SOLID WASTE ISSUES IN THE OIL & GAS INDUSTRY

U.S. OIL & GAS RENAISSANCE

Source - Wealth Daily September 15, 2011

BACKGROUND

- In 1976, Congress enacted the Resource Conservation and Recovery Act (RCRA) (codified at 40 C.F.R. 239 – 299), to classify solid waste as either hazardous or non-hazardous and to provide guidance for managing both.
- Hazardous waste is regulated under Subtitle C of RCRA
- Other solid waste is regulated under Subtitle D
OIL & GAS EXEMPTION

- In 1978, EPA proposed to exempt oil and gas exploration and production (E&P) waste from the Subtitle C hazardous waste rules (43 Federal Register 58946).

NON-EXEMPT WASTE

- Hazardous waste is regulated under Subtitle C of RCRA
- Other solid waste is regulated under Subtitle D
WHERE DO EXEMPT OIL & GAS WASTES COME FROM?

- Drilling
- Production
- Surface handling (associated wastes)

HOW MUCH WASTE IS GENERATED

- In 2000, the American Petroleum Institute (API) estimated that ~1.21 barrels of total drilling waste is generated for every foot drilled in the United States
  - Of this total drilling waste, nearly 50% is solid drilling waste
  - Accumulated volume of solid drilling waste generated yearly is ~139,961,305 barrels – equivalent to 29,097,984 cubic yards of solid drilling waste
  - Enough generated waste to fill almost 9,000 Olympic swimming pools

WHAT IS IT?

- Waste generated during drilling and production of oil and natural gas consist mainly of:
  - Brine waters co-produced with oil and natural gas (i.e., produced water)
  - Small pieces of rock (i.e., cuttings) – generated when wells are drilled into the earth
  - Drilling mud (a mixture of mud, water, and chemicals) – used to lubricate and stabilize the well hole during drilling

DRILLING WASTES

- Drilling muds
- Drill cuttings
PRODUCTION WASTES
- Produced water
- Produced sand
- Treatment, workover, and completion fluids including fracking fluid flowback

ASSOCIATED WASTES
- Tank bottoms
- Contaminated soil
- Naturally occurring radioactive materials (NORM) scale and sludges

HOW ARE WASTES MANAGED?
- Different options for different wastes
- Different options for different states
- Onsite versus offsite

Most E&P Wastes Are Non-hazardous Wastes
- EPA decisions in 1988 and 1993
- States have regulatory authority over E&P wastes
- Some generic industrial waste is hazardous
  - Solvents, paint waste, etc.
The federal E&P RCRA Subtitle C exemption, however, does not preclude these wastes from control under other federal regulations and state regulations (including oil and gas conservation programs and some hazardous waste programs).

EXEMPT WASTES FROM E&P ACTIVITIES

- It is important to remember that all E&P waste requires proper management to ensure protection of human health and the environment.
- The exempt status of an E&P waste depends on how the material was used or generated as waste, not necessarily whether the material is hazardous or toxic.

The following simple rule of thumb can be used to determine if an E&P waste is exempt or non-exempt from RCRA Subtitle C regulations:

- Has the waste come from down-hole, i.e., was it brought to the surface during oil and gas E&P operations?
- Has the waste otherwise been generated by contact with the oil and gas production stream during the removal of produced water or other contaminants from the product?

If the answer to either question is yes, then the waste is likely considered exempt from RCRA Subtitle C regulations.
WASTE MANAGEMENT HIERARCHY

- Waste minimization
  - Product substitution

- Reuse/Recycle
  - Reuse of flow back water for the next frac
  - Re-injection of produced water for enhanced recovery
  - Pretreatment, then reuse for landfill cover

- Treatment/Disposal
  - Burial
  - Landspread
  - Injection
  - Discharge to surface water body
  - Evaporation
  - Incineration

WASTE MANAGEMENT TRIANGLE

The preferred option for preventing pollution is to avoid generating wastes whenever possible (source reduction).
METHODS FOR DISPOSING SOLID E&P WASTES

- Underground injection
- Landspreading and landfarming
- Evaporation and burial onsite
- Incineration and other thermal treatment
- Bioremediation and composting
- Reuse and recycling
- Landfill

UNDERGROUND INJECTION

- 98 percent of waste is produced water or brine water, co-produced with oil and natural gas. These brines are typically injected back into the same rock formation from where they came.

INJECTION WELLS

- Injection wells for disposal are regulated by the EPA Underground Injection Control Program and state regulatory agencies.
- As part of disposal, the volume of flowback must be reported by the gas well operator, but there are no requirements to test waste for hazardous characteristics.

LANDSPREADING AND LANDFARMING
BIOREMEDIATION AND COMPOSTING

RECYCLING AND REPURPOSING

- Crude oil residuals and produced water can be safely and creatively recycled for road building, stabilization, de-icing, and dust suppression.

NPDES DISCHARGE

- NPDES program regulates the types and amounts of pollutants industrial sites, industrial wastewater treatment facilities, and municipal wastewater treatment facilities can discharge into the nation’s surface waters.
- Currently, there is a zero discharge limit for direct discharges to surface waters for oil and gas wastewater.

OFFSITE DISPOSAL
LANDFILL

- When the other options have been exhausted much of the waste goes to permitted landfills.
- This includes
  - Drilling solids
  - Drilling mud
  - Produced water
  - Universal wastes
  - Non-exempt wastes

HAZARDOUS WASTE

- Meets one or more of the following:
  - Is specifically listed hazardous by the EPA, or
  - Ignitable, corrosive, reactive, or toxic.
- Must be shipped using Uniform Hazardous Waste Manifest
- Ship according to both EPA and DOT requirements
- Maintain records for at least 3 years

TOXIC SUBSTANCES

- Toxic Substances Control Act (TSCA) provides EPA with authority to require reporting, recordkeeping and testing requirements, and restrictions relating to chemical substances and/or mixtures.

NATURALLY OCCURRING RADIOACTIVE MATERIALS

- As a result of oil and gas production and processing operations, NORM sometimes accumulates at elevated concentrations in by-product waste streams.
MISUNDERSTANDING: ALL WASTES LOCATED AT E&P SITES ARE EXEMPT.

Fact: All wastes located at E&P sites are not necessarily exempt. To be considered an exempt waste, the waste must have been generated from a material or process uniquely associated with the exploration, development, and production of crude oil and natural gas. For example, a solvent used to clean surface equipment or machinery is not exempt because it is not uniquely associated with exploration, development, or production operations. Conversely, if the same solvent were used in a well, it would be exempt because it was generated through a procedure that is uniquely associated with production operations.

MISUNDERSTANDING: UNUSED PRODUCTS ARE EXEMPT.

Fact: Unused products, if disposed of, are not exempt, regardless of their intended use, because they have not been used and therefore are not uniquely associated with the exploration or production of oil and gas. When unused products become waste (e.g., they are disposed of), they are subject to RCRA Subtitle C hazardous waste regulations if they are listed or exhibit a hazardous characteristic.

MISUNDERSTANDING: ALL EXEMPT WASTES ARE HARMLESS TO HUMAN HEALTH AND THE ENVIRONMENT.

Fact: Certain exempt wastes, while excluded from RCRA Subtitle C hazardous wastes control, might still be harmful to human health and the environment if not properly managed.

MISUNDERSTANDING: ANY MIXTURE OF A NON-EXEMPT HAZARDOUS WASTE WITH AN EXEMPT WASTE BECOMES AN EXEMPT WASTE.

Fact: Not all mixtures of a non-exempt hazardous waste with an exempt waste become exempt wastes. Generally, a mixture of a listed hazardous waste with an exempt waste becomes a non-exempt hazardous waste.
E&P WASTE MANAGEMENT
TECHNOLOGIES – ONE SIZE
DOES NOT FIT ALL