Produced Water Treatment For Recycle

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EDF
ENVIRONMENTAL DEFENSE FUND®
Finding the ways that work

Who is EDF?

- Beginnings in the 1960s with the DDT issue
- Recognized that science was the answer to arguing the point
- Now an organization of 500+
  - US, Europe, Asia. Mexico, South America
- Sound science to inform sound policy
- Work on the State level as well as the Federal level

Realities of Water Management

- Water use can be significant
- Supplying water using alternate water sources increasing
- Surface operations critical to managing environmental risks
- Environmental risks with all facets
  - Storage
  - Transportation
  - Treatment
  - Disposal

Managing Produced Water

- 21 billion bbls (900 billion gallons) of produced water generated each year

- What to do with this water?
  - Disposal wells
  - Reuse for subsequent fracturing operations
  - Treat for other purposes
    - Discharge
    - Beneficial Use (i.e. Irrigation)
    - Other?

What are the Issues?

- Storage
  - Longer term and greater volumes
- Transportation
  - Not fresh water; transportation operation critical to managing risks
- Treatment
  - Generation of novel waste streams
- Disposal
  - Solids and fluids requiring disposal

Constituents of Concern in Produced Water

- Produced water a combination of flowback and formation water
- Fracturing chemicals return with the flowback
- Formation water contain more than just total dissolved solids
  - Studies show 60 priority pollutants identified in produced water
- Transformational products
  - High heat + high pressure = chemical reactions

NPDES Permitting

- Indirect vs direct discharge

- Direct discharge (following treatment)
  - East/west of the 98th meridian makes a difference from a NPDES permitting perspective

- Indirect discharge
    - Publically Owned Treatment Works (POTWs)
      - Not well suited for high TDS and/or other consituents
    - Centralized wastewater treatment facilities (CWTs)

Concerns Related to Treatment/Discharge

- What is in the produced water?
  - 1,000+ chemicals listed in FracFocus
  - Limited number of analytical methods
    - Not going to find what you are not looking for
    - Matrix Interferences
  - Toxicity
- Design of treatment systems
- Monitoring of treated effluent

EPA Activities Related to Treatment for Discharge

- Pretreatment standards for the shale gas extraction industry for discharge to POTWs
  - Proposed standards late 2014
  - Indirect discharge to POTWs not allowed
- Final 2012 and Preliminary Effluent Guidelines Program Plans
  - Includes study of CWTs accepting oil and gas extraction wastewater

Treatment Technologies

Combination of treatment technologies required

Pretreatment

- Settling
- Separation
- Filtration

More robust treatment to meet discharge requirements

- Membrane system
- Thermal

Examples of Advancements in Treatment Technology

Biological treatment in high salinity environments

- Current studies show promise in waters of 100,000 mg/l TDS
- Addresses organics – still have to address inorganics
- Organics can cause fouling of membrane systems
  - So could enhance efficiencies of downstream treatment systems

Waste Streams Generated by Treatment

- Solids waste stream generated as part of any treatment process
- Waste streams comprised of concentrated constituents removed by treatment
- Treatment technologies are continually advancing potentially affecting waste stream characteristics

Disposal

- Regardless of level of produced water reuse, there will always be a waste stream to manage
- Solids waste stream generated as part of any treatment process
- Treatment technologies are continually advancing potentially affecting waste stream characteristics
- RCRA
  - Subtitle C exemption
  - Subtitle D
    - NOI recently filed

Thank You

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