Cuttings Re-Injection (CRI) Piggyback Concept & Technical Support Services

Terralog Technologies Inc

***Terralog Technologies Inc.* provides a CRI Technical Support Service for technical support and data management during CRI operations.**

Terralog helps clients achieve Zero Discharge E&P operations. *Terralog* works directly with License Holders and the Drilling Teams.

Terralog's work has proven results in helping to meet the operational-drilling objectives of Drilling Rig Groups by ensuring successful CRI operations.

Terralog's Technical Services Group combines expertise in geomechanics, geology, rock mechanics, reservoir engineering, and environmental management with practical field experience in long-term deep well injection operations.

Terralog's **CRI Technical Support Service** is built on our extensive experience in deep well disposal operations for wastes generated from Exploration and Production activities (e.g. drilling wastes, produced sands, oily viscous fluids, contaminated soils and tank bottoms).

CRI Piggyback Concept

The CRI Piggyback Concept offers proven and significant advantages for deep well disposal of drilling wastes and related waste streams during onshore or offshore operations.

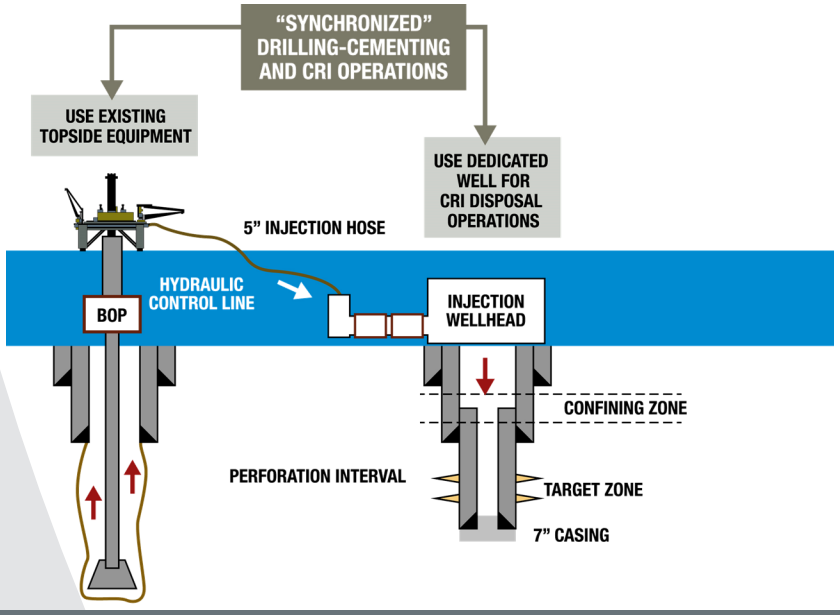
The key element of the Piggyback Concept is integrating the CRI operations with the existing rig equipment systems. Existing topside equipment is used and connected to a dedicated disposal well.

The CRI operations, drilling and cementing operations are synchronized to use idle cementing equipment and employ available cementing crews during CRI. Typically only a small slurrification unit is needed as additional equipment.

Terralog provides the technical support to ensure Process Control and Best Practices during active CRI operations.

Terralog works directly with the cement crew and drilling engineer.

Therefore, the 'zero discharge' operational-drilling objectives of the Drilling Team are met by ensuring successful, reliable CRI operations.



The CRI Piggyback approach offers:

- *achievable 'zero discharge' drilling operations… economically;*
- *fast implementation with minimal rig modifications;*
- *low CAPEX & low implementation cost*
- *disposal of large waste volumes (1000++ m^3/month/well);*
- *use of modified existing wells, or dedicated water disposal wells;*
- *continuous injection cycles - synchronized with drilling & cementing operations;*
- *disposal of multiple waste streams (drilling wastes, slop, waste water);*
- *improved well drilling performance and drilling costs;*
- *reduced requirement of dedicated site crew;*
- **proven and successful in North Sea offshore drilling operations.**

CRI Piggyback *eliminates* the need for:

- *dedicated and complex topside equipment systems;*
- *high CAPEX & implementation costs of a stand-alone CRI operation;*
- *large dedicated manpower requirements in the field; only 1 dedicated engineer is required, working with existing cementing crews with the piggyback approach;*
- *'skip and ship' operations from offshore platforms/rigs to onshore disposal sites.*

Benefits for the Drilling Team

✔ ***Ensuring CRI Operations follow CRI Best Practices procedures***

- Properly designed, implemented and managed CRI operations during drilling operations
- Offshore / onshore applications
- **Significant mitigation of HSE risks associated with Skip & Ship operations.**

✔ ***Maintaining 'process control' during active CRI operations:***

- Optimized formation injectivity for a variety of waste streams
- Maintain waste material containment in the formation
- Maximize formation storage capacity for injected waste streams (slurry, slop, etc.).
- Ensure wellbore integrity of the disposal well.

✔ ***Reliable and sustained CRI well performance during drilling operations:***

- Wellbore integrity
- Maximum well life
- **Optimizing drilling operations by reducing waste-related downtime caused by poor weather conditions.**

✔ ***Achieve Zero Discharge drilling operations (offshore/onshore).***

- Cuttings Re-Injection (CRI) offers upstream operators Zero Discharge waste disposal.
- It is economical with no impact on marine life and eco-systems.
- **Reduced operating cost due to elimination of Skip & Ship operations; utilization of idle cementing crew & equipment.**

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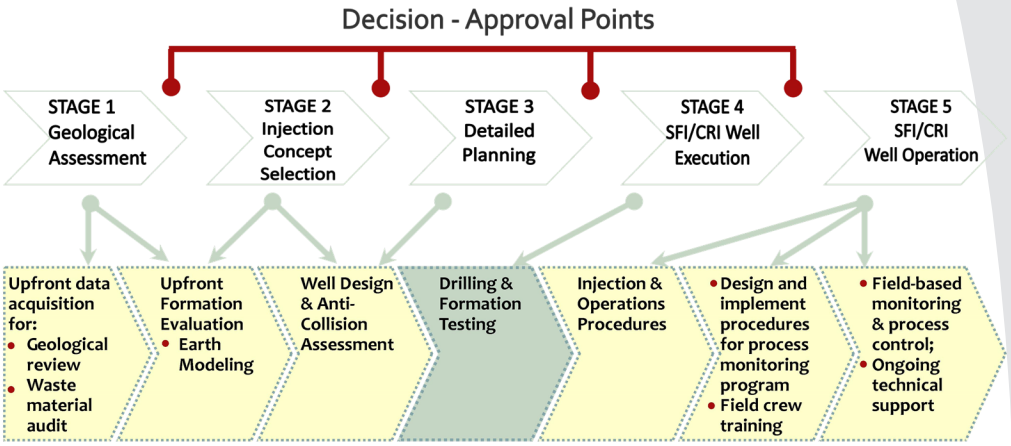
CRI Best Practices

Terralog helps clients successfully integrate environmental waste management into upstream E & P activities by following ***CRI Best Practices*** workflow processes. Related risk conditions are identified and mitigated, so that subsequent deep well disposal operations can be controlled.

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



Terralog's CRI Technical Support Service

1. Technical-engineering support (exclusive of platform pumping services) in the CRI planning stage:
   - geological assessment
   - equipment assessment
   - well design
   - injection strategy design
   - CRI Best Practices compliance

2. Daily technical-engineering support, process control & monitoring during active CRI operations:
   - design and implementation of optimum injection strategies
   - analyses of injection data to optimize the injection strategy
   - maintain formation injectivity
   - ensure material containment in the disposal formation
   - ensure CRI well performance and integrity
   - maximize formation storage capacity.

3. Data management services for CRI disposal operations, using TTI specialized database applications and data management processes.

4. Project reports during active CRI operations, and regular project meetings with the Drilling Teams.