

APPENDIX 5.2
WATER PRODUCTION WELL DESCRIPTION

Appendix 5.2: Water Production Well / Disposal Well

A new combined gas producer, water producer and annulus injector well will be constructed at the EMS Well Site which will require the use of a workover rig and associated equipment. Once mobilised onto Site the workover equipment will be set-up and utilised in accordance with the following level 3 procedure:

- The Existing wells surface equipment will be removed as the well is currently plugged off with two tested barriers.
- The Workover rig will move in and rig up above the existing connections, and rig up blow out preventers.
- Existing barriers in the well will be removed, these consist of a tubing hanger plug, and a deep set plug.
- The existing kill string will be circulated and flow checked. This allows full control of the fluid column in the well.
- The Tubing hanger will be unseated and pulled to the rig floor, and broken out, the remaining kill string will also be pulled out the hole and broken out and laid down.
- A Wireline ran GR/CCL log will identify the Sherwood Formation.
- Rig will run Tubing conveyed perforation guns to the required depth across the Sherwood formation, and drop a ball to allow the tubing to pressure up and fire the guns.
- The well will be flow checked, and injectivity tested across the Sherwood.
- Two 7" RTTS packers will be set and tested in the 7" casing above the Sherwood perforations, these provide two independent barriers for well control.
- The Drilling/WO bop system will be removed, and an additional 5-1/2" liner hanger spool will be installed onto the existing casing hanger, prior to the tubing hanger spool being reconnected.
- The drilling/WO bops will be re-installed and tested.
- A new 5-1/2" liner will be installed with a swellable packer, and new liner hanger. The well will be circulated with brine to activate the swellable packer.
- A new completion string will be ran to the bottom of the well. This will consist of an Electrical submersible pump, a seating nipple, a sub surface safety valve, and a hanger.
- The barriers will be placed in the well, and tested, prior to removing the drilling/WO bops and associated rig equipment.
- The new 3-1/16" surface tree will be installed and tested.
- The new Surface Pipework and Valves will be installed, these connect the existing tree flow wing valve to the 9-5/8" x 5-1/2" annulus valve, to provide a

line for the water re-injection.

- In addition, a new gas line will be installed from the new 5-1/2" x 3-1/2" annulus, this will be connected to the new flowline.
- The upper and lower plugs will be removed by using slickline equipment rigged onto the tree.
- Once all the barriers are removed, the surface electrical components will be connected to the hanger feed through for power to the electrical submersible pump. The well will be in a safe condition to start operations.

- Once producing, the well design will allow the following;

Since the Electrical submersible pump is sat 1000ft below the existing Kirkham Abbey perforations in the sump of the well, the water will be pumped directly up the 3-1/2" completion string to surface, and then be re-injected via the 9-5/8" x 5-1/2" annulus, directly into the Sherwood formation.

Any hydrocarbon will be allowed to break through the kirkham abbey formation, and produce up the 5-1/2" x 3-1/2" Annulus to surface, to be sent via the new flowline to Knapton generating station.