PHE KE30-A8 WORKOVER PROGRAM

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HARVEY H WARD JACK-UP
PHE KE-30-A8 WORKOVER & ESP INSTALLATION PROCEDURES

AFE No. 12-8749. Date: 21st June 2012

WORK PLANNED: Kill well. Remove existing completion. Isolate upper perforated gas interval with casing patch. Run ESP completion.

WELL INFORMATION (See Attachment # 1):

TYPE OF WELL Deviated. Max 52deg

TOTAL DEPTH - PBTD: 5993 ft-MD

CASING:
- 13-3/8” 54.5 ppf, K-55, BTC; shoe at 846 ft-MD
- 9-5/8” 43.5 ppf L-80, BTC; shoe at 2170 ft-MD
- 7” 26 ppf, L-80 BTC; shoe at 5703 ft. MD
- 4-1/2” 12.6 ppf L-80 TB; Shoe @ 5993’ MD.

SITP = 180psi. SICP = 490 psi.

FLUID IN WELL: Well has been on nitrogen lift. Annulus will be empty.

ORIGINAL RKB-MSL & Water depth: 107 ft and 82 ft

ORIGINAL WELL HEAD: FMC SEE ATTACHMENT # 5

PROPOSED WELL INFORMATION:

RKB-MSL & Water depth: 107 ft and 82 ft

Completion fluid: Sea water for kill and work fluid.

ESP Packer: Halliburton ESP Packer, 9-5/8” 43.5 ppf,

Wellhead: FMC. SEE ATTACHMENT # 4

ESP Schematic: See attachment # 7 & 8.

Casing Patch: See attachments 9 & 10.

ANTICIPATED BHP AND BHT: +/- 1800 psig and 170 - 190 deg F

ANTICIPATED PUMPING RATE: 1,500 – 3,200 BLPD. [Optimum operating range of ESP.]
PACKER FLUID PREPARATION

BRINE

<table>
<thead>
<tr>
<th>BRINE PROPERTIES</th>
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<tr>
<td>Density</td>
<td>8.8 ppg</td>
</tr>
<tr>
<td>Clarity</td>
<td>(&lt;30) ntu.</td>
</tr>
<tr>
<td>Purity</td>
<td>(&lt;2) micron</td>
</tr>
<tr>
<td>PH</td>
<td>10.5</td>
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PROGRAM PROCEDURES:
Note: Hold safety meetings & review SOP before beginning each phase of operations and on crew changes.

Note: All the depth in this program is RKB-MSL = 107 ft for Harvey H Ward. A-8 tubing will be cut at 4861'.

1. Move in with drilling rig. Make required rig inspection and fill in “BP Migas offshore safety inspection checklist” for KE-30-A8.
2. Pick up & stand in derrick sufficient 5” drill pipe to reach 7” liner hanger and 3-1/2” drill pipe to reach 4-1/2” liner hanger.
4. Kill tubing with sea water.
   String capacity to EOT calculated 48 Bbls. Kill rate up to 4.0 BPM. Monitor pressure closely to keep below fracture pressure..
   Note: Continue to cut tubing in KE30-A3.
   Note: 2 sets of tubing cutter presently available. [2 chemical cutters & 2 RCT.] Plan to use 1 set to cut A8 & A3. Keep 1 set as backup in the event the cut is not successful on A8.
6. Close TRSSSV. Install lubricator. Set BPV. Nipple down x-mas tree.
7. Nipple up BOPE. Connect tubing hanger running tool & landing string.
   [Note: BOP needs to be pre tested on stump]
8. Test BOP connections to 3000 psi. Note: Collapse pressure of 7” x 26 ppf casing landing string = 5410 psi.
   Disconnect tubing hanger running tool & landing string.
10. Pull tubing hanger above Rotary Table. [Ensure tubing has been cut above packer.] Expected string pick up weight with blocks & TDS 113 klb.
11. Contingency if tubing has not been successfully cut.
M/U tubing hanger running tool with crossovers to 4-1/2" tenaris blue. M/U 4-1/2" tubing riser to rig floor with
crossover to Halliburton logging lubricator. Pull 30% overpull on riser & set in slips. Rig up E-line c/w
lubricator BOP & pump in connection. M/U chemical cutter. Pump sufficient sea water through TRSSSV to
maintain open. Run in & correlate on depth. Shut down pumping & wait for fluid to fall past cutting tool. Cut
string at 4861’.

**Be sure to begin pumping past TRSSSV before moving e-line up.**
Pull out & L/O tools. **Take extreme care as tools are passing TRSSSV.** Rig down E-line & lubricator. Pull
tubing hanger above rotary table.
Release running tool. L/O tubing hanger & install safety valve. Connect control line. Open TRSSSV. Check
for trapped pressure below TRSSSV.

12. If well standing full, circulate clean.
   [If well on vacuum continue pumping sufficient sea water to annulus to keep well controlled.]

13. Trip out to TRSSSV. [Remove control line clamps.] Bleed off control line pressure & L/O TRSSV.

14. Trip out of hole, laying down completion string and accessories.
   **[Note: Tubing to be loaded out to shore base for inspection prior to being re-used.]**

15. P/U fishing equipment & drill collars as per fishing engineer’s run list. Trip in hole on drill pipe. Latch into the
cut tubing above the packer. Pull in increments to release 7” & 4-1/2” PHL packers. If necessary, Jar packers
free.
   Note: After top packer has released tensile rating for 2-3/8” EUE tubing = 42 klb.
   [80% of new tubing.]
   Top packer [7” @ 4883’] pinned to release with 32klb overpull.
   Lower packer [4-1/2” @ 5777’] pinned to release with 27.3 klb overpull. Max pull 193 klb.
   If well standing full, circulate clean.
   [If well on vacuum continue pumping sufficient sea water to annulus to control well.]

16. **Contingency in the event the 7’’ packer will not release.**
   Milling and fishing equipment will be on board. Detailed program will be supplied.
   **Contingency in the event the 4-1/2’’ packer will not release.**
   **Rig up e-line C/W logging lubricator. Make dummy run with GR-CCL. Run RCT & cut the 2-3/8’’ tubing at
5767’. Rig down e-line & lubricator.** Trip out & L/O completion string & accessories. M/U fishing equipment as
per fishing engineer list. Pick up 3-1/8” drill collars & 2-7/8” PAC drill pipe to run inside 4-1/2” liner. Trip in hole
on 3-1/2” & 5” drill pipe to fish at 5767”. Engage fish & jar 4-1/2” packer loose. Flow check.
   If well standing full, circulate clean.
   [If well on vacuum continue pumping sufficient sea water to annulus to control well.]

17. **Trip out & L/O fishing tools & L/O recovered completion assy.**
   **Note: There are no 2-3/8” pipe rams available on the rig. In the event there is a well control issue
while pulling 2-3/8” tubing, the annular will be used to shut in. As a last resort the shear rams
will be closed.**

18. M/U tandem 7” & 4-1/2” casing scraper & 3-3/4” bit. Run in to TD. [Space out 7” casing scraper to top of
4-1/2” liner. Run 2-7/8” PAC drill pipe in 4-1/2” liner.] Circulate well clean. [Depend if well loosing fluid.]
   **Note: Confirm with Jakarta office prior to proceeding with step 18.**

19. Pump well clean up as follows: 50 Bbls of fresh water mixed with 3.0 ppb of XANTHAN GUM D, 50
Bbls of fresh water, 50 Bbls of fresh water mixed with 1 drum of casing wash. Continue circulating with
sea water till returns clean.

20. Trip out of hole Stand 3-1/2” drill pipe in derrick. L/O 2-7/8” PAC drill pipe, scrapers & bit.

21. If the well is standing full and stable. R/U E-line and perform cased hole logging as per step 22.
   Otherwise proceed with step 24.
22. Rig up E-line.

23. Run RMT in modes (Sigma/Capture & C/O mode) combined with GR-CCL for correlation data from PBTD to top of 4-1/2” liner section.

24. Rig down E-line.

25. **Remove bell nipple. Install & pressure test shooting nipple on annular BOP. Rig up E-line. Run RMT-GR-CCL for correlation data across 4-1/2” liner section. Rig down shooting nipple. Re-install bell nipple**

26. **Install casing patch:**
Make up casing patch assembly and running tool with X/O to 2-7/8” PAC drill pipe.

27. Pick up +/- 440’ 2-7/8” PAC drill pipe. [Top of 4-1/2” liner to top of casing patch = 336ft]
   [Install R/A pip tag marker 3 joints above running tool & record length from R/A marker to top of casing patch.]
28. Trip in hole on 3-1/2” drill pipe work string. [To isolate interval 5688’-5750’.]
   [Install pup joint marker 3 joints above x/o from 2-7/8” pipe to 3-1/2” pipe & record length from marker to top of casing patch.]
29. Trip in hole on 3-1/2” drill pipe to setting tally depth.
30. Rig up logging equipment c/w e-line lubricator.
31. Pick up slim hole GR-CCL & run to correlate RA marker depth. Pull out & L/O tools. Rig down logging equipment.
32. Space out to position casing patch on correct depth as per result of GR-CCL log.
33. Set casing patch as per attached Corelab Procedure.
34. Trip out of hole. L/O 2-7/8” PAC drill pipe. Stand 3-1/2” drill pipe in derrick. Break out running tools.

35. **ESP Running and Setting Procedure**

1. Hold safety meeting. Review SOP & JSA with all personnel involved.
   • Focus on Health Safety and Environment & positioning of the equipment in work area.
2. When working over the hole, ensure that the hole-cover is in place to prevent loss of tools or equipment down hole.
3. Make up ESP equipment as per the attached completion assembly schematic. Ensure plug and prong installed in SSD just above the ESP assembly. Connect ESP cable. Follow Reda running procedure and engineer instructions. [Install cable clamps as per Reda program.] Continue running in hole with 3-1/2” 9.2 ppf, L-80 Tenaris Blue tubing.
   • Recommended make up torques for 3-1/2”, 9.2 ppf, L-80, Tenaris Blue:

<table>
<thead>
<tr>
<th>Tubing OD / ID (in)</th>
<th>Setting Depth MD-RT</th>
<th>Grade</th>
<th>Weight (ppf)</th>
<th>Drift ID (in)</th>
<th>Burst Rating (psi)</th>
<th>Collapse Rating (psi)</th>
<th>Make Up Torque (ft-lbs)</th>
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<tbody>
<tr>
<td>3.5 / 2.992</td>
<td>As per schematic</td>
<td>L80</td>
<td>9.2</td>
<td>2.86</td>
<td>10160</td>
<td>10530</td>
<td>3390 3770 4150</td>
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   • Apply dope to the pin end only. Apply dope sparingly.

   • Run torque monitoring and recording equipment on each make up. Have SPIJ representative on board.
• Maximum running speed when running in hole is 60 ft per minute.

4. Run in hole with ESP completion to packer depth. [Packer depth +/- 500 ft from surface.] Pressures test the string every 1000 ft, test REDA cable reading (phase to phase, phase to ground).

5. Make up ESP packer. Install cable through packer & install pack-off grommets. Splice ESP cable above packer. Connect vent valve control line to top of packer. Pressure test control line to 5000 psi.

6. Pick up TRSSV and make up control line for TRSSSV. Function test to 5000 psi for 15 min. Record and chart all pressures and volumes. Bleed control line to 4000-psi hold open pressure to keep TRSSSV open. Continue RIH installing control line & cable protectors.

• When setting the slips, great care must be taken to ensure that the slips do not damage any of the control lines or ESP cable. The risk of damage increases as the number of control lines increase during running in hole. Any damage must be cut out of the control line and spliced.

• **Pump setting depth 5297 ft. MD.**

7. Make up and install FMC 13-⅜" x 4 ½" tubing hanger with crossover to 3-1/2” tenaris blue. Connect control lines to hanger and test to 5000 psi for 15 minutes as per Halliburton, Reda and FMC specs. Record and chart pressures and volumes. Connect ESP cable to tubing hanger penetrator.

8. Make up 7” BTC landing joint and running tool to FMC hanger. Drain stack and land hanger in tubing head. Measure elevation on landing joint to ensure hanger is correctly landed. Set tubing hanger lock ring. Test lock ring with 10 klb over pull.

**NOTE:**
If well is on losses, switch hole fill-up to the casing valve. If well is not on losses, drain stack and leave casing valve open while landing and testing the hanger.

9. Pressure test tubing hanger body seals through dedicated test port to 5000 psi for 15 mins. Record test on a chart.

10. Install full opening safety valve & circulating sub assembly on top of landing joint.

11. R/U surface lines to circulating sub. Close FOSV, test surface lines to 4000 psi, bleed off pressure.

12. Open FOSV (Full Opening Safety Valve).

13. Pressure up string against the plug & prong to 1000 psi – Hold pressure.

14. Perform TRSSV negative test. Close Halliburton TRSSSV, bleed off pressure above TRSSSV to 300 psi. Monitor pressure for 5 minutes.

15. Pressure up tubing above TRSSSV back to 1000 psi. Open Halliburton TRSSSV.

16. Continue in increments to 3500 psi to set ESP packer. Hold 3500 psi for 10 minutes. Bleed off pressure. Pressure test back side to 1,000 psi for 5 minutes. Bleed off pressure. **Note:** If well is on losses and being filled through casing valve, Shut down pumping to the annulus when setting the packer. Fill annulus after the packer is set.

18. Nipple down BOP stack and nipple up tubing head adaptor & tree. Test tree cavity to 5000 psi. Test control line ports to 5000 psi. Record test pressure and volumes. Bleed off pressure.

19. Open TRSSSV.

20. Connect cement pump line to x-mass tree. Pressure test x-mas tree against plug & prong to 3500 psi. Disconnect cement pump line.

21. Rig up slickline equipment. Pressure test lubricator to 3000 psi. Pull prong & plug from SSD above ESP assembly. Rig down slickline equipment.

22. Notify PHE WMO Production personnel to prepare for flow line modification & installation.

23. Inspect and discuss completion and well hook up with production personnel.

24. Prepare a well turnover checklist and review with production personnel. Ensure both drilling and production personnel have signed the document.

25. Hook up and commission flow line, actuator controls, and safety valve controls.

26. Hand well over to Production.
ATTACHMENT 3. HARVEY H. WARD ELEVATION

Date: 23 Nov 2011
LAT: 6°50' 34.571" S
Long: 113° 02' 43.476" E
Location: PHE KE30
Rig Heading: 135 deg

Date: 23 Nov 2011
LAT: 6°50' 34.571" S
Long: 113° 02' 43.476" E
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Rig Heading: 135 deg
ATTACHMENT 6. WELL PLOT.
ATTACHMENT 7. PROPOSED ESP SCHEMATIC.
ATTACHMENT 8. PROPOSED COMPLETION DIAGRAM.

# XXX
KE-30 A - 8
WORK OVER
WITH ESP

3 1/2” TRLV, Wellstar, with 2.813” X Profile
9-5/8” ESP Packer 40-47#, 3-3/4” - 9.3# EUE, B-P
3-1/2” X Nipple, with 2.813”, TDH Blue, B-P

3 1/2”-9.20# TSH Blue, B-P, Tubing

7” Casing

3-1/2” SSD With 2.813” X Profile, TSH Blue, B-P
ADV, with 3-1/4” - 9.3# EUE Box Connection

ESP, with 3-3/4” - 9.3# EUE Box Connection
End of ESP Assembly : 5297 FT MD
Top of 4.50” Liner : 5347 FT MD

GAS ZONE, After being Casing Patched

4.50” LINER

OIL ZONE

KE-30 A8 WORKOVER PROCEDURES
ATTACHMENT 9. CASING PATCH SETTING PROCEDURE.

Running Procedure for 4.5" & 7" Casing Patch with Alpha Circ. Sub & Hydraulic Setting Tool (KE-30 - A8)

1. Run a Bit and Scraper to ensure that the area where the patch is to be set is free from any scale deposits and the casing is in gauge.
2. R/U Wireline and RIH Caliper log to ensure that the ID of the casing is within specification.
3. Caliper all the OD’s and ID’s of the patch & accessories and ensure that the setting ball (3/4" Dia) will pass through any crossover’s or restriction in the running string.
4. Make up patch as per Owen standard procedures.
5. Make up patch to setting tool as per Owen standard procedures.
6. Drift the tubing (running string) prior to running in hole, to prevent a tool failure due to blockage from any debris that may be in the tubing.
7. RIH with casing patch assembly on tubing, avoiding sudden jarring when setting the slips. Do not force or spud the casing patch into the well, and maximum allowable set down weight is 3000 #.
8. Space out on surface so that casing patch is at correct depth. The last movement should be up.
9. Drop 3/4" ball into tubing and allow to gravitate, approximately 5 min per 1000 feet in water and longer for denser fluids.
10. R/U Surface line, pressure test to 5000 PSI.
11. Pressure up tubing slowly and observe for any pressure increase, increase pressure to 800 psi. A slight pressure drop may be observed at surface, indicating the alpha circ. sub shifting.
12. Continue pressuring up at 1000 psi increments, to 3600 psi.
13. Increase pressure up to 3600 psi, a shock on the tubing may be observed on surface, indicating the shear ring at the setting tool has sheared. Pressure will bleed off tool at this time.
14. Pick up 20 feet slowly and ensure shear ring has sheared (no over pull on string weight indicator.). Lower down string slowly to tag top of patch (max 3000#).
15. POOH string with setting tool and lay down.
ATTACHMENT 10. CASING PATCH SCHEMATIC.