

## **TENORM contamination of Gas Storage Cavern Equipment**

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### **Abstract**

Radioactivity is a pervasive problem the Oil and Gas production and Natural Gas Transmission as an environmental and worker safety issue. In this paper, we will examine the potential impact of TENORM contamination in gas storage surface facilities and the caverns where natural gas is stored. This paper will provide an overview of the sources of radiation, where it occurs, and show how it can impact the surface facilities and equipment related to Natural Gas and Natural Gas liquid fractions storage. Most of us are aware of Radon 222 gas can be a problem in basements of residential homes where it percolates up through rocks and soil. In fact, the Nuclear Regulatory Commission (NRC) has determined that Radon-222 (including its radioactive daughters), is the single greatest source of ionizing radiation that Americans encounter over a lifetime.

However, Oil and Gas Production is a very large source of Radon 222 which flows almost exclusively with the Natural Gas fraction. While natural gas is contained in tanks, transmission lines and gas tight storage caverns, it isn't a threat. However, any equipment such as tanks, compressors, pipes, valves, and filter pots will become contaminated with radioactive Lead-210, Bismuth-210 and Polonium-210. During maintenance, the natural gas is released (with Radon-222) prior to maintenance. Once the systems are open up for cleaning and repair, there is a high potential for internal worker exposure due to inhaling airborne radioactive particles. The most dangerous of these is Po-210 by a factor of 20 times. Lead-210, Bi-210 and Po-210 contaminate debris ranging from dry dust to thick sludge and required by law to be disposed in a licensed disposal facility. In addition, facilities that generate radioactive waste can fall under the general license provision of many state laws. States, such as Texas, will also require that such waste be removed by licensed NORM service companies with highly trained employees that follow appropriate field protocols and approved protective personal protective equipment.

In summary, most of the states with significant oil and gas operations ranging from production, transmission, storage and processing have NORM and TENORM regulations that are in affect for any facility that acquires radioactive material. Summary TENORM regulations:

1. All companies that possess regulated TENORM hold either a General or a specific TENORM license and are subject to all applicable Radioactive Material regulations.
2. Worker protection is mandatory and TENORM license holders are required to prove protection of the general public. In addition, OSHA has specific safety regulations for radiation safety for all workers.
3. Radioactive waste must be managed appropriately and transported and disposed of in a licensed disposal facility. Some waste may be categorized as mixed waste which is which is radioactive and also containing hazardous waste such as benzene.

4. Specifically Licensed NORM contractors are required to remove the waste. The facility will likely be required to follow the protocol to register each waste shipment in the EPA database. This system includes the shipping procedures required by the DOT as well disposal of the waste at the licensed facilities
5. A four hour hazard recognition radiation safety training course is required for all individuals that work at the facility.

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