

Generic Drill Stem Test Procedure

General and Safety Requirements

1. The Origin Wellsite Representative is the person responsible for DST safety procedures. All requests or instructions must be routed through him. Under no circumstances will instructions be given directly to the testing or drilling contractors without his knowledge and approval.
2. The drill pipe and bottom hole assembly must be strapped while pulling out for a test unless the pipe was recently strapped prior to the test.
3. Test results must not be given to any third party. All enquiries must be referred to the Brisbane office.
4. The Contractor's Rig Manager should be instructed not to include test results in his morning report.
5. All samples must be correctly and fully labelled.
6. DSTs must not be opened for the initial flow during the hours of darkness.
7. DSTs must not be pulled during the hours of darkness without ensuring that the string is free of hydrocarbons.
8. DSTs may only be pulled without reversing if a water flow to surface or a negligible blow with no string weight is observed.
9. All unnecessary electrical equipment must be switched off during DSTs.
10. Ensure BOPs tests are current prior to running a DST.
11. The emergency shut down must be tested prior to running a DST.
12. The mud pumps should be lined up on the hole and test run prior to picking up test tools.
13. The Wellsite Representative must hold a safety meeting before picking up the test string.
14. The Wellsite Representative must witness the picking up and running of the test tools.
15. The Wellsite Representative must give the Driller written instructions detailing the running procedure string make up, etc.
16. Ensure that there is sufficient clearance around the flare pit and that there is no rubbish in the flare pit that could be blown out and become a fire hazard.
17. Ensure that there is sufficient water hose available to allow fires to be extinguished around the flare pit.
18. Any pup joints used for space out should be positioned one stand down from surface to avoid BOP space out problems.
19. Driller or Rig Manager to be on the floor at all times
20. Annulus level to be observed continuously.

Testing Procedure

The following procedure will be adopted:

1. Circulate until hole is clean.
2. Pull out of hole.
3. Make up testing assembly. Proposed test interval xxxx - xxxx mRT.
4. Final test string configuration will be confirmed with testing contractor prior to test. Tools must include as a minimum, four (4) recorders (mechanical - inside, outside and recovery, electronic - inside) plus two independent reversing / pump-out subs, safety joint and jars. Email the proposed tool string to the Brisbane office before make up.
5. Check measurements with the testing operator to ensure that the desired interval is in fact tested. Write all measurements on the back of the Drill Stem Test Report Form.
6. **Confirm if water cushion is required.** Based on packer size, estimated hole size, depth and existing mud weight.
7. Check that the flare line is clear and all valves on this line downstream from the choke are open. Ensure that, if a separator is used, valves and dumps are in the operating position and that the entry and exit valves are closed.
8. Pressure test all surface flow lines to 3000 psi.
9. Ensure water sprays to all exhausts are in operation and that all sources of ignition have been suppressed.
10. Ensure appropriate flare buckets are in position and lit.
11. Set packers.
12. Open valve - observe annulus to ascertain if the packers are holding.
13. After a 5-minute initial flow, close tool. Report to Brisbane Office on result of initial flow. On basis of this flow proceed to option A or B shown below:

(A) IF THERE IS ONLY A SLIGHT AIR BLOW

14. After 60 minutes shut-in, re-open the tool.
15. Open for a further 2 hrs. **Report to Brisbane Office on status of flow.** A decision may be made to shorten the second flow/shut-in periods shown below if indications of flow are poor. Shut-in tool after 2hrs flow.
16. After 4 hrs buildup on second shut-in, pull free and P.O.O.H.
17. Proceed to (23).

**(B) IF THERE IS A STRONG AIR BLOW OR IF THERE IS GAS
TO SURFACE DURING THE INITIAL FLOW PERIOD**

18. After 60 minutes shut-in, re-open tool.
19. Flow gas until all mud has been cleared (the gas should be vented through the flare line and flared).
20. Flow gas for at least 60 minutes or until pressure has stabilised. **Report to Brisbane Office on status of test before shutting tool.** Observe pressures and temperatures every 5 minutes if recorders are not available. Two samples of gas will be collected from the floor manifold.
21. If the gas flow during the clean up is moderate and decreasing and if the flare has a smoky reddish colour, there may be oil/condensate in the pipe. In this case, the flow period should be prolonged until oil reaches the surface **Consult Brisbane Office regarding this.** If oil does reach surface and there is no separator and test tank on site the tools must be shut in.
22. If there is no gas to surface but there is a continuing air blow, prolong flow period until either water reaches the surface or the air blow dies. **Consult Brisbane Office regarding this.**

COLLECT FLUID SAMPLES AS PER ORIGIN PROCEDURE 1.3

23. Shut-in tool for at least 4 hours (unless Brisbane Office have requested an alternate duration) then pull packer free.
24. Observe the mud level in the hole for any returns.
25. If the contents of the drill pipe have not been reversed out, take samples of the fluid in the drill pipe and it is most important to take a sample from above the test valve.
26. When pulling out of hole it is most important that the hole is kept full.
27. Keep a full and accurate record of all operations during the test on the Drill Stem Test Report Form.
28. If oil/condensate has been produced, reverse circulate out to a test tank. **Do not circulate to the flare pit.**

PULLING DRILLPIPE CONTAINING HYDROCARBONS MUST NOT BE ATTEMPTED

**DRILL PIPE SHALL NOT BE PULLED DURING THE HOURS OF DARKNESS WITHOUT REVERSE
CIRCULATING**

Reverse Circulating Procedures

If it is considered that there could be liquid hydrocarbons in the string, it should be reverse circulated out to a test tank, not the flare pit, prior to pulling the string.

The following procedure should be followed when reversing out:

1. Closing the choke manifold when shearing the knock out sub or opening the DCIP valve will buffer the sudden drop of annular fluid. This reduces the commingling of produced fluids, and by manipulation of the choke, a controlled recovery can be made.
2. Calculate the drill string capacity above the pump out sub or DCIP (which ever is used), and convert the volume to pump strokes at 95% efficiency.
3. Zero the pump stroke counters or have two people on the pumps counting strokes. Line the pump to the kill line - DO NOT close the BOP's. Dip all mud tanks.
4. Close the choke manifold. Drop the knock out bar or rotate the DCIP valve to the circulating position.
5. Fill the hole as the annulus drops. Watch the annulus at all times, adjusting the pump rate to keep the annulus full, but not overflowing.
6. Open the choke and commence recovery. Control the recovery rate using the choke and collect samples from the bubble hose.
7. As the flow slows down due to hydrostatic balancing, shut-in the annular preventer and pump out the remaining recovery. Ensure the pump pressure, 1400 - 2100 kPa max (200 - 300 psi), does not exceed formation breakdown pressure. When the calculated capacity has been pumped, drilling mud returns should act as a final check to full recovery.
8. Continue circulating for approximately 15 minutes to ensure a balanced system. Return fluids will normally be diverted into a holding tank where volumetric recovery is confirmed, and after a settling period, various fluid recoveries can be accurately determined.
9. Pull out with test string.

Formation Fluid Samples

1. Crude Oil Samples

In the unlikely event that crude oil is recovered, two 5-litre can samples will be taken for analysis. Preliminary analysis of the API gravity and pour point of the oil will be made at the wellsite. The samples will be labelled with: Well Name, Date, DST Number, DST Interval, Formation, Sample origin and Temperature.

2. Gas Samples

Gas samples of 500 - 1000 ml are required for analysis. A minimum of two samples per test will be collected under pressure in an evacuated steel cylinder (minimum 1500 psi). The cylinder will be labelled with:- Well Name, Date, DST Number, DST Interval, Formation, pressure, sample origin, time sample was taken and the reservoir and surface temperatures.

Use the Drill Stem Test Report form to record all information about the samples collected. A sample of any gas to surface will be analysed at the wellsite using the chromatography in the mud-logging unit. Avoid saturating the detector by diluting with air.

3. Water Samples

The following procedures for sampling drill stem test fluid for hydrogeochemical evaluation are recommended.

Collect the following types of samples for evaluation:-

- (i) Drilling mud sample - 1 litre plastic bottle
- (ii) Make-up water - 1 litre plastic bottle
- (iii) DST samples
 - 1 sample from the top
 - 1 sample from the middle
 - 1 sample from the bottom
- (iv) Mud filtrate - 20 ml sample

Collect each DST sample in a 1 litre plastic bottle. If an organic extraction of possible petroleum components from the water is required, then two, 1 litre GLASS bottles should be collected.

4. Sample Collection Methods

Rinse all containers thoroughly with the fluid to be sampled before collecting the actual sample.

If possible, obtain the Ph and resistivity of each sample immediately after collection. Measure and record the amount of chlorides by titration.

Fill all plastic containers to the brim with sample. Screw cap down and at the same time squeeze some of the liquid out then tighten the cap. Wrap the cap tightly with tape. This procedure will provide a good seal and reduce bacterial putrefaction and oxidation.

For gas saturated samples, fill bottles $\frac{3}{4}$ full, tap cork evenly into position, invert and store with bottom end upwards. This will trap gases against the bottom of the bottle. Check for leakage around the cork.

Label all containers clearly.

STORE SAMPLES IN A COOL PLACE AND SHIP AS SOON AS POSSIBLE FOR ANALYSIS.

Water samples quickly change composition upon sitting, especially if they have been contaminated with mud. Thus for best results, samples should be sent for analysis immediately after collection.