Water Recycling / Oil & Gas Waste

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Bureau of Waste Management
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Overview

• Waste Generation
• PA Shale Wastewater Management
• Wastewater Management Options
• Regulatory Requirements for Wastewater Management Options
• Processing Wastewater for Beneficial Use
• Underground Injection
• Treatment Solids Disposal
PA Shale Wastewater Management

Drilling Fluid
0.72 m bbl Jan-Jun 2014

- Direct Reuse: 39%
- Recycle for Reuse: 56%
- Injection Well: 1%
- Discharge: 2%
- Landfill: 2%

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PA Shale Wastewater Management

Hydraulic Fracturing Wastewater
5 m bbl Jan-Jun 2014

- Direct Reuse: 74%
- Recycle for Reuse: 24%
- Injection Well: 2%
PA Shale Wastewater Management

Produced Fluid
10.6 m bbl Jan-Jun 2014

- Direct Reuse: 68%
- Recycle for Reuse: 18%
- Injection Well: 14%
- Produced Fluid: 10.6 m bbl
On-Site/Off-site Treatment and Discharge

- 2010 revised regulations required publicly owned treatment works and centralized waste treatment facilities to treat new or increased discharges of Total Dissolved Solids (TDS) to more stringent standards.

- Practice of treatment and discharge of unconventional wastewater voluntarily discontinued in April of 2011.
Wastewater Management Options - Reuse

- Reuse without Processing
  - Permitted Well Site; or
  - Off-Site Permitted Well Site
  - Managed, transported and stored as a waste
  - If stored off the well site, considered to be a transfer station requiring a permit

- Since 2010, wastewater reuse has increased from 2.6 to over 22 million bbl/yr.
• Processing Prior to Beneficial Use
  – On a permitted well site approved by the Oil and Gas Management Program
    • Managed, transported and stored as a waste
  – Off Well Site
    • GP 123
    • Individual waste permit
    • Managed, transported and stored as a waste
  – Since 2010, wastewater recycling has increased from 4.6 to over 7.8 million bbl/yr.
Processing and beneficial use of processed liquid wastes generated by oil and gas well sites and associated infrastructure.

Encourages the return of treated liquid waste to oil and gas well sites for reuse.

Wastes include drilling fluid waste, hydraulic fracturing fluid waste and produced fluid.

Minimizes water withdrawal and emission impacts on valuable water resources.

Solids generated through treatment are processed for disposal in a landfill.
Underground Injection

- Administered by US EPA
- Eight permitted underground injection wells in Pennsylvania

<table>
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<th>API Number</th>
<th>County</th>
<th>Municipality</th>
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<td>South Beaver</td>
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<td>063-31807*</td>
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<td>Grant</td>
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* Change in use authorization has not yet been issued
Form U Disposal Approval for PA Landfills
  – Must meet Landfill Acceptance Criteria
  – Submitted to DEP Regional Offices

In 2012, the total amount of solid waste generated by the oil and gas industry and disposed of in Pennsylvania landfills was 1.3 million tons.
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