Fact Sheet on Andover Infusion Station

1. What is an infusion station?

An infusion station is a new thing. A web search reveals nothing about it. According to the company that is going to build it, an infusion station is used to put compressed natural gas from a truck trailer into a natural gas transmission pipeline. The trucks and trailers would form a virtual pipeline, transporting natural gas from eastern Pennsylvania to Andover where Rte, 6 crosses the Algonquin transmission pipeline. The company says that 5 to 8 trucks an hour, 24 hours a day, 7 days a week will transport the compressed gas to the infusion station.

According to the plans, the station will consist of a pavilion with bays for 16 trucks with trailers. The gas will be unloaded from the trailers and decompressed through an apparatus that will heat the gas to maintain it at room temperature. Then the gas will be transported through a pipeline to a metering station where the gas pressure will undergo a final adjustment before being put into the Algonquin Pipeline.

2. What company is doing this?

The company is Global CNG Holdings, LLC. A web search reveals nothing about this company as it was just recently incorporated in Delaware in October 2015. There is no website and it has to yet to file any tax returns. Terence Durkin is general legal counsel for Global CNG Holdings for the Andover station.

About 6 months ago, another company, Pentagon Energy, tried to get the town of Rocky Hill to lease land for a very similar infusion project. Rocky Hill turned them down. Terence Durkin was the general legal counsel for Pentagon Energy for the Rocky Hill station. Another piece of evidence for the connection between these companies is the traffic impact study done by Solli Engineering to be presented to the Andover Planning and Zoning Commission. Solli Engineering says the study was done for the Pentagon Energy Facility at Andover.

Thus it appears that Global CNG Holdings is connected to Pentagon Energy but incorporated under another name. This is helpful because there is a quite a bit of information about the infusion station that Pentagon Energy planned for Rocky Hill.

3. Description of trailer gas containers:

In the Pentagon Energy version of a virtual pipeline, each truck trailer would carry four tubes, each 42 inches in diameter and 45 feet long. The gas in the tubes would be at a pressure of 4500 pounds per square inch (psi)[a,b]. For comparison, normal tire pressure for a car is 30 psi; the gas in Algonquin Pipeline is at a pressure between 600 psi and 800 psi.

The amount of gas in the four tubes on a trailer is 620,000 cubic feet at normal air pressure, 15 psi. This amount of gas would fill a building with a 80 foot by 80 foot base and 8 stories high.

[a] CNG trailers from Composite Advanced Technologies CNG, LLC, https://prezi.com/rq8zi1p3i1gt/cat-cng-pentacles-energy/.

[b] Rich Piellisch, "Pentagon CNG for Powerplant Peaking," November 19,2015. http://www.pentagon-energy.com/pentagon-cng-for-powerplant-peaking/#more-132.

4. Why the infusion station should be opposed:

A. Road maintenance and safety. The plan is for 5 to 8 trucks an hour to come into the infusion station. Let us assume 6 trucks an hour as an average. Since this happens 24 hours a day, this would be 144 trucks coming in loaded every day and 144 empty trucks going back to Pennsylvania. The company says it will operate this way for five months out of year. Taking 30 days in a month, that would be 144x30x5 = 21,600 loaded trucks and 21,600 empty trucks for the months November through March. That is an increase of 43,200 truck trips for these 5 months.

This increase would mean more maintenance on Rte. 6 and the strong likelihood of more accidents. Of course, Rte. 6 is already known for the number of accidents that occur on it.

B. Explosive hazard. If one of these loaded trucks is involved in an accident, the gas container may rupture. This would lead to an explosion that would be much worse than a high pressure gas pipeline explosion. Hazard radii have been worked out for gas pipeline explosions. For a 42 inch pipeline at an operating pressure of 850 psi, the hazard radius would be over 800 feet.[a] For a tube rupture at 4500 psi, we can only guess at the hazard radius; it would certainly be well over 1000 feet. A story on a 36 inch transmission gas pipeline explosion can be found at http://www.wtae.com/news/reports-gas-well-on-fire-in-salem-township/39279470.

[a] M.J. Stephens, "A Model for Sizing High Consequence Areas Associated with Natural Gas Pipelines," C-FER Technologies for the Gas Research Institute, October 2000.

C. Radioactive hazard. The Marcellus Shale in Pennsylvania where much of the fracked gas comes from is one of the most radioactive shales. Several radioactive elements come up in the produced water from fracking; however, once the natural gas is separated from the water only radioactive radon is in the natural gas. Radon is a radioactive gas that does not react with other chemicals. Therefore, it is difficult to separate it from natural gas.

The amount of radioactive radon in the Algonquin Pipeline in Pennsylvania has been measured at 27.6 pCi/L (pico Curies per liter) with an uncertainty of 2.6 pCi/L at the Anadardo Metering and Regulation Station[a]. This amount of radon in the pipeline appears to be safe for household use[a].

The problem with radioactivity in closed systems containing natural gas is that radon has a short half-life of 3.8 days. Thus in 3.8 days, half of the radon present in the gas will decay into

other elements. Since ten half-lifes is usually taken as the time for most of a radioactive element to disappear, in about a month radon can be considered to be gone.

When radon decays, it turns into a sequence of radioactive elements with very short half-lives (minutes or seconds) until it becomes radioactive lead-210 that has a half-life of 22.4 years. This is a long enough half-life that the radioactive lead can be considered to persist for over a century. When the lead-210 decays, it rapidly turns into polonium-210 that has a half-life of 138 days. Both lead and polonium are metals that will precipitate out of the gas; they coat the surfaces of the container that the gas is in as a scale.

In a gas pipeline or gas-fired power plant, the radioactive lead and polonium will build up as natural gas flows through the system[b]. Lead-210 and polonium-210 have shown up as contaminants in the ash of power plants and the tubes, valves, and tanks of gas production plants[c,d].

In the containers carrying natural gas by truck, the natural gas and radon will be confined for the length of trip from eastern Pennsylvania to Andover. It is about 250 miles from Andover to Susquehanna County, Pennsylvania where Pentagon Energy has a storage facility for natural gas. If we assume an average speed of 50 mph for the trucks, then the trip will take five hours. During this time, radon will be decaying into lead-210; when the gas is unloaded, the lead-210 will remain in the container as a scale. The truck will return to Susquehanna County where it will be filled with compressed natural gas again. Thus, the lead-210 inside the container will build up with each round trip.

If there is a truck accident and a resulting explosion, the radioactive lead will be scattered over the hazard area. Not only will be buildings and trees be burned in the explosion, but the land may not usable until decontaminated.

[a] L.R. Anspaugh, "Scientific Issues Concerning Radon in Natural Gas, Texas Eastern Transmission LP and Algonquin Transmission LLC, New Jersey-New York Expansion Project, Docket No. CP11-56," July 5, 2012.

[b] **"**TENORM: Oil and Gas Production Wastes," United States Environmental Protection Agency, https://www.epa.gov/radiation/tenorm-oil-and-gas-production-wastes.

[c] M.S. Al-Masri and Kh. Haddad, "NORM emissions from oil and gas fired power plants in Syria," *Journal of Environmental Radioactivity* **104**, 71-74 (2012).

[d] J.M. Godoy, R. Carvalho, A. Cordilha, L.E. Matta, and M.L. Godoy, "^{210}Pb content in natural gas pipeline residues ('black powder') and its correlation with chemical composition," *Journal of Environmental Radioactivity* **83**, 101-111 (2005).

D. Health hazards: When the trailers are unloading natural gas at the infusion station, there will be some leaking of natural gas into the air. There will probably be leakage when the natural gas is decompressed when it is expanded and heated. Metering stations usually leak and vent natural gas. The biggest problem with the natural gas leakages is that it increases global warming.

Natural gas is 97% methane (chemical formula CH_4). Methane is a greenhouse gas with an average lifetime of a molecule in the air of 12 years. It is destroyed in the air by a chain of chemical reactions that usually result in carbon dioxide being created. Methane, pound for pound, traps 86 times more heat than carbon dioxide over a period of 20 years.

Natural gas when it decomposes in air turns into formaldehyde that is a carcinogen and also damages mucus membranes. Another chemical produced in the decomposition is ozone that leads to respiratory diseases. Natural gas also contains small amounts of other hazardous air pollutants. Persons near where leaks and venting occur will be at risk for health impacts.[a]

[a]W. Subra, "Human Health Impacts Associated with Chemicals and Pathways of Exposure from the Development of Shale Gas Plays," Earthworks Oil and Gas Accountability Project, https://www.earthworksaction.org/files/publications/SUBRA_3_Shale_Gas_Plays-Health_Impacts_sm.pdf.