



Petroleum Development Oman L.L.C.

Document Title: HSE Precautions for NORM Well Re-Entry

Document ID	GU-750
Document Type	Guideline
Security	Restricted
Discipline	Occupational Health
Owner	MCOH/2
Issue Date	September – 2019
Revision	3.0

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I Document Authorisation




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1. Introduction

1.1 Objective

To provide safe systems of work when handling equipment and fluids potentially contaminated with NORM during well re-entry operations with work-over or drilling rigs.

1.2 Scope

This procedure shall apply to all well re-entry operations carried out by drilling or workover rigs. All wells, which have been previously active (not new wells), shall be considered NORM contaminated unless demonstrated otherwise by measurements using the correct meters. A separate procedure exists for the wireline and coil tubing unit operations of production wells.

2. Responsibilities

2.1 Contractors

The Rig Manager shall supervise the re-entry work and is responsible for the activation and implementation of this procedure. Where a PDO Supervisor is located on the Rig/Hoist the PDO Supervisor is responsible for ensuring that the Rig Manager/Tool Pusher follows this procedure. The contractors are responsible for adopting these procedures into their own standard operating procedures as the minimum standard. Contractors should develop their own procedures which must be verified by the PDO Corporate Radiation Safety Advisor and the Senior Well Engineer to comply with this PDO procedure.

The Contractor is also responsible for:

- Providing the correct personal protective equipment for their staff, likely to be exposed to NORM.
- Providing own calibrated NORM meters to measure equipment/material removed from the well.

The Rig Manager/Tool Pusher shall supervise the re-entry work and is responsible for the activation and implementation of this procedure.

2.2 Rig/Hoist Supervisor

The supervisor is responsible for advising on radiological controls in Supervised and Controlled Areas.

3.0 Safety measures and work instruction

Removal of flowline (prior well re-entry):

- Prior to well re-entry the flowline needs to be removed under a PTW issued by the Production Coordinator or his deputy. Ideally, PDO will know which wells are NORM contaminated prior to any activities. However, the rig/hoist should assume the well is contaminated until proven otherwise through monitoring.
- Prior to disconnecting the flowline, NORM measurements must be carried out on the outside of the flowline/Xmas tree. If NORM is detected, workers must don the correct PPE before disconnecting any equipment. There is no need to wear PPE prior to removal of the flowline as the NORM is contained on the scale inside and is only an inhalation risk when opening equipment.

4.0 General precautions for well re-entry:



- All wells, which have been previously active (not new wells), shall be treated as NORM contaminated until measurements prove otherwise.
- All personnel who routinely or frequently work on the well-site shall attend a NORM course and be familiar with the hazards and safeguards involved with NORM jobs.
- The DSV or Rig Manager shall verify that the appropriate meters are with the Rig/Hoist, that they are intrinsically safe, calibrated and in good operating condition.
- The DSV or Rig Manager shall conduct background measurements of the internals a clean item of pipe.
- The DSV or Rig Manager shall monitor the exterior of flowline bends or areas where scale is likely to accumulate prior to nipping down. If no contamination is found above background levels, work may progress without NORM precautions.
- Basically, the nominated Meter user measures the internals of first five tubular pulled at the pin end. If no NORM is found then every fifth tubular from then on is monitored. If no NORM is found, then the work continues with no NORM precautions. If NORM is found $\geq 0.5 \mu\text{Sv/hr}$, the previous 5 joints must be monitored and every joint from there forward. The well and work shall be classified as a NORM Job and workers shall adopt and follow the NORM Procedures.
- Work can continue provided staff in the Supervised Area wear the specified PPE.
- The DSV or Rig Manager must also check for external alpha /beta contamination. Any measurements of $\geq 0.5 \mu\text{Sv/hr}$ indicate the presence of external contamination.
- Externally contaminated equipment must be plastic wrapped to prevent scale from becoming airborne during handling and transport.
- NORM contaminated scales are present if the readings exceed $\geq 0.5 \mu\text{Sv/hr}$

Basic precautions are:

- Keep personnel involved to the minimum.
- Prepare a NORM contaminated equipment storage location (minimum 50m away downwind from location, roped off with tape and provided with warning notices)
- Workers on the deck or platform shall wear the designated PPE prior to removal of any well equipment
- The Hoist/Rig manager shall specify what extent of cordoned off area is required. This area shall be termed a Supervised Area and only workers in PPE can enter
- All persons shall be checked for contamination on exit from the supervised area
- If personnel contamination is found it should be removed by wiping with a damp cloth to prevent airborne dust. The rags shall be stored in sealed containers
- Equipment used inside the Supervised Area shall be checked for contamination prior to removal with the NORM Meters. Cleaning of the contaminated equipment on the rig site should be limited

handling tools. Cleaning should be done by wiping the tools with clean rags that should be disposed of as contaminated waste. Any equipment that cannot be cleaned shall be bagged, sealed and marked externally as NORM contaminated with activity levels and transported to the Bahja NORM storage yard

- Any further waste generated should be checked for NORM contamination and if activity is found, placed in suitable containers and registered for storage
- NORM contaminated equipment and waste shall be transported to the Bahja NORM storage yard

5.0 Step by step review of well re-entry operations:

- Hold regular toolbox meeting with crew, drawing attention to the presence and hazards of NORM and referring to the relevant procedures (Record in Daily Drilling Report)
- During removal of Xmas-tree, adapter flange and hanger and continue to measure for NORM
- Once Xmas-tree, adapter flange and hanger are removed, hoist/ rig supervisor to measure the internals of the Xmas-tree, adapter flange and tubing hanger. NORM contaminated equipment may be reused but each item must be recorded in DIMS/ EDM and the well should be labelled as NORM Contaminated.
- Contaminated Xmas-tree, adapter flange, tubing, hanger and accessories not to be reused shall be registered, packed, stored and transported to Bahja.
- During removal of tubing from the well, the hoist/rig supervisor shall measure the first five tubulars at the pin end. If no NORM, detected, measure every 5 tubular or every 3rd string if pulling doubles. Continue measuring for NORM at regular intervals.
- During well clean up with bit and scraper, hoist/ rig supervisor to continue measuring radiation in return fluids (particularly in the viscous pill), drill pipe, and BHA equipment when pulling out of hole. The RPT shall monitor the filters again • Any material or scales collected that test $\geq 0.5 \mu\text{Sv/hr}$ shall be collected and placed into sealed drums, labelled and transported to the Bahja NORM Yard.