

# International Conference on the Management of Naturally Occurring Radioactive Materials (NORM) in Industry

## VIRTUAL EVENT

International Conference on  
**Management of Naturally  
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## Achieving Zero-Discharge NORM Waste Disposal using Slurry Fracture Injection (SFI) Technology

A primary challenge for industry today is the safe management and disposal of large volumes of Naturally Occurring Radioactive Material (NORM; also called TENORM, Technologically Enhanced NORM) contaminated waste generated from various industrial activities, including upstream petroleum operations. NORM flows to the surface in a mixture with oil, gas, or water during production operations and accumulates in surface facilities in various forms, including: scale deposits, sludge, pipelines scraping solids, water, and soil.

The NORM waste management technologies and storage methods currently being implemented in industry all present significant limitations based on technical capability, environmental efficiency, or cost-effectiveness. However, the development of an advanced deep well disposal technology, Slurry Fracture Injection (SFI), for NORM waste addresses these gaps and provides an environmentally sustainable disposal method to achieve 'Zero Discharge' NORM waste management. The SFI process is a versatile technology, with multiple applications including the permanent disposal of large volumes of NORM, and low- and intermediate-level radioactive wastes streams. SFI Best Practices utilize structured project development planning and design, extensive process monitoring, and continual operational improvement in order to mitigate risks during SFI disposal operations.

With an emphasis on maintaining Process Control, the SFI technology requires a comprehensive understanding of geomechanics, wellbore mechanics, and formation fluid flow behavior in order to meet the process and monitoring requirements for sustainable NORM disposal. Careful geological evaluation, process design, site selection, engineering analysis, and HSE controls are incorporated into the SFI process to ensure a high degree of operational efficiency and environmental security.

The use of the SFI technology for NORM disposal has many environmental advantages. SFI disposal eliminates the need for landfill facilities and associated long-term maintenance requirements; pollution caused by discharging of NORM waste; high costs of NORM treatment and incineration; health hazards due to radiation exposure; and operational restrictions due to build-up of scale and other deposits.

The technical presentation will provide a review of the geological, technical, and environmental aspects of advanced deep well disposal for NORM generated from the upstream petroleum industry, along with field cases reviewing SFI NORM disposal projects. The presentation also covers risk assessments and current industry Best Practices for NORM deep well disposal, as well as lessons learnt from industry experiences.

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