCC as well as operators and contractors in the gas and oil industry. Currently, the DGO has minimal funding for specialized training.

19. Briefly describe how the state agency provides for **dissemination of**

educational information regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public as provided in Section 4.2.2.2 of the guidelines. This is especially important in areas where development has not occurred historically and in areas where high volume water use for hydraulic fracturing is occurring. [9.2.4]

The DGO disseminates educational information concerning fracturing and other issues through career fairs, energy seminars, tours, brochures and public meetings. Educational information on fracturing is found on the DMME website.

20. Fundamental differences exist from state to state, and between regions within a state, in terms of geology and hydrology. Describe how the state evaluated and addressed, where necessary, the **availability of water for hydraulic fracturing** in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing. [9.3]

    Current gas and oil operations have required relatively little water for hydraulic fracturing in Virginia (100,000 to 300,000 gallons). The availability of water has not been an issue in Virginia. Water use is regulated by DEQ in Virginia if withdrawals from surface or groundwater sources exceed an average of 10,000 gallons per day during any single month per 9VAC25-200.

21. Describe how the availability and use of alternative water sources for hydraulic fracturing, including recycled water, is encouraged. [9.3]

    The use of alternative water sources has not been an issue in Virginia.

22. Briefly describe how **waste** associated with hydraulic fracturing is managed consistent with Section 4.1.1 and Section 7 of the guidelines. [9.3]

    Hydraulic fracturing waste is handled as pit fluid and a proper disposal plan is required in order to obtain a well permit. NORM in E&P waste has not been an issue in Virginia.

23. Discuss how the state encourages the efficient development of adequate **capacity and infrastructure** for the management of hydraulic fracturing fluids, including the transportation, recycling, treatment and disposal of source water and hydraulic fracturing wastes. [9.3]

    Frack fluids are disposed as pit fluid. Pit fluids are disposed by land application or taken to an injection well. Disposal of pit fluids requires an application and approval process through DGO. Companies are required to track fluids to an off-site disposal well. Tracking information is submitted to DGO as part of their annual report.

24. Discuss how the state encourages the efficient development of adequate capacity and infrastructure for the management of hydraulic fracturing fluids, including the transportation, recycling, treatment and disposal of source water and hydraulic fracturing wastes. [9.3]

    Gas and oil production activities are relatively small in Virginia. Source water and disposal capacity has not been an issue.

VIII. REUSED AND RECYCLED FLUIDS (Guidelines Section 11)

1. Please provide **definitions** used by the state to differentiate between "reused fluids" and "recycled fluids". [11.1]

   No such definitions exist in Virginia's program.

2. Discuss how operators are encouraged to develop **water management plans** that consider reuse and recycling options. [11.2]

   Virginia has not encouraged reuse and recycling options.

3. Have **barriers** to reuse and recycling options been identified at the state level, and if so, how has the state sought to reduce those barriers? [11.2]

   No barriers have been identified and Virginia has not pursued this subject.

4. How has the state pursued **interagency coordination** where jurisdictional issues exist between multiple state agencies, river basin commissions, and other parties involved in the management of reused and/or recycled fluids? [11.2]

   These issues are handled on a case by case situation.

5. Does the state have a **regulatory process** to designate fluids as a non-waste when the fluid is treated to a satisfactory level and reused and/or recycled? [11.3]

   No

6. Discuss how the state regulates **pipelines** transporting fluids to be reused and/or recycled. [11.4.1]

   If utilized, the pipelines would be regulated as other pipeline according to the regulations. Virginia has not had this request.

7. Describe the state's **leak detection** program requirements for pipelines transporting fluids to be reused and/or recycled. [11.4.1]

   Virginia does not have this regulatory requirement.

8. Discuss how the state encourages operators to utilize **smart truck routing** for

truck transportation of fluids to be reused and/or recycled. [11.4.2]

Virginia does not have this requirement but would recommend implementation of the program if the trucks were in a large residential or commercial area.

9. Describe the state's rules for the **treatment and storage** of fluids to be reused and/or recycled. [11.5]

   Virginia has no rules established for the treatment and storage of fluids for reuse.

10. Describe the state's **permitting process** for facilities used for the storage of reused and/or recycled fluids. [11.5]

    Virginia has no rules established for the treatment and storage of fluids for reuse.

11. Discuss how the state's **waste management** requirements (including tracking and reporting) apply to fluids to be reused and/or recycled. [11.5]

    Recording and reporting of fluid transportation is only required for storage transfer or disposal. Virginia has no rules established for the treatment and storage of fluids for reuse.

12. Describe how the state differentiates between **centralized and commercial** wastewater treatment facilities, and any special requirements for facilities that process fluids to be reused and/or recycled. [11.5]

    No differentiation in current regulations. There are no centralized or commerical facilities that process fluids for reuse or recycling in Virginia.

13. Describe how the state regulates **waste generated during the treatment** of fluids to be reused and/or recycled. [11.5]

    Presently, there are no centralized or commercial facilities that process fluids for reuse or recycling in Virginia. Virginia has not developed regulation for waste generated fluids.

14. Describe the conditions under which the state requires **groundwater monitoring**. [11.5]

    The state requires companies to sample ground water sources within 750 feet of the well location for baseline purposes. Follow-up sampling or monitoring is not required but monitoring regulations have been proposed and our currently in the review process.

The proposed regulations extend this distance to ¼ of a mile with pre and post testing.

15. Describe how the state's methodology for the determination of the presence of **NORM** applies to fluids to be reused and/or recycled. [11.5]

    Virginia does not require monitoring for NORM.

16. Has the state evaluated whether **air emissions** at facilities used for the storage and/or treatment of fluids to be reused and/or recycled require an air quality permit, authorization, or exemption? [11.5]

    Air emissions are regulated by the Virginia DEQ. The DGO would assist DEQ if required.

DEQ Questionnaire – STRONGER Air Quality Guidelines

Please provide the requested information in a brief manner that describes the program in sufficient terms for the review team to understand, but does not go into excessive detail. During the interview the review team will ask for additional detail or clarification on points which they feel merit further discussion.

To the extent possible, provide hyperlinks to state web pages where the review team can access statutes, rules, policies, guidance, reports and other related information used to support your responses.

Numbers (10.n.n.n) indicate the reference to Section 10 of the STRONGER Guidelines.

1. Identify the agency or agencies with jurisdictional responsibilities for air quality related to oil and gas exploration and production and provide the information requested below.

   State Air Pollution Control Board
   Virginia Department of Environmental Quality
   629 Main Street
   P.O. Box 1105
   Richmond, VA 23218
   (804) 698-4000

   a. Statutory authority detailing powers and duties (10.2.1.2)

      State Air Pollution Control Board statute:
      Code of Virginia §10.1 Chapter 13
      http://law.lis.virginia.gov/vacode/title10.1/chapter13/

      State Air Pollution Control Board regulations:
      Virginia Administrative Code, Title 9, Agency 5 (9VAC5)
      http://law.lis.virginia.gov/admincode/title9/agency5/

   b. Authority for oversight and ability to develop regulations to meet state obligations under federal law (10.2.1.3)

      State Air Pollution Control Board
      Code of Virginia §10.1-1307:
      http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1307/

      Code of Virginia §10.1-1308:
      http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1308/

9VAC5 Chapter 170, Part III:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter170/

c. Authority to promulgate more stringent than federal regulations as necessary to protect public health and the environment (10.2.1.4)

Code of Virginia §10.1-1308:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1308/

d. Authority to accept delegation of federal air programs for oil and gas (10.2.1.5)

General authority:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter20/section21/

Specific citations of authority appear in individual Articles. Examples are given below:

New Source Performance Standards: 9VAC5 Chapter 50, Part II, Article 5
http://law.lis.virginia.gov/admincode/title9/agency5/chapter50/section405/

National Emission Standards for Hazardous Air Pollutants: 9VAC5 Chapter 60, Part II, Article 1
http://law.lis.virginia.gov/admincode/title9/agency5/chapter60/section65/

Maximum Achievable Control Technology Standards: 9VAC5 Chapter 60, Part II, Article 2
http://law.lis.virginia.gov/admincode/title9/agency5/chapter60/section95/

e. Authority to consider cost effectiveness in setting standards and to exempt de minimis facilities or sources (10.2.1.6)

See Administrative Process Act (APA):
http://law.lis.virginia.gov/vacode/title2.2/chapter40/

Economic Impact Analysis requirement of APA:
http://law.lis.virginia.gov/vacode/title2.2/chapter40/section2.2-4007.04/

Economic consideration by Virginia Air Pollution Control Board

Code of Virginia §10.1-1307.E:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1307/

Cost consideration for minor source permitting BACT determinations:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter50/section250/

Cost consideration for major source permitting BACT determinations:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section1615/

The State Air Pollution Control Board's authority to develop regulations:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1308/

Exemptions from minor new source permitting requirements:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section1105/

Insignificant activities with regard to Title V operating permit applicability:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section720/

f. Statutes and regulations with clearly defined terminology (10.2.1.7)

Code of Virginia §10.1-1300:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1300/

Most 9VAC5 Chapters and/or Articles contain their own definitions. Some examples are referenced below.

General definitions:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter10/section20/

Individual Articles within Chapter 80 (permit rules) contain their own definitions (see link below):
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/

g. Adequacy of funding for staff and equipment to carry out duties and meet objectives (10.2.1.8)

State Air Pollution Control Board authority to receive monies and collect fees:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1307/
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1322/

Requirement for sources to pay permit application fee:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section2290/

Requirement for sources to pay maintenance fee:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section2350/

Requirement for sources to pay emission fee:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/section350/

h. Mechanisms for coordination among stakeholders (10.2.1.9)

APA requirements:
http://law.lis.virginia.gov/vacode/title2.2/chapter40/section2.2-4007.02/

Individual permit-related Articles and Chapters contain their own specific public participation requirements.

i. Technical criteria for air emission controls (10.2.1.10)

Best Available Control Technology
http://law.lis.virginia.gov/admincode/title9/agency5/chapter50/section260/

2. Provide reference to any oil and gas exploration and production related NAAQS nonattainment areas and related SIP approval status. (10.2.2)

There are no nonattainment areas in the southwest region. We are unaware of any O&G sites in the Northern Virginia Ozone Nonattainment Area, which is the Commonwealth's only nonattainment area.

3. Describe the level of federal delegation of air quality requirements related to oil and gas exploration and production. (10.2.2)

Virginia DEQ has been fully delegated by EPA to enforce many, but not all, federal regulations:
http://law.lis.virginia.gov/admincode/title9/agency5/chapter20/section21/
http://www.deq.state.va.us/Portals/0/DEQ/Air/Regulations/505.pdf
http://www.deq.state.va.us/Portals/0/DEQ/Air/Regulations/602.pdf

Following is a non-exhaustive list of regulations potentially impacting oil and gas industries.

Incorporation by reference of the federal New Source Performance Standards subpart OOOO: 9VAC5-50-410 Subpart OOOO - Crude Oil and Natural Gas Production, Transmission and Distribution

Incorporation by reference of Maximum Achievable Control Technology Standards subparts HH and HHH: 9VAC5-60-100 Subpart HH – Oil and Gas Production Facilities, and 9VAC5-60-100 HHH – Natural Gas Transmission and Storage Facilities

4. Describe your permitting program and the process by which emissions are estimated during the permitting process. (10.2.3)

Authority of the State Air Pollution Control Board to issue permits:
http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1322/

Virginia's minor stationary source pre-construction permit rule: 9VAC5-80 Article 6 – Permit applicability for new sources and projects at sources is determined by one or both of the following, 1) comparing the emission units size or rating to categorical exemption thresholds, and/or 2) comparing the source or project's uncontrolled emission rates to exemption thresholds in the Article.

Virginia's major stationary source pre-construction permit rule: 9VAC5-80 Article 8, Prevention of Significant Deterioration – Permit applicability is determined for new sources and modifications by comparing potential or projected future actual emissions to significant emission increase thresholds in the Article.

Various other permit-related Articles are included in Chapter 80.
http://law.lis.virginia.gov/admincode/title9/agency5/chapter80/

5. Describe your compliance monitoring, demonstration and assurance program, including the information requested below. (10.2.4)

In addition to state law (http://law.lis.virginia.gov/vacode/title10.1/chapter13/section10.1-1306/;

http://law.lis.virginia.gov/vacode/10.1-1309/) and regulation (http://law.lis.virginia.gov/admincode/title9/agency5/chapter20/section180/; http://law.lis.virginia.gov/admincode/title9/agency5/chapter40/section20/; http://law.lis.virginia.gov/admincode/title9/agency5/chapter50/section20/), individual regulations have specific compliance monitoring, demonstration and assurance requirements.

a. Procedures for receipt, evaluation, retention and investigation of notices and reports (10.2.4.1)

b. Inspection and monitoring procedures that are independent of information supplied by the regulated entity (10.2.4.2)

c. Procedures for receipt and evaluation of information submitted by the public (10.2.4.3)

d. Authority to conduct unannounced inspections and inspect, sample, monitor or otherwise determine compliance (10.2.4.4)

e. Authority to copy or obtain records (10.2.4.5)

f. Procedures to ensure that documents and evidence are managed in a manner that will permit their use during enforcement proceedings (10.2.4.6)

g. Authority to require stack testing to establish or verify compliance (10.2.4.7)

h. Authority to establish requirements for recordkeeping, reporting, sampling, stack testing, and compliance certification. (10.2.4.8)

6. Describe your enforcement program, including the available enforcement tools and the relative frequency of their use. (10.2.5.1)
   More information about DEQ's enforcement program is available at: http://www.deq.state.va.us/Programs/Enforcement.aspx

7. Provide any penalty calculation guidance in use in your program. (10.2.5.2)
   See: http://www.deq.state.va.us/Programs/Enforcement/Laws,Regulations,Guidance.aspx.

8. Describe the appeal or review rights afforded to persons aggrieved by an action of the agency. (10.2.5.3)
   See Part VIII of 9VAC5-170 (http://www.deq.state.va.us/Portals/0/DEQ/Air/Regulations/C170-ADM.pdf), Rule 2A:2 of the Supreme Court of Virginia (http://www.courts.state.va.us/courts/scv/rulesofcourt.pdf), and the

Administrative Process Act
(https://www.townhall.virginia.gov/um/dpb_apa.htm).

9. Describe your staffing patterns, training opportunities provided to staff, and methods used to assess and retain staff. (10.2.6)
   See: http://www.deq.state.va.us/AboutUs/StrategicPlan.aspx

10. Describe your data management program, including access to data systems in other programs containing inventories of facilities, and describe how information is made available to the public. (10.2.7)
    DEQ maintains an enterprise database system known as the Comprehensive Environmental Data System (CEDS). Information is available to the public on request.

11. Describe any public involvement provisions that are part of your program. (10.2.8)
    Specific public involvement requirements are included in individual state and federal regulations. DEQ's Southwest Regional Office conducted training sessions specific to the O&G industry explaining the requirements of subpart OOOO. In addition, DEQ has a strong public outreach program that can address program specific needs on an ad hoc basis:
    http://www.deq.virginia.gov/connectwithdeq/environmentalinformation.aspx.

12. Describe any outreach efforts of your program. (10.2.9)
    See:
    http://www.deq.virginia.gov/connectwithdeq/environmentalinformation.aspx.
    There are no specific activities relevant to O&G at this time.

13. Describe your strategic and resource planning processes. (10.2.10)
    See: http://www.deq.state.va.us/AboutUs/StrategicPlan.aspx.

14. Describe your inventories of oil and gas exploration and production sources and activities. (10.3.1)
    See: https://www.dmme.virginia.gov/dgoINQUIRY/. All well notifications are housed in the DMME database with information accessible through their website. DEQ is provided with immediate electronic notification. Other oil/gas sources of compressors, glycol dehydrators, etc. may be permitted or registered based on potential emission estimates.

15. Describe how the air program addresses the reporting and correction of unplanned and episodic emissions. (10.3.2)
    See 9VAC5-20-180:
    http://law.lis.virginia.gov/admincode/title9/agency5/chapter20/section180/. In addition to the regulatory citation for registered/permitted sources, O&G facilities submit annual reports in accordance with subpart OOOO and other applicable regulations.

16. Describe how the air program interfaces with the oil and gas conservation program on wasted gas from venting and flaring. (10.3.2)
    See subpart OOOO. In addition, Natural Gas STAR is a flexible, voluntary partnership that encourages oil and natural gas companies to adopt proven, cost-effective technologies and practices that improve operational efficiency and reduce methane emissions.

17. Describe your air quality monitoring network as it relates to oil and gas exploration and production activities. Including the following. (10.3.3)
    See: http://www.deq.state.va.us/Programs/Air/AirMonitoring.aspx.

    a. The number and location of monitors and frequency of monitoring

    b. Ambient air quality monitoring

    c. Sharing with the public the air quality data from the monitoring network

18. Describe the reporting, emissions inventory and recordkeeping requirements applicable to various oil and gas activities. (10.3.4)
    These requirements are contained in the state and federal regulations described above. Many various reporting/recordkeeping scenarios are required for the O&G industry in accordance with NSPS subpart OOOO, MACT HH and MACT HHH. A variety of tank emission estimate models are available and used by the industry.

19. Describe the oil and gas emission tools used in determining sources to be reported to EPA every three years. (10.3.4)

    There is no oil and gas tool that we are aware of that is used in determining sources to be reported to EPA every three years for the purpose of subpart OOOO. Only the DEQ regional office and DMME would have access to detailed information about individual sources to determine which ones are subject to NSPS subpart OOOO.

    Subpart OOOO is a source performance standard, not an emission reporting rule. Subpart OOOO specifies certain controls or requirements for equipment that the oil and gas industry may utilize. For the most part, the rule specifies new source performance standards that must be met and the oil and gas industry is obligated to comply with those standards and that is basically it. Beyond that, there generally isn't a specific emission inventory reporting requirement that the oil and gas industry must meet as part of Subpart OOOO for these non-point sources, other than what DEQ or DMME may require for inspection or compliance purposes.

    There is an "National Nonpoint Oil & Gas Emissions Estimation Tool" which was developed by the EPA, but it not intended to address subpart OOOO compliance. EPA developed the "Nonpoint Oil & Gas Emissions Estimation

Tool" to estimate the emissions for the oil and gas sector because there was little emission data available pertaining to these types of sources prior to that. EPA relies on oil and gas site data that they obtain directly from DMME as far as the number of new and existing wells in order to estimate emissions within the "Nonpoint Oil & Gas Emissions Estimation Tool." Virginia utilizes the oil and gas emission estimates calculated with the EPA "Nonpoint Oil & Gas Emission Estimation Tool" for emission inventory and air quality planning purposes.

20. Describe methods you are using to develop air quality emission projections related to oil and gas, and methods used in making the information available to the public. (10.3.4)
    For emission inventory purpose, DEQ accepts the emission estimates developed by the EPA "Nonpoint Oil & Gas Emissions Estimation Tool" since we don't have an alternate means of estimating oil and gas emissions. We have not generally had a need to project oil and gas emissions into the future, but MARAMA is currently attempting to do that for a regional inventory that they are developing.

21. Describe the criteria used for the reporting of significant releases to the air, and required emergency response reports and actions. (10.3.5)
    See 9VAC5-20-180:
    http://law.lis.virginia.gov/admincode/title9/agency5/chapter20/section180/
    and 9VAC5-70:
    http://www.deq.state.va.us/Portals/0/DEQ/Air/Regulations/700.pdf.

22. Describe your long-term planning, prioritization and evaluation process. (10.3.6)
    See: http://www.deq.state.va.us/AboutUs/StrategicPlan.aspx.

23. Provide any additional information pertaining to the air quality control of oil and gas exploration and production facility emissions that you feel would be beneficial to the review team in the preparation of the review report. This should include any 'above and beyond' program functions that may be of interest to other states.

    DEQ has worked extensively with DMME Oil & Gas for coordination of well information and other critical parameters associated with the federal subparts. DEQ has entered into to formal agreements with DMME in order to facilitate management of these sources; see attached.

    Persons interested in receiving information about regulatory and permitting actions germane to oil and gas production in Virginia should sign up for Town Hall email notification: www.townhall.virginia.gov. Regulatory and permitting actions are also posted on the DEQ web site: www.deq.virginia.gov.

    If there are any further questions or a need for more information about this

survey, please contact the following staff:

ISSUES SPECIFIC TO SOUTHWEST VIRGINIA:
Compliance: Crystal Bazyk, 276-676-4829, crystal.bazyk@deq.virginia.gov
Permits: Rob Feagins, 276-676-4835, rob.feagins@deq.virginia.gov

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2016 Virginia Follow-Up State Review

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2016 Virginia Follow-Up State Review

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2016 Virginia Follow-Up State Review

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Appendix D – 2015 Edition STRONGER Guidelines

STRONGER

State Review of Oil & Natural Gas Environmental Regulations

2015 Guidelines

State Review of Oil and Natural Gas Environmental Regulations, Inc.
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SECTION 1 | Introduction

1.1 Background

The 1980 amendments to the Resource Conservation and Recovery Act (RCRA) created an exemption to the federal hazardous waste program for oil and gas exploration and production (E&P) wastes pending completion of a study by the U.S. Environmental Protection Agency (EPA). In 1988, EPA completed its study and determined that these wastes should not be regulated as hazardous wastes. EPA's regulatory determination concluded that existing state and federal regulations were generally adequate, but that some regulatory gaps existed and that enforcement of existing regulations was inconsistent. EPA proposed a three-pronged approach to address these concerns that included working with the states to encourage improvement in state regulations and enforcement programs. Further discussion of the regulatory determination follows in section 1.2.

In 1989, the Interstate Oil and Gas Compact Commission ("IOGCC") responded by offering to assist EPA by creating a state regulatory review process. The IOGCC created the Council on Regulatory Needs, bringing together state, environmental, and industry representatives to develop national guidelines for state oil and gas programs. In early 1990, the Council released a document entitled "EPA/IOCC Study of State Regulation of Oil and Gas Exploration and Production Waste". This document established guidelines that represented recommended criteria for regulatory programs. The Council also proposed to implement a process by which state oil and gas programs were reviewed in comparison with those guidelines.

In 1990, EPA provided a grant to the IOGCC to initiate state regulatory program reviews in comparison with the guidelines. Review teams were comprised of state regulatory officials, environmental representatives, and industry representatives. Representatives of other interested parties, such as federal agencies and tribal governments, were invited to observe the process. State reviews were conducted in states that volunteered for review. Recommendations were offered as blueprints for change to be considered by state legislators and regulators.

The Council recommended that the guidelines be reviewed and updated every three years. In 1994, the Council updated the guidelines and added sections regarding naturally occurring radioactive material (NORM) and abandoned wells.

In 1999 a multi-stakeholder organization was formed by the state review program participants to revitalize and carry the state review program forward. This organization is called State Review of Oil and Natural Gas Environmental Regulations, Inc. ("STRONGER"). STRONGER is a non-profit corporation that has been formed to educate regulators and the public as to the appropriate elements of a state oil and gas exploration and production regulatory program, and

to compare various state programs against the guidelines developed by STRONGER and for the protection of public health, safety and the environment.

In 1999, STRONGER established five committees to review and update the 1994 version of the Guidelines. STRONGER incorporated the consensus recommendations of the committees, including a new section on performance measures in the 2000 Guidelines update. STRONGER again initiated revision and updating of the Guidelines in 2004, which resulted in the 2005 Guidelines. The 2005 Guidelines incorporate spill prevention and performance measures into the administrative criteria section, and were expanded to include a new section on stormwater management. In 2009 STRONGER formed a workgroup that developed guidelines for hydraulic fracturing that were finalized in 2010, and updated in 2013. STRONGER adopted guidelines for Air Quality in 2014. In 2015 STRONGER adopted guidelines for Reused & Recycled Fluids, as well as making minor updates to the General Criteria, Administration, Technical Criteria, NORM, and Hydraulic Fracturing sections.

Since 1990, 38 initial and follow-up state reviews have been conducted against the guideline standards: 12 under the 1990 guidelines, 5 under the 1994 revised guidelines, 11 under the 2000 guidelines, 2 under the 2005 guidelines, and 6 focused on hydraulic fracturing. These states represent over 94% of all domestic, onshore oil and gas production. The states have implemented many of the recommended improvements, as documented in STRONGER's report entitled "A Report and History on the STRONGER State Review Process" (June, 2015).

1.2 EPA's Regulatory Determination for E&P Waste

The 1980 amendments to the RCRA required EPA to conduct a study of the environmental and potential human health impacts associated with E&P wastes and their associated waste management practices. EPA completed its two-year study in 1987. Based on the findings in the Report to Congress, and on oral and written comments received during public hearings in the spring of 1988, on June 30, 1988, EPA decided not to recommend federal regulation of E&P wastes as hazardous wastes under Subtitle C of RCRA (EPA 1988). The Agency gave the following reasons for its determination:

a. "Subtitle C does not provide sufficient flexibility to consider costs and avoid the serious economic impacts that regulation would create for the industry's exploration and production operations;

b. "Existing state and federal regulatory programs are generally adequate for controlling oil, gas, and geothermal wastes. Regulatory gaps in the Clean Water Act and UIC (Underground Injection Control) program are already being addressed, and the remaining gaps in state and federal regulatory programs

can be effectively addressed by formulating requirements under Subtitle D of RCRA and by working with the States;

c. "Permitting delays would hinder new facilities, disrupting the search for new oil and gas deposits;

d. "Subtitle C regulation of these wastes could severely strain existing Subtitle C facility capacity;

e. "It is impractical and inefficient to implement Subtitle C for all or some of these wastes because of the disruption and, in some cases, duplication of state authorities that administer programs through organizational structures tailored to the oil and gas industry; and

f. "It is impractical and inefficient to implement Subtitle C for all or some of these wastes because of the permitting burden that the regulatory agencies would incur if even a small percentage of these sites were considered Treatment, Storage, and Disposal Facilities (TSDFs)." (53 FR 25456, July 6, 1988).

In the determination, EPA found that "existing state and federal regulations are generally adequate...Certain regulatory gaps do exist and enforcement of existing regulation in some states is inadequate." To address those concerns, EPA announced a three-pronged approach that consists of:

- "Improving federal programs under existing statutory authorities in RCRA Subtitle D, the Clean Water Act, and the Safe Drinking Water Act;
- "Working with states to encourage improvements in the states' regulations and enforcement of existing programs; and
- "Working with Congress to develop any additional statutory authority that may be required."

1.3 State and Federal Relations

Periodic evaluations of state and federal E&P waste management programs have proven useful in improving the effectiveness of those programs and increasing cooperation between federal and state regulatory agencies. Stakeholder review mechanisms have demonstrated the need for establishment of a performance baseline against which E&P waste management programs can be evaluated. Those mechanisms have led to the identification of strategies that will improve communication and program understanding between the states and the federal government.

1.3.1 Strategies for Maintaining a Successful Relationship Between State and Federal Agencies

As stated in EPA's regulatory determination for E&P waste, "…existing state and federal regulations are generally adequate to control the management of oil and gas wastes. Certain regulatory gaps do exist, however, and enforcement of existing regulations in some states is inadequate." The key is that overall state programs are adequate, and have improved since 1990 through adoption of recommendations from reviews, information sharing among the states and self-initiated program improvements. To address remaining gaps and build upon the success of the state review program, the focus of future efforts should be to utilize information developed from the reviews already conducted, augmented by new information developed by the stakeholders, to improve the performance of state regulatory programs.

The stakeholders — oil and gas producing states, public interest representatives, and industry representatives — have identified ten related strategies that enhance state and federal relationships.

a. Commitment to Work Cooperatively. The states and federal agencies should maintain a commitment to work cooperatively to improve the design, implementation, and enforcement of state and federal programs for managing E&P wastes. State and federal agencies should take steps to encourage open communications among state and federal agencies, the regulated industry, and other interested parties pertaining to the management and regulation of E&P wastes.

b. Recognition of Different Priorities. States should recognize the interest of federal agencies in achieving national goals and objectives and assuring adherence to federal statutory and regulatory requirements. At the same time, federal agencies should recognize the authorities, responsibilities, and capabilities of states to regulate certain activities within their borders.

c. Recognition of Different Statutory Objectives. Several of the federal statutes governing protection of the environment (*e.g.,* RCRA, Clean Water Act (CWA), Safe Drinking Water Act (SDWA), Clean Air Act (CAA)) provide for state implementation of certain elements with federal oversight. The objectives of and authorities granted by each statute differ. As such, it should be recognized that federal and state authorities and implementation approaches may differ.

d. Recognition of Regional Diversity. As discussed in the Report to Congress and the legislative history of the SDWA, variable approaches to the management of E&P wastes are necessary. These variable approaches are partly a result of the different geologic, hydrologic, or historic conditions in states and areas

within a state, the diverse characteristics of oil and gas activities, and differences in state government structures among the producing states. Guidelines or criteria, whether issued by a federal agency such as EPA or as advocated by STRONGER, should be sufficiently flexible to permit states to take into account these varying conditions.

e. Baseline of Performance. The criteria adopted by STRONGER should be used by federal or state agencies that are responsible for any portion of an E&P waste management program. These criteria should serve as a baseline of performance by which the effectiveness of programs can be judged. The criteria provide states flexibility to address unique conditions while accomplishing the goals set forth in Section 3.

f. State Responsibility for Enforcement. Enforcement is a critical component of a state E&P waste management program. Federal government involvement should occur only if the state agency fails to enforce the requirements or requests federal assistance.

g. State Program Review Process. The state program review process should continue to provide states with an independent evaluation of their E&P waste management programs using criteria adopted by the IOGCC and STRONGER.

h. Resolving Conflicts/Building Consensus. Where there are unresolved national issues or concerns regarding E&P waste management, a task force should be created which is similar in makeup and form to that established for the EPA's Office of Drinking Water Mid-Course Evaluation of Class II UIC programs. The creation of this task force would bring knowledgeable federal and state regulators together to discuss issues, to ascertain whether problems associated with these issues are real or perceived, and to decide how best to address the issues. This process should be based on the best available information and could be initiated by either the federal government or the states.

i. Effective Multi-Agency Coordination. Coordination among the state agencies is addressed in more detail in section 4.4. However, each state should recognize that coordination among various agencies is necessary for building and maintaining trust between the state agencies and the federal agency that has oversight responsibilities.

j. Technical and Financial Assistance. The federal government should provide technical and financial assistance to states to improve the design, implementation, and enforcement of state E&P waste management programs. Such assistance may be in the areas of training, enforcement, and data management.

SECTION 2 | Scope of the Criteria

2.1 General

a. These criteria are intended to guide states in assessing and improving their regulatory programs for E&P waste management, abandoned sites, naturally occurring radioactive materials (NORM), storm water management, hydraulic fracturing, air quality, and reused & recycled fluids. This document, therefore, sets out the elements of an effective program using "should" rather than the mandatory "shall", and “are encouraged to” for elements which are desirable, but which are not necessary for an effective program.

b. These criteria address waste management practices that are unique to E&P operations and wastes that were determined by EPA to be exempt from the hazardous waste management requirements of Subtitle C of RCRA. These narrowly defined wastes include drilling muds and cuttings, produced water and other wastes associated with E&P activities. The chemical and radiological characteristics of these wastes and the management practices associated with the storage, treatment, and disposal of these wastes are covered by these criteria. Wastes that are uniformly regulated by RCRA hazardous waste management requirements, as well as general industrial wastes such as solvents, off-specification chemicals, commercial products, household wastes, and office refuse are not addressed by these criteria.

c. These criteria apply to all new and currently operating E&P waste management facilities. In addition, the criteria in Section 6 apply to abandoned sites, the criteria in Section 7 apply to NORM, the criteria in Section 8 apply to storm water management, the criteria in Section 9 apply to hydraulic fracturing, the criteria in Section 10 apply to air quality, and the criteria in Section 11 apply to reused and recycled fluids.

d. These criteria do not address disposal of E&P wastes by injection or surface discharge when those waste management practices are regulated by EPA or by the states under authority of the federal SDWA and federal CWA, respectively. Brief descriptions of the regulatory frameworks authorized by those laws follow in Sections 2.2. and 2.3.

e. In addition to a review of provisions of the SDWA and CWA that are applicable to E&P wastes, this section also contains federal definitions of solid wastes and hazardous wastes and reviews EPA's waste mixture rule; lists examples of exempt and non-exempt E&P wastes; and describes general requirements for the management of non-exempt wastes. States may have different definitions

for solid and hazardous wastes.

2.2 Class II Injection Wells

The SDWA is the primary federal statute that governs injection wells. The SDWA required the EPA to promulgate regulations to protect drinking water sources from contamination through underground injection, but directed the Agency not to prescribe requirements that would impede oil and gas production. EPA established five classes of injection wells, categorized by purpose, potential for endangering drinking water, depth of injection, and characteristics of their injectate quality. Class II injection wells are broadly defined as related to oil and gas injection activities. Activities in this class relate to the disposal of fluids associated with oil and gas exploration and production, enhanced recovery operations, and the storage of liquid hydrocarbons.

Enhanced recovery describes all efforts to increase ultimate production of oil and gas from a reservoir, and this terminology will be considered to encompass other nomenclature in common usage such as pressure maintenance, secondary recovery, and tertiary recovery. All enhanced recovery techniques include methods for supplementing natural reservoir forces and energy, or otherwise increasing ultimate recovery. Such techniques include water injection, gas injection, gas cycling, and miscible chemicals and thermal processes.

Class II UIC programs are administered by the States where EPA has approved primary enforcement authority (primacy), or are directly implemented by EPA where the States have not sought or received approval for their UIC program. Amendments to the SDWA in 1980 further allowed a State with an existing regulatory program to obtain primary enforcement authority from EPA as long as the State was able to demonstrate that its program was effective in protecting underground sources of drinking water (USDWs), rather than adopting the complete set of Federal requirements. States with UIC program primacy receive federal funding for program implementation.

In general, EPA determines which fluids may be injected into Class II wells in direct implementation UIC programs. Primacy States follow their EPA-approved primacy agreements in ascertaining whether specific fluids are qualified for injection into their Class II wells.

Among the minimum requirements for Class II wells are:

a. Only approved fluids may be injected,

b. No injection may endanger a USDW,

c. No well may be used for injection without a permit, unless authorized by rule.

d. All injection wells must demonstrate mechanical integrity at least once every 5 years.

2.3 NPDES-Permitted Discharges

All point-source discharges of pollutants to surface waters of the United States must comply with the requirements of permits issued under the National Pollutant Discharge Elimination System (NPDES). The NPDES program is administered by EPA under the authority of the federal CWA or by the states through programs delegated by EPA. NPDES permits establish effluent limitations and monitoring requirements for discharges. Effluent limits are based upon the more stringent of levels which can be achieved through the use of available technology, and levels necessary to meet EPA-approved state water quality standards.

The CWA requires NPDES permits for E&P waste discharges to surface water. Currently, effluent guidelines prevent most discharge to surface waters except the following categories:

a. Discharges to certain coastal areas;

b. Discharges of low-salinity produced waters which are of beneficial use in arid regions west of the 98th meridian; and

c. Discharges from stripper oil wells in certain areas.

2.4 Federal Definition of Solid Waste

a. In simplest terms, a solid waste is any material that is discarded or intended to be discarded. According to RCRA, solid wastes may be solid, semi-solid, liquid, or contained gaseous material. Commercial products are not solid wastes unless, and until, they are discarded. Commercial products and their releases may also be regulated under other statutes such as the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the Toxic Substances Control Act (TSCA), Superfund Amendments and Reauthorization Act (SARA), and the Occupational Safety and Health Act (OSHA).

b. EPA has also determined that produced water injected for enhanced recovery is not a waste for purposes of RCRA Subtitle C or D, since produced water used in enhanced recovery is beneficially recycled and is an integral part of some crude oil and natural gas production processes.

2.5 Hazardous Waste

Under RCRA, a solid waste may be designated as hazardous waste if it is specifically listed as a hazardous waste or if it exhibits one or more of the characteristics of hazardous wastes. (See 40 CFR 261).

2.5.1 Listed Hazardous Waste

a. EPA has listed numerous types or classes of solid wastes as hazardous waste because they typically exhibit one or more of the characteristics of hazardous waste, or have been shown to exceed certain human toxicity criteria, or contain any one of the chemical compounds or substances that are listed as hazardous constituents. (see 40 CFR 261 APP VIII.)

b. EPA's regulations contain four lists of hazardous wastes: 1) hazardous waste from non-specific sources; 2) hazardous waste from specific sources; 3) commercial chemical products that become acutely hazardous waste when disposed; and 4) commercial chemical products that become toxic wastes when disposed.

2.5.2 Characteristically Hazardous Waste

a. EPA considers any solid waste to be a hazardous waste if it exhibits any one of the characteristics of ignitability, corrosivity, reactivity, or toxicity.

b. The toxicity characteristic is determined by the toxicity characteristic leaching procedure (TCLP). The list of constituents includes eight heavy metals and thirty-two organic compounds

2.6 EPA's Identification of Exempt Exploration and Production Wastes

The list below identifies many, but not all, exempt wastes. In general, E&P exempt wastes are generated in "primary field operations" and are unique or intrinsic to exploration and production activities (e.g., drilling for, producing, and purifying crude oil and natural gas), and not as a result of maintenance or transportation activities.

All wastes generated in transportation and refining are non-exempt. EPA's regulatory determination for E&P wastes (see 53 FR 25453, July 6, 1988) found that the following wastes are exempt from RCRA hazardous waste management requirements:

- "Produced water;
- "Drilling fluids;
- "Drill cuttings;
- "Rig wash;
- "Drilling fluids and cuttings from offshore operations disposed of onshore;
- "Well completion, treatment, and stimulation fluids;
- "Basic sediment and water, and other tank bottoms from storage facilities that hold product and exempt waste;
- "Accumulated materials such as hydrocarbons, solids, sand, and emulsion from production separators, fluid treating vessels, and production impoundments;
- "Pit sludges and contaminated bottoms from storage or disposal of exempt wastes;
- "Workover wastes;
- "Gas plant sweetening wastes for sulfur removal, including amine, amine filters, amine filter media, backwash, precipitated amine sludge, iron sponge, and hydrogen sulfide scrubber liquid and sludge;
- "Cooling tower blowdown;
- "Spent filters, filter media, and backwash (assuming the filter itself is not hazardous and the residue in it is from an exempt waste stream);
- "Packing fluids;
- "Produced sand;
- "Pipe scale, hydrocarbon solids, hydrates, and other deposits removed from piping and equipment prior to transportation;
- "Hydrocarbon-bearing soil;
- "Pigging wastes from gathering lines;
- "Wastes from subsurface gas storage and retrieval, except for the listed non-

exempt wastes;

- "Constituents removed from produced water before it is injected or otherwise disposed of;
- "Liquid hydrocarbons removed from the production stream but not from oil refining;
- "Gases removed from the production stream, such as hydrogen sulfide and carbon dioxide, and volatilized hydrocarbons;
- "Materials ejected from a producing well during the process known as blowdown;
- "Waste crude oil from primary field operations and production; and
- "Light organics volatilized from exempt wastes in reserve pits or impoundments or production equipment."

On March 22, 1993, EPA provided "clarification" regarding the scope of the E&P waste exemption. (see 58 FR 15284-15287.) EPA clarified the concept of primary field operations for crude oil and natural gas production. To fall under the scope of the exemption, an E&P waste must be generated in primary field operations and be unique or intrinsic to the production process. In addition, EPA stated that certain waste streams generated by oil and gas service companies may be "uniquely associated" with primary field operations and as such are within the scope of the RCRA Subtitle C exemption. EPA further clarified that an exempt waste remains exempt regardless of the waste's custody transfer, and that the residual waste from the treatment of an exempt waste remains exempt (e.g., residual sediment and water from crude oil reclamation from exempt tank bottoms). EPA's clarification cautioned, however, that exempt crude oil reclamation and service-company wastes may not remain exempt if they are mixed with non-exempt materials or wastes. States should carefully review EPA's clarification along with EPA publication EPA530-K-01-004 (October 2002). (found at http://www.epa.gov/epaoswer/other/oil/oil-gas.pdf). EPA periodically issues interpretive letters regarding the oil and gas exemption. One such letter was issued in November 1993 and is referred to in EPA publication EPA530-K-01-004.

2.7 EPA's Identification of Non-exempt Exploration and Production Wastes

Non-exempt wastes include wastes that are not unique to E&P and wastes generated by transportation (pipeline and trucking) and service activities. While the following wastes are non-exempt, their regulatory status as "hazardous wastes" is dependent upon whether they are listed as hazardous waste or they exhibit a hazardous waste characteristic. Non-exempt wastes should be managed as described under Section 2.8. EPA's 1988 regulatory determination lists the

following wastes as non-exempt:

- "Unused fracturing fluids or acids;
- "Gas plant cooling tower cleaning wastes;
- "Painting wastes;
- "Oil and gas service company wastes, such as empty drums, drum rinsate, vacuum truck rinsate, sandblast media, painting wastes, spent solvents, spilled chemicals, and waste acids;
- "Vacuum truck and drum rinsate from trucks and drums transporting or containing non-exempt waste;
- "Refinery wastes;
- "Liquid and solid wastes generated by crude oil and tank bottom reclaimers;
- "Used equipment lubrication oils;
- "Waste compressor oil, filters, and blowdown;
- "Used hydraulic fluids;
- "Waste solvents;
- "Waste in transportation pipeline-related pits;
- "Caustic or acid cleaners;
- "Boiler cleaning wastes;
- "Boiler refractory bricks;
- "Incinerator ash;
- "Laboratory wastes;
- "Sanitary wastes;
- "Pesticide wastes;
- "Radioactive tracer wastes; and Drums, insulation, and miscellaneous solids."

EPA did not specifically address, in its 1988 regulatory determination, the status of hydrocarbon-bearing material that is recycled or reclaimed by re-injection into a crude stream. However, under existing EPA regulations, recycled oil, even if it were otherwise hazardous, could be reintroduced into the crude steam, if it is from normal operations and is to be refined along with normal process streams at a petroleum refinery facility. Regulations addressing an exclusion for used oil are at 40 C.F.R 261.6(a)(4), and regulations addressing an exclusion for recovered oil are at 40 C.F.R. 261.4(a)(12) as revised.

2.8 Requirements for Non-exempt Wastes

a. EPA's hazardous waste regulations require that a hazardous waste determination be made for any non-exempt E&P waste. The determination may find the non-exempt waste either to be listed as a hazardous waste or to exhibit a hazardous waste characteristic. If a non-exempt waste is found not to be listed as a hazardous waste or not to exhibit a hazardous waste characteristic, it is a non-exempt non-hazardous waste.

b.If a non-exempt waste is not a listed hazardous waste, it should be tested whenever there is reason to believe it may exhibit one or more of the hazardous waste characteristics. Alternatively, a hazardous waste determination may be made based on knowledge of the process by which the waste is produced. Although there is no requirement that a non-exempt waste be tested to determine if it is hazardous, civil and criminal penalties may be imposed if the waste is not managed in a safe manner and according to regulations.

c. Depending on the actual hazardous waste quantity generated and accumulated on-site, RCRA hazardous waste management standards for generators may apply. Additionally, treatment, storage, or disposal activities on-site may be subject to more stringent RCRA Subtitle C requirements, such as permitting and corrective action.

d. Non-exempt waste should also be segregated whenever possible from exempt waste. If the non-exempt waste was a listed hazardous waste, its mixture with an exempt waste could make the entire commingled waste stream subject to stringent RCRA Subtitle C requirements, including the requirement that the waste be disposed at a hazardous waste facility. When segregation is not practical, the non-exempt waste should be examined closely to assure that it is not a hazardous waste. See Section 2.9 for additional discussion of waste mixtures.

e. Some states have adopted hazardous waste regulations and have obtained authority from EPA to administer the federal hazardous waste regulations. Those state programs' regulations may differ from those that EPA has

promulgated; however, by law, the states' regulations must be at least as stringent as the federal programs.

2.9 Waste Mixtures

EPA's RCRA regulations provide that the commingling of any listed hazardous waste with a non-hazardous waste generally renders the entire mixture a hazardous waste. The intent of this mixture rule is to prevent avoidance of hazardous waste regulations through dilution. For example, discarding a listed hazardous waste (e.g., a half-empty container of a listed solvent) in a reserve pit could cause the otherwise exempt pit contents to become a hazardous waste and result in the expensive closing of the reserve pit under RCRA hazardous waste regulations. Likewise, the mixing of a characteristic hazardous waste with an exempt waste could render the entire mixture a hazardous waste. Also, in those cases where the mixture is no longer considered a hazardous waste, the process of rendering the hazardous waste non-hazardous could be considered treatment of a hazardous waste and RCRA Subtitle C would apply.

Unused commercial products are not exempt wastes when disposed and, if hazardous (or potentially hazardous), should not be disposed with exempt E&P waste. All reasonable efforts should be made to completely use commercial products, return them to their vendor if they are not fully used, or segregate them from other waste for management and disposal.

SECTION 3 | General Criteria

3.1 General

An effective program for the regulation of E&P activities should include, at a minimum:

a. Statutory authority that adequately details the powers and duties of the regulatory body;

b. Statutory authority to promulgate appropriate rules and regulations;

c. Statutes and implementing regulations which adequately define necessary terminology;

d. Provisions to adequately fund and staff the program;

e. Mechanisms for coordination among the public, government agencies, and regulated industry; and

f. Technical criteria for E&P environmental management practices.

3.2 Goals

An effective state program should contain a clear statement of the program's goals and objectives. Such goals should include, at a minimum, protecting human health and the environment from the mismanagement of E&P activities while recognizing the need for an economically viable oil and gas industry**.** When establishing regulations and policies for E&P waste management, states should use the waste management hierarchy set forth in Section 5.3 to encourage waste minimization and source reduction.

3.3 State/Regional Variations in Criteria

These criteria are intended to provide guidance to the states in the formulation, development, and evaluation of oil and gas environmental regulatory programs. Fundamental differences exist from state to state, and within regions within a state in terms of climate, meteorological patterns, air quality compliance status, hydrology, geology, economics, and method of operation, which may impact on the manner in which oil and gas exploration, development, and production is performed. State oil and gas programs can and should vary from state to state and within portions of a state. The process by which these criteria are

incorporated into state programs is a function of, and within the discretion of, the responsible state agency. It is recognized that state programs must vary in order to accommodate differences in climate, hydrology, geology, economics, and method of operation or to accommodate individual differences in state administrative procedures or law. Furthermore, in some instances, in order to accommodate regional, area-wide, or individual differences within a state, it is appropriate for site-specific waivers or variances to be allowed for good cause shown. All such variations should be consistent with the goals of Section 3.2.

SECTION 4 | Administrative Criteria

4.1 Basic Requirements

Various federal regulations applicable to the delegation to states of federal environmental programs provide a useful framework for the development of criteria for an effective state program. Environmental regulatory programs for E&P activities should, at a minimum, include provisions for permitting, compliance evaluation, and enforcement.

4.1.1 Permitting

A state should have a regulatory mechanism to assure that E&P activities are conducted in an environmentally responsible manner. A program to achieve that objective may rely on one or more mechanisms, including issuance of individual permits, issuance of permits by rule, establishment of regulatory requirements by rule, issuance of general permits, registration of facilities, and/or notification of certain activities undertaken pursuant to general regulations. State agencies should have authority to refuse to issue or reissue permits or authorizations if the applicant has outstanding, finally determined violations or unpaid penalties, or if a history of past violations demonstrates the applicant's unwillingness or inability to comply with permit requirements. Where the operator responsible for E&P activities changes, state requirements should address the new operator's financial responsibility and compliance history. An effective state program should provide that a state permit does not relieve the operator of the obligation to comply with federal, local, or other state permits or regulatory requirements.

Individual permits for specific facilities or operations should be issued for fixed terms. In the case of commercial or centralized facilities, permits generally should be reviewed and revised, if necessary, no less frequently than every five years. Where two or more regulatory programs mandate similar requirements, those requirements should be combined where feasible. The process for obtaining permits and other authorizations should also involve prompt consideration and response to applications while preserving the integrity of the permit review process, including appropriate public participation. For the purposes of these guidelines, the terms "license" or "licensing" as used in Section 7 of these guidelines, criteria for the management of E&P NORM, will be synonymous with the terms "permit" or "permitting" as they are used throughout these guidelines.

4.1.2 Compliance Evaluation

4.1.2.1

State programs should contain the following compliance evaluation capabilities:

a. Procedures for the receipt, evaluation, retention, and investigation for possible enforcement action of all notices and reports required of permittees and other regulated persons. Investigation for possible enforcement action should include determination of failure to submit these notices and reports. Effective data management systems as prescribed in Section 4.2.7. can be used to track compliance.

b. Inspection and surveillance procedures that are independent of information supplied by regulated persons and which allow the state to determine compliance with program requirements, including:

i. The capability to conduct comprehensive investigations of facilities and activities subject to regulation in order to identify a failure to comply with program requirements by responsible persons;

ii. The capability to conduct regular inspections of regulated facilities and activities at a frequency that is commensurate with the risk to the environment that is presented by each facility or activity; and

iii. The authority to investigate information obtained regarding violations of applicable program and permit requirements.

c. Procedures to receive and evaluate information submitted by the public about alleged violations and to encourage the public to report perceived violations. Such procedures should not only involve communications with the public to apprise it of the process to be followed in filing reports or complaints, but should also communicate how the state agency will assure an appropriate and timely response.

d. Authority to conduct unannounced inspections of any regulated site or premises where E&P activities are being conducted, including the authority to inspect, sample, monitor, or otherwise investigate compliance with permit conditions and other program requirements.

e. Authority to enter locations where records are kept during reasonable hours for purposes of copying and inspecting such records.

f. Investigatory procedures that will produce a paper trail to support evidence which may be admitted in any enforcement proceeding brought against an alleged violator, including clear inspection and inspection reporting procedures.

4.1.3 Enforcement

4.1.3.1

With respect to violations of the state program, the state agency should have effective enforcement tools, which may include the following actions[1]:

a. Issue a notice of violation with a compliance schedule;

b. Restrain, immediately and effectively, any person by order or by suit in state court from engaging in any impending or continuing unauthorized activity which is causing or may cause damage to public health or the environment;

c. Establish the identity of emergency conditions which pose an imminent and substantial human health or environmental hazard that would warrant entry and immediate corrective action by the state agency after reasonable efforts to notify the operator have failed;

d. Sue or cause suit to be brought in courts of competent jurisdiction to enjoin any impending or continuing violation of any program requirement, including any permit condition, without the necessity of a prior revocation of the permit;

e. Require, by administrative order or suit in state court, that appropriate action be undertaken to correct any harm to public health and the environment that may have resulted from a violation of any program requirement, including, but not limited to, establishment of compliance schedules;

f. Revoke, modify, or suspend any permit upon a determination by the state agency that the permittee has violated the terms and conditions of the permit, failed to pay an assessed penalty, or used false or misleading information or fraud to obtain the permit; or

g. Assess administrative penalties or seek, in court, civil penalties or criminal sanctions including fines and/or imprisonment.

h. Forfeiture of financial assurance instruments.

4.1.3.2

States should develop guidance for calculations of penalties that include factors such as the economic benefit resulting from the violation, willfulness, harm to the

[1] *In some states, enforcement remedies include authorities to cause cessation of production or transportation of product, and/or seizure of illegal product.*

environment and the public, harm to wildlife, fish or aquatic life or their habitat, expenses incurred by the state in removing, correcting or terminating the effects of the unauthorized activity, conservation of the resource, timeliness of corrective action, notification of appropriate authority, and history of violations. Benefits of guidance for calculation of penalties include consistency in the assessment of penalties and development of readily defensible assessments. Penalties should be such that an operator does not benefit financially from unlawful conduct, and should provide compliance incentive to other operators. States should evaluate their enforcement options and policies to assure that the full range of actions available are effectively used.

4.1.3.3

The right to appeal or seek administrative and/or judicial review of agency action should be available to any person having an interest which is or may be adversely affected, or who is aggrieved by any such action.

4.2 Additional Program Requirements

Beyond basic requirements, an effective state program should also include a variety of other administrative requirements as discussed below.

4.2.1 Contingency Planning and Spill Risk Management

4.2.1.1 State Contingency Program

a. The state should develop and adopt a state contingency program for preventing and responding to spills and unauthorized releases to land, water, or air from E&P facilities. The state program need not duplicate applicable federal regulations for contingency planning and spill risk management. The state's contingency program may include a state contingency plan, or may consist of a set of regulations or operator contingency plan requirements. The program should define the volume of a spill or release of a petroleum product or waste and the level of risk to various receiving environments that triggers implementation of the spill contingency plan and response requirements.

b. The state contingency program should also contain funding provisions which enable the state agency to undertake immediate response actions for significant spills or releases which constitute a threat to human health or the environment in the event that a responsible operator cannot be located or is unwilling or unable to respond to the spill or release in a timely manner.

4.2.1.2 Reporting capabilities

The state should provide mechanisms for operators or the public to report spills and unauthorized releases. These mechanisms should include telephone access 24 hours a day, 7days a week. A single point of contact_1-800 telephone number should be considered. Telephone answering capabilities should include provisions for the prompt notification of appropriate state agency personnel.

4.2.1.3 Interagency coordination

The state should provide for coordination of actions between appropriate agencies that have jurisdiction for the management of risks from spills and unauthorized releases from E&P facilities. This includes clear designation of onsite spill responsibilities.

4.2.1.4 Operator Prevention of, and Response to, Spills and Releases

The state agency should require an operator to take measures to prevent, and prepare to respond to, spills or unauthorized releases of petroleum products or waste that may occur at an E&P facility. These requirements can be spelled out in regulations or guidance, or they may be included in operator-specific or site-specific plans.

4.2.1.4.1 General

a. State contingency programs should address the following:

i. E&P facilities, equipment at those facilities, and materials found at E&P sites that may pose a significant threat to human health and/or the environment;

ii. The various types of receiving environments, including water (surface and groundwater) and land (environmentally sensitive areas, special soil or geological conditions, urban areas, cultural and special resource areas); and

iii. Public and responder safety concerns, including training for response personnel.

b. The state program should require the operator to identify the following:

i. The operator's incident command structure, including emergency contact information for key personnel.

ii. Equipment, manpower, contracted services, and other logistical support

necessary for response to spills and unauthorized releases.

iii. Opportunities for coordination of joint response actions, manpower or equipment, with nearby well sites or other facilities of the operator or other operators.

iv. Procedures for identification of and communication with parties impacted or threatened by spills or unauthorized releases.

v. Acceptable methods of containment of spills and unauthorized releases.

vi. Acceptable disposal methods, such as on-site remediation, approved disposal facilities, and waste haulers, for materials of concern.

c. The State program should require responder training to assure that personnel are prepared to respond efficiently and effectively.

4.2.1.4.2 Prevention measures

Where spills and unauthorized releases pose a significant risk to human health and/or the environment, the State should require prevention measures that may include:

a. Secondary containment such as dikes, berms and firewalls, or equivalent measures.

b. Tertiary containment and/or monitoring systems in high-risk areas.

c. Inspection, testing, and maintenance schedules and procedures for facilities and equipment.

d. Site security measures as necessary.

e. Periodic review of spill histories to identify opportunities to reduce future spills and unauthorized releases.

4.2.1.4.3 Response Measures

a. A State program should include reporting and notification procedures to be used in the event of a spill or unauthorized release. These should include:

i. Agencies and parties to be notified with contact information.

ii. The type of reporting (verbal, written) required for various incidents.

iii. Reporting time requirements.

iv. Reporting thresholds.

v. Operator reporting information, such as the name of the operator and the operator's representative reporting the incident; a description of the incident, including the date and time of the incident and its discovery; the type and volume of material released; the location of the incident; the apparent extent of the release; damage or threat to groundwater, surface water, land, and/or air; and weather conditions.

b. States should provide guidance for containment, abatement, and remediation, including:

i. Cleanup standards;

ii. Required sampling and analyses; and

iii. Where appropriate, approved non-mechanical response actions, such as the use of dispersants and in-situ remediation, including identification of the agencies that must provide approval of these operations.

c. The state should specify any requirements for final reporting, site monitoring, and necessary agency approvals. Any final report required should identify the cause of the incident and actions taken to prevent or minimize the likelihood of a recurrence.

4.2.1.5 Follow-up actions

The state program should provide for enforcement, as described in Section 4.1.3. of these Guidelines, for the failure of an operator to report or respond to spills and unauthorized releases as required. The state program should also consider provisions for the assessment of damages caused by an incident. A state program should contain provisions allowing the state to pursue a responsible operator for reimbursement of state monies expended in responding to such a spill or release.

4.2.1.6 Database

The state data management program, as described in Section 4.2.7. of these Guidelines, should include information on spills and unauthorized releases. This data should be analyzed periodically as part of a program effectiveness evaluation as described in Section 4.2.3, Program Planning and Evaluation, of these Guidelines.

4.2.2 Public Participation

4.2.2.1 Notice and Records

State program legislation or regulations should require that the affected public be provided with adequate notice of the agency's intention to issue a permit or license that addresses E&P activities. The public should be provided with an appropriate opportunity to comment on a permit or license prior to issuance. Wherever possible, this notice should be coordinated with the notice requirements of other concurrently applicable state or federal programs. For commercial or centralized disposal facilities, the operator should also be required to provide written notice to adjacent landowners of record for such area and in such manner as may be prescribed by the state agency.

Agency records related to this program should generally be available for review by the public. Such records are to include waste disposal and pit locations and any required analytical data. Where information submitted by an operator is of a "confidential business" nature, an agency should have procedures for segregating that information and protecting it from disclosure. In all cases, spill and violation records should be available to the public. Agencies should establish a minimum record keeping time period of three years that should be automatically extended while any unresolved enforcement action regarding the regulated activity is pending.

4.2.2.2 Program Information

States should provide for the dissemination of program information to the regulated industry and the public. Such educational materials should include information or guidance on contingency planning, spill response, permitting, operating, monitoring and other requirements. Such efforts should be part of an ongoing process through which information is exchanged in an open forum. Because E&P environmental requirements are undergoing numerous changes, states have the obligation to inform the regulated industry and the public of changes. Industry associations and other organizations may provide a convenient and effective mechanism for dissemination of information. States should actively make use of seminars, newsletters, special mailings, association committees, incentive programs and other mechanisms.

4.2.2.3 Advisory Groups

States should use advisory groups of industry, government, and public representatives, or other similar mechanisms, to obtain input and feedback on the effectiveness of state programs for the regulation of E&P activities. Provision should be made for education or training as is appropriate to give such advisory

groups a sound basis for providing input and feedback.

4.2.3 Program Planning and Evaluation

4.2.3.1 Program Planning

States should have a sound regulatory development process which includes both short-term and long-term strategic planning for defining goals and objectives, setting priorities, and evaluating the clarity, efficiency, and effectiveness of the E&P environmental regulatory program. In formulating environmental regulatory programs, states should use the best available scientific and technical information and should consider the environmental, economic and energy impacts of the regulations.

4.2.3.2 Program Evaluation

a. General

Beyond the general, technical and administrative criteria set forth elsewhere in this guidance document, a program for the regulation of E&P activities should evaluate how well the program protects human health and the environment while recognizing the need for an economically viable oil and gas industry**.**

Program evaluation measures may be of a wide variety and include positive indicators (what's working) as well as negative indicators (what's not working). Some administrative aspects of program performance can be evaluated by examining how well the program enables the industry, the public, and the regulators themselves to function. Environmental aspects can be evaluated by assessing some combination of preventive measures, the qualities and characteristics of E&P wastes the severity of impact from a spill or unauthorized release, and the timeliness of remediation. While it is important for the program to have adequate rules, performance evaluation indicates to what extent the implementation of a rule or practice of the program brings about environmental protection.

Although a formal evaluation of program performance might occur at periodic intervals, the monitoring of activities and the modifications to the program form an ongoing, cyclic process as outlined in Figure 4.1. The process has no specific beginning or ending point. Rather, the steps in the process form a continuous progression that should be examined during performance review.

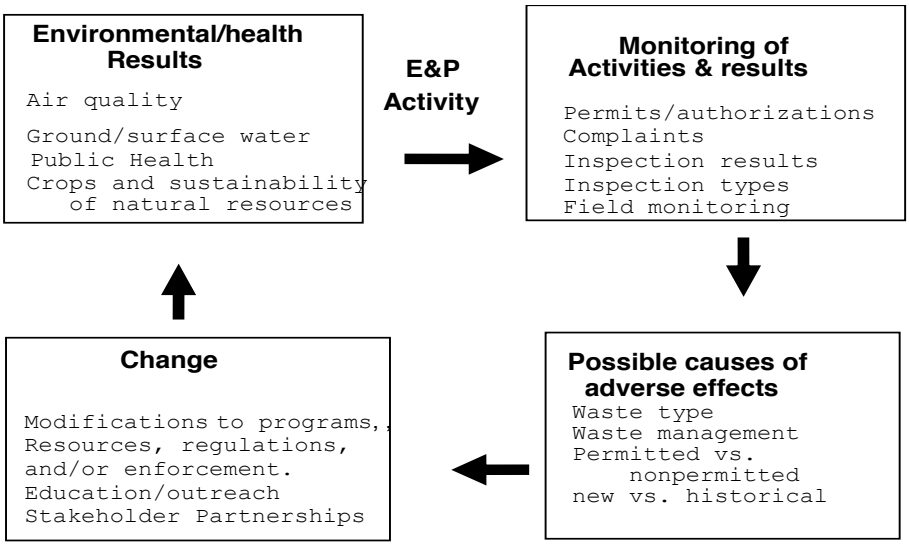

Figure 4.1. Performance review cycle.

A state should select parameters that are appropriate for use in measuring the effectiveness of its E&P regulatory program. Documentation of the selected parameters and the ability to acquire, assess, and present the relevant data are critically important to evaluation of performance. This requires establishing a definition of the parameters being evaluated and specifying the technical measurements to be made or the technical data to be examined. In addition, it requires installation and use of a data management system that facilitates review and evaluation. Program performance should be evaluated periodically, using measures that can be applied consistently from one evaluation period to another, although the measures may evolve and improve in time. If a database of releases, regulatory activities, remediation sites, or other information is used for performance evaluation, it should, if possible, extend backward in time so as to enable a measure of progress on historical problems.

b. Qualities of Performance Measures

In evaluating its performance, a program should have data management capabilities to enable assessment of program effectiveness and timeliness. Evaluation measures should:

- be quantitative, whenever possible;
- allow consistent evaluation across time;
- be available to program personnel, the industry, and the public;
- document significant trends;
- summarize an evaluation of the nature and extent of contamination [Section 5.2], abandoned wastes, and abandoned facilities [Section 6] as they occur across the state; NORM [Section 7], stormwater management [Section 8], hydraulic fracturing [Section 9], air quality [Section 10], and

reused & recycled fluids [Section 11].

- include identification and priority of outstanding environmental threats, so as to aid the program in targeting its efforts;
- enable evaluation of whether the program's responses to violations encourage compliance.

Evaluation of performance may include, as an example:

- Contamination: the state-wide nature and extent of environmental contamination by E&P wastes;
- Trends: whether the extent of contamination by E&P wastes is increasing or decreasing, and the reasons why;
- Prevention: the effectiveness of the program's efforts in preventing releases of E&P wastes to the environment;
- Timeliness: the timeliness of agency actions in controlling the impacts of E&P wastes released to the environment;
- Abatement: the effectiveness of agency actions in abating pollution by E&P wastes, or in causing pollution to be abated; and
- Enforcement: the effectiveness of the agency's administrative controls in the prevention or abatement of pollution by E&P wastes [Section 4.1].

c. Examples of program evaluation

i. Assessment of impacts

A state could identify documented cases that demonstrate reasonably clear links of cause and effect between operational practices and resulting environmental impacts. Such impacts might be human health effects, ecological effects, effects on_wildlife or livestock, or effects on natural resources.

From examination of documented cases, a state could determine whether those cases were the result of violations of existing program requirements, insufficient programmatic enforcement of the requirements, other causes, or whether the cases suggest that the requirements should be revised.

A case could be documented if impacts are found to exist as part of the findings of a scientific study. Such studies could be formal investigations supporting litigation or a state enforcement action, or they could be the results of technical tests (such as monitoring of wells) if such tests (a) were conducted with state-approved quality control procedures, and (b) revealed contamination levels in excess of an applicable state or federal standard or guideline (such as a drinking water standard or water quality criteria).

Possible impact indicators might be:

- The area or other measure of contaminated or affected ground or surface water, tracked periodically over time.
- A histogram of the number of releases versus time, amount of produced resource and number of wells in the state. Releases might be grouped by material released, such as crude oil, produced water, etc.
- A histogram of the number of releases of a given material versus the approved time to completion of remediation.
- The time elapsed between an agency's receipt of a remediation proposal or related correspondence, and the agency's response to that proposal or correspondence.

ii. Analysis of activities and results

Activity and results analysis comprises administrative measures of program goals, plans, and operations. These measures focus on prevention of pollution, efficiency of operations, priorities, and the allocation of resources within the program.

The following are examples of activities:

- The development of a strategic plan with goals, milestones, and establishment of priorities [Sections 3.2, 4.2.3]. The plan should be based on anticipated threats and/or known impacts, as well as budget and administrative factors that may be beyond the control of the agency.
- The development of a program promoting use of the waste management hierarchy [Section 5.3].
- A review of the number of stream miles listed as impaired by oil and gas activities in the state biennial Integrated Water Quality Monitoring and Assessment Report required under Sections 305(b) and 303(d) of the federal Clean Water Act.
- An evaluation of the number of wells abandoned without being properly plugged compared to levels of financial assurance or other program measures to address orphan wells.
- Evaluation of the results of surveys to determine the satisfaction of permit recipients and other customers with program implementation.
- The development of a program, including time and activity tracking, to conduct efficiency studies of average time to issue permits, conduct inspections and perform other required activities.
- A documented process for obtaining input from within the agency, from the public, and/or from an advisory group for identification of program strengths and deficiencies [Section 4.2.2.3].
- Evaluation of the results of a training, educational, or outreach program

[Section 4.2.2].

- Evaluation of the effectiveness of the agency's enforcement program. [Sections 4.1.2, 4.1.3, 4.2.1.2].

The following are examples of results:

- The number of inspections by the agency.
- The number, type and causes of spills, accidents and safety incidents reported to the agency.
- The number of operations witnessed by the agency.
- The number, type, frequency and cause of violations detected by inspectors [Section 4.1.2].
- The number, type, frequency and cause of complaints by the public, and the time required to resolve those complaints [Section 4.2.2.1].
- The number of violations, the time to resolve those violations, and the number unresolved [Section 4.1.2].
- The number of actions going to hearing, enforcement, and/or fines [Section 4.1.3].

d. Baselines and Follow-up

A state agency should regularly evaluate its effectiveness in attaining the goals set forth in Section 3.2 in a way that will create a baseline against which to compare the program's performance in the future.

A state agency is encouraged to conduct periodic self-assessments in addition to the assessments conducted in the State Review Process. These self-assessments should document successes and should identify areas for improvement. This will allow continual improvement of a state's program while recording its successes

The utilization of performance evaluations and a continual improvement process will demonstrate the state's efforts to adapt to changes in technology, concerns of the public and regulated community, and to provide both for the documentation of successes and identification of areas requiring improvement.

4.2.4 Financial Assurance

All states should have an adequate financial assurance program to provide resources to the state to close or remediate a site should an operator fail to meet its obligations under the law. The goal of any financial assurance program should be to avoid passing on the responsibility for closure and remediation costs to the citizens of the state. An adequate financial assurance program should be supported by the following elements: frequent site inspections; strict permit enforcement; and appropriate regulations governing and monitoring "inactive

status" of covered facilities.

States should identify activities such as closure and remediation and other relevant activities for which criteria have been set forth in Section 5 that need to be covered by financial assurance. Some states require financial assurance for inactive wells, some for drilling and/or plugging, some for waste disposal facilities, and some for the life of the well.

States should determine the types of financial assurances that will provide reliable monetary resources to the state and will facilitate an operator's compliance with permit requirements. Types of financial assurance include surety bonds; self-bonding; letters of credit; certificates of deposit; cash, federal, state, or municipal bonds; and other forms of collateral. Some states require performance bonds and some states require penal bonds. Some states accept a nonrefundable fee to be paid into the well plugging fund in lieu of a bond. Some states allow phased payments of collateral into a fund so that small operators can develop a collateral bond over a specified period of time. States should develop financial assurance options that facilitate an operator's compliance with bonding requirements. In addition to single well bonds, many states allow blanket bonds. This allows operators to assure that an established minimum level of financial assurance is provided without the commitment of an unnecessary amount of operating funds.

States should periodically review the amount of assurance required to determine if the amount is adequate to provide incentive for proper plugging of a well and reclamation of a site, and to assure proper management of E&P wastes.

In the case of commercial and centralized facilities as defined in Section 5.10, including those that manage E&P NORM, state financial assurance requirements should be sufficient to cover the costs of appropriate facility decontamination, reclamation, and closure, and should extend through any post-closure care, monitoring, or control period. (see Section 5.10.2.2.e.)

States should develop appropriate procedures to access an operator's financial assurance when the operator does not meet the obligations covered by the financial assurance. These procedures should include provisions for notice, hearings, and forfeiture.

Some states have special funds, such as well-plugging funds, that are available for state use to correct problems where an operator does not comply with state requirements. Although the availability of such funds may be a consideration in some states when determining bond coverage amounts, special funds should be used to supplement rather than completely take the place of other forms of financial assurance provided by the operator. The use of special funds should be limited to instances where the responsible operator cannot be determined or is unavailable. These special funds can be generated by taxes, fines, forfeitures, or fees.

4.2.5 Waste Hauler Certification

The appropriate state agency should have authority to require the training of drivers of trucks that are involved in the commercial transportation of E&P waste to a commercial or centralized disposal facility. Such training should include, among other things, emphasis on proper record keeping, the need to deliver the waste to the designated facility and emergency response and notification procedures. The appropriate state agency should also have authority to require the registration of all vehicles used to commercially transport the waste and of all commercial waste haulers.

4.2.6 Location of Closed Disposal Sites

A state program should contain authority with respect to disposal site closure, including authority to identify the location of the disposal site and for such information to be permanently maintained by the state agency for public review. Whether the location of a waste disposal site is disclosed in the public land records is a matter that is within the discretion of the state.

4.2.7 Data Management

4.2.7.1 General

Effective data management systems should be maintained due to the amount of information that states compile. Such systems should include permitting, operating, spill, remediation, and monitoring information and should include those data elements that an individual state finds are necessary to make cost-effective, risk-based decisions. Data should be maintained on as detailed a level as is necessary for the agencies to conduct their regulatory reviews. States and the federal government should undertake efforts to facilitate the sharing of data among responsible agencies, the public, and other users. States should develop policies for data access, data dissemination, and the allocation of cost of services to governmental and non-governmental users.

4.2.7.2 Electronic Data Management

Electronic filing, permitting, imaging, geographic information systems and internet data transfer and access are technologies that can contribute to program efficiency and data accessibility, although they are not required for effective waste

management. However, because of the efficiencies of electronic data management and enhanced accessibility of electronic data to regulators, the industry and the public, agencies are encouraged to develop systems for the electronic submittal, storage and retrieval of agency data. States are encouraged to implement electronic data management systems to improve program efficiency, data access, and data security to the extent they are appropriate to the State's regulatory program.

4.2.7.3 Program Elements

Agencies should provide for the capture of data and images as appropriate, and for both protecting the quality of data collected and the long-term protection and backup of captured information through measures such as off-site duplicate storage, archiving, and/or data retention and destruction policies. Agencies should include public and industry access in their data management systems.

Most program data are available to the public under various sunshine rules. Some records may be retained as confidential files for a defined period of time. Certain confidential types of data may also be discoverable. States should develop policies that define data sets to be made available to the public and/or industry.

4.3 Personnel and Funding

4.3.1 Personnel

For a state program to function effectively, sufficient, properly trained personnel to accomplish the goals and objectives of the program are necessary.

In determining its personnel needs, a state agency should consider not only the number of activities that it must regulate and inspect, but also the accessibility of those activities to agency personnel. Accessibility will be heavily influenced by the size of the area to be regulated, the local terrain, and road conditions. In addition, a state agency should evaluate how its personnel needs will be affected by activities occurring in environmentally sensitive areas (e.g., in close proximity to surface water and groundwater).

Generally, personnel needs should be evaluated in each of the categories of administration, legal, technical, and field inspectors. In each case, a state agency should define the areas of responsibility for the position, as well as any prerequisite experience and background. In addition, the state agency should provide for the continuing training of personnel to keep them abreast of changes in regulations, policy and technical issues, and to increase professionalism. This training can be accomplished through such means as seminars and university

short courses. The following discussion addresses these issues in each of the major personnel categories:

4.3.1.1 Administration

The elements of the administration of a state program should include traditional administrative functions such as program planning and evaluation, budgeting, and personnel. In addition, administration should be responsible for such programmatic functions as permitting, licensing, financial assurance, and ownership transfer. Public involvement and data collection management are also key elements of program administration. The conduct public hearings, the coordination of enforcement activities, and the referral of cases to legal personnel for follow-up action should also be administrative functions.

4.3.1.2 Legal

Legal support for an E&P environmental regulatory program can be provided by in-house state agency lawyers through the support of the attorney general's office or through independent counsel. In any case, sufficient legal support should be provided to a state agency to assure that the regulatory program has an effective capability to pursue appropriate enforcement actions in a timely manner against violators of program requirements. A critical element of this capability is that the program's legal element be capable of directing the preparation of enforcement cases and providing guidance and direction to field inspectors and others involved in case preparation. The legal element of a program should also be involved in both the procedural and substantive aspects of rulemaking.

4.3.1.3 Technical

All program elements require adequate technical support. In supporting administrative functions, technical personnel should provide geologic and engineering evaluation, and technical specifications on such matters as cementing and casing. Technical support to the legal and field personnel is necessary for the development and implementation of rules and in the preparation of enforcement cases. In support of field inspectors, technical personnel should be capable of mapping hydrologically sensitive areas and areas containing treatable water, and provide support in determining pit construction requirements and guidance in waste handling. Key technical personnel should have a bachelor of science degree in geology, engineering, hydrology, earth science, environmental science, or a related field, or possess equivalent experience. Technical personnel should be subject to continuing education in such areas as ongoing development of rules, policies, and technological changes.

4.3.1.4 Field Personnel

Field personnel should be responsible for conducting routine inspections of regulated facilities and activities to assure compliance with program requirements. In addition, field personnel should be among the state agency's on-site representatives to witness critical regulated activities and to observe or supervise clean-up or remedial actions. Field personnel also should be involved in the assembly of evidence for enforcement actions and in the state agency's community relations. Field personnel generally should be high school graduates or have equivalent experience, and should otherwise be knowledgeable about oil and gas field-related work and waste management practices. The ongoing training of field personnel should emphasize the range of chemical and radiological constituents in E&P wastes and at E&P sites, sampling and investigative procedures associated with enforcement proceedings, and a thorough understanding of current rules and policies of the program, as well as sound environmental practices. Field personnel should be provided with training in NORM identification and management, where appropriate. In addition, field personnel should be skilled in the handling of hazardous materials and in all aspects of personnel safety. They should also be trained in the identification of abandoned sites and the abandoned site remediation program, storm water management practices and requirements, and hydraulic fracturing processes.

4.3.1.5 Training Requirements

State programs should provide for adequate and effective training of state agency personnel regarding the regulations, policies, and criteria applicable to E&P activities. These programs should include training for agency personnel on such issues as site maintenance, contingency planning and spill response, permitting requirements and standards, compliance requirements and criteria, data management, enforcement procedures, investigative procedures, court preparation, report writing, sampling and analysis, and such other issues relating to proper E&P environmental regulation as may be necessary. Training programs should be incorporated as an on-going activity to encourage consistent enforcement of regulation throughout the state.

4.3.2 Funding

An effective E&P environmental regulatory program should be funded at a level sufficient to allow it to accomplish its environmental protection goals and objectives. While many state agencies are funded through a general appropriation from that state's legislature, each state agency should evaluate other sources of funding such as user fees, special levies on production, the dedication of fees and penalties to special accounts, and grants from various sources.

4.4 Coordination Among Agencies

Many state programs regulating E&P activities have their roots in oil and gas conservation programs that were established during the early part of the last century. In most cases, these programs have evolved to accommodate other state and federal objectives such as protection of human health and the environment.

In most states, multiple agencies are involved in the management of E&P activities. Different agencies are often responsible for the regulation of oil and gas wells, pits and impoundments, disposal wells, surface water discharges, spill prevention and response, and disposal of drill cuttings and muds. Each agency has its own administrative requirements relating to permitting, operational requirements, and financial assurance, and develops its own budget priorities. Each has its own inspection and enforcement authorities. Unless a high level of formal interagency coordination exists, such unilateral program development and implementation can lead to duplication of personnel effort, duplication of regulation with sometimes conflicting standards for the industry, and duplication of funding. Duplication of programs often diminishes the effectiveness of spill response, permitting, inspection, enforcement, training, and other regulatory activities. Where multiple state agencies have jurisdiction over the management of E&P activities, budget development should be coordinated and the agencies should develop formal coordination procedures, such as the development of interagency Memoranda of Agreement, interagency task forces with periodic meetings, and/or interagency legislative and regulatory review panels to ensure jurisdictional clarity and regulatory consistency.

Additionally, states should review existing agreements to assure that they are current and effective. Finally, interagency mechanisms should be developed to facilitate the sharing of information among and between involved agencies so that each agency can carry out its program responsibilities.

SECTION 5 | Technical Criteria

5.1 General

These technical criteria for E&P waste management practices address waste characterization, waste management hierarchy, pits, land applications, tanks and centralized and commercial facilities. In most cases, these criteria are general in scope. The states should establish and implement specific performance standards and design specifications based on site-specific or regional differences in geology, hydrology, climate, and waste characteristics. State E&P waste management programs should include the following general provisions as requirements:

a. Facilities and sites used for the storage or disposal of wastes derived from the exploration and production of oil and natural gas should be operated and managed at all times to prevent contamination of groundwater and surface water, soil and air, protect public health, safety and the environment, and prevent property damage.

b. Facilities and sites operated specifically for the storage or disposal of exempt E&P wastes should not receive, collect, store, or dispose of any wastes that are listed or defined as hazardous wastes and regulated under Subtitle C of RCRA, except in accordance with state and federal hazardous waste laws and regulations.

c. Disposal of E&P wastes into landfills may be considered. If such disposal is allowed, it should only be allowed where the landfill is designed to contain such wastes, and the E&P wastes contain no free liquids and are not mixed with non-exempt wastes prior to disposal.

d. Technical criteria for siting, construction, and operation of E&P waste disposal facilities should be flexible enough to address site-specific or regional conditions based on findings by the regulatory agency.

e. Siting Criteria

i. States should incorporate siting requirements in statewide rules for pits, landspreading, landfilling and burial, and waste reclamation facilities. Area-wide rules or site-specific permits may contain additional siting conditions.

ii. No E&P waste management facility should be located in a flowing or intermittent stream.

iii. Where necessary to protect human health, new E&P waste management

facilities should not be located in close proximity to existing residences, schools, hospitals or commercial buildings. The need for minimum distance criteria from residences or other buildings to the boundary of E&P waste management facilities should be considered.

iv. Generally, applicable siting requirements should address such factors as depth to and quality of groundwater, wetlands, floodplains, topography, proximity to existing drinking water supplies and wells, geology, geologic hazards, and other environmentally sensitive areas.

v. Siting of E&P waste management facilities should be consistent with applicable land-use requirements.

5.2 Waste Characterization

5.2.1 Purposes

Waste characterization should support at least the following functions of a state's E&P waste management program:

a. ensuring E&P waste management practices are suited to the particular wastes involved and in compliance with applicable program requirements; and

b. ensuring commercial E&P waste facilities are managing only wastes they are authorized to handle.

5.2.2 Sampling and Analysis

a. State waste characterization requirements should include appropriate testing of E&P wastes prior to disposal for such characteristics as organic content, pH, salinity, and sulfur compounds, including hydrogen sulfide content. Testing must be appropriate for the type of waste, method of disposal, and the potential for adverse health and environmental effects. In addition, while nothing in these criteria mandates testing for every hazardous constituent in E&P wastes, it is recognized that waste management practices and regulatory requirements would be improved by obtaining a more complete knowledge, through sampling and analysis, of the range of hazardous and toxic constituents in E&P wastes. Accordingly, waste characterization requirements should provide data necessary to meet the purposes of waste characterization described in section 5.2.1 and to administer and enforce state program requirements effectively.

b. State requirements for the assessment of E&P wastes for Naturally Occurring Radioactive Material (NORM) should meet the criteria of this section and of

sections 7.3.3. and 7.3.9. Such requirements should address all types of radiation expected in E&P wastes.

c. These guidelines do not address all the details of a waste characterization program, such as testing methods, frequencies, or parameters. The details are expected to vary depending upon the waste, the proposed management practice, and other state program requirements.

5.2.3 Quality Control

a. State programs should contain provisions that any required waste sampling follow appropriate sampling procedures, and any required laboratory analysis be performed by qualified laboratories in order to produce valid and reliable results. A state may rely on field testing to satisfy waste characterization requirements where it can be determined that such testing will produce valid and reliable results.

b. Testing methods should produce data that are valid for the purpose intended. By example, EPA's Toxicity Characteristic Leaching Procedure (TCLP) may not accurately predict the leachability of oily E&P wastes.

5.3 Waste Management Hierarchy

As in any aspect of waste management, there are some general, sound practices that should be employed. These practices, which emphasize waste minimization, not only serve to protect human health and the environment, but also tend to protect waste generators from long-term liabilities associated with waste disposal. Additionally, waste minimization may reduce regulatory compliance concerns for E&P operators and result in cost savings. Generally, the choice of an E&P waste management option should be based upon the following hierarchy of preference:

a. Source Reduction: Reduce the quantity and/or toxicity of the waste generated;

b. Recycling: Reuse or reclaim as much of the waste generated as possible, and whenever possible, combine hydrocarbons with crude oil, condensate, or natural gas liquids;

c. Treatment: Employ techniques to reduce the volume or the toxicity of waste that has been unavoidably generated.

d. Proper Disposal: Dispose of remaining wastes in ways that minimize adverse impacts to the environment and that protect human health.

5.3.1 Source Reduction Opportunities

There are significant source reduction opportunities in E&P waste management. State programs have a variety of available resources which provide proven source reduction techniques. Categories of source reduction opportunities and examples include:

a. Equipment Modifications: Many technically and economically feasible equipment modifications are available. For example, retrofitting glycol dehydration units with volatile organic vapor recovery units can result in the recovery, in certain circumstances, of economically viable quantities of volatile hydrocarbons that would otherwise be released to the atmosphere. In addition, compliance concerns regarding air emission regulations may be reduced considerably.

b. Procedure Changes: Many times a simple change in the procedure used in an operation can result in significant source reduction. A simple example with significant results is the change one operator made in produced water filter replacements in an EOR project. The original procedure of bi-monthly filter replacements was changed to a procedure based on filter differential pressure. The result was a 98% reduction in the quantity of generated waste filters. At production sites where NORM-scale formation is expected, implementing a procedure of scale inhibitor injection may reduce its occurrence.

c. Product Substitution: The careful selection of chemical products used in exploration and production can reduce the toxicity of E&P wastes. Potential product substitution candidates include biocides, coagulants, dispersants, emulsion breakers, scale and corrosion inhibitors, gas sweetening and dehydration agents, catalysts, and pipe dope. In particular, many substitute drilling fluids have been developed to replace oil-based drilling fluids.

d. Reduction in the Use of Fresh Water: A significant example of the reduction of fresh water use is the use of produced water for EOR whenever possible. Another simple example is the use of high-pressure, low-volume nozzles on rig wash hoses.

e. Good Housekeeping and Preventive Maintenance: In addition to product substitution, source reduction can be achieved by minimizing the generation of clean-up wastes from production facilities and waste management facilities. An evaluation of potential spills and mitigation measures may identify effective spill and release prevention techniques. These techniques include good housekeeping practices, routine inspections of equipment, equipment innovations, and containment systems. Radiation surveys of equipment and sites can be helpful in preventing or minimizing the spread of above-background levels of E&P NORM that may be encountered during routine equipment maintenance and servicing and site cleanup.

f. Planning: The first opportunity to accomplish source reduction is in the planning stage of an operation. For example, careful planning of a well stimulation can result in the reduction of left over chemical that may be disposed. Also, careful planning of a drilling site's construction to control stormwater runoff may reduce the quantity of contaminated stormwater that may be generated as waste.

g. Training: Training is possibly the most important source reduction opportunity. Personnel in the E&P conduct the activities that generate waste. Training in waste identification, classification, and source reduction techniques provides the field personnel with the tools necessary to effectively reduce waste generation.

h. Selection of Contractors: Service companies perform a wide variety of functions in the E&P on behalf of E&P operators. An important source reduction opportunity for operators is the selection of service companies that implement source reduction opportunities as a business practice.

5.3.2 Recycling and Reduction Opportunities

Many opportunities now exist to recycle E&P wastes. State programs are encouraged to develop or coordinate with recycling programs developed by other agencies responsible for waste management. For example, many states' agencies provide listings of companies that recycle wastes common to E&P and, in some instances, operate waste exchange programs.

Wastes generated at E&P facilities that may be recycled include drilling fluids, used lubricating oil, used lubricating oil filters, antifreeze, wooden pallets, spent solvents, unused chemicals, liners, aggregate, and scrap metal. Also, recycling opportunities include the use of produced water for enhanced recovery, and the recovery of hydrocarbons in crude oil tank bottoms, skim oils, gas pipeline drips, slop oil emulsions solids and sludges, and other oily sludges.

Recycling also includes reuse of materials that would otherwise be managed as waste. For example, a natural gas company found that partially spent caustic sweetening solution was suitable for use as reagent in sulfur dioxide scrubber units at a natural gas processing plant.

See Section 11 for guidance specific to the reuse and recycling of fluids generated during the drilling, completion (e.g. hydraulic fracturing flowback), and production stages of a well.

5.3.3 State Program Elements

State programs should contain mechanisms to encourage waste management consistent with the hierarchy of this section. A variety of mechanisms may be used, such as:

a. Program requirements or policies that encourage source reduction and recycling;

b. Improved training of state personnel so they can identify source reduction opportunities;

c. Technical assistance or incentives to operators; and

d. Educational activities aimed at informing facility operators of the options available.

The waste management hierarchy should be integrated into the other elements of a state program. For example, spill and release prevention should be incorporated into facility management regulations. Similarly, state requirements should address the segregation of waste streams that have a higher pollution potential from those with a lower pollution potential. State information program elements should include a component related to hierarchy planning and implementation.

State program planning activities should include goals and objectives that provide for substantial progress in this area over a reasonable time. States should have sufficient information to evaluate whether the mechanisms used to encourage source reduction and recycling are achieving those goals and objectives. State program requirements should be reviewed for consistency with the waste management hierarchy and the established goals and objectives. State agencies should also coordinate their efforts with other agencies that are responsible for waste management.

5.4 Quantitative Elements

Specific quantitative guidelines have been included for some waste management practices. The numbers cited are considered to be conservative values for protection of human health and the environment. However, they are not intended to be the basis for nationwide standards. Regulatory agencies may approve either less stringent or more stringent requirements where circumstances warrant as long as they afford the protection described in Section 5.1.a, and in the goals statement of Section 3.2.

5.5 Technical Criteria for Pits

5.5.1 Definitions

a. Reserve Pits

Pits used: (a) to store additional drilling fluids for use in drilling operations; and/or (b) to dispose of wastes generated by drilling operations and initial completion procedures.

b. Production Pits

i. Skimming/Settling: Pits used to provide retention time for settling of solids and separation of residual oil.

ii. Produced Water: Pits used for storage of produced water prior to injection for enhanced recovery or disposal, off-site transport, or surface-water discharge.

iii. Percolation: Pits used to dispose of waste liquids via drainage or seepage through the bottom and/or sides of the pits into surrounding soils.

iv. Evaporation: Lined pits used to contain produced waters which evaporate into the atmosphere by natural thermal forces.

c. Special Purpose Pits

i. Blowdown: Pits used for collecting material resulting from the emptying or depressurization of wells or vessels.

ii. Flare Pits: Pits used exclusively for flaring gas.

iii. Emergency Pits: Pits used to contain liquids on a temporary basis due to process upset conditions.

iv. Basic Sediment: Lined pits used for temporary storage of production wastes from tank batteries or production vessels which may contain residual oil.

v. Workover: Pits used to contain liquids during the performance of remedial operations on a producing well in an effort to increase production.

5.5.2 Permitting

a. A permitting or review process should be in place for all pits. Pits may be

authorized by rule, general permit, individual permit, or as a part of an operational permit or program.

b. Pits may be permitted by rule based upon specific requirements in areas where geologic, topographic, hydrologic or other conditions are similar.

c. Authorization for a pit may be included in operational, facility, or other environmental permits (e.g., drilling, workover, gas plant, NPDES discharge). The permit application process may have to be expanded to include certain additional information concerning the pit (i.e., intake volume, soil type, fluid makeup, topography, geology, hydrology, climatology, and such other factors as may be necessary to protect human health and the environment).

d. Construction and use of rule-authorized pits should require prior notification of the appropriate regulatory agency to ensure that proper construction, operation, and closure methods are used to protect human health and the environment.

e. State programs should include provisions to accommodate approval of pits for emergency situations.

5.5.3 Construction

General standards for construction of pits should be included in area or statewide regulations and should address the following items:

a. Size should be sufficient to ensure adequate storage until closure, taking into account historical precipitation patterns.

b. Depth should be such that the bottom does not penetrate groundwater or such that the pit contents do not adversely impact groundwater or surface water. A review of available information or a study should be made of the area where the pit is to be located to determine if aquifers are present and should be protected.

c. Berm height, slope, and material should be such that the pit is structurally sound and that pit integrity is not compromised by terrain or breached by heavy rains, winds, seepage, or other natural forces.

d. If a salt section is anticipated or oil-based muds are used during a drilling program, reserve pits should be designed to accommodate those fluids.

e. Construction standards for pits may differ depending upon the wastes they receive, the length of time they are used, and site-specific conditions.

i. The use of production pits is declining nationally because of concerns about potential contamination of air, soils, and groundwater. In many instances,

equipment consolidation, process modifications, or tanks can be used in lieu of pits. The use of alternatives is generally encouraged. Where production pits are used, they should generally be lined, except as provided below in subsection 5.5.3.e.v.

ii. In the case of reserve and workover pits, liners should be required in certain instances based upon fluid type and site-specific characteristics (e.g., unconsolidated soils and/or hydro-geologic conditions that create a potential for adverse impact to surface water or groundwater, and proximity to environmentally sensitive areas).

iii. Special purpose pits and other pits such as dehydration, tank drain, pipeline drip collector, and compressor scrubber pits should be lined.

iv. Blowdown, flare and emergency pits may be unlined where the removal requirement of Section 5.5.4.k. will prevent adverse groundwater quality impacts.

v. Variances to the above liner requirements should only be provided, and percolation pits should only be used, where it is clearly demonstrated there is minimal potential to affect adversely groundwater quality.

vi. Liners can consist of natural or synthetic materials, should meet accepted engineering practices, and should be compatible with expected pit contents.

f. Requirements for fencing, netting, and caging, or any other method to secure a pit, should be set by area or statewide regulations, as necessary, to protect the public, domestic animals, and/or wildlife. Netting of a pit is recommended as the preferred method to protect wildlife in circumstances, among others, where pits have oil on the surface, where pits are used for long periods, and/or where pits are located in areas with arid climates.

g. Where feasible, reserve pits should be placed to directly receive the discharge from solids separation equipment and to collect rigwash water, spills, and leaks from drilling equipment.

5.5.4 Operational Requirements

a. Specific restrictions on the type of wastes that can be placed in the different types of pits should be included in area or statewide regulations. Restrictions should consider salinity, hydrocarbon content, pH, radionuclides associated with E&P NORM, or other characteristics that may be detrimental to the environment.

b. General security guidelines should protect the public, the environment, and

wildlife.

c. Liquids should be maintained at a freeboard level determined by the state that takes into account extreme precipitation events or other possibilities and prevents overtopping or un-permitted discharges.

d. Lined pits should be operated in a manner that ensures liner integrity.

e. Inspections and monitoring should be conducted at regular intervals or as necessary to ensure that pits meet all operating and structural integrity requirements and to ensure that pit contents do not adversely impact groundwater or surface water.

f. Hydrocarbons that inadvertently accumulate in an unlined reserve pit should be skimmed off the pit at the cessation of drilling and completion operations.

g. Separated oil or accumulated wastes should be periodically removed from unlined skimming/settling pits.

h. Produced water pits should be used only for storage of produced water prior to injection or off-site transport.

i. Percolation pits should be used only for disposal of produced waters and only when area or statewide restrictions established under Section 5.5.4.a. above are met.

j. Evaporation pits should be periodically inspected for compliance with permitted input volumes and liner integrity. Evaporation pits should be skimmed as necessary to maintain an optimum evaporation rate.

k. Blowdown, flare, and emergency pits should not be used for long-term storage or disposal. The regulatory agency should be notified promptly of the use of emergency pits. Fluids diverted to emergency pits should be removed as quickly as practical following the end of the emergency.

l. Unlined basic sediment pits should not be used for storage of oily wastes; they should be replaced by lined pits or tanks.

m. Workover pits should be open only for the duration of workover operations and should be closed within 120 days after workover operations are complete.

n. Pit wastes that exhibit oilfield NORM above regulatory action levels should be managed in accordance with the criteria of Section 7 and any other applicable criteria of these guidelines.

5.5.5 Closure

a. Pits should be closed in accordance with local, state, and federal regulations and, if on private property, consistent with lease obligations.

b. Reserve pits should be closed as soon as practical but no later than 12 months after cessation of drilling operations. However, the closure of reserve pits beyond 12 months after cessation of drilling operations may be allowed in unusual circumstances if good cause can be demonstrated.

c. Pit liquids should have free oil removed and, when appropriate, should be sampled prior to closure for salinity, hydrocarbon content, pH, radionuclides associated with E&P NORM, or other characteristics which may be detrimental to the environment. On-site disposal of pit contents should be conducted in accordance with the landspreading, burial, and landfilling criteria of Sections 5.6. and 5.7, or by NPDES or UIC permit.

d. Liquid and nonliquid materials not satisfying the on-site criteria for landspreading or burial (Sections 5.6. and 5.7.) should be disposed in federal or state approved disposal facilities.

e. Pit sites should be capped, compacted, contoured, and vegetated where necessary, and in accordance with applicable state or area regulations to ensure ground support stability and to prevent erosion and ponding.

f. Records should be permanently kept by the regulatory agency of all pit locations and should be available to the public for inspection and copying. A permit to drill may serve as adequate record keeping for the location of all pits within 200 feet of the well location.

5.6 Technical Criteria for Landspreading

5.6.1 Definition and Applicability

a. Landspreading is a method of treatment and disposal of low toxicity wastes in which the wastes are spread upon and sometimes mixed into soils to promote reduction of organic constituents and the dilution and attenuation of metals. Landfarming or multiple applications are covered under Section 5.10.

b. These criteria apply to waste disposal at or near E&P locations and do not apply to commercial disposal operations. Commercial facilities used for disposal of E&P wastes are covered in Section 5.10.

c. On-site landspreading of E&P wastes containing NORM above regulatory

action levels should be prohibited.

5.6.2 Regulatory Requirements

When landspreading practices are used at E&P sites, they should be conducted consistent with local, state, and federal regulations, and lease and landowner obligations. General standards for landspreading should be included in area or state regulations and should address the operational requirements of Section 5.6.3.

5.6.3 Operational Requirements

a. Free oil should be removed from the wastes by mechanical means such as skimming or filtration before the wastes are landspread.

b. Landspread liquids should have a pH of 6 to 10 S.U. Where needed, liquids should be neutralized to obtain this range.

c. Solid wastes should be spread evenly and disked into the soil.

d. E&P wastes should be subject to loading rates, location restrictions, and/or other appropriate requirements that promote biodegradation of organic constituents; will not result in waste pooling, ponding, or runoff; will prevent the contamination of groundwater or surface waters; and will protect air quality.

e. Where enhancement of biodegradation is desired, nitrogen and other nutrients should be added to the soil before disking. Nutrient application can be repeated over time.

f. Amounts of waste added to soil during landspreading are generally limited by the electrical conductivity (EC), exchangeable sodium percentage (ESP), and sodium absorption ratio (SAR). The state should determine its criteria based on site-specific and waste-specific conditions. For example, some plants tolerate higher or lower salt levels, higher rainfall areas encourage salt movement out of the root-zone, or shallow groundwater may severely limit application.

g. After landspreading of hydrocarbon containing waste, the waste-soil mixture should not exceed one percent by weight oil and grease, unless the state regulatory agency approves a less or more stringent requirement where circumstances warrant.

h. Salt- and hydrocarbon-loading criteria apply to the final waste-soil mixture and are not an application standard. The operator should be required to demonstrate that these criteria are met within 12 months of cessation of drilling

or production. If these criteria are not met, remediation will be required. Nothing in this paragraph is intended to delay any requirement for erosion control and/or site reclamation or re-vegetation.

i. Soil analyses should be performed prior to landspreading and again upon closure of the site. Upon site closure, waste constituents should not be present at levels that pose a significant risk to human health and the environment.

j. Enhanced techniques, such as repetitive disking and nutrient addition, may be needed to meet the salt and hydrocarbon criteria of the final waste-soil mixture.

k. Under special or abnormal conditions, additional limitations and analysis requirements should be considered for wastes that may contain toxic constituents derived from formation liquids, cuttings, drilling muds, or drilling-mud activities. Records should be permanently maintained by the agency of all waste analyses conducted pursuant to such additional requirements.

5.7 Technical Criteria for Burial and Landfilling

5.7.1 Definitions and Applicability

a. Burial of wastes involves placing the wastes in an excavation and covering the wastes with a layer of soil.

b. Landfilling of wastes involves placing the wastes on the ground and covering them with a layer of soil.

c. These criteria apply to waste disposal at or near E&P sites and do not apply to commercial disposal facilities. Criteria for commercial disposal facilities are contained in Section 5.10.

5.7.2 Regulatory Requirements

When burial or landfilling is used at E&P sites, either should be conducted consistent with lease and landowner obligations and with local, state, and federal regulations. General standards for burial or landfilling should be included in area or statewide regulations and should address the operational requirements in Section 5.7.3.

5.7.3 Operational Requirements

a. Wastes or waste-soil mixtures may be buried or landfilled without a protective

bottom liner only when they meet the landspreading criteria of Section 5.6 prior to burial. The contents of such waste or waste-soil mixtures should be limited to materials such as fresh water-based drilling muds, drill cuttings, spent iron sponge, gas plant catalyst, or molecular sieve. Closure should be consistent with Sections 5.5.5.a and 5.5.5.e.

b. A protective bottom liner, solidification, fixation, or encapsulation should be required for burial or landfilling of wastes whose salt and/or hydrocarbon content exceeds the landspreading criteria of Section 5.6.3. A protective bottom liner, solidification, fixation, or encapsulation should be required for burial or landfilling of E&P wastes containing NORM above regulatory action levels. The regulatory agency may grant a variance from this requirement for fields or portions of fields, upon a showing by the operator that groundwater either is not present beneath the waste site or is naturally protected from the threat of contamination.

c. Agency records should be permanently maintained for any required analytical data taken, sites used, and types and quantities of waste disposed. Site locations should be located on plat maps.

5.8 Technical Criteria for Roadspreading

5.8.1 Definition

Roadspreading is the placement on roads of E&P wastes that exhibit properties similar to commercial road oils, mixes, dust suppressants, or road compaction or deicing materials. Roadspreading of E&P wastes that do not exhibit such properties should be prohibited. Roadspreading of E&P wastes containing NORM above regulatory action levels should be prohibited.

5.8.2 Regulatory Requirements

When roadspreading is used, it should be conducted consistent with lease and landowner obligations and local, state, and federal regulations. General standards for roadspreading should be included in area or state regulations and address the operational requirements in Section 5.8.3.

5.8.3 Operational Requirements

a. Exempt wastes such as tank bottoms, emulsions, heavy hydrocarbons, and crude oil-contaminated soil may be used for road oil, road mix, or asphalt if they

are not ignitable and have a mixed density and metal content consistent with approved road oils or mixes.

b. Roadspreading should be subject to loading rates and/or other appropriate requirements that prevent pooling, ponding, or runoff; prevent the contamination of groundwater and surface water; and protect air quality.

c. Roadspreading should be subject to appropriate buffer zones established to protect waters of the state, water wells, and wetlands.

d. Produced water should be tested and should exhibit properties similar to commercial roadspreading products that are regulated by federal, state, or local agencies.

5.9 Technical Criteria for Tanks

5.9.1 Scope

a. This section applies to permanently installed E&P waste tanks and to produced water storage tanks located at enhanced recovery operations. Where some waste tanks are regulated under the Spill Prevention Control and Countermeasures (SPCC) requirements of the federal Clean Water Act, states may defer to the SPCC requirements for those tanks.

b. Except as provided in Section 5.9.3.b., this section does not apply to:

i. condensate and crude oil tanks;

ii. process vessels, such as separators, heater treaters, dehydrators or freewater knockouts, except that stacks or vents on such vessels should be equipped, where necessary, to protect migratory birds and other wildlife; and

iii. tanks used temporarily in drilling and workover operations.

c. The regulatory agency may adjust or exempt from the requirements of this section small-capacity tanks.

5.9.2 General Requirements

a. States should have information, where available, on the locations, use, capacity, age and construction materials (e.g., steel, fiberglass, etc.) of tanks as needed to administer and enforce state program requirements effectively. Such

information may be obtained through registrations, inventories, or other appropriate means.

b. Tanks covered by this section should not be located in a flowing or intermittent stream and should be sited consistent with applicable local land-use requirements.

c. Tanks should be subject to spill-prevention, preventive maintenance and inspection requirements, including those of Sections 5.3.1.c. and 5.3.3. of these guidelines.

5.9.3 Construction and Operation Standards

a. A principal goal of construction and operation standards for tanks is to minimize the occurrence of and the environmental impacts from spills and leaks.

i. New tanks should be constructed in a manner that provides for corrosion protection consistent with the intended use of the tanks. All tanks covered by this section should be operated in a manner that provides for corrosion protection consistent with the use of the tanks.

ii. Tanks should exhibit structural integrity consistent with their intended use. Wooden tanks should receive increased scrutiny in this regard.

iii. Tanks should be operated in a manner that protects against overtopping.

iv. Secondary containment systems or other appropriate means, such as leak detection, should be employed to minimize environmental impacts in the event of releases.

b. Covered tanks are preferred to open tanks. Open E&P waste and product tanks should be equipped to protect migratory birds and other wildlife in a manner consistent with the wildlife-protection criterion of Section 5.5.3.f.

c. Tanks located in populated areas where emissions of hydrogen sulfide can be expected should be equipped with appropriate warning devices.

5.9.4 Tank Removal and Closure

a. Tanks should be emptied prior to their retirement and the resulting materials should be managed properly.

b. Tanks and associated above ground equipment should be removed upon cessation of operations. For good cause, a state may allow tanks to be removed as soon as practical thereafter. Site reclamation should meet all

landowner and lease obligations and any other applicable requirements.

c. Prior to removal, closure, or release for unrestricted use, tanks and associated piping and equipment should be surveyed for NORM as provided for in Section 7. When regulatory action levels are exceeded, NORM and the equipment containing NORM should be managed in accordance with the state's NORM regulatory program (see Section 7 of these guidelines).

5.10 Technical Criteria for Commercial and Centralized Disposal Facilities

5.10.1 Definitions and Exemptions

a. Commercial Disposal Facility: A facility whose owner(s) or operator(s) receives compensation from others for the temporary storage, reclamation, treatment, and/or disposal of produced water, drilling fluids, drilling cuttings, completion fluids, and any other RCRA exempt E&P waste, and whose primary business objective is to provide these services. These facilities may, under certain circumstances, also accept non-exempt, non-hazardous wastes generated from E&P operations. This definition also includes facilities whose owner(s) or operator(s) receives compensation from others for E&P NORM-related storage, decontamination, treatment, or disposal.

b. Centralized Disposal Facility: A facility, other than a commercial disposal facility, that is: (1) used exclusively by one owner or operator; or (2) used by more than one operator under an operating agreement and which receives for collection, treatment, temporary storage, and/or disposal of produced water, drilling fluids, drill cuttings, completion fluids, and any other RCRA exempt E&P wastes that are generated from two or more production units or areas or from a set of commonly owned or operated leases. These facilities may, under certain circumstances, also accept non-exempt, non-hazardous wastes generated from E&P operations. This definition covers the surface storage and disposal facilities that are present at Class II disposal well sites. This definition also covers E&P NORM related storage, decontamination, treatment, or disposal.

c. Exemptions: The definitions and technical criteria of Section 5.10 do not apply to Class II injection wells or to enhanced oil recovery projects. The definitions and technical criteria of Section 5.10 are not intended to apply to emergency cleanup situations at a Class II injection facility. The regulatory agency may adjust or exempt from the standards and requirements of this section (Sections 5.10), centralized facilities that receive a limited number of substantially similar waste streams and limited volumes of wastes, or commercial or centralized tank-only facilities.

5.10.2 Technical Standards and Regulatory Requirements

Commercial and centralized off-site disposal facilities should meet the technical and regulatory requirements of this section and the general standards of Section 5.1 of these criteria. Compliance with these requirements should be demonstrated in the permit application required in subsection 5.10.2.a. Because commercial disposal facilities use advanced methods of *waste* treatment and disposal, the regulatory agency should establish, where applicable, numerical requirements for the design of pond liners and leachate collection systems, for landfarming operations (i.e., repeated land applications), and for E&P waste reclamation facilities. The requirements of this section are intended to furnish the regulatory agency with sufficient and meaningful information such that permitting decisions will lead to no environmental impact or public health impact once the facility has commenced operations and following its closure.

The regulatory agency may adjust or exempt from these requirements centralized facilities that receive a limited number of substantially similar waste streams and limited volumes of waste, such as the consolidated produced water disposal facilities in a large multi-operator field. Administrative criteria for centralized facilities also may be less extensive than those for commercial facilities.

5.10.2.1 Regulatory Agency Responsibilities in Permitting

a. Permits. The regulatory agency should authorize off-site commercial and centralized disposal facilities for E&P wastes by permit. A permit should be in force for a finite period to be determined by the agency. The agency should use the data and information required by the technical standards of this section to approve or deny applications for permits, to ensure compliance with permit conditions, to order corrective actions in order to prevent or abate violations of the standards, or for any other purpose deemed necessary by the agency.

b. Acceptable Wastes. The agency should prescribe the range of E&P wastes that can be disposed at commercial and centralized facilities and at municipal solid-waste landfills.

c. Waste Characteristics and Disposal. The agency should identify the chemical characteristics of wastes likely to be disposed at commercial and centralized facilities on the basis of published scientific data and on knowledge about regional or site-specific waste characteristics. The agency should consider the types of waste management appropriate for each waste type, and the extent to which additional protective measures (e.g., leachate collection) are needed to protect groundwater, surface water and air. The agency should prescribe these waste disposal facilities and waste stream relationships by rule or in the permitting process and ensure that operators of commercial or centralized facilities comply with them. For sampling and testing, refer to Section

5.10.2.2.c.v. and vi. For determining radiological content, refer to Sections 7.3.3 and 5.2.2.b.

5.10.2.2 Permitting Requirements

a. Any new or existing commercial or centralized facility should be required to obtain a permit from the regulatory agency to commence operation or to continue to operate. An individual permit should be required for E&P waste reclaimers and other commercial facilities where waste is placed on the land (e.g., in pits and in landfarms). A permit should be issued only upon compliance with the general requirements of Section 5.1 and the technical requirements of this section, and upon submittal and approval of an application that contains a Siting Plan, Construction Plan, Operating Plan, and Closure Plan. Operation of a facility should comply with the terms and conditions of the permit. The regulatory agency may tailor the technical requirements for all existing facilities and for centralized disposal facilities to the conditions present at the locations of such facilities. In the case of centralized facilities, the regulatory agency may adjust the requirements of Section 5.10.2.2.a. b. and c. in the light of the volume and characteristics of wastes received by the facility.

b. Siting Plan. The specific site for a commercial facility and, to the extent possible, the site for a centralized facility, should have natural features that prevent or minimize release of pollutants to waters, land, and air. Those natural features could include isolation from or considerable depths to groundwater, protection against flooding, the presence of low permeability soils, and topography conducive to protection against erosion. Additional safeguards may be required by the regulatory agency for centralized facilities that are located on sites that do not exhibit natural protective features or are located in close proximity to residences, schools, hospitals or commercial buildings. An application for a permit for a commercial or centralized facility should, at a minimum, contain the following information:

i. Names, addresses, and telephone numbers of owner(s) and the operator(s) of the facility, the owner(s) and occupant(s) of properties within close proximity of the site, or any nearby person who may reasonably be adversely affected by release from the site;

ii. Topographic map showing the location of the site and any highways or roads that abut or traverse the site and depicting all water courses, flood plains, water wells, pipelines, and dwellings located within one mile of the site;

iii. Geologic, hydrologic, engineering, chemical, and any other data or information that demonstrate disposal of wastes and operation of the facility will not contaminate fresh water, the surrounding soils or air, endanger public health, safety or the environment, or cause property damage;

iv. Average annual precipitation and evaporation rate at the disposal site;

v. Nature and permeability of vadose zone; description of the subsurface strata, identification of the areal extent of underlying aquifer(s), and depth to groundwater; direction of groundwater movement; baseline data on water quality of nearby surface waters, underlying aquifer(s) and soils prior to commencement of operations; and points of past or current use of surface water or groundwater;

vi. Proof that all public notice requirements have been met; and

vii. Certification by an authorized representative of the applicant that information submitted in the application is true, accurate, and complete to the best of the applicant's knowledge.

c. Construction Plan. In general, commercial and centralized disposal facilities should be constructed to prevent or minimize releases of wastes or waste byproducts to surface water, groundwater, soils, and air. Design should allow for the segregation, separation and containment of free oil to minimize emissions, where appropriate. The need for additional protective measures (e.g., barriers) at facilities in close proximity to residences, schools, hospitals, or commercial buildings should be considered. Pits at these facilities should at least meet the construction requirements of Section 5.5.3.e. In the case of E&P waste reclamation facilities, construction requirements to prevent or minimize releases should also apply to wastes stored before and after reclamation. For commercial facilities, detailed engineering drawings and diagrams of engineered disposal facilities should be required; for centralized or one-owner facilities, such extensive construction details may not be needed. Construction should follow guidelines and rules adopted by the regulatory agency.

d. Operating Plan. Applications for permits for existing or new facilities should be accompanied by an Operating Plan that describes the wastes that will be accepted at the facility and the methods by which those wastes will be managed and disposed. The need for groundwater, air, or other monitoring at commercial or centralized disposal facilities where wastes are placed on the land should be evaluated by the state as part of this program development and implementation, and should depend upon the nature and size of the disposal activities. At facilities that manage E&P NORM, monitoring should be sufficient to determine compliance with maximum permissible doses to workers and to members of the public in unrestricted areas. The Operating Plan should contain the following information:

i. Volume, rate of application, and type of material to be disposed at the facilities and the facilities that will be used to dispose of each waste stream (i.e., unlined or lined pits, above- or below-grade tanks, etc.);

ii. Contingency plan for reporting, responding to and cleaning up spills, leaks, and releases of wastes or waste byproducts, including provisions for notifying emergency response authorities and for taking operator-initiated emergency response actions;

iii. Plan for routine inspection, maintenance, and monitoring to ensure and demonstrate compliance with permit requirements. At commercial and centralized facilities where wastes are placed on the land, such as in pits or landfarms, groundwater monitoring should be required in the absence of site-specific or facility-specific conditions that minimize the potential for adverse impacts to groundwater. Specific plans for preventing or minimizing air emissions from sources such as (1) the volatilization of organic materials in the waste; (2) particulate matter (dust) carried by the wind; and (3) chemical reactions (e.g., production of hydrogen sulfide from sulfur-bearing wastes) should be considered. Monitoring to ensure organic wastes are treated effectively should also be required for landfarming operations.

iv. Waste acceptance policy for the facility that details the types of wastes that the facility will accept(exempt E&P wastes and/or non-exempt, non-hazardous wastes from E&P operations), how the facility will determine whether a shipment of wastes meets its acceptance criteria including whether on-site sampling and testing will be employed, and the procedures that will be followed if unacceptable wastes arrive at the facility;

v. Plan to characterize wastes received for disposal. Waste characterization requirements for small centralized facilities may be more limited, based on the limited types and volumes of wastes received. At a minimum, waste characterization should comply with the requirements of Section 5.2. States should determine additional minimum testing criteria applicable to their regions;

vi. Plan for periodic removal and subsequent handling of free oil;

vii. Security plan for the facility;

viii. In the case of landfarming operations, loading rates, location restrictions, and/or other appropriate requirements that ensure the treatment of organic constituents, prevent the contamination of groundwater or surface waters, and protect air quality. Operations should comply with the requirements of Section 5.6.3;

ix. A community relations or public information plan should be considered; and

x. Environmental, Health, and Safety Plan. Where applicable, an environmental, health, and safety plan should be developed for commercial

disposal facilities. Such plan should describe site sampling methods and procedures to determine the potential risks to human health and the environment posed by the site. State regulatory programs should take into consideration the size and nature (treatment and disposal processes) of each facility when determining whether or not this environmental, health, and safety plan is applicable.

e. Closure Plan.

i. Applications for permits for existing or new facilities should be accompanied by a Closure Plan that describes the methods to be used to reclaim the facility following the cessation of operations. Closure should comply with the general requirements of Section 5.1 and with any other requirements established by the regulatory agency.

ii. For commercial disposal facilities and centralized disposal facilities of comparable nature or size, the plan should describe the site sampling methods that will be used to determine the risks to human health and the environment posed by the site, if any, once closure is completed; and any further measures that may be necessary to address remaining site contamination at that time. The plan should also include post-closure monitoring and maintenance requirements where the wastes remaining on-site after closure may adversely affect groundwater or surface waters, or otherwise pose a significant risk to human health and the environment. The duration of the post-closure care period and the nature of the post-closure requirements should correspond to the continuing risks posed by the facility after closure.

iii. The plan should include a closure schedule, a cost estimate for reclamation, and a schedule for authorized financial assurance instrument. The cost estimate and authorized financial assurance instrument schedule should be used to establish a financial surety level for the facility prior to permit approval. The level of financial surety requested should cover the full estimated cost of facility closure and reclamation.

5.10.2.3 Waste Tracking Requirements

To assure that only acceptable wastes are disposed of at commercial or centralized facilities, a waste tracking system that documents the movement of wastes from the site of their origin to their final disposition should be implemented. The following elements should be included in the waste tracking system:

a. Multi-Part Form or Equivalent Documentation: State regulatory programs should require operators to use a multi-part form or equivalent documentation that contains the names, addresses, and phone numbers of the generator

(producer), hauler, and disposal facility operator; a description of the waste; the time and date it was collected, hauled, and deposited at the disposal facility; and the volume of the waste hauled.

b. Maintenance of Waste Tracking Information: The waste tracking information should be maintained by the generator, hauler, and operator of the disposal facility for inspection by the regulatory agency for a period of three years after the shipment date. This record retention period should be automatically extended for any person who is the subject of an unresolved enforcement action regarding the regulated activity from the date such person receives notice of the enforcement action until it is resolved.

c. Attest to No Illegal Dumping: The waste hauler should certify in writing that no unauthorized wastes were dumped illegally or at a location or facility not designated by the generator and that no unauthorized wastes were mixed with the exempt wastes during transport. The disposal facility operator should certify in writing that the facility is authorized to receive the waste for disposal.

d. Reporting of Discrepancies: The operator of the disposal facility should immediately report to the regulatory agency and the generator, any discrepancy in waste descriptions, volumes, or place of origin based on personal observations or documentation.

e. Permitting of Waste Haulers: Waste-hauling companies should be permitted by the regulatory agency based on a showing of basic knowledge about the regulatory requirements for disposition of E&P wastes transported from their point of generation to their final disposal site. The regulatory agency may issue permits to individual waste haulers or to waste hauling firms.

5.10.2.4 Applicability of Waste Tracking Criteria

These waste tracking requirements do not apply to wastes moved by pipeline. Operators who transport wastes by pipeline should periodically report waste quantities to the regulatory agency.

SECTION 6 | Abandoned Sites

6.1 Abandoned Oil and Gas Sites Introduction

States with current or historic oil and gas operations should develop and implement a program to inventory, prioritize, and remediate, as necessary, abandoned sites. The purpose of this section is to provide guidance for that program. It is not the intent of these guidelines to preclude an abandoned site from being returned to operation in accordance with state requirements.

6.2 Definition of "Oil and Gas Site" and "Abandoned Site"

The terms "Oil and Gas Site" and "Abandoned Site," as used herein, have the following meanings:

a. An **Oil and Gas Site** is land or equipment, including a wellbore, that is now or has been used primarily for oil or gas exploration or production, or for the management of oil and gas wastes from exploration and production.

b. An **Oil and Gas Site** is considered an **Abandoned Site** if the site:

i. Was not adequately plugged or closed at conclusion of operations such that it constitutes or may constitute a threat to public health or the environment; and

ii. Has no owner, operator, or other responsible person (hereinafter called "responsible party") who can be located, or such responsible party has failed or refused to undertake actions, where required by law, to abate the threat. A responsible party cannot be located, among other circumstances, where no liability for remedial actions is imposed by the state upon past or current owners and operators.

6.3 Identification of Abandoned Sites

A state should have a procedure for identifying sites that may constitute a threat to public health or the environment and for determining whether a responsible party exists. The state should develop and maintain an inventory of abandoned sites. Examples of elements that may be considered in identifying sites that may constitute a threat to public health or the environment include agency reviews or inspections, referrals by other agencies, or citizen or landowner inquiries. Classifications or rankings may be used to separate these sites into relative risk categories. Examples of elements that may be considered in determining whether

a responsible party exists include the failure to file required data or reports, the failure to respond to agency inquiries, tax defaults, information in public records, or landowner or public inquiries. In developing an inventory of abandoned sites, the state should have procedures for attempting to notify the last known responsible party, and providing legal notice.

Emergency protocols should be included, so that remedial action can be initiated prior to legal notice on sites that are judged to present an immediate threat to the public health or environment. Where there are agencies with overlapping jurisdiction for abandoned sites, inventory procedures should be coordinated among these agencies as further discussed in Section 4.4 of these guidelines.

6.4 Funding for Abandoned Site Remediation

An effective state program to address abandoned sites should have adequate funds available to permit the state to undertake any necessary assessment, plugging, closure, or remediation of such sites.

Adequate funding involves the development of a financial assurance program as provided in Section 4.2.4. To ensure the continuity of financial assurance in the event of a change of operator, notice to the state of any such change should be required. Any financial assurance provided by the previous operator should remain in effect until the new operator's compliance with the state's financial assurance program is verified.

Section 4.2.4 describes some of the types of financial assurance a state should consider in designing a program to provide it with the necessary economic resources while facilitating operator compliance. As part of a financial assurance program, a state should consider establishing a special purpose fund to plug, close, or remediate an abandoned site. The state should have the authority to recover costs from the responsible party, where such party exists. The state should evaluate its needs and establish such funding mechanisms as are appropriate to satisfy those needs. A wide variety of funding mechanisms have been employed to support existing special purpose funds in various states. Those mechanisms include bond forfeitures; legislative appropriations to the responsible state agency; a percentage of the taxes on oil and gas production; fines and penalty assessments; equipment salvage; and a host of fees, among them fees or charges based on the value of oil and gas, fees or charges based on units of production of oil and gas, operator fees, supplemental fees in lieu of bonds, inactive well fees, permit fees, and waste generation fees.

6.5 Criteria for Prioritizing Remediation

The state program should include criteria for determining whether an abandoned

site constitutes a threat to public health or the environment and the site's priority for remediation. Among other things, the following criteria may be used: (1) the occurrence of or potential for an imminent release from the site; (2) the nature, extent, and degree of contamination; (3) the proximity of the site to populated areas, surface water, and/or groundwater; (4) whether the site is in an environmentally sensitive area; and (5) wellbore lithology and condition. Where appropriate, the state should perform a more detailed site evaluation. The state agency should have flexibility and discretion to consider the factors associated with the individual sites, including cost savings associated with simultaneous remediation of multiple sites that otherwise would have different priorities or similar financial considerations, in assigning them a priority on the inventory of abandoned sites.

6.5.1 Goal for Remediation

A goal of the state program should be to remediate the abandoned sites on its inventory in a manner that assures that reasonable and measurable progress is made.

6.5.2 Liability for Remediation

The state should establish a liability scheme that will ensure that the goals of its abandoned sites program will be achieved. States should consider a range of options with respect to liability for remediation, which may include among others: (1) liability for all current and past owner(s) and operator(s); (2) liability for the owner(s) and operators(s) found to be responsible for the contamination at an abandoned site; or (3) no liability for past or current owner(s) and operator(s) should the state choose to finance the abandoned sites program.

Any liability scheme established by a state should clearly define the responsibility for remediation. A state should allow remediation of an abandoned site by a party that would not otherwise be responsible for the remediation.

6.6 Standards for Remediation

The state should ensure that abandoned sites, including well bores, be plugged or closed in a cost-effective manner that minimizes or removes the threat to public health and the environment and that restores the land to an environmentally stable condition.

6.6.1 Well bore Remediation

The state should consider existing rules and regulations when determining proper plugging procedures for abandoned sites. However, the state should have the flexibility to modify those plugging procedures, while maintaining mechanical integrity of the well bore adequate to ensure that public health and the environment are protected.

In carrying out well bore remediation, the state should use existing information from well records including depth of well, depth of any old plugs, presence of casing and tubing and depths set, perforations, existence of groundwater and hydrocarbon-bearing zones, existence of over-pressured zones, and any junk in the hole to determine the condition of the well and the proper plugging procedure. In the absence of the above information, data such as existing geological and engineering field studies, water well records, interviews with nearby landowners, corporate records, and historical literature can be reviewed.

6.6.2 Site Remediation

The extent of surface remediation of an abandoned site should be determined based on surface and subsurface resources and land use. Consultation by the state regulatory agency with the surface owner, surface tenant, and other federal, state and local agencies, as appropriate, should take place prior to remediation.

As appropriate, abandoned sites should be re-vegetated in accordance with state regulatory agency rules, and with consideration given to recommendations from the surface owner, surface tenant, and federal and local agencies. As appropriate, soil should be evaluated to determine if hydrocarbons, chemicals, or NORM were spilled or leaked, and to determine remediation.

Surface equipment or materials on an abandoned site should be removed, and salvaged when possible, unless the state determines otherwise. Procedures should be identified for handling NORM, if present. Due to the expense and potential damage to the land, there may be situations where equipment or materials would not be removed, e.g., a gathering system might be abandoned in place with appropriate protection. When reclaiming a pit, the state should determine the contents of the pit and how the pit can best be remediated. Once emptied, cleaned and tested as appropriate, pits should be backfilled and contoured to prevent erosion from or ponding of surface water. Monitoring wells at an abandoned site should be as necessary to protect groundwater resources. The state should develop additional remediation criteria for commercial disposal sites, as appropriate.

6.6.3 Record of Remediation

Once remediation of an abandoned site has been completed, reports on how the

site was remediated should be maintained by the regulatory agency.

6.7 Public Participation

The state abandoned sites program should provide for public participation. At a minimum, the public should have: (1) access to information about the program; (2) the opportunity to participate in any rulemakings associated with the program; and (3) a statutory or regulatory mechanism to petition the state agency to change a site's status on the inventory and/or the level of remediation required on a site.

6.7.1 Access to Information

The state should maintain and make available to the public, records related to the abandoned sites inventory, including: (1) the location of an abandoned site; (2) the extent and degree of contamination of the abandoned site; and (3) the method of remediation that has been or will be required for an abandoned site. In addition, the state should maintain public records on the state's progress with respect to implementing the abandoned sites program.

6.7.2 Participation in Rulemaking

The state program should provide an opportunity for the public to participate in any rulemakings associated with the program.

6.7.3 Participation Regarding Priority on the Inventory and Level of Remediation

The state program should include a mechanism by which an affected person could petition the state to: (1) add a site to the abandoned sites inventory; (2) change the priority for remediation of a site on the inventory; and (3) conduct or require additional remediation of a site.

6.8 Avoid Future Abandoned Site Problems

Since abandoned sites may constitute a threat to public health and the environment, the state should:

a. Establish and implement an abandoned site program consistent with the guidance in this section; and

b. Enforce its existing regulatory program, with modifications, if necessary,

consistent with this guidance.

c. Evaluate its programs for financial assurance, inspection, compliance tracking, and monitoring of inactive sites to determine whether or not the state should make adjustments to prevent an increase in abandoned sites.

SECTION 7 | Naturally Occurring Radioactive Materials

7.1 Background

Naturally occurring radioactive material (NORM) is present above background levels at some oil and gas E&P facilities and E&P service company locations. NORM found in E&P operations originates in subsurface oil and gas formations and is typically transported to the surface in produced waters. NORM may deposit in well tubulars, surface piping, vessels, tanks, pumps, valves, and other producing or processing equipment and may be found in scales, sludges, contaminated soil, and other associated E&P wastes. NORM is also referred to as Technologically Enhanced Naturally Occurring Radioactive Material or TENORM.

7.2 General

States should adopt an E&P NORM regulatory program that addresses identification, use, possession, transport, storage, transfer, decontamination, and disposal to protect human health and the environment. States may choose not to adopt such a program if they find, based on field monitoring data and other scientific information, that no NORM is present in oil and gas operations in the State, or that the levels of NORM present in oil and gas operations in the State do not present such a risk to human health or the environment to warrant a regulatory program. States that make such a finding should periodically reevaluate the basis for the determinations.

If a state determines that a regulatory program is necessary, it should tailor its program to NORM occurrence in the oil and gas E&P industry and an assessment of risks to human health and the environment. The program should include the elements listed in Section 7.3. E&P NORM should be managed in accordance with the pollution prevention and waste management hierarchy provisions of these guidelines. In addition, the other sections of these guidelines apply, where applicable, to NORM as a constituent of E&P waste.

7.3 Elements of an E&P NORM Program

7.3.1 Definition

States should develop a definition for NORM that is consistent with that which occurs in the oil and gas E&P industry. For purposes of these guidelines, NORM is defined as any naturally occurring radioactive materials (not including byproduct, source or special nuclear material, or low level radioactive waste) not subject to

regulation under the Atomic Energy Act, whose radionuclide concentrations have been enhanced by human activities such that potential risk to human health or the environment are increased.

7.3.2 Action Levels

States should establish risk-based numerical action levels above which NORM is regulated taking into consideration the risk of exposure to human health and the environment. Such action levels should also be used to regulate the transfer or release of equipment, materials, and sites.

7.3.3 Surveys

States should develop standards for survey instruments and procedures for identifying and documenting equipment, materials, and sites that may contain NORM above the action levels. States should consider the types of facilities to be surveyed, when surveys should be performed, when survey results should be reported to the state regulatory agency, and any necessary training of surveyors. State survey requirements should provide data necessary to meet the purposes described in Section 5.2.1 and to administer and enforce state program requirements effectively.

7.3.4 Worker Protection

State regulatory programs should include applicable state and federal standards for worker protection from exposure to radiation, including worker protection plans, and other standards necessary for the protection of workers from exposure to NORM. States should establish NORM training or certification requirements based upon E&P work related duties and their associated NORM exposure risk (i.e., NORM awareness training may be sufficient for many common E&P work activities).

7.3.5 Licensing/Permitting

a. General licensing/permitting: Persons who possess E&P NORM in concentrations or at exposure rates that exceed state-adopted action levels should be generally licensed or permitted.

b. Specific licensing/permitting: Specific licenses or individual permits should be required for commercial storage, removal, decontamination, remediation, treatment or disposal of E&P NORM. A state may require specific licenses or individual permits for the management of E&P NORM at centralized facilities as

defined in Section 5.10.

7.3.6 Removal/Remediation

States should consider performance standards for removal, decontamination, and remediation that are protective of human health and the environment.

7.3.7 Storage

States should establish standards for storage of NORM that are protective of human health and the environment. NORM storage facilities should be constructed to prevent or minimize releases. Tanks used to store E&P NORM should meet the requirements of Section 5.9. A state should consider adoption of limits on the amount of time NORM that exceeds action levels can be stored, depending on factors such as quantity, radioactivity, climate, proximity to the public, and protective controls.

7.3.8 Transfer for Continued Use

State regulatory programs should allow for the transfer of land and equipment containing NORM for continued operations in the production of crude oil and natural gas, with appropriate notification to affected parties.

7.3.9 Release of Sites, Materials, and Equipment

State regulatory programs should address the levels below which, and conditions under which, equipment, materials, and sites containing NORM may be released. State regulatory programs should authorize the release of equipment, materials, and sites for unrestricted use only if NORM is below action levels. Such regulations should provide for appropriate notification to affected persons.

7.3.10 Disposal

State regulatory programs should authorize disposal alternatives within the state's jurisdiction for various E&P wastes containing NORM, including contaminated equipment, and should include regulatory requirements for NORM disposal that are protective of human health and the environment. Landowner or other notification may be required as a condition of disposal. Commercial and centralized NORM disposal facilities should meet the criteria of Section 5.10.

7.3.11 Interagency Coordination

State radiation programs, oil and gas programs, and waste management programs are frequently distributed among separate agencies. Therefore, in many states, multiple agencies may regulate NORM. The various agencies should coordinate their regulatory and enforcement activities under the guidance given in Section 4.4 of these guidelines.

7.3.12 Public Participation

State regulatory programs for NORM should meet the public participation guidelines established in Section 4.2.2.

7.4 Regulatory Development and Research

The Conference of Radiation Control Program Directors has prepared suggested state regulations for NORM, and a number of states have developed or are in the process of developing NORM regulations. States that are developing their own NORM programs are encouraged to consult these sources as well as applicable federal radiation guidance and requirements for information and assistance. In addition, states should encourage and keep abreast of ongoing and future research on NORM, including risk assessment.

SECTION 8 | Stormwater Management

8.1 General

Stormwater can become contaminated from contact with spilled or stored materials, from contact with E&P waste, or from the erosion of soils. E&P waste management practices that have a potential of contaminating stormwater include land application, landfarming and roadspreading. States usually have statutory authority for stormwater management programs through general pollution prevention or water pollution control legislation. States should implement programs to minimize the potential for contamination of surface water from sediment and other E&P contaminants contained in stormwater.

Stormwater management requirements should be adapted to regional characteristics. These characteristics include variations in topography, rainfall (annual average, episodic and seasonal), major soil types, proximity to surface waters, floodplains, seasonal and permanent swamps, wetlands and marshes, and vegetative cover.

States should adopt a stormwater management program based on the potential effects on human health and the environment. States may choose not to adopt such a program if they find, based on field monitoring data and other scientific information, that stormwater runoff does not pose a significant risk to human health or the environment. States that make such a finding should periodically reevaluate the basis for the determination. The state program need not duplicate applicable federal regulations for stormwater management.

Stormwater management regulatory activities should be coordinated with activities of other interested parties including landowners, soil conservation agencies, land management agencies, agencies with NPDES jurisdiction, and agencies with spill response authority.

8.2 State Regulatory Elements

The state agency with stormwater management or erosion control_authority should require an operator to minimize environmental impacts caused by stormwater. These requirements should include a description of the action the operator will take to meet state program goals for the geographic location in which the activity will take place. These requirements may be spelled out in specific regulations or they may be required to be included in operator- or site-specific plans developed by operators. State program requirements should specify time frames when stormwater control measurements are to be in place and when any state notifications are to occur.

In regions where stormwater has a high potential for causing environmental degradation, states should consider the use of permits or other authorizations to assure that adequate measures will be put in place. Such permits or authorizations should conform to Section 4.1.1. (Permitting).

State stormwater management programs should contain compliance evaluation capabilities as outlined in Section 4.1.2. (Compliance Evaluation), contain enforcement capabilities as outlined in Section 4.1.3. (Enforcement), be applicable to responses to spills and releases as outlined in Section 4.2.1. (Contingency Planning and Spill Risk Management), and contain data management capabilities as described in Section 4.2.8. (Data Management).

States programs should provide for outreach and training on stormwater management requirements and practices for operators, landowners and the public. These activities should conform to Section 4.2.2.2. (Public Participation). Similarly, training should be provided for state agency personnel as outlined in Section 4.3.1.5. (Training Requirements). Where stormwater management and E&P regulatory authority reside in different agencies, oil and gas agency staff should be trained so that they can, as time and staffing patterns allow, provide information and referrals to operators.

State stormwater management programs should be evaluated periodically in accordance with Section 4.2.3 (Program Planning and Evaluation). Such evaluations should include an analysis of all aspects of the program, and procedures for making any necessary program changes identified during the evaluation.

8.3 State Agency Regulatory Program Criteria

8.3.1 Planning

Within the context of an E&P program, selection of the location for a well site, roadway, pipeline or other E&P facility is a critical component of a stormwater management program. Factors to be considered during the development of site requirements with respect to stormwater management include: minimization of the area to be disturbed, current land uses, site gradient, the type of facility to be constructed, springs and seeps, floodways, stream crossings, and the management of E&P wastes.

Other factors that should be considered in the development of stormwater management requirements include well density, distance between wells, existing roads, necessary temporary and permanent roads to be constructed, road alignment, slope, grade and length, the availability of vegetative filter strips, and

the management or disposal of trees and stumps to be removed during construction.

8.3.2 Construction

The construction of well sites, access roads, pipelines, stream crossings and crossings of wetlands, swamps and marshes can result in the contamination of stormwater and/or adjacent surface waters. Consequently, state agencies should develop standards or management practices appropriate for these activities. Similar practices may be necessary when responding to spills and releases when soils are disturbed or contaminants are mobilized by stormwater.

Standards or management practices should be appropriate for the region in which the construction activity will occur. Examples of such requirements include the construction of upgrade diversion channels and the collection of construction site runoff; the use of brush and other barriers and the stockpiling of topsoil and subsoil during clearing and grubbing; and the grading of cut and fill slopes, road embankments, road surfaces (crowned, insloping or outsloping) and roadside ditches to control water.

Similarly, requirements should be developed for bridges, causeways, cofferdams, fords and bank stabilization when surface waters are encountered. Requirements for temporary road or stream crossings and use of rock at construction entrances may be necessary.

Practices to be considered for stormwater controls during construction include drainage ditches, basins, sediment traps, berms, vegetative filter strips, sediment barriers, turnouts, culverts and cross-drains, broad-based dips and swales, waterbars, rock filters, straw bale barriers and fabric filter fence. Outlet protection should be provided for devices with outlets to surface waters.

Additional practices to be considered for pipeline construction include the use of ditchline barriers, timing of backfilling, materials used for trench backfill, location of staging areas, and the use of trench plugs. In fragile soil, wetland and marshy areas, and at stream crossings, construction mats, board roads or geo-textiles should be considered.

Criteria should be developed for temporary stabilization if permanent stabilization will be delayed. Temporary stabilization practices such as seeding with annual grasses and mulching, or seed/filter fabric combinations should be considered. Permanent stabilization can occur through the application of rock to well sites and roads, and achieving adequate growth of (or sodding with) permanent vegetation. Factors to be considered during revegetation include calculation of acreage, soil types and distribution, seed bed preparation, seed mixtures (temporary, permanent), soil amendments, and mulching and anchoring.

8.3.3 Operation and Maintenance

States should require that stormwater control measures be operated and maintained in a manner that will assure their effectiveness during site preparation, well drilling and production, and until the site is restored. These measures should be operated and maintained to control sediment as well as E&P waste and spills. Requirements regarding the frequency and type of inspection, preventative maintenance and repairs are appropriate.

8.3.4 Restoration and Reclamation

Where appropriate, states should incorporate stormwater management during the development of standards for site restoration and reclamation. These requirements should apply to the restoration of recently active sites, orphan sites, remediation sites, and sites where prior restoration efforts failed.

Where appropriate, stormwater management criteria should be developed for the removal of equipment, restoration of pits, disconnection and abandonment of pipelines, backfilling and grading, and access road reclamation.

SECTION 9 | Hydraulic Fracturing

9.1 Background

The practice of completing oil and gas wells through hydraulic fracturing, while not new, has evolved into a key technology in the development of unconventional oil and gas resources, such as coal bed methane or shale gas. This has resulted in questions about the potential impacts on water resources due to the volume of water needed for hydraulic fracturing, the potential impacts to groundwater by the hydraulic fracturing process, or the proper management or disposal of waste and other fluids associated with hydraulic fracturing.

9.2 General

States should evaluate potential risks associated with hydraulic fracturing, taking into account factors such as depth of the reservoir to be fractured, proximity of the reservoir to fresh water resources, well completion practices, well design, and volume and nature of fluids. Where necessary and recognizing the local and regional differences discussed in Section 3.3, states should have standards to prevent the contamination of groundwater and surface water from hydraulic fracturing. State programs for hydraulic fracturing should ensure establishment and maintenance of well control; protection of groundwater zones, other mineral resources.

9.2.1 Standards

State programs for hydraulic fracturing should include standards for casing and cementing to meet anticipated pressures and protect resources and the environment. The state should have the authority as necessary to require the performance and/or submittal of diagnostic logs or alternative methods of determining well integrity. The state program should address the identification of potential conduits for fluid migration in the area of hydraulic fracturing and the management of the extent of fracturing where appropriate. The program should require monitoring and recording of annular pressures during hydraulic fracturing operations. The program also should address actions to be taken by the operator in response to operational or mechanical changes that may cause concern, such as significant deviation from the fracture design and significant changes in annular pressures.

State programs for hydraulic fracturing should consider baseline groundwater monitoring protocols that address appropriate factors which may include distance/radius from the well, timing/frequency of testing, test parameters, reporting and management of and access to data, existing/new development or existing production in area, responsibility for sample collection, testing, cost, location/gradient, surface owner

consent, laboratory accreditation, and remedial actions.

Surface controls, such as dikes, pits or tanks, should meet the criteria in Sections 5.5 and 5.9. In addition to pit technical criteria for authorization, construction, operation, pit integrity monitoring, and closure contained in Section 5.5, states should address unique characteristics of impoundments associated with hydraulic fracturing, including the use of centralized and commercial facilities, operatorship, size, location, duration, closure, retention for other use, and characteristics of contained fluids. States should consider erosion and safety issues such as embankment integrity associated with fresh water impoundments associated with hydraulic fracturing.

Contingency planning and spill risk management procedures that meet Section 4.2.1 should be required. Waste characterization should be consistent with Section 5.2. The waste management hierarchy contained in Section 5.3 (source reduction, recycling, treatment and disposal), including the provisions relating to toxicity reduction, should be promoted. The tracking of waste disposed at commercial or centralized facilities should meet the requirements of Section 5.10.2.3. Procedures for receipt of complaints related to hydraulic fracturing should be consistent with Section 4.1.2.1.

9.2.2 Reporting

The regulatory agency should require appropriate notification prior to, and reporting after completion of, hydraulic fracturing operations. Notification should be sufficient to allow for the presence of field staff to monitor activities. Reporting should include the identification of materials used, aggregate volumes of fracturing fluids and proppant used, and fracture pressures recorded.

State programs should contain requirements for public disclosure of information on type and volume of base fluid and additives, chemical constituents, and actual or maximum concentration of each constituent used in fracturing fluids. States are encouraged to require disclosure of such information online. State programs should contain mechanisms for disclosure of chemical constituents used in fracturing fluids to the state in the event of an investigation and to medical personnel on a confidential basis for diagnosis and/or treatment of exposed individuals. Where information submitted is of a confidential nature, it should be treated consistent with Section 4.2.2.

9.2.3 Staffing and Training

In addition to the personnel and funding recommendations found in Section 4.3, state staffing levels should be sufficient to receive, record and respond to complaints of human health impacts and environmental damage resulting from hydraulic fracturing. Staff should receive adequate training to stay current with new and developing hydraulic fracturing technology.

9.2.4 Public Information

State agencies should provide for dissemination of educational information regarding well construction and hydraulic fracturing to bridge the knowledge gap between experts and the public as provided in Section 4.2.2.2. This is especially important in areas where development has not occurred historically and in areas where high volume water use for hydraulic fracturing is occurring.

9.2.5 Coordination

In addition to coordination as contained in Section 4.4, states should consider interstate coordination of regional multi-state issues such as source water, transportation and waste management related to hydraulic fracturing.

9.3 Water and Waste Management

Fundamental differences exist from state to state, and between regions within a state, in terms of geology and hydrology. The state should evaluate and address, where necessary, the availability of water for hydraulic fracturing in the context of all competing uses and potential environmental impacts resulting from the volume of water used for hydraulic fracturing. The use of alternative water sources, including recycled water, acid mine drainage and treated wastewater, should be encouraged.

Waste associated with hydraulic fracturing should be managed consistent with Sections 4.1.1 and 7.

States should encourage the efficient development of adequate capacity and infrastructure for the management of hydraulic fracturing fluids/wastes, including transportation (by pipeline or otherwise), recycling, treatment and disposal. State programs should address the integrity of pipelines for transporting and managing hydraulic fracturing fluids off the well pad.

SECTION 10 | Air Quality

10.1 Background

As a result of the increased development of oil and natural gas from shale formations in recent years, concerns about air emissions have become more focused. On August 16, 2012, EPA published 3 final rules for the Oil and Natural Gas Sector (NSPS OOOO, for the control of VOC and SO_2 emissions; and NESHAP HH/HHH, for the control of hazardous air pollutant emissions). The NSPS applies to sources that are new, modified or reconstructed since August 2011. It requires that companies reduce completion flowback emissions from hydraulically fractured and refractured gas wells by employing reduced emissions completions (aka "green completions"), control emissions from storage vessels by 95%, use low or no bleed pneumatic controllers in the production segment, use no bleed controllers at gas plants, replace reciprocating compressor seals every 26,000 hours of operation or three years, reduce wet seal centrifugal compressor emissions by 95%, and implement more stringent leak detection and repair programs at gas plants.

The NESHAP HH/HHH rules amended provisions to currently codified rules. In particular, the amendments set new standards for small glycol dehydrators, lowered the leak detection threshold at gas plants and amended the definition of "associated equipment" used in making major source determinations at well sites.

In response to petitions for administrative reconsideration of the 2012 rules, EPA is working on changes over the next several years to improve the effectiveness and practicability of programs.

10.2 Administrative

Where necessary, and recognizing the local and regional differences discussed in Section 3.3, states should have standards to prevent the contamination of air. While oil and gas regulatory agencies have many environmental responsibilities for oil and gas operations, the air programs are typically regulated by sister state environmental protection or health agencies and are given statutory and regulatory powers as described below. The state should develop procedures for regular evaluation and consideration of the appropriateness and adequacy of the regulatory program.

10.2.1 Scope of Authority

1. An effective state program for the regulation of air emissions from oil and gas exploration and production activities should include, at a minimum:

2. Statutory authority that adequately details the powers and duties of the respective regulatory body or bodies;

3. Statutory authority that grants the regulatory body (or bodies) the power to oversee air emissions from upstream oil and gas activities, including production, gathering, compression and processing. This authority should include the ability to promulgate appropriate rules and regulations and meet the state's obligations under federal law;

4. Statutory authority to promulgate specific requirements that are more stringent than required under the federal Clean Air Act or regulations where necessary and appropriate to protect public health and the environment;

5. Authority to accept delegation of federal air quality programs specific to oil and gas;

6. Authority to consider cost effectiveness in setting air emission standards when appropriate, as well as to exempt facilities or sources based on criteria such as de minimis emissions or by type of source or facility;

7. Statutes and implementing regulations which adequately and clearly define necessary terminology;

8. Provisions to ensure adequate funding for the staff and program to carry out its objectives and duties;

9. Mechanisms for coordination among stakeholders (including the public, federal and state agencies, and the regulated industry); and

10. Technical criteria for air emission controls.

10.2.2 Jurisdiction and Cooperation Between Agencies

The Clean Air Act establishes a dual federal/state system for establishing requirements to protect public health and the environment, and to oversee air pollution sources, including oil and gas exploration and production (E&P) operations. Under this framework, states are required to establish State Implementation Plans (SIPs) that contain sufficient requirements to attain and maintain compliance with National Ambient Air Quality Standards. Separate from the SIP process, states may, but are not required to, accept delegation of certain federal air quality requirements such as the preconstruction Prevention of Significant Deterioration (PSD) permitting program, the Title V permit program or

New Source Performance Standards. If a state does not accept delegation of a particular federal requirement, EPA retains responsibility for implementing and enforcing that requirement.

Within states that do accept delegation, jurisdiction over air quality issues related to E&P facilities may be split between the state air quality agency, local air quality agencies and/or the agency with jurisdiction over oil and gas drilling and production. Finally, because states have no jurisdiction over air pollution sources on tribal lands, responsibility for implementation and enforcement of air quality requirements for E&P sources on these lands is held by EPA or the tribes.

Where multiple state, federal or tribal authorities have jurisdiction over air quality issues, mechanisms should be in place to avoid duplication, regulatory gaps or inconsistent air quality requirements or enforcement of such requirements. Such mechanisms could include formal Memoranda of Understanding, established interagency task forces, regular periodic meetings between agency staff, and joint inspections of facilities. In addition to ensuring proper coordination, agencies should communicate with the regulated community and the public to make it clear which agency has jurisdiction over a particular area or is responsible for enforcing a given set of air quality requirements.

10.2.3 Permits, Authorizations and Exemptions

States with approved Clean Air Act permitting authority should adopt an air quality permitting program for emission sources in the oil and gas industry that is legally and practically enforceable and harmonizes with federal requirements to avoid confusing and duplicative requirements for operators. The program should allow the state to adopt additional air quality requirements beyond federal requirements to address state-specific air quality issues. State permits should clearly establish what performance standards and/or emission control requirements are required for each covered source.

State air quality permitting programs should be designed to protect human health and the environment while allowing oil and gas development to proceed promptly and efficiently to provide continued, responsible growth in US oil and natural gas production. Therefore, state air quality permitting programs should be straightforward for operators to understand and implement, and administratively efficient for the regulatory agency to minimize cost in time and resources. To accomplish this, states are encouraged to simplify the application process, make available accepted emission estimation methods, make permit application assistance tools available to the operator, establish and make clear permit exemption criteria, and employ construction general permits or permits by rule that also serve as final permits to operate.

When emissions are difficult to estimate due to uncertainty of source throughput and composition, states should also consider mechanisms, similar to some federal

rules (e.g., the storage vessel provisions of the Oil and Gas NSPS OOOO that allow an established period for emissions determination before requiring control), that allows operators to construct and operate certain source types for a limited but sufficient period of time to determine actual facility emissions prior to permitting to ensure that permit conditions, including emission control requirements and Federal applicability, are properly informed. States should consider requiring appropriate levels of control during this evaluation period to avoid exceeding regulatory emission thresholds. It is important to note that the construction of a major source without a permit is prohibited by the Clean Air Act.

10.2.4 Compliance Monitoring, Demonstration & Assurance

State programs should contain the following compliance monitoring, demonstration and assurance capabilities:

1. Procedures for the receipt, evaluation, retention, and investigation of all notices and reports required of permittees and other regulated persons. These procedures should ensure that the notices and reports submitted are adequate in both content and frequency to assess compliance with applicable requirements. States should consider integrating electronic reporting systems to improve efficiency and timeliness of data received. Duplicative or unnecessary reporting should be minimized. Investigation for possible enforcement action should include determination of failure to submit complete notices and reports in a timely manner. Effective data management systems, as described in Section 4.2.7, can be used to track compliance.

2. Inspection and monitoring procedures that are independent of information supplied by regulated persons and which allow the state to determine compliance with program requirements, including:

    a. The capability to conduct comprehensive investigations, that may include advanced monitoring techniques as appropriate, of facilities and activities subject to regulation in order to identify a failure to comply with program requirements by responsible persons;

    b. The capability to conduct regular inspections of regulated facilities and activities at a frequency that is commensurate with state priorities based on the risk to health, safety and the environment; and

    c. The authority to investigate information obtained regarding potential violations of applicable program and permit requirements.

3. Procedures to receive and evaluate information submitted by the public about alleged violations and to encourage the public to report perceived

violations. Such procedures should not only involve transparent communications with the public (to apprise it of the process to be followed in filing reports or complaints), but should also communicate how the state agency will assure an appropriate and timely response.

4. Authority to conduct unannounced inspections at a reasonable time of any regulated site or premises where oil and gas activities are being conducted, including the authority to inspect, sample, monitor, or otherwise investigate compliance with permit conditions and other program requirements, such as proper operation of control devices, process operating conditions and control device operating parameters.

5. Authority to enter locations where records are kept during reasonable hours for purposes of copying or obtaining electronic copies and inspecting such records.

6. Procedures to ensure that documents and other evidence are maintained and/or managed such that they can be admitted in any enforcement proceeding brought against an alleged violator, noting that some information may be entitled to confidential treatment (however, it is the source's obligation to identify which information is confidential business information).

7. Authority to require regulated persons to conduct stack testing or other measurements to establish or verify compliance with applicable emission standards, to allow the state to be present for such tests, be given adequate notice of the tests, and to conduct its own tests when deemed appropriate.

8. Authority to require, under statute, regulation or permit, regulated persons to:

    a. Establish and maintain records;
    b. Make reports;
    c. Install, use, and properly maintain monitoring equipment, and use audit procedures, or methods;
    d. Sample emissions in accordance with prescribed methods;
    e. Provide stack test protocols and test reports;
    f. Perform parametric monitoring where direct emissions measurement is impracticable;
    g. Submit compliance certifications; and
    h. Provide other information needed to determine compliance on a one-time, periodic or continuous basis.

10.2.5 Enforcement

10.2.5.1 Enforcement Tools

The state agency should have effective enforcement tools to address any violations of the state air program, which may include the following actions:

1. Issue a notice of violation with a compliance schedule;

2. Restrain, immediately and effectively, any person by order or by suit in state court from engaging in any impending or continuing unauthorized activity which is causing or may cause damage to public health or the environment;

3. Establish the identity of emergency conditions which pose an imminent and substantial human health or environmental hazard that would warrant entry and immediate corrective action by the state agency after reasonable efforts to notify the operator have failed;

4. Sue or cause suit to be brought in courts of competent jurisdiction to enjoin any impending or continuing violation of any program requirement, including any permit condition, without the necessity of a prior revocation of the permit;

5. Require, by administrative order or suit in state court, that appropriate action be undertaken to correct any harm to public health and the environment that may have resulted from a violation of any program requirement, including, but not limited to, establishment of compliance schedules or requiring the source to apply for and obtain permits for previously unpermitted emissions;

6. Encourage Beneficial Environmental Projects or Supplemental Environmental Projects to secure additional environmental benefits through enforcement settlements;

7. After administrative review, revoke, modify, or suspend any permit, or take other enforcement action deemed appropriate by the state, when the state agency determines that the permittee has violated the terms and conditions of the permit, failed to pay an assessed penalty, or used false or misleading information or fraud to obtain the permit;

8. Assess administrative penalties or seek, in court, civil penalties or criminal sanctions including fines and/or imprisonment; or

9. Resolve compliance issues informally, through mechanisms such as settlement agreements or warning letters, in lieu of a formal notice of violation, administrative order, or court order.

As an alternative to the enforcement tools identified above, state programs should have incentives (such as penalty mitigation and auditing/self disclosure policies) to encourage sources to voluntarily disclose and correct violations.

10.2.5.2 Penalties

States should develop guidance for calculations of penalties that include factors such as the economic benefit resulting from the violation, willfulness, harm to the environment and the public, duration of the violation, the operator's compliance history, and the operator's good faith efforts to comply. Some of the benefits of having guidance for calculation of penalties include: 1) an opportunity to encourage voluntary disclosure of violations; 2) providing consistency and transparency in the assessment of penalties; and 3) providing for the development of readily defensible assessments. Penalties should be such that an operator does not benefit financially from unlawful conduct, and should provide compliance incentive to other operators. States should evaluate their enforcement options and policies to assure that the full range of actions available are effectively used.

10.2.5.3 Right of Appeal

The right to appeal or seek administrative and/or judicial review of agency action should be available to any person having an interest which is or may be adversely affected, or who is aggrieved by any such action.

10.2.6 Staffing and Training

In addition to the general personnel and funding recommendations found in Section 4.3, state staffing levels should be sufficient to receive, record and respond to complaints of human health impacts and environmental damage resulting from air emissions. Staff should receive adequate training to stay current with federal and state air regulatory requirements, state airshed goals, and industry production practices and technology, especially new and developing air pollution control and monitoring technology. This training should include an oil and gas industry overview to familiarize state agency staff with the sources and monitoring equipment they will be regulating. Training programs to accomplish these goals could include:

1. Training courses or resource materials available through US EPA, multi-state air planning organizations, private sector, industry associations, consortiums and universities;

2. Field visits and tours to oil and gas facilities in the state;

3. Engagement with other states' air regulatory programs;

4. Conference attendance; and

5. Coordination and frequent discussions with other state agencies regulating oil and gas operations, including state oil conservation commissions and divisions.

Additionally, agencies should have a mechanism to assess and implement strategies designed to recruit and retain key agency staff such as:

1. Maintaining competitive salary levels;

2. Creation of new technical positions (air specialists, oil and gas sector specialists, etc.) in the permitting and enforcement programs; and

3. Increasing staff responsibilities via promotion of staff to higher positions (project leaders, team leaders, etc.).

10.2.7 Data Management

In addition to the data management recommendations found in Section 4.2.7, states should ensure that appropriate data is shared between agencies so that the air quality program has access to the inventory, which includes the level of detail needed to conduct an effective program (locations of oil and gas facilities and a unique identifier for the regulated activity (e.g., API well number)). as necessary to conduct an effective program. After appropriate quality assurance, public information, such as emissions data, should be made available to the public, air quality researchers and managers, in appropriate user-friendly electronic formats (e.g., data downloads, web services).

10.2.8 Public Involvement

State agencies should provide for the electronic dissemination of educational and other appropriate information regarding air emissions from oil and gas activities to bridge the knowledge gap between experts and the public. This should occur as part of an ongoing process through which information is exchanged in an open forum as provided in Section 4.2.2.2. This is especially important in areas where development has not occurred historically. The public should also have the ability to ask questions and receive responses through the agency website. States should also use advisory groups of industry, government, and public representatives, or other similar mechanisms, to obtain input and feedback on the effectiveness of state programs as provided in Section 4.2.2.3.

10.2.9 Outreach

In addition to the public participation provisions found in Section 4.2.2, states should take measures, such as web postings, FAQs, and distribution of fact sheets, to ensure that the industry, other state agencies and the public are aware of the delineation of responsibilities between the air quality program and the oil and gas program. Provisions should also be made for the availability of speakers to make presentations to interested groups.

10.2.10 Strategic Program and Resource Planning

State air programs for oil and gas will require adequate resources to fulfill state and federal mandates to ensure healthy air quality while providing adequate response time to permit applications and other needs from industry. As with other growing sectors, the oil and gas industry's potential for rapid growth in production basins can challenge the planning process for air programs, since large numbers of facilities can be deployed in production basins and cumulative emissions from new and existing facilities can potentially have significant impacts on air quality.

To address these challenges, and as set forth in these guidelines, states should have adequate resources to conduct necessary regulatory development, permitting, enforcement, monitoring, modeling, inventory development and public outreach activities. Additionally, states should have strategic planning capabilities to ensure that these resources remain adequate in light of dynamic growth in the oil and gas sector and rapid evolution in production technologies.

10.3 Air Program-Specific Elements

10.3.1 Delineation of Sources

States should consider developing an inventory of sources and activities not previously registered or permitted, for example grandfathered facilities and equipment, and non-permitted sources and activities, if information about emissions from those sources is critical for planning and analysis for agency priorities such as efficiently ensuring compliance with air quality standards.

This inventory should be comprehensive but straightforward and relatively simple to administer. However, the state or tribe should make efforts to avoid capture of inconsequential (de minimis) sources that do not impact air quality.

10.3.2 Source-Specific Requirements

These guidelines are developed with particular emphasis on VOC and HAP emissions, and control of these pollutants often reduces methane emissions as a co-benefit. However, there may be some sources that emit dry gas with little or no VOC or HAP content, but that emit methane emissions.. Since 1993, industry partners in the EPA voluntary Natural Gas STAR Program have developed and employed a variety of innovative techniques for mitigating methane emissions in the oil and gas sector. The state should be aware of which operators participate in EPA's Natural Gas STAR program and make others aware of the program. States should be aware of regulatory initiatives of other states to address methane/dry gas emissions.

A state's air quality program should identify oil and gas industry emission source types that must be represented in applications for air quality permits or authorizations. Oil and gas emissions source types and activities may include stationary engines and turbines, well completions or recompletions, venting and leaking gas from compressors, gas-powered pneumatic devices, dehydration units, gas processing plants, transmission and storage facilities, storage vessels and condensate handling, wellbore liquids unloading, produced water management facilities, sweetening units and flares.

The state requirements for these source types and activities should align with Federal requirements unless the state needs to establish additional or more stringent requirements. When specific air issues demand more stringent requirements, states may consider adopting, as consistently as possible, provisions by other states that have been implemented to address similar air quality issue, to minimize the impact on state resources.

State air quality programs may want to address unplanned and episodic emissions due to such things as fugitive air emissions upstream of gas processing plants, process upsets, wellbore liquids unloading, third party equipment downtime, and equipment failure. The programs should require incident reporting and corrective actions where possible, to avoid incident recurrence. However, the state should also consider safety aspects when developing new requirements for unplanned emissions.

Finally, because there is a growing concern over wasted gas from drilling operations, the state air quality regulator should consider coordination with the state oil and gas conservation regulator on a process to quantify and minimize the flaring or venting of associated gas from oil wells.

10.3.3 Air Quality Monitoring Networks

Air quality monitoring is an essential tool both to determine compliance with

National Ambient Air Quality Standards and to assess the impact of air pollution sources on air quality. State programs should have an air quality monitoring network in place that meets these needs. In developing an air quality monitoring network, states should consider several parameters, including but not limited to: the number of monitors, the types of pollutants to be monitored, the location of monitors, specific monitoring instrumentation to be used, frequency of monitoring, and appropriate QA/QC procedures. In placing air quality monitors, states should consider factors such as emission source location, population density, topography and meteorology.

Many of the air quality monitoring requirements for states are set forth in implementing regulations for the various National Ambient Air Quality Standards. Additionally, federal permitting requirements for major stationary sources include certain source specific monitoring requirements. States should have appropriate mechanisms in place to ensure that this source specific monitoring is conducted in accordance with established standards and methods.

States may also consider whether to conduct ambient air quality monitoring that goes beyond the standards established under federal law. While states should have considerable latitude in determining whether and how to conduct such additional monitoring, appropriate procedures should be established to ensure that such monitoring, if undertaken, accurately assesses ambient air quality levels. As part of this additional monitoring, states should consider, where possible, establishing baseline air quality levels in order to assess the impact of emission source changes.

Areas with significant oil and gas production activity may have few or no regulatory air quality monitors, because these areas may not meet typical criteria for siting of monitors, such as population density. States should consider whether to add monitors in these areas to assess emissions from present or anticipated increases in oil and gas activity.

Once it has gone through appropriate QA/QC procedures, air quality data should be publicly available. Options for making data available could include putting it on-line or publishing regular air quality reports. US EPA makes limited criteria air pollutant data from state air monitors available through federal websites, such as AIRNow.gov. Agencies should consider whether to make data additionally available through their own websites to allow greater context and address local issues and concerns.

10.3.4 Reporting, Emission Inventories & Recordkeeping

States should develop and periodically update accurate and robust emission inventories as necessary to conduct good air quality planning and program assessment. States should establish emission reporting requirements for air

pollution sources that adequately support their efforts to develop high quality emission inventories. For individually small sources of air pollution that don't report (commonly called nonpoint sources), states should use the best available methodologies to quantify emissions. As states review and update their inventories they should work with industry and other stakeholders to identify the types of oil and gas sources which can produce significant emissions, and determine when updates to inventories are needed due to new information, changes to emission inventory compilation methodologies, or changes in production or operational practices.

States should consider using the EPA's oil and gas emissions tool(s) for computing nonpoint sources of oil and gas emissions. EPA provides the tool, instructions, and other guidance for computing these emissions as part of its National Emissions Inventory (NEI) program available on the Clearinghouse for Inventories & Emissions Factors (CHIEF). The tool allows for local inputs to be added by states to improve their emissions estimates. EPA also develops projection methods available on the CHIEF Emissions Modeling Clearinghouse for use by states.

Every three years, states are required to submit to EPA all sources of emissions of criteria pollutants and their precursors (Air Emissions Reporting Requirements, 40 CFR Part 51, Subpart A). This includes both point and nonpoint sources for the oil and gas sector.

States should also develop well-founded emission projections, to ensure that air quality standards will continue to be met in the future. Best available data and methods should be used for these projections. As with other growing emission sectors, development of oil and gas can result in rapid increases in emissions in a given area, so states should develop programs that can keep pace Projections which consider emissions under a range of alternative future conditions, such as the effect of changing industry practices and regulations, will yield better results than those that are based on single factors.

After administrative review, emission inventories and projections and reported emission data should be readily available to the public, including documentation of methodology, data sources, and assumptions made in producing the inventory. The inventory development process should include stakeholder review so that the general public and the regulated community can provide input. Furthermore, consistent calculations methods, based on the gas and condensate compositions for specific formations and basins, should be applied. If included in SIPs, the public review process is a requirement for those current and projected inventories used for both nonattainment area inventories as well as modeling inventories.

10.3.5 Corrective Actions & Emergency Response

The states should establish clear criteria for the emergency reporting of significant,

non-routine releases to air. These criteria should consider factors such as the mass and type of constituents released and the proximity of the release to sensitive receptors.

Agencies responsible for receiving emergency notifications of reportable releases to air should be identified and be responsible for the coordination, as appropriate, of any necessary response action with the operator, state and local emergency responders, environmental and/or public health agency and any other agency responsible for public protection.

States should ensure that community residents are notified when potentially hazardous air releases occur and should ensure that companies, in addition to emergency responders, take necessary actions to minimize public exposure.

States should require operators to submit reports that contain information on the cause of the release, the type(s) and amount(s) of pollutants released and the corrective actions the company implemented, to aid in the prevention of incident recurrence.

State air regulators should have appropriate air monitoring equipment necessary to support emergency response activities.

10.3.6 Long-Term Planning, Prioritization & Evaluation

In addition to the program planning and evaluation provisions found in Section 4.2.3, states should have a good understanding of oil and gas operations, including exploration and production; gathering, boosting, processing, and transmission; and accurate inventories and projections of air emissions. Because emissions characteristics, operational requirements, and operational approaches can vary widely by basin, it is critical for regulators to involve interested stakeholders (including oil and gas producers and environmental and citizen groups) in the planning and evaluation processes., Periodic analyses should be completed to ensure that air quality will remain protective of public health and the environment, in accordance with state and federal statutes and regulations, as industry evolves and grows.

There are and will be a number of federal regulations applicable to oil and gas operations that must be assessed for state adoption, incorporated by reference into state regulations, or left to US EPA for implementation. In most states, these federal regulations become the base of the state air regulatory program. State air regulatory program planning must consider the air quality impacts of federal regulations. Airsheds with oil and gas basins that have measured or modeled concentrations of air pollutants near or above the NAAQS, considerable existing or planned development, and/or geographic conditions (topography and meteorology) that can create stagnant air, may require specific, specialized analyses to assess

the short-term and long-term status of compliance with the NAAQS. Collaboration with industry and other stakeholders is very important to ensure that the analyses are comprehensive, scientifically sound and adequately address the relevant questions and issues. Technical collaborations may be more successful when accomplished within a structured process that clearly defines the roles and responsibilities of participants, procedures for widely disseminating analysis design, solicitation of comments, processes for responding to comments, and other opportunities for feedback.

Analyses of criteria pollutant trends, comprehensive emissions trends, and projections of pollutant concentrations, visibility, and deposition are important indicators for evaluation of state air programs. In the process of developing a strategic plan, states may develop specific airshed goals to reduce the impacts of pollutants. The development of these goals should be based upon careful analysis of state needs, priorities, available resources, and applicable state and federal regulations.

Additional program goals could include (i) the development and implementation of an effective stakeholder outreach and education program; (ii) the development of incentives for additional pollution control, such as streamlined permitting programs, permits by rule, and other permitting options that simplify the application and review process while promoting air pollution control; (iii) the development and posting of guidelines, policies and templates that result in efficiencies in the permitting and enforcement processes while encouraging good practice; (iv) the creation of voluntary programs that recognize operators adopting additional air pollution measures; and (v) the development or improvement of an air monitoring network in areas with oil and gas activity, emissions inventories and calculation methods, and air modeling tools.

Regarding evaluation, performance metrics could include an evaluation of ambient pollutant concentrations, emissions trends, permit response time, appropriateness of permitting options, and clarity of conditions required for compliance. States should give consideration to the frequency of the evaluation of these types of metrics as well. Evaluation of emissions trends and modeling data may be more suited to an annual or periodic basis, whereas other metrics, such as stakeholder outreach and monitoring, may be done more frequently. The state agency should identify the set of measures that is most applicable to the goal and then determine the schedule for program evaluation.

SECTION 11 | Reused and Recycled Fluids

11.1 Definitions

State regulatory programs should define fluids that may be reused and recycled. For the purposes of these guidelines, these are fluids that are generated during the drilling, completion (e.g. hydraulic fracturing flowback), and production stages of a well. The term "reused fluids" is commonly used to refer to fluids that require only minimal processing to remove suspended solids. The term "recycled fluids" is commonly used to refer to fluids that typically require more advanced treatment or processing to reduce the salinity of the recycled fluid. Reused and/or recycled fluids are used for well drilling (generally below the base of protected water), well workover, and completion.

11.2 Water Management Planning

Operators should be encouraged to develop Water Management Plans that consider reuse and recycling options. Water Management Plans should address all aspects of water management from acquisition through final disposition. Plans should be tailored to particular projects. State programs should recognize barriers that would limit an operator's ability to reuse or recycle fluids generated during drilling, completion, and production such as technological limitations, fiscal constraints, lease or surface use constraints, stage of development, fluid quality, and agency approval timeframes. States should encourage the use of fresh water alternatives for the drilling and completion of wells where available sources are feasible and where environmental risks can be adequately identified and controlled. See Section 9.3 for additional information concerning water and waste management related to hydraulic fracturing.

Where jurisdictional issues exist between multiple state agencies, river basin commissions, and other parties involved in the management of reused and/or recycled E&P fluids, coordination should be pursued as discussed in Section 4.4.

11.3 Waste Management

Fluids that are to be reused or recycled should be managed and regulated as a waste up to the point the fluids are used in the drilling, workover, or completion of a well. State programs should consider having a regulatory process to designate fluids as a non-waste when they are treated to a level satisfactory to the State and the fluid is reused or recycled. Regulatory responsibility for the reused or recycled fluids should lie with the operator of the facility that is storing, transporting, or processing the fluids. See Sections 5.1 – 5.3 for information concerning technical

criteria of waste.

11.4 Transportation

The fluids to be reused or recycled are generally transported through pipelines or by truck.

11.4.1 Pipelines

Pipelines should be constructed of a material that is compatible with the fluid being transported. They should be constructed and operated in compliance with the manufacturer's specifications. Pipelines transporting fluids to be reused or recycled should be demarked so that personnel and inspectors can clearly identify the pipeline. Rules should differentiate between above ground temporary lines and buried lines. The location of buried lines should be made available to regulators.

Leak detection should be performed prior to and during the operation of pipelines. The leak detection program should account for the length of service, composition of fluid being transported, and pressure. There should be a means of accounting for and reporting waste quantities transported by pipeline and leaks as discussed in Section 5.10.2.4.

11.4.2 Trucks

Truck transportation of fluids to commercial or centralized facilities should be addressed in accordance with the waste tracking and reporting provisions of Section 5.10.2.3. States should encourage operators to utilize smart truck routing to minimize traffic through residential areas, damage to roadways, and to avoid problems associated with spill exposure and complaints.

11.5 Treatment and Storage

Rules for the treatment and storage of fluids to be reused and recycled should be based on the potential risk presented by the treatment or storage of the fluid. Risk factors to consider include location and duration of fluid treatment or storage, chemical content and characteristics of the fluid and waste resulting from the treatment process, the volume of the fluid stored or treated, type of storage structure to be used (i.e. pits, tanks, or modular aboveground storage structures).

Permit processes for the storage of reused or recycled fluids should be streamlined and minimized for activities deemed to be of low risk. For example, the temporary storage and reuse of fluids on an Operator's lease might be approved during the well permitting process, or by other authorization, while facilities used for long-term storage and treatment of fluids may require separate prior authorization by the

State.

Reporting requirements should include records of amounts of waste processed and, where appropriate, laboratory results for treated waste. See section 5.10.2.3 for more information on waste tracking requirements. Where appropriate, States should require groundwater monitoring consistent with the provisions of Section 9.2.1.

State regulatory programs should differentiate between centralized and commercial wastewater treatment facilities. See Section 5.10 for additional information regarding the permitting, construction, operation and closure of these facilities.

State regulatory programs should regulate the waste generated during the treatment of fluids in a manner as described in the technical criteria in Section 5. Those criteria address waste characterization, waste management hierarchy, pits, land application, tanks, and centralized and commercial facilities.

State regulatory programs should include a methodology for the determination of whether or not Naturally Occurring Radioactive Material (NORM) is present to the extent that it is regulated. See Section 7 for additional information on the identification, use, possession, transport, storage, transfer, documentation, and disposal of materials containing NORM.

States should evaluate air emissions at facilities used for the storage and treatment facilities of fluids to be reused or recycled and determine whether a permit or exemption is required. See Section 10.2.3 for additional information regarding air quality permits, authorizations and exemptions.

SECTION 12 | Recommendations for Future Work

1. Industry, the federal government, state-affiliated academic institutions, and public-interest groups are encouraged to conduct and support research into effective ways of minimizing and reusing wastes generated in the nation's oil and gas fields.

2. EPA is urged to continue to support and work with IOGCC, STRONGER, and all interested parties in advancing the state review process.

3. While these guidelines expressly provide for the protection of air quality, few specifics are now included in this area. Accordingly, these guidelines will continue to be reviewed for possible additional air quality recommendations.

4. These guidelines should be updated as state reviews progress and additional information and experience is gained in their application.

SECTION 13 | References

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APPENDIX A | Glossary of Terms

The following is a glossary of selected terms used in the Interstate Oil and Gas Compact Commission Environmental Guidelines for State Oil and Gas Regulatory Programs. The glossary is included only as an aid for the convenience of the reader. It is not intended as an exhaustive compilation of the terms used in the Report, nor are the definitions set forth intended to be preclusive of other potential meanings. Terms expressly defined in the text of the Report are not included in this glossary.

A

Acid: A chemical compound, one element of which is hydrogen, that dissociates in solution to produce free-hydrogen ions. For example, hydrochloric acid, HCI, dissociates in water to produce hydrogen ions - H^+, and chloride ions, CI^-.

Ambient Air Quality – The concentration of pollutants present in the portion of the atmosphere, external to buildings, to which the general public has access, measured in the form of mass of the pollutant per volume of air or as a certain number of parts of the pollutant per million (ppm) or per billion (ppb). *See generally* 40 C.F.R. § 50.1(e).

Aquifer: A geological formation, group of formations, or part of a formation that is capable of yielding water to a well or spring.

B

Barrel: A measure of volume for petroleum products. One barrel is equivalent to 42 U.S. gallons.

Basic Sediment and Water (BS&W): The water and other extraneous material present in crude oil.

Biodegradation: The process of breaking down matter into innocuous products by the action of living things, such as microorganisms.

Blowdown: The material discarded as a result of depressurizing a vessel or well.

Brackish Water: Water that contains relatively low concentrations of soluble solids. Brackish water has more total dissolved solids than fresh water, but considerably less than sea water.

Brine: Water that has a large quantity of salt, especially sodium chloride, dissolved in it; salt water and certain produced water are considered brines.

C

Characteristic Waste: Waste that is considered hazardous under RCRA because it exhibits any of four different properties: ignitability, corrosivity, reactivity, and toxicity.

Clean Air Act (CAA): The federal act that regulates air emissions from area, stationary, and mobile sources codified at 42 U.S.C. Ch. § 7401 *et seq*.

Clean Water Act (CWA): The act that sets the basic structure for regulating discharges of pollutants to surface waters of the United States. CWA imposes contaminant limitations or guidelines for all discharges of wastewater into the nation's waterways.

Climatology: The science that deals with climates (the prevailing influence or environmental conditions characterizing a group or period) and their phenomena.

Completion Fluid: A special fluid used when a well is being completed. It is selected, not only for its ability to control formation pressure, but also for its properties that minimize formation damage.

Completion Operations: Work performed in an oil or gas well after the well has been drilled to total depth. This work includes, but is not limited to, setting the casing, perforating, artificial stimulation, production testing, and equipping the well for production, all prior to the commencement of the actual production of oil or gas in paying quantities, or in the case of an injection or service well, prior to when the well is plugged and abandoned.

Corrosivity: The characteristic which identifies wastes that are acidic or basic (alkaline) and can readily corrode or dissolve flesh, metal, or other materials. The hazardous characteristic of corrosivity, for purposes of RCRA, is defined in 40 CFR 261.22, and generally includes aqueous solutions with a pH less than or equal to 2.0, or greater than or equal to 12.5, and/or liquids which corrode SAE 1020 steel at a rate greater than or equal to 6.35 mm per year.

Crude Oil: Unrefined liquid petroleum. It ranges in gravity from 9 to 55 API and in color from yellow to black, and it may have a paraffin, asphalt, or mixed base. If a crude oil, or crude, contains a sizable amount of sulfur or sulfur compounds, it is called a sour crude; if it has little or no sulfur, it is called a sweet crude. In addition, crude oils may be

referred to as heavy or light according to API gravity, the lighter oils having the higher gravities.

D

Delegated Authority – A state's assumption, after US EPA approval, of partial or complete responsibility for administering EPA's CAA programs.

De-listing: A site-specific petition process whereby a handler can demonstrate to EPA that a particular waste stream generated at its facility that meets a listing description does not pose sufficient hazard to warrant RCRA regulation. Owners and operators can also use the de-listing process for wastes that are hazardous under the mixture and derived-from rules that pose minimal hazard to human health and the environment.

Derived-from Rule: A rule that regulates residues from the treatment of listed hazardous wastes. This rule is found at 40 CFR 261.3.

Disking: The process of using a tractor-pulled set of disks to mix surface soil with waste for the purpose of treating and/or disposing of E&P wastes.

Disposal Well: A Class II well permitted under the SDWA which is employed for the injection of produced water and certain other E&P wastes into an underground formation.

Drill Cutting: The formation rock fragments that are created by the drill bit during the drilling process.

Drilling Fluid: The circulating fluid used in the rotary drilling of wells to clean and condition the hole and to counterbalance formation pressure. Drilling fluids are circulated down the drill pipe and back up the hole between the drill pipe and the walls of the hole usually to a surface tank. Drilling fluids are used to lubricate the drill bit, to lift cuttings, to seal off porous zones, and to prevent blowouts. A water-based drilling fluid is the conventional drilling mud in which water is the continuous phase and the suspended medium for solids, whether or not oil is present. An oil-based drilling fluid has diesel, crude, or some other oil as its continuous phase, with water as the dispersed phase. Synthetic drilling fluid has a synthetic material such as esters or olefins as the continuous phase and water as the dispersed phase. In some circumstances air or another gas is used as a drilling medium.

E

Electrical Conductivity (EC): A numerical expression of the ability of a material to carry a current; the reciprocal of resistivity; normally expressed in milliohm/meter. It is frequently used in soil analysis to evaluate a soil's ability to sustain plant growth.

Emulsion: A mixture in which a liquid, termed the dispersed phase, is uniformly distributed (usually as minute globules) in another liquid, called the continuous phase or dispersion medium. In an oil-water emulsion, the oil is the dispersed phase and the water the dispersion medium; in a water-oil emulsion, the reverse holds. For example emulsions occur during production processes where crude oil is prepared for pipeline transportation.

Exploration: The search for reservoirs of oil and gas, including aerial and geophysical surveys, geological studies, core testing, and the drilling of exploratory wells, also known as wildcats.

Exchangeable Sodium Percentage (ESP): The extent to which the absorption complex of a soil is occupied by sodium.

$$ESP = \frac{\text{exchangeable sodium}}{\text{cation exchange capacity}} \times 100$$

Where the units for both the numerator and denominator are in milliequivalents per 100 grams of soil.

F

FAQs – "Frequently Asked Questions" reference document created, updated, and made publically available by a state that clarifies issues involving the delineation of responsibilities between a state's air quality program and oil and gas program.

Field: A geographic area in which a number of oil or gas wells produce from a continuous reservoir. A field may refer to surface area only or to underground productive formations as well. In a single field, there may be several separate reservoirs at varying depths.

Formation: A bed or deposit composed throughout substantially the same kinds of rock; a lithologic unit. Each different formation is given a name, frequently as a result of the study of the formation outcrop at the surface and sometimes based on fossils found in the formation, and is sometimes based on electric or other bore-hole log characteristics.

Formation Water: The original water in place in a formation at the time production commences.

Fracturing: A method of stimulating production by increasing the permeability of the producing formation. Under hydraulic pressure, a fluid is pumped down the well and out into the formation. The fluid enters the formation and parts or fractures it.

Fracturing Fluids: The fluids used to hydraulically fracture a rock formation. In some cases, a proppant is deposited in the fractures by the fracturing fluid, which is subsequently pumped out and recovered.

G

Gas Processing Plant: A plant for the processing of natural gas, by other than solely mechanical means, for the extraction of natural gas liquids, and/or the fractionation of the liquids into natural gas liquid produces such as ethane, butane, propane, and natural gasoline.

Gas Treating Plant: A plant for the purification of natural gas (e.g., the removal of water and/or acid gases such as hydrogen sulfide) and recovery of condensate.

Generator: Any person whose act first creates or produces a waste.

Groundwater: Water below the land surface where there is sufficient water present to completely saturate the soil or rock.

Groundwater Monitoring: Sampling and analysis of groundwater for the purpose of detecting the release on contaminants.

H

Hazardous Waste: A waste with properties that make it dangerous or capable of having a harmful effect on human health and the environment. Under the RCRA program, hazardous wastes are specifically defined as wastes that meet a particular listing description or that exhibit a characteristic of hazardous waste.

Hydrocarbon: Organic compound of hydrogen and carbon, whose densities, boiling points, and freezing points increase as their molecular weights increase. Although composed of only two elements, hydrocarbons exist in a variety of compounds because of the strong affinity of the carbon atom for other atoms and for itself. The smallest molecules of hydrocarbons are gaseous; the largest are solid.

I

Ignitability (RCRA): The characteristic which identifies wastes that can readily catch fire and sustain combustion. The hazardous characteristic of ignitability for purposes of RCRA is defined in 40 CFR 261.21 and is generally a liquid with a flash point less than 140 F., a non-liquid that causes fire under a friction condition, an ignitable compressed gas, or is an oxidizer.

L

Land Disposal: For purposes of RCRA Subtitle C regulation, placement in or on the land, except in a corrective action unit, and includes, but is not limited to, placement in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation. underground mine or cave, or placement in a concrete vault or bunker intended for disposal purposes.

Landfill: For purposes of RCRA Subtitle C, a disposal unit where non-liquid hazardous waste is placed in or on the land.

Lease: A legal document executed between a landowner (or a lessor) and a company or individual as lessee, that grants the right to exploit the premises for minerals or other products. The lease is sometimes referred to as the area where production wells, stock tanks, separators, and production equipment are located.

Legally and Practicably Enforceable – All terms or conditions included in a permit issued under a federally approved program – including delegated authority – authorizing EPA to enforce such terms or conditions. Federally enforceable programs under the CAA include, but are not limited to, the New Source Review program, the New Source Performance Standards program under Section 111 of the CAA, the Title IV acid rain program, the National Emission Standards for Hazardous Air Pollutants program under Section 112 of the CAA, the Title V program, and state permit programs approved by EPA in the state's SIP.

Liner: Continuous layer of natural or synthetic materials, beneath and on the sides of a surface impoundment, landfill, or landfill cell, which restricts the downward or lateral escape of waste, waste constituents, or leachate.

Listed wastes: Wastes that are considered hazardous under RCRA because they meet specific listing descriptions.

Loading Criteria: A numeric level, normally expressed in pounds per acre, below which a specific chemical compound may be applied to the soil.

Location: Place at which a well is to be or has been drilled.

M

Mixture Rule: A rule that is intended to ensure the regulation of mixture of listed wastes with non-hazardous solid wastes.

Molecular Sieve: Absorbents that are used to remove small amounts of H_2S and/or water from natural gas, capable of being regenerated.

Municipal Solid Waste: Durable goods (e.g. appliances, tires, batteries), non-durable goods (e.g. newspapers, books, magazines), containers and packaging, food wastes,

yard trimmings, and miscellaneous organic wastes from residential, commercial and industrial non-process sources.

N

National Ambient Air Quality Standards (NAAQS) – Nationwide air quality levels, promulgated pursuant to section 109 of the CAA ,42 U.S.C. § 7409, for six criteria pollutants – sulfur dioxide, particulate matter, nitrogen oxide, carbon monoxide, ozone, and lead – of which a state is responsible for achieving, maintaining, and enforcing pursuant to section 110 of the CAA, 42 U.S.C. § 7410, through its approved SIP for each given pollutant.

National Emissions Standards for Hazardous Air Pollutants – Nationally applicable standards under section 112(b) the CAA, 42 U.S.C. § 7412(b), for emissions of hazardous air pollutants listed under section 112(d) the CAA, 42 U.S.C. § 7412(d), that apply to major and area stationary sources as defined under section 112 of the CAA, 42 U.S.C. § 7412.

Natural Gas: Naturally occurring mixture of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the earth's surface. The principal hydrocarbon constituent is methane.

New Source Performance Standards – Nationwide technology-based emissions standards for new or modified stationary sources in specified industrial source categories promulgated pursuant to section 111 the CAA, 42 U.S.C. § 7411. The standards reflect the degree of emission limitation achievable through the application of the best system of emission reduction, taking into account the cost of achieving such reduction and any health and environmental impact and energy requirements, that EPA determines is adequately demonstrated.

O

Operator: The person or company, either proprietor, contractor, or lessee, actually operating a well, lease, or disposal facility.

P

Permeability: The ability of a formation to transmit fluids.

pH: A measure of acidity or alkalinity of a solution, numerically equal to 7 for neutral solutions, increasing with increasing alkalinity and decreasing with increasing acidity.

Plug and Abandon (P&A or Plugging): The placement into a well of a plug or plugs designed to restrict the vertical movement of fluids after abandonment.

Process Upsets – unintended mode of operation of a unit which could result in impaired functionality.

Produced Sand: The formation solids which flow into the wellbore with the produced formation fluids. In general, the lower the formation competency, the greater the produced sand volumes.

Produced Water: The fluid brought up from the hydrocarbon-bearing strata during the extraction of oil or gas. It can include formation water, injection water, and any chemicals added downhole or during the oil/water separation process.

Production: The phase of the petroleum industry that deals with bringing the well-fluids to the surface and separating them, and with storing, gauging, and otherwise preparing the product for sale.

Q

QA/QC – "Quality Assurance/Quality Control" are criteria and procedures that must satisfied to ensure the quality of data and the calibration, repair, and evaluation of air quality monitoring instruments.

R

Reactivity: The characteristic identifying wastes that readily explode or undergo violent reactions. The hazardous characteristic of reactivity for purposes of RCRA is defined in 40 CFR 261.23 and generally includes wastes with highly exothermic reactions or wastes which create toxic gases when mixed with water.

Reclaimed: For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is reclaimed if it is processed to recover a usable product, or regenerated by processing it in a way that restores it to usable condition.

Reclamation: The process of returning a site or contaminated soil to an appropriate state of environmental acceptability.

Recycled: For purposes of defining a material as a solid waste under RCRA Subtitle C, a material is recycled if it is used or reused, or reclaimed.

Recycled Fluids: Commonly used to refer to fluids that typically require more advanced treatment or processing to reduce the salinity of the fluid prior to reuse in well drilling, workover, and completion.

Reused Fluids: Commonly used to refer to fluids that require only minimal processing to remove suspended solids prior to reuse in well drilling, workover, and completion.

Recycling: The separation and collection of wastes, their subsequent transformation or remanufacture into usable or marketable products or materials, and the purchase of products made from recyclable materials.

Reservoir: A subsurface, porous, permeable rock body in which oil or gas or both are stored. Most reservoir rocks are limestones, dolomites, sandstones, or a combination of these. The three basic types of hydrocarbon reservoirs are oil, gas, and condensate. An oil reservoir generally contains three fluids; gas, oil, and water-with-oil, the dominant product. In the typical oil reservoir, these fluids occur in different phases because of the variance in their gravities. Gas, the lightest, occupies the upper part of the reservoir rocks; water, the lower part; and oil, the intermediate section. In addition to occurring as a cap or in solution, gas may accumulate independently of the oil; if so, the reservoir is called a gas reservoir. Associated with the gas, in most instances, are salt water and some oil. In a condensate reservoir, the hydrocarbons may exist as a gas, but when brought to the surface, some of the heavier constituents condense to a liquid or condensate. At the surface, the hydrocarbons from a condensate reservoir consist of gas and a high-gravity crude (i.e., the condensate). Condensate wells are sometimes called gas-condensate reservoirs.

S

Safe Drinking Water Act (SDWA): The act designed to protect the nation's drinking water supply by establishing national drinking water standards (maximum contaminant levels, (MCL's), or specific treatment techniques), and by regulating UIC wells.

Salinity: The quantitative level of salt in an aqueous medium.

Salt Section: A formation, or part of a formation, which is predominately made up of salt; typically sodium chloride.

Sodium Absorption Ration (SAR): A ratio of the concentration of sodium to the square root of the sum of the concentrations of calcium and magnesium.

$$SAR = \frac{Na+}{-[Ca+ + Mg^{2}+]}$$

Where the cation concentrations are in millimoles per liter. It is a measurement frequently used in soil analysis to evaluate a soil's ability to sustain plant growth.

Solid Waste: Any garbage; refuse; sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material, including solid, liquid, semisolid or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. For the purposes of hazardous waste regulation, a solid waste is a material that is discarded by being either abandoned, inherently waste-like, a certain waste military munition, or recycled.

Solids Separation Equipment: Equipment used in drilling and workover/completion operations to remove drill cutting or formation solids from the drilling or workover/completion fluid. May include liquid/solids separation devices such as shale shakers, hydrocyclones, centrifuges, and filtration units.

SPCC: Spill prevention Control and Countermeasures. Regulations establishing spill prevention procedures and equipment requirements for non-transportation related facilities with certain above-ground or underground storage capacities (e.g., crude oil tanks) that could reasonably be expected to discharge oil into or upon the navigable waters of the United States or adjoining shorelines.

Spent Materials: Materials that have been used and can no longer serve the purpose for which they were produced without processing.

State Implementation Plan (SIP) – The body of air quality rules including, but not limited to, enforceable source-specific emissions limitations, monitoring plans, and permit programs established by each state which are designed to either attain or maintain the NAAQS and to implement other requirements established by the Clean Air. Each state's SIP must include, at a minimum, the elements prescribed under CAA section 110(a)(2), 42 U.S.C. § 7410(a)(2), and must be approved by EPA before it becomes effective.

Subtitle C: That portion of the Resource Conservation and Recovery Act (RCRA) which defines and legislates the management of hazardous wastes.

Sweetening – The removal of hydrogen sulfide and other organosulfur compounds from "sour" natural gas. Natural gas is considered "sour" if it contains hydrogen sulfide in amounts greater than 5.7 milligrams per normal cubic meters.

T

Tank Bottoms: Produced sand, formation solids, and/or emulsions that settle-out in production operation process vessels.

Title V Permit Program – A federally mandated operating permit program under the CAA that requires implementation by the states. *See generally* 42 U.S.C. §§ 7661-7661f; 40 C.F.R. Parts 70 and 71. The Title V permit program applies to: all "major sources" as that term is defined in CAA section 501(2), 42 U.S.C. § 7661(2); sources subject to a standard or regulation under the NSPS program, 42 U.S.C. § 7411, or the NESHAP program, 42 U.S.C. § 7412; "affected" sources under the Acid Rain Program; sources required to have a PSD or NSR permit; and any other sources as designated by EPA. *See* 40 C.F.R. § 70.3 (applicability of Title V program). Title V permits consolidate all of these applicable CAA requirements into one legally enforceable document.

Topography: The physical features of a district or region, such as are represented on maps, taken collectively; especially the relief and contour of the land.

Toxicity: The characteristic which identifies wastes that are likely to leak dangerous concentrations of toxic chemicals into groundwater. The hazardous characteristic of toxicity for purposes of RCRA is defined in 40 CFR 261.24 and includes eight metal and thirty-one organic compounds. The toxicity characteristic is determined in accordance with a prescribed test procedure (the toxicity characteristic leaching procedure -TCLP).

Toxicity Characteristic Leaching Procedure (TCLP): A lab procedure designed to predict whether a particular waste is likely to leach chemicals into groundwater at dangerous levels.

Transporter: A person engaged in the off-site transportation of waste.

Treatment: Any method, technique, or process designed to physically, chemically, or biologically change the nature of a hazardous waste.

Treatment, Storage and Disposal Facilities: Facilities engaged in the treatment, storage, or disposal of hazardous waste. These facilities are the last link in the cradle-to-grave hazardous waste management system.

U

Underground Source of Drinking Water (USDW): An aquifer which supplies drinking water for human consumption or for any public water system, or contains fewer than 10,000 mg per liter total dissolved solids, and does not contain minerals or hydrocarbons that are commercially producible, and is situated at a depth or location which makes the recovery of water for drinking water purposes economically or technologically practical. While EPA defines an USDW as containing less than 10,000 mg per liter TDS, certain states, such as California and Texas, have adopted a 3,000 mg per liter TDS definition for the Class II UIC injection well programs.

Universal Wastes: Commonly referred to as recycled wastes with special management provisions intended to facilitate recycling. There are three categories of universal wastes; hazardous waste batteries; hazardous waste pesticides that have been recalled or collected in waste pesticide collection programs; and hazardous waste thermostats.

Used Oil: Any oil that has been refined from crude or synthetic oil that has been used, and as a result of such use, is contaminated by physical or chemical impurities.

V

Vadose Zone: A subsurface soil zone that contains suspended water. The vadose zone is above the zone of continuous water saturation.

W

Waste Minimization: The reduction, to the extent feasible, in the amount of waste generated prior to any treatment, storage, or disposal of the waste. Because waste minimization efforts eliminate waste before it is generated, disposal costs may be reduced, and the impact on the environment may be lessened.

Waterflood: A method used to enhance oil recovery in which water is injected into a reservoir to remove additional quantities of oil that have been left behind after the primary recovery. Usually, a waterflood involves the injection of water into strategically placed wells so that it sweeps through the reservoir and moves remaining oil to the producing wells.

Workover: One or more of a variety of remedial operations performed on a producing well to try to increase production. Examples of workover operations are deepening, plugging back, pulling and resetting the liner, squeeze-cementing, perforating additional horizons, etc.

Workover Fluid: A special fluid used to keep a well under control when it is being worked over. A workover fluid is composed carefully so it will not cause formation damage. Also used to stimulate a well to enhance productive capacity such as a frac fluid, acid, etc.

Workover Wastes: Wastes resulting from well workover operations. The wastes usually include workover fluids, similar to drilling fluids and could include various small volume wastes such as tubing scale, wax/paraffin, and cleaning or painting wastes.