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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Radiation Protection

TENORM Study Update

Appalachian Compact Commission Meeting

November 5, 2014

Tom Corbett, Governor

Dana Aunkst, Acting Secretary

Background

- **T**echnologically **E**nhanced **N**aturally **O**ccurring **R**adioactive **M**aterial
  - *TENORM*, a naturally occurring radioactive material not subject to regulation under the laws of the Commonwealth or the Atomic Energy Act of 1954, whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the natural state by human activities.

PA DEP Regulations, Title 25, Chapter 271

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Background

Generation of TENORM has increased significantly. This is mainly due to the recent expansion in natural gas exploration and production in Pennsylvania.

There are many issues with TENORM that must be managed effectively.

These issues include:

- Potential Worker Radiation Exposure
- Possible Public Radiation Exposure
- Environmental Contamination (soil, water, etc.)
- Waste Disposal

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Site Categories for Sampling

- Waste water treatment plants (WWTPs)
- Landfills
- Waste sludge loads to landfills
- Well pads
- Underground natural gas storage sites
- Gas-fired electricity generating facilities
- Compressor stations
- Beneficial use sites
- Decommissioned well casings

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Work Completed in 2013

- 184 Site visits
- 114 Locations
- 1,000 Samples analyzed
- 25 WWTPs / 73 visits (3 rounds)
- 48 Landfills (9 extensively sampled)
- 1 Set of facilities to evaluate the effect of waste sludge transport on external radiation levels

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Work Completed in 2013

- 20 Well pads / 41 visits
- 13 Beneficial use sites
- 1 Decommissioned well casings disposal site
- 7 Facilities that compress, store and utilize natural gas

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Sample Types

- Natural gas samples
- Liquid samples (i.e., frac, flowback and produced water)
- Solid samples (i.e., drill cuttings, proppant, sludge, soil and sediment)
- Radiation surveys
- ‘Swipe’ samples

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Sample Analysis

- The samples are being analyzed for the presence of alpha, beta and gamma radiation (gross counting and spectroscopy).
- The gas is being sampled for the presence of radon-222.

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Field Work in 2014

- Well pad sampling (23 visits to 11 pads)
- Continued landfill leachate collection (5 facilities)
- Landfill ‘bulking’ operations (2 facilities)
- Beneficial use sites (4 sites)
- Gas-fired power plants (1 facility)
- Gas storage facilities (4 facilities)

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Field Work in 2014

- Compressor stations (1 facility)
- Gas processing facilities (1 facility)
- Wastewater impoundments (2 facilities)
- Evaluating the effect of transport on sludge external radiation levels (5 events)

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Field Work in 2014

- Landfills – recovered deployed radon detectors (8 facilities)
- Landfills – waste bulking (2 facilities)
- Well Pad – completed, 1 production phase gas collection for radon
- Well Pads – ambient gamma surveys of areas with buried rock cuttings

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Lessons Learned

- Well pad field work schedule changes
- Logistical and technical challenges
- Science-based study plan - had to make some adjustments and additions in numbers of sites

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Schedule

- Field work has been completed as of August
- Sample analysis, data analysis and report preparation from March through fall 2014
- Internal DEP final review now on-going
- Peer review fall 2014
- Final study report planned for completion in 2014.

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TENORM Study Information

- Study-related documents are available at www.dep.state.pa.us Keyword “TENORM”
- Updates are being provided to the appropriate DEP advisory committees and other stakeholders

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QUESTIONS?

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Bureau of Radiation Protection

David J. Allard, CHP
PA DEP Bureau of Radiation Protection
PO Box 8469
Harrisburg, PA 17105-8469

Tel: 717-787-2480
djallard@pa.gov