2020

Gas and Oil Drilling: A Look at Waste Management

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BACKGROUND

The start of gas and oil drilling can be dated back to the 1860s while the style of hydrofracking that can be seen today was developed in the 1940s. Hydrofracking enabled drilling companies to extract higher volumes of natural gas & oil at a faster pace. High-volume hydrofracking was banned in New York in 2014 due to environmental concerns, yet other states like Pennsylvania continue to practice fracking regardless of the environmental impacts. Conventional drilling wells refers to wells that are drilled vertically in order to retrieve the gas and oil, which eventually slows in production. Unconventional well drilling includes drilling vertically as well as drilling horizontally in which fracking then occurs. The unconventional method produces a larger quantity of natural gas & oil however, this process produces more waste products, which has a larger negative impact environmentally.

METHODS

1. I conducted an interview with a member of the Department of Environmental Protection as well as a member of Lenape Resources.
2. I utilized a public data set comprised of waste reports made by the DEP in Pennsylvania, as well as, public data provided by the NYS DEC.

ACKNOWLEDGEMENTS

I would like to thank Professor Holahan and Professor Imbruce for providing me with resources to further my research. I would also like to thank graduate student Josh Novello for putting me into contact with a member of the Department of Environmental Protection n Pennsylvania. Lastly, I would like to acknowledge the NYS DEC for providing me with additional information on well drilling in New York State.

Waste Products Derived from natural gas & oil drilling in Susquehanna County, PA are more hazardous and voluminous

Figure 1

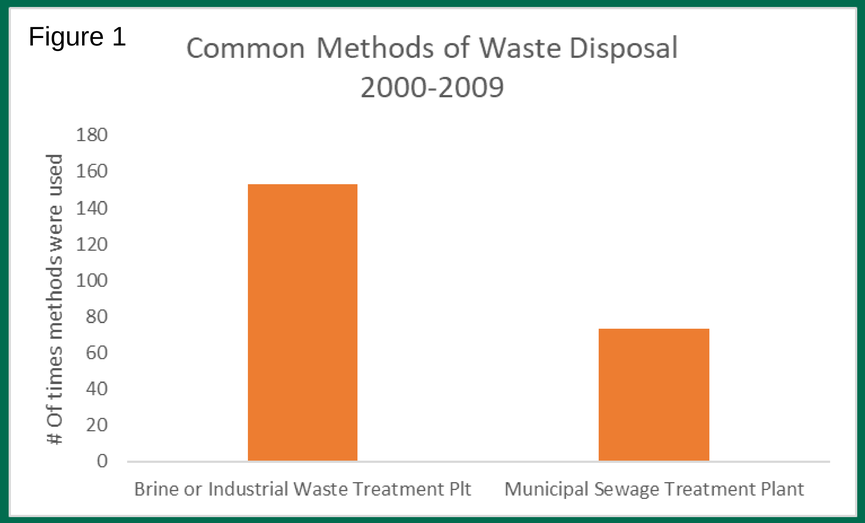

Figure 1: Brine treatment involves removing dissolved salt ions from the **waste** stream. Although similarities to seawater or brackish **water** desalination exist, industrial brine treatment may contain unique combinations of dissolved ions, such as hardness ions or other metals.

Figure 2: Brine is generalized as any solution with an extremely high concentration of salts. Drilling Fluid, also referred to as "Drilling mud" is used to aid in the drilling of holes into the Earth. Basic Sediment is classified as when crude oil contains water and solids from the reservoir formation. **Fracking fluid** (or frac **fluid**) is a chemical mixture used in drilling operations to increase the quantity of hydrocarbons that can be extracted.

Figure 2

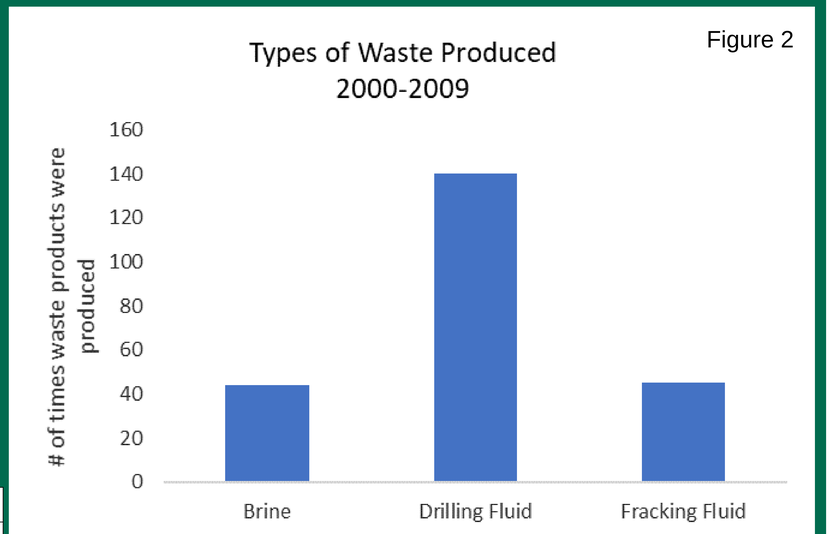

Figure 3: Drill cuttings are the broken bits of solid material removed from a borehole and brought to the in the drilling mud. Other oil & gas wastes include radioactive materials.

Waste Reports
Susquehanna County (2015-2019)

Type of Waste Produced	Number of Times Produced
Basic Sediment	35
Drill Cuttings	1,146
Drilling Fluid Waste	315
Filter Socks	67
Fracturing Fluid Waste	248
Other Oil & Gas Wastes	6,379
Produced Fluid	56,667
Servicing Fluid	156
Soil Contaminated by Gas & Oil Spills	502
Spent Lubricant Waste	23
Synthetic Liner Materials	3,378
Unused Fracturing Fluid Waste	479
Wastewater Treatment Sludge	2,171

Figure 3

Common Disposal Methods (2015-2019)

Disposal Methods	Number of Times Method was Used
Residual Waste Processing/Transferring Facility	34,718
Surface Impoundment	17,171
Reuse (at well pad)	13,171
Landfill	6,340
Reuse Other Than Road Spreading	3,697
NPDES	39
Beneficial Reuse	24

Figure 4

Figure 4: NPDES – National Pollutant Discharge Elimination System. Surface impoundment is the disposal of waste through injection wells. The landfills that accept and process these waste products are hazardous waste disposal centers. The most common method of waste disposal in recent years has been through residual waste processing and transferring facilities. A processing facility is a transfer station, compost facility, resource recovery facility, or a facility that reduces the volume or bulk of residual waste for off-site reuse. A transfer station receives and processes or temporarily stores residual waste at a location other than the generation site. The use of wastewater from conventional oil and gas wells has been allowed as a "beneficial reuse" in Pennsylvania since 1988. Road spreading involves spreading brine on dirt roads for dust suppression, although the spreading of brine can threaten environmental and public health.

How has Pennsylvania waste management changed since the ban of high-volume fracturing in New York?

RESULTS

- Brine or Industrial Waste Treatment plants were the most common method of waste disposal for conventional drilling wells from 2000 to 2009
- From 2000-2009 the most common waste product was Drilling Fluid.
- Drilling in Susquehanna County throughout the past 5 years has shown a significant increase in waste being produced, however the disposal methods often include forms of reuse.
- A large majority of waste is processed at residual waste processing or transfer facilities or disposed of at landfills

CONCLUSIONS

- Unconventional drilling methods have caused an increase in potential health threats arising from the increase of volatile organic compounds and air toxics.
- Fracking (unconventional drilling) requires more water than conventional gas drilling; but when natural gas is used in place of coal or nuclear fuel to generate electricity, it saves water.
- Conventional drilling techniques produce a much smaller carbon footprint as opposed to that of unconventional wells.

REFERENCES

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DEC in New York
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