

NORM, The Good, The Bad, and the Ugly

Naturally Occurring Radioactive Material (NORM) is at best not well understood. NORM is a byproduct of many oil and gas type refining processes. NORM can be found/identified when producing propane, natural gas, crude oil, propylene, and polypropylene, just to name a few. Some facilities maintain good, best management processes, which help to limit NORM exposure, cross-contamination, and dissemination, whereas others do not maintain these processes. Often workers do not understand the risk associated with the NORM containing products.

IKON has worked in and with numerous facilities that have NORM issues and has seen good, best management practices, bad best management practices, and just plain ugly (no) management practices. Often these different outcomes of management practices are directly related to each facility's level of awareness concerning NORM.

For example, some of the good Sites, which have competent NORM best management practices are often pipeline pigging Sites. Most pipeline companies, or their maintenance providers, have expertise because NORM is an issue with specific geological formations, wells, and/or petroleum feedstocks. Therefore, they also have sophisticated health and safety plans, radiation protection programs, Radiation Safety Officers (RSOs), waste management plans, and decontamination protocols. These plans, and their advanced planning, enable the pipelines, their maintenance providers, and their contractors to operate at a highly advanced level. This advanced level, in relation to NORM, helps to protect, contain, decontaminate, and provide efficient waste disposal protocols for their pigging activities, cleaning activities, and decontamination activities. Good NORM practices for most pipelines include scheduled, controlled, and closely orchestrated movements and surfacing of the pigs. The pigs are surfaced into catchment basins with decontamination crews awaiting their surfacing, with correct PPE, plans, decontamination preparation zones, containerization for the wastes, and decontamination containment trailers to clean the pigs (most pigs these days are smart pigs) to prevent cross-contamination or movement of NORM from one Site to another (not all parts of the pipeline contain NORM or the same amounts of NORM). In general, when we think about what "good" looks like for containing and limiting NORM contamination, pigging pipelines with proper preparations, are normally an arranged and "good" outcome.

Some of the bad Sites that have less-than-competent NORM best management practices are sometimes pipe yards and recycling centers. Often, piping from wells, well drilling, collection lines, and gathering systems are placed in boneyards for storage of the piping. These yards frequently have limited management practices and are just a storage yard for piping that will be, in large loads, taken to a scrap yard. Often the piping is not cleaned or decontaminated, and

the pipes' NORM impacts are left overlooked and unaddressed. In many instances, piping sits on bare ground as pipe is accumulated waiting for recycling. Many recycling centers have, in the past few years, installed NORM identification monitoring systems at their scale houses. Scrap metal for recycling passes over the weigh scales, and simultaneously a monitoring system (many systems exist, some of the more popular are LAURUS, Ludlum, and Thermo Scientific) monitors the scrap metal for elevated radioactivity. Scrap yards have become sensitive to taking metals with elevated radioactive readings. They have worker exposure issues, and there is a chance that highly NORM contaminated piping could impact a large amount of recycled metals already at the facility. Often the companies storing this pipe for recycling, stockpile the pipe, unknowingly letting NORM impacted piping sit out in the storage yard. The piping can often rust, and scale contaminates the bare ground where the pipe is stored. Then the pipe is often transported in bulk loads to the scrap yard where it is rejected because of screening procedures for radioactive nuclides. Once the piping is rejected at the scrap yard, with good management practices, the piping can be isolated and descaled by a crew with appropriate PPE, plans, RSOs, and sampling. The removed scale is containerized, the soil, where the pipe was stored is scrapped and containerized, and once the piping is decontaminated it makes its way back to the scrap yard (very seldom is the pipe impacted with NORM, it is more often the scaling on the pipe). In a "bad" situation, the piping is taken back to the yard, scale is knocked off by unqualified workers, workers are exposed, the soil receives the scaling and is now more heavily impacted, and then the piping returns to the scrap yard. The pipe yard soil is now contaminated and may require cleanup. Many times, the pipe crews do not know the risk of exposure, or what exposure to NORM is. This type of Site can quickly turn into a bad Site requiring further assessment and cleanup. This can lead to human exposures, soil exposures, no decontamination procedures, and no containment of the scaling, allowing the NORM to migrate.

One of the ugly Sites was a frac sand yard that received spent frac sand from a formation that contained NORM. The facility was a central gathering place for spent frac sand. The well owners brought spent frac sand to the facility which was often still wet with produce water and inevitably NORM. The sand was piled on bare ground as a central repository. It is unclear if there was a plan to address the sand in some way (re-use, disposal, etc.). In the end, the sand, which was heavily impacted with NORM, was placed upon bare soil, wet, and with no containment. When the NORM survey was performed after run-off was identified going off-Site and complaints were made, the sand registered high screening values for radioactivity and identified exceedingly high levels of NORM. The elevated NORM levels migrated to the sand placement areas, the soil under the placement areas, and the off-Site run-off areas from the wet material and from stormwater events with no containment. This was an ugly Site, as the sand, the soil beneath the sand, and a large area of off-Site impact needed to be address through soil removal and disposal at a radioactive regulated facility that could receive NORM impacted materials. Soils and solids disposal at NORM regulated facilities ends up exceedingly costly because of the transportation, precautions, and the stabilization that needs to occur for

disposal. It is best to keep these quantities isolated and in the parent materials only, as much as possible.

The point of highlighting the good, the bad, and the ugly of Sites is to illustrate that a little bit of knowledge and planning can help to eliminate issues before they occur. Reducing the exposure to elevated levels of radionuclides, taking precautions to decrease exposure for human health and safety, obtaining proper PPE, instituting a radiation protection program, appointing an RSO, and having the proper waste containerization and disposition arranged beforehand can greatly limit the costs and headaches associated with uncontrolled NORM releases.

IKON has assisted on numerous NORM surveys, decontaminations, cleanups, and disposal projects related to scale, sludge, rouge, and pipe removal and cleaning. From small pipeline pigging projects to large NORM waste cleanups. Making NORM projects effective and efficient is a hallmark of IKONs work in the NORM field. Tune in to listen to IKON's webinar entitled [*NORM: Who's NORM – A Primer on Natural Occurring Radioactive Material*](#). Reach out to [Chris Walters](#) for additional information and expertise. We Have Solutions!