Basics of Drilling, Coring, and On-Site Disposal of Solids and Fluids

NORM and TENORM: Occurrence, Characterizing, Handling and Disposal

The Ohio State Subsurface Energy Resource Center

Mark Moody 5/12/2014
Basics of Drilling

• In its simplest form, drilling an oil and gas well requires the following:
  ▪ A mast (derrick)
  ▪ A hoist (draw works)
  ▪ A rotating device (rotary table or top head drive or down hole motor)
  ▪ A circulating medium (drilling fluid)
  ▪ A cutting mechanism (drill bit)
  ▪ Drill string (drill pipe)
Basics of Drilling

• Drilling rig components for a typical “conventional” drilling rig.
Basics of Drilling

• The cutting mechanism is called a drill bit.
  ▪ Rotary bit
  ▪ Air hammer
  ▪ PDC
Basics of Drilling

• The circulating medium is called drilling mud, but sometimes compressed air is used
• Mud can be water-based, oil-based or synthetic.
Basics of Drilling

- The drilling mud cools and lubricates the bit, conditions the wellbore and transports the drilling cuttings to the surface.
- The mud is separated from the cuttings and re-used.

Shale Shaker – Vibrating Mud Screen
Basics of Drilling

• A major portion of the onshore drilling activity today is in unconventional resources
  ▪ Tapping the reserves in low permeability, source rocks
  ▪ Large, environmentally-engineered, multiple well drilling pads
  ▪ Horizontal wellbores with long laterals
  ▪ Closed loop drilling systems
  ▪ Synthetic drilling muds
  ▪ No earthen pits
Basics of Drilling

• Directional Drilling
  - Used to drill to targets which are inaccessible by vertical drilling
    - Metropolitan areas
    - Residential areas
    - Lakes, rivers and wetlands
    - Public parks
    - Historical landmarks
Basics of Drilling

• Horizontal drilling greatly increases exposure to the producing formation

• Completed in multiple stages from the “toe” to the “heel” of the wellbore
Basics of Drilling

• Horizontal drilling reduces the environmental footprint compared to the same number of vertical wells
  ▪ Promotes more efficient production in low permeability reservoirs
Basics of Drilling

• Coring
  ▪ Coring is a process that allows a long column of rock (core) to be recovered for petrophysical and geomechanical analysis
  ▪ A special “coring” bit and core barrel are used for cutting and retrieving the core
Basics of Drilling

• The drilling mud is stored in tanks on the drill site, reconditioned and re-used from well to well and from drill site to drill site.

• Most frac flow back is treated and recycled. Usually stored in large, earthen impoundments for re-use.
Basics of Drilling

- The drill cuttings are stockpiled on location or stored in dewatering tanks to dry until they are hauled away to a permitted landfill for disposal.
NORM and TENORM

- Recent legislation regarding NORM and TENORM was introduced in HB 59

Off Site Permitting for Brine Storage, Brine Recycling, Drill Cutting Treatment or Drill Cutting Processing (ORC Section 1509.22)

ORC 1509.22 was modified to provide that the Division of Oil and Gas Resources Management (DOGRM) shall have sole and exclusive authority to permit the off wellpad storage, recycling, treatment or processing of brine or drill cuttings. The permit requirement will be in place beginning January 1, 2014 and will require a permit fee of $2,500.00 as a part of the permit application. The provision was designed to insure that the Division had “sole and exclusive permitting authority” for these facilities.
NORM and TENORM

• NORM is regulated by the Ohio EPA and the Ohio Department of Health. The Division does not regulate NORM, except for drill cuttings while on the drill site. Once the drill cuttings leave the drill site, they are regulated by the Ohio Department of Health and if they are taken to a permitted landfill, then OEPA has jurisdiction.

• The Division does regulate TENORM as it relates to drill cuttings and drilling/completion fluids.
NORM and TENORM

• TENORM requires testing for radium-226 and radium-228 before it can be disposed of in an Ohio-permitted landfill.

• No testing is required if the material is to be re-used on the drill pad, is disposed of in a Class II injection well, is used for enhanced recovery, or if it is transported out of state.

• No treatment is required if tests are within 5 pc of background radiation
Occupational/ Environmental Health, and Health Physics Support

• Paul Pirkle, CIH, P.E.
  ▪ Office: 404.460.1463| Mobile: 404.520.1097
  ▪ pirklep@battelle.org

• David Smith, PhD
  ▪ Office: 703.875.2960| Mobile: 937-829-0393
  ▪ smith@battelle.org

• Eric Daxon, PhD, CHP
  ▪ Office: 210.293.9914| Mobile: 210.573.1120
  ▪ daxone@battelle.org
Capabilities

• Management System Auditing
• Hazard And Risk Assessment
• Compliance
• Remediation
Questions???

Mark Moody
moodym@battelle.org