



RADIOACTIVE WASTE MANAGEMENT ASSOCIATES

Memo

To: Terry Lodge, Esq
From: Marvin Resnikoff
Date: February 27, 2017
Re: Radon and Nexus Compressors

I have been asked by counsel to review the potential radioactive emissions from the Nexus pipeline and in particular at the Wadsworth, Ohio and Waterville, Ohio compressor stations. I have worked on issues related to Naturally-Occurring Radioactive Materials, or NORM since 1992 and I'm familiar with the radioactive materials carried by the pipelines. My resume is attached at the end of this brief memo.

Summary

At p. 5/66 of the Wadsworth compressor station permit, Ohio EPA states "Ohio EPA is not aware that the compressor station will emit radon gas and/or radioactive particulate matter." At p. 27/98 of the Waterville compressor permit, Ohio EPA says "There is no indication the proposed compressor station would emit radon gas or radioactive particulate matter." However, based on my review of the Final Environmental Impact Statement for the NEXUS pipeline, the OEPA permits, and my previous work involving the radiation present in Marcellus and Utica shales, it is my opinion that to a reasonable degree of scientific certainty, there will be radon gas transmitted through the pipeline as a component of the shale gas. It is also probable to a reasonable degree of scientific certainty that some radioactive particles will adhere to the fine ash which will be emitted when gas from the pipeline is burned to power the compressors. Finally, it is probable to a reasonable degree of scientific certainty that radon and some radioactive particulate would likely be emitted from all components within a compressor station facility which leak, not just the compressor engine alone, and that consequently, the emissions from the overall compressor station must be aggregated and quantified.

Specific Comments

The entire discussion of radon in the final environmental impact statement (FEIS) for the Nexus project consists of three paragraphs in 300 pages of text. The FEIS has no quantitative estimate of radon release at the compressor station. As the response to public comments states, the draft air permit does not require monitoring record-keeping, reporting and emissions testing which will be used to verify that actual omissions are below the allowable limits. It is well known that radon is a carcinogen that can increase the probability of lung cancer. It should be carefully monitored..

Past studies have shown, mainly in the South and the Gulf coastal region that the average radon concentration at well heads is 37 pCi per liter ranging up to 179 pCi per liter. However the Marcellus and Utica shale formations have much higher radon concentrations because the radium concentrations that give rise to radon are much more radioactive. According to the State of Pennsylvania, in its study of radioactivity, the average radon in natural gas range between 3 and 147.5 pCi/l with a median radon concentration of 40.8 pCi/L. This is higher than the measurements by Johnson¹ taken in 1973. Johnson's measurements were taken before the use of fracking to release radon gas. The FEIS discusses instances where various materials in the pipeline are released but does not discuss the release of radon. The FEIS discusses how blowdowns can be burned but burning doesn't destroy the radon gas. The effect of radon, as a heavy gas, concentrates in basements and other low-lying areas near compressor stations, and not immediately dissipate into the atmosphere. Studies of radon in Pennsylvania homes following fracking indicate that radon concentrations are higher in areas that have been fracked. A study by Johns Hopkins University² indicates that 42% of readings near fracked locations surpass concentrations that the US government considers safe and these levels have been rising since 2004, around the time the natural gas industry began drilling natural gas wells in Pennsylvania. In addition to radon gas the progeny of radon, such as polonium, lead and bismuth particulates are also radioactive. Bismuth-214 is a strong gamma emitter. The FEIS considered the potential buildup of decay products within the pipeline and the risk of releasing these products into the environment. The FEIS says "the applicant would clean the pipe joints prior to the reuse. As I mentioned I've been examining NORM and in particular the cleaning of these pipes since 1992. Many workers have developed cancer because these radioactive particulates were released to the air when the pipes are cleaned. Workers inhaled these radionuclides. The FEIS says nothing about where these pipes are cleaned except to say that the cleaning would be collected and treated as hazardous materials. The FEIS doesn't say anything about how the cleaning is done or where it's done. It's just a vague promise.

¹Johnson, RH, et al, "Assessment of Potential Radiological Health Effects from Radon in Natural Gas," Environmental Protection Agency, EPA-520/1-73-004, November 1973

² Johns Hopkins University, Environmental Health Perspective, April 9, 2016

My concern about the FEIS is it doesn't quantify the radon hazard. A radon study conducted by the EPA in 1973, before the use of fracking showed the median natural gas as 37 pCi/L (ranging from 1 to 79 pCi/L). The Marcellus formation is considered to be more radioactive, and the radon concentrations would be more radioactive.

The EPA has set the indoor action level for radon at 4 pCi/L. If concentrations of radon are high enough to exceed these activity levels, the EPA recommends implementing remedial actions, such as improved ventilation, to reduce levels below this threshold. Further, the Indoor Radon Abatement Act established the long-term goal that indoor air radon levels be equal to or better than outdoor air radon levels. The average home in the United States has a radon activity level of 1.3 pCi/L, while outdoor levels average approximately 0.4 pCi/L.

The FEIS also states comments were received concerning the potential buildup of decay products (progeny) within the pipeline and the risk of releasing these products to the environment either during pipeline maintenance or the removal of existing pipe. The FEIS noted that without a significant presence of the parent radionuclide (i.e. radon), it is unlikely for there to be a significant presence of progeny. However, this is not the case. The Marcellus and Utica formations are relatively close to the Wadsworth and Waterville compressor stations compared to gas from the Gulf Coast region. However, to further address this potential, the applicants promises to clean the pipeline prior for its reuse. The applicant would also conduct annual inspections and regular cleaning of their operational pipelines. Any liquids or solids removed during these cleanings would be collected and treated as hazardous material that would be disposed of at a licensed facility in accordance with federal, state, and local regulations. These measures would minimize the risk that any radioactive solids would be released into the environment, thereby reducing the risk to the worker and the general public. But the details are not spelled out. The FEIS says radon is present but it doesn't say what the implications are. There should be a supplement to the FEIS which discusses radioactive materials at the compressor stations in particular since these locations are where radioactive materials can be released. It is important to address the fact that each permit, in OEPA's responses to public comments, denies that there will be radon emitted.