EPA’s Energy Extraction Enforcement Initiative

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Overview

• Concerns with natural gas extraction
• EPA’s enforcement footprint
• “Cradle to grave” approach
• Beyond enforcement
  – Scientific study
  – Regulation and policy development
  – RCRA and E&P Waste
Energy Extraction: Expansion

Advances in hydraulic fracturing and horizontal drilling have opened new areas for oil and gas development.
Natural Gas Drilling: Expansion

- According to 2009 US Dept of Energy data:
  - US natural gas **proved** reserves: 8.045 Tm$^3$
  - US “technically recoverable” shale gas: 23.43 Tm$^3$
Natural Gas and the Environment

• Natural gas is **cleaner burning**
  – About 53 kg of CO₂ for every million Btu equivalent of natural gas

  **versus**
  – About 91 kg of CO₂ for every million Btu of coal, and 73 kg of CO₂ for every million Btu of fuel oil

• But CH₄ is a **potent greenhouse gas**
  – About 25 times more potent than CO₂
Energy Extraction: Environmental Concerns

- Citizen complaints
- Air impacts
- Water impacts
March 2010 EPA announced new **enforcement initiative** for energy extraction

First focus area is **onshore gas production**

Two major goals:

- Take action where violations cause **air or water impacts that threaten human health**
- Ensure companies implement practices across operations
Energy Extraction Initiative – Nationwide Enforcement

• Pollutant approach

• Multimedia information requests

• Inspections across the regions
Energy Extraction Initiative—Nationwide Enforcement

- Enforcement tools
  - Single media and multimedia actions
  - Imminent and substantial endangerment actions
- Negotiations to secure company-wide relief
Energy Extraction Initiative – EPA & State Capacity Building

• Training of civil and criminal investigators

• Purchase of industry specific production data

• Integration of new technology in field activities

• Retention of industry technical experts
Examples:

Air reductions of about 2,300 tons per year (TPY) of NOx, 1,600 TPY of CO, and 3,600 TPY of VOCs, and conservation of 22.65 million m$^3$ of CH$_4$ from 10 concluded enforcement actions.

About 20 orders to address brine spills.

Emergency orders to address contamination of drinking water aquifers with contaminants (including CH$_4$) from gas and oil operations.

Orders to restore wetlands illegally filled to create access roads to well pads.
“Cradle to Grave” Approach

• Natural gas exploration, drilling and production may have many environmental impacts
  – Site selection and preparation
  – Staging, transport, water withdrawal and chemical storage
  – Drilling
  – Well completion
  – Air emissions
  – Wastewater handling
  – Well abandonment and plugging

• Advances in drilling and production technologies have positive and negative impacts

• Environmental and safety regulations are important for ensuring safe natural gas production
Site Selection and Preparation

Gas well development in Marcellus Shale in western Pennsylvania.

Gas well field in Green River Basin, near Pinedale, Wyoming.
Site Selection and Preparation

- Impacts and considerations:
  - Avoid sensitive environments, such as surface waters, wetlands and source water protection areas
  - Install physical controls, such as silt fencing, sediment traps and basins, and expanded riparian areas. Use storm water management plan practices
  - Minimize surface water and air impacts from access roads, staging areas, pits, ponds, impoundments, tanks and other equipment
  - Ensure appropriate confining layer between target formation and underground sources of drinking water
Staging, Transport, H₂O and Chemical Storage

Impacts and considerations:
• Spill and runoff prevention
• Sample water wells in vicinity to determine baseline water quality
• Plan for proper wastewater disposal areas with adequate liners and freeboard
• Consider use of LNG versus diesel trucks and equipment
• Work with local agencies and citizens to determine appropriate water sources

Hydraulic fracturing staging near Fort Worth, Texas.
Impacts and considerations:
• Prevention of methane and other contaminant migration
• Adequate well construction and pressure control to prevent explosions
• Limit chemical use to only those required by site-specific characteristics
• Consider use of less toxic alternatives
Impacts and considerations:

• Loss of methane and VOCs to atmosphere
  • “Green completions” capture product, while reducing air emissions
  • Use of flares where “green completions” not possible
• Well integrity, monitoring and modeling critical to ensuring fracture in target zone
• Spill prevention
• Occupational hazards
### Air Emissions

**Impacts and considerations:**
- Occur throughout lifecycle of well development and production
  - Poses environmental and occupational risks
- Use of flares, no-bleed pneumatics and other control technology to limit emissions
  - Some technologies have rapid return on investment
- Use of remote monitoring to determine and react quickly if something amiss

Forward Looking Infrared (FLIR) image of condensate tank.
Impacts and considerations:

- Wastewater may contain chlorides, heavy metals, hydraulic fracturing chemicals and radioactive material
- Spills may be lethal to aquatic and terrestrial organisms
- Difficult to treat in typical wastewater plant – ultimate disposal in deep injection wells may be necessary
- Important to maximize recycling for additional hydraulic fracturing
Well Abandonment & Plugging

Impacts and considerations:

• Abandoned wells can leak or provide conduits for migration of contaminants
• Utilize proper materials and techniques to ensure proper seal
• Consider institutional controls to prevent access and monitor seals

Leaking 75-year-old, abandoned gas well in NY state.
EPA’s Approach to Natural Gas – Scientific Study

- US Congress asked EPA to study relationship between hydraulic fracturing and drinking water resources
- **Peer-reviewed** study currently underway, with first results due in late 2012
- **Lifecycle approach**, use of **case studies**, focus on **sources** and **pathways** of potential impacts to water resources
- **Stakeholder involvement** throughout process

- Topics that are not within the scope of the study include: **air quality**, impacts on land and aquatic ecosystems, **seismic risks**, **public safety** and **occupational risks**
EPA’s Approach on Natural Gas – Regulation and Policy Development

Regulation and policy development under existing authorities:

• New air regulations may govern certain activities at well sites
• Guidance to provide framework for use of diesel fuel in hydraulic fracturing fluids
• Guidance on how to construct proper wastewater pits and impoundments
• Regulations and guidance for treatment and disposal of production wastewater

Continuing partnership with US states – on the frontlines of regulating this sector
EXPLORATION & PRODUCTION WASTE AND RCRA

Sandra Connors
Deputy Director, Office of Resource Conservation & Recovery
• 1980 “Bentsen” Amendment exempted waste from the exploration, development, and production (E&P) of crude oil, natural gas, and geothermal energy from the Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste regulations pending a study and regulatory determination that regulation under Subtitle C was warranted.

• Waste covered under the exemption include “drilling fluid, produced waters and other wastes associated with the exploration, development and production of crude oil, natural gas, and geothermal energy.”
RCRA Subtitle C Exemption (cont’d)

- Report to Congress (RTC) was completed in 1987 and included findings and recommendations for Federal and non-Federal actions that deal with the adverse effects of E&P wastes.
- EPA issued a Regulatory Determination in 1988, based on RTC and public comments received, indicating whether Subtitle C of RCRA was warranted for E&P wastes.
- For the regulations to go into effect, must be submitted to both House of Congress and “shall take effect only when authorized by the Act of Congress.”
EPA’s Report to Congress (1987)

- Report found that:
  - State and federal regulation is generally adequate, although also recognized that there were regulatory gaps in certain states. Determined that when these wastes are managed in accordance with state and federal requirements, exempted E&P wastes rarely pose significant threats to human health and the environment.
  - Regulations under RCRA Subtitle C would have substantial impact on U.S. economy and that regulation under Subtitle C of RCRA would be unnecessary and impracticable.
EPA’s Regulatory Determination (1988)

- Developed a three-pronged approach:
  1. Improve existing programs under RCRA, the Safe Drinking Water Act, and the Clean Water Act
  2. Work with states to improve their programs
  3. Work with Congress on any additional legislation that might be needed

- Agency Actions on three-pronged approach:
  1. Worked with Office of Water on development of offshore and coastal effluent guidelines
  2. To improve programs under RCRA, the Regulatory Determination stated that, “The Agency intends to augment the Subtitle D program by developing appropriate standards and taking other actions as appropriate for crude oil and natural gas wastes.” Ultimately, the Agency decided to work with the states rather than develop RCRA Subtitle D regulations
  3. No RCRA legislation enacted since regulatory determination.
EPA and Stakeholder Follow-up

- Subsequent to the July 6, 1988 Regulatory Determination, EPA worked with states to improve their oil and gas regulations and developed an audit program to improve state programs.

- The Interstate Oil and Gas Compact Commission coordinated the state review process for many years seeking improved state oil and gas waste programs through the audit program.

- STRONGER (State Review of Oil and Natural Gas Environmental Regulations) currently administers the state review process.
E&P Guidance

- In October 2002, EPA issued a guidance entitled “Exemption of Oil and Gas Exploration and Production Waste from Federal Hazardous Waste Regulations.”
- Guidance Covered the following fundamental areas:
  - Basic rules for determining the exempt or non-exempt status of wastes
  - Examples of exempt and non-exempt wastes
  - Status of E&P waste mixtures
  - Clarifications of several misunderstandings about the exemption
Current Activities

• On September 8, 2010 NRDC submitted a petition requesting regulation of waste associated with E&P of oil, natural gas, and geothermal energy.

• OSWER’s Office of Resource Conservation and Recovery is currently:
  1. Reviewing alleged incidents cited in the NRDC petition
  2. Compiling and reviewing State regulations in States with natural gas activities
Conclusion

We must ensure that [energy] production is safe, responsible, and efficient.

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Mr. Socash’s Presentation