

Naturally Occurring Radioactive Material (NORM/ TENORM) Management & SFI Disposal Service

Terralog Technologies Inc.™ (TTI™) offers a unique, cost effective integrated NORM/TENORM management & 'zero discharge' deep well waste disposal service.

Terralog has pioneered the use of deep well disposal-injection process to dispose of Naturally Occurring Radioactive Material (NORM) waste generated from upstream petroleum operations.

Deep well disposal-injection using the Slurry Fracture Injection™ (SFI™) technology is the most acceptable and permanent disposal option to achieve '**Zero Discharge**' NORM waste management.

SFI™ is an environmentally sustainable technology used to place petroleum exploration and production (E&P) waste & contaminated soils in the deep subsurface (geo-sequestration).

TTI is the only company to design, operate and manage specialized deep well disposal-injection facilities capable of disposing up to 15,000 m³/month of NORM waste material.

Terralog's Services are built on our extensive experience in deep well disposal of E&P waste streams. **TTI's** service combines expertise in geomechanics, geology, hydraulic fracturing and environmental management with practical field experience in continuous long-term deep well injection operations.

The SFI process is being successfully used by clients/operators around the world. TTI is active in Canada, Norway, Russia, Indonesia and Saudi Arabia.

The **Terralog** integrated waste management service for NORM includes:

- ✓ NORM field surveys & assessments
- ✓ Equipment decontamination and waste segregation
- ✓ Transport to SFI facility and disposal
- ✓ HSE Controls

Total Solution NORM Management & Disposal:

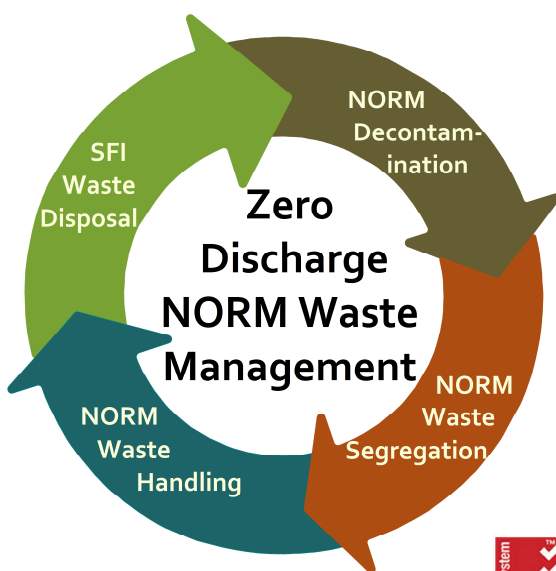
Unique integrated service provides NORM waste management and SFI 'Zero Discharge' deep well disposal.

The **Total Solution** concept provides clients with proven, safe and efficient NORM management: decontamination, segregation, handling, and deep well waste disposal using the SFI process.

NORM decontamination, segregation, transportation and handling operations are performed using the best technology available for quality assured service.

Paired with SFI deep well waste disposal, the **Total Solution** concept ensures safe and secure NORM waste disposal with no impact on underground sources of drinking water, soil & air quality, and surface land use (**Zero Discharge**).

The Integrated NORM Management and SFI Waste Disposal Service is ISO quality assured and meets all environmental regulatory standards.



NORM/TENORM Waste Management Service :

- *Cradle-to-grave system for NORM contaminated soil, sludge, water, pipe scale, etc.*
- *Unique 'total solution' to manage NORM waste from the source to final disposal using the permanent and proven SFI deep well disposal process.*
- *Cost-effective & environmentally friendly method to achieve 'Zero Discharge' exploration and production operations.*
- *Fast implementation and disposal.*

Terralog Integrated NORM/TENORM Service Benefits:

- *Eliminates landfills and NORM surface storage facilities.*
- *Zero Discharge waste disposal.*
- *Eliminates pollution caused by dumping of NORM waste.*
- *Approved by regulators worldwide & reduces long-term liability to operator/generator.*
- *Eliminates high costs of NORM treatment and incineration.*

For more information please contact:



tticalgary@terralog.com

SFI®, Slurry Fracture Injection®, TTI®, and Terralog® are Trademarks, property of Terralog Technologies Inc.

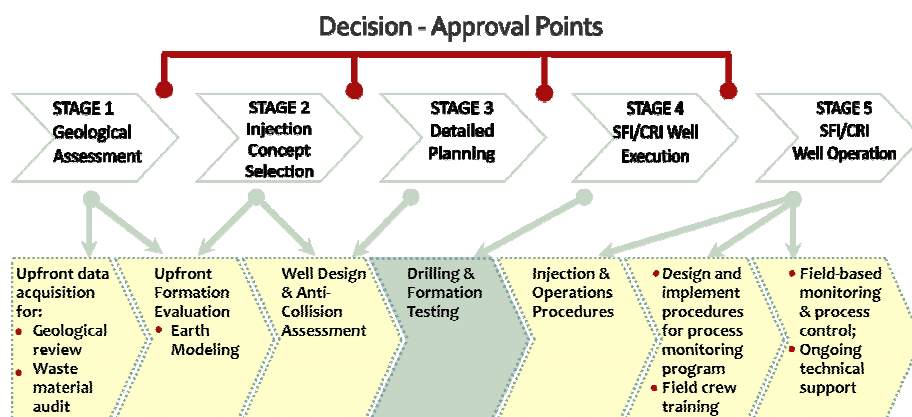
Total Solution NORM/TENORM Management & Disposal



SFI Best Practices

Terralog helps clients successfully integrate environmental waste management into upstream E & P activities by following **SFI Best Practices** workflow processes. Related risk conditions are identified and mitigated, so that subsequent deep well disposal operations can be controlled. Terralog Best Practices for SFI operations have been adopted by major energy companies and service companies in the petroleum industry.

Applying **SFI Best Practices** during each step of a deep well disposal project ensures safe and successful deep well disposal operations:



Slurry Fracture Injection - Deep Well Disposal Process

- NORM/TENORM waste material is delivered to the SFI facility. The waste is screened, and then mixed with produced water to create a slurry. If required, waste streams can be pre-processed before slurification.
- SFI technology can effectively dispose of materials with grain sizes up to 4 mm. The slurry is made with the highest possible solid material concentration – from 10 to 30 percent by volume.
- The slurry is pumped down a waste disposal well at in-situ fracturing pressures. It is important to determine the proper slurry concentrations, injection rates and volumes sustainable by the target geological structure (disposal zone).
- Disposal zones are usually thick permeable, confined and unconsolidated sand formations. In these types of formations, the high in-situ compressive stresses and the high pressure bleed-off capacity of the target formation ensures that the waste is permanently immobilized in the formation.
- Process Control procedures are an integral part of the Terralog SFI technology. Extensive monitoring, data analyses and engineering occurs during SFI operations in order to:
 - ✓ Map the waste pod.
 - ✓ Ensure formation containment of injected slurry.
 - ✓ Ensure optimal formation response (fluid flow and geomechanics) to injected slurry.
 - ✓ Assess and ensure hydraulic integrity of the disposal well.
 - ✓ Maximize formation storage capacity.