



What is NORM?

NORM is an acronym for Naturally Occurring Radioactive Material, which includes all radioactive elements found in the environment. Long-lived radioactive elements such as uranium, thorium and potassium, and any of their decay products, such as radium, and radon are examples of NORM. These have always been present in the Earth's crust and within tissues of all living beings. (<http://www.world-nuclear.org/>)

The average person in the United States is exposed to about 360 millirems of radiation from natural sources each year. A millirem, or one one-thousandth of a rem, is a measure of radiation exposure. More than 80% of this exposure level comes from background radiation sources. Consumer products contribute 10 millirem/year, while living or working in a brick building can add another 70 millirem/year. A person who smokes one and a half packs of cigarettes per day increases his or her exposure by 8000 millirem/year, while porcelain false teeth can add another 1600 millirem/year to a person's exposure level. (Railroad Commission of Texas, <http://www.rrc.state.tx.us>).

Where is NORM found in the oil and gas industry?

NORM found in oil and gas exploration, development and production operations originates in subsurface formations, which may contain low-level radioactive materials. NORM may be brought to the surface in the formation water that is created in conjunction with the production of oil and gas. The concentration of radioactivity in the formation water is ultra-low and is only measurable if a sufficient amount of scale is accumulated.

NORM found in produced waters may form scale in well piping, storage tanks and other surface equipment. It can take several years before scale accumulation in oilfield equipment reaches a regulatory threshold. Additionally, concentrations of NORM may occur in sediments that collect in oilfield vessels and tanks. If this does occur, the pipe or vessels are handled according to regulatory standards.

What are NORM's potential exposure routes?

In oil and gas operations, most of the NORM resides within closed steel vessels and piping. These vessels reduce the exposure hazard for site workers. The quantity of materials affected by NORM at any given work location is small and the external radiation levels are not significant.

What are the health risks associated with NORM?

The health risk of NORM to the general public is virtually non-existent. The risk of NORM exposure to a site worker is increased only slightly.



In order to better understand potential risk, it is important to understand the three varieties of radiation: Alpha, Beta and Gamma.

Alpha particles are the nucleus of the helium atom, the same gas occupying a child's birthday balloon. The poor penetrating ability of alpha particles is the primary reason why the average individual is not at significant risk from oil and gas NORM waste.

Beta particles are electrons, the same electrons that are beamed into the phosphor inside a television tube. Like alpha particles, beta particles also have difficulty penetrating skin.

Gamma radiation, made famous by cartoon superheroes, is not a significant source of radiation in oil and gas NORM.

It is highly unlikely that any one individual would receive a dose of one rem over the course of a year when working with NORM. However, if a dose of one rem was received, either from external sources or through inhalation or ingestion, then the risk incurred in terms of loss of life expectancy would be one-and-one-half days. This risk is 240 times lower than the risk of dying when driving a motor vehicle and is 827 times lower than the risk of developing and dying from cancer induced by non-radiation causes.

The distance between a person and the radioactive source is a key factor in protection. Compared to the level of radioactivity at one foot away, radioactivity is four times lower at two feet away and 16 times lower at four feet away. In addition, dense materials such as steel prohibit alpha and beta radiation and significantly reduce gamma radiation. It is only when equipment is opened to the atmosphere or piping is pulled out of the well, that potential exposure exists.

What are the Texas state regulations for oil and gas NORM?

The Railroad Commission of Texas (RRC) regulates the identification and labeling of equipment containing NORM and the disposal of oil and gas NORM waste while the Texas Department of Transportation regulates the transportation of NORM on public roads and the Texas Department of State Health Services (DSHS) regulates all other oil and gas NORM activities.

The Texas Department of State Health Services' NORM regulations include special worker protection requirements for oil and gas operations. Oilfield equipment, such as piping and storage tanks, is subject to DSHS regulation if the concentration of NORM is above the regulatory threshold. Transfer of NORM-containing equipment is allowed, provided the equipment is reused in oil and gas operations. However, NORM-containing equipment that is taken out of oilfield service must be decontaminated before it is disposed or accepted at a metal recycling facility. The DSHS regulations require a specific license to perform this decontamination work.