See BARRAMUNDI-1 PT1
591001 Letter 24/8/99.

GLOBEX Far East

TPR
OR-459.

T/27P

BARRAMUNDI-1

OPERATIONS MANUAL

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for GLOBEX Far East

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1. RIG MOVE/ANCHORING

1.1 Notifications

1) The Operator is required to obtain permission from the Designated Authority to move the rig to the drilling location in accordance with Clause 302 (3) of the PSLA-Schedule (minimum 7 days ahead of the intended move).

2) The OIM/Master will keep AMSA advised of the rig move and give them the final position when anchored up. The Operator should also notify the DA when on location.

1.2 Operations

1) Prior to commencement of rig move/anchoring the OIM will conduct a meeting with the workboat captains/rig superintendents/surveyors and Petroz Drilling Supervisor to discuss procedures and safety issues during the operation.

2) Extra AHSV crews may be required for the move in accordance with MO47.

3) Extra marine personnel crews may be required for the move in accordance with MO47.

4) The Barramundi-1 site survey does not indicate any anchoring hazards.

5) One additional anchor will be available offshore as contingency.

6) When running anchors, the daily drilling report should include for each anchor:

   a) Time pennant passed to boat
   b) Anchor on Bottom
   c) Pre-tension load

7) Keep anchor tensions above normal drilling tension to prevent rig movement until the the BOP is landed.

8) A post-anchoring report is to be prepared by the OIM/Vessel Masters if any abnormal conditions have occcurred.

9) A Positioning Report showing the final position, distance from intended location, anchoring diagram (showing the rig heading, anchor headings, tensions, length of chain and piggybacks used) is to be faxed to the Shore base when the rig is in position.

2. PRE-SPUD PREPARATION

While under tow or running anchors or rig has been ballasted through the transition zone or as practical, the following items should be checked/prepared:

1) All BHA components have been inspected.

2) Pressure test the BOPs, manifolds, valves etc in accordance with the pressures in the Drilling Programme.

3) Commence mixing mud as soon as the rig has been ballasted down past the transition zone. Check with ballast control.

4) Dril-Quip wellhead equipment will be used (Dril-Quip engineer to be on board).

5) Inspect 30/20" float shoe for proper operation and absence of junk inside the shoe joint.

- 18 3/4" and 30" wellhead will have anti-rotation tabs.

  Note: The 18 3/4" wellhead will be run with the 13 3/8" casing.

- Paint the 30" shoe and the 18 3/4" wellhead extension white.
- Clean and inspect 30" connectors.
- Paint the top 5m of the 30" wellhead with white bands at 1m apart. Number these bands to show distance from the top of wellhead.
- Measure and tally casing.
- Ensure pipe tally is checked independently by at least two people.

6) Measure PGB dimensions. Complete PGB Detail Form and fax to Shore base office.

7) Ensure tide tables are available.

8) Install PGB in moonpool. PGBs will have l0ft removable posts. Check that the length will not interfere with the base of the BOP telescoping posts. Paint guideposts with numbering rings at the top with black paint.

9) Attach shear out assemblies to stop plates at bottom of posts. Use 10000 lb shear pins. Attach shear out caps to end of guidelines as required.

10) Attach strops (made from geolograph wire) around guidelines at 1 m from the post base and tape around post. This is to facilitate the ROV in pulling out the guidelines from the posts if the guidelines are not properly cut (in the event the well is suspended).

11) Check Regan slope indicators (5 deg unit) are giving the correct reading - put two indicators side by side and observe angles are similar. Install first slope indicator on PGB between SSTV guide wires. Install second slope indicator on the opposite side.

PGBs should have two prefabricated trays at 180 deg made for this.

12) If sea conditions permit, makeup and hang off 30" casing into PGB.

- Carry out JSA.
- Make up 30" wellhead running tool to 1 stand of HWDP and rack back.
- 30" casing will consist of: Wellhead, Cross-over joint, Intermediate and shoe joint as per diagram.
- 2 sets of 30" elevators will be required to run the 30" casing.
- Skid back PGB and cover wellhead.

13) Make up circulating head to a single of HWDP and lay out.

14) Make up 18 3/4" wellhead hang off tool and rack back.

15) As soon as practical, jump ROV to inspect seabed. This may have to be done with pipe in the water if guidance is required.

Note: If visibility is poor or high currents are present, advise Drilling Superintendent. Consideration will be given to running a TGB

16) Ensure a TGB is available on board for contingency purposes.

17) Makeup 18 3/4" wellhead R/T(with DP pup as required) into 18 3/4" wellhead.

18) Pick up BHA as required.

3. DRILLING 36in HOLE

A) Potential Hazards

- Ledges that can prevent casing entry.
- Locating hole due to poor visibility
- PGB inclination/excessive wellhead wear

B) General Operating Practices

1) The hole will be flushed with seawater at the seabed to clear away any build-up of suspended gel. This will allow better visibility of the hole for casing entry.

2) Two hole markers are to be placed prior to POH.

3) To minimise the difficulty in finding the hole, the ROV is to take a fix on the hole and markers and to remain stationary on bottom until the casing is stabbed in. This will allow the entry point to be permanently located on the video monitor.

C) Operational Procedures

1) Carry out JSA prior to picking up BHA.

2) Pick up and rack back 5 stands HWDP.

3) RIH with the following BHA:

26" bit	Type IADC 111
9 1/2" Pony Drill Collar	
36" Hole Opener	Security Custom 4 - + Totco ring
1 x 9 1/2" Drill Collar	
36" Stabiliser	Welded blade
3 x 9 1/2" Drill Collars	
Crossover	7 5/8" Reg Pin x 6 5/8" Reg Box.
3 x 8" Drill collars	
Crossover	6 5/8" Reg Pin x 4 1/2" IF Box.
HWDP	

3) Paint bit and hole-opener white.

4) Paint white mark on drill collar to denote TD of 36" hole. This will allow confirmation of TD with the ROV.

Note: The 30" casing is to be landed on bottom. Maximum stick-up for the 30" wellhead is 2.0m.

5) With pumps just ticking over, tag seabed and note water depth. ROV to observe (note if any currents).

6) Check if string is vertical in moonpool.

Spud well at slack current conditions.

- Spud well with 500 gpm, 50-60 rpm, 3-5000lb WOB and drill with low parameters for the first 5-10m or until firmed up.
- Thereafter use 1000-1100gpm, 50-l00rpm, 0-l0000lb WOB.
- At hard bands, do not increase WOB (to prevent ledging). Reduce flowrate to minimise hole washout.
- The seawater should be treated with Noxygen and the pipe slugged with Amitec when POH. Refer to mud programme for details.
- Sweep hole with 50bbl Hi-Vis pill every 5-l0m depending on ROP. Spot 100 bbl Hi-Vis pill at connection.

7) Drill to required TD. Circulate out 100bbl Hi-Vis pill. Make wiper trip. Do not pull bit above seabed. RILI to TD.

8) At TD circulate out a 100 bbl Hi-Vis pill and spot 2O0bbl prehydrated gel.

9) Drop Totco survey prior to POH.

- If gel cover obscures hole, POH to 1m below seabed. Circulate with seawater for 2-3 min. to flush away the gel above the hole and allow better visibility during casing entry.
- Prior to POH, the ROV is to position 2 hole markers 2-3m from the hole - diagonally opposite each other.
- The ROV is to confirm the white mark on drillcollar if visibility allows.
- The ROV is also to obtain a location fix of the hole relative to the markers and to remain on bottom. This will allow the hole to be permanently located on the video monitor.
- The ROV should attempt to catch a small sample of drill cuttings from seabed for geological studies.

10) Check and grade bit/holeopener.

4. RUNNING/CEMENTING 30" CASING

1) Skid PGB/casing to underneath rotary table.

2) Run two singles of drill-pipe below the running tool.

3) Makeup running tool to wellhead

4) Pick PGB up off beams. Note the slope indicator readings.

5) Run the casing on HWDP. Fill the casing at the splash zone with seawater using the top drive.

6) Stroke out motion compensator before casing enters the hole.

   - ROV should already be on bottom to observe entry.

7) Land casing on bottom and slack off casing weight. Compensate running string.

   Note:If slope indicator reading is more than 1.0 degrees, attempt to decrease angle by picking up casing or moving rig as appropriate. If angle is still more than 1.0 degrees consult with Shore Base.

8) Mark pipe at rotary. ROV to check height of wellhead above seabed and PGB orientation. Record distance to top of wellhead.

9) Ensure all guidelines are in tension.

10) Rig up cement hose. Pump 50 bbl seawater. Pressure test lines. Mix and pump cement in accordance with the Drilling Programme and final laboratory tests from Halliburton.

   - Cement slurry samples are to be collected during the cement job.
   - Casing setting depth must be held constant during cementing. If mark on pipe at rotary starts to float up, slack off weight to maintain position. Allow for tide movement.
   - Displace cement to within 5m of the shoe. Observe cement returns with ROV.

   Note:Do not stop pumping cement until calculated volume has been pumped even if cement is observed at the seabed.

11) When cement is in place, check for backflow. If float shoe does not hold attempt to rock float. If unsuccessful, displace any excess bleed back. Hold pressure until cement sets.

12) Check slope indicator. If angle is more than 1.0 degree, hold casing tension to decrease angle and hold until cement sets.

13) Release running tool. POH. Strap out for exact distance to wellhead. Layout running tool.

14) Set tide marker.

15) Complete the casing/cementing report and forward to Shore base.

16) On Daily Drilling Report, state if cement returns were visible, PGB angle and wellhead stickup.

5. DRILLING 17 1/2" HOLE

A) Well Design Considerations

This section will be drilled riserless. Returns will be to the seabed.

B) Operations Procedures

1) RIH with the following 17 1/2" BHA:

17 1/2" Bit IADC 115
2 x 9 1/2" Drill Collars
17 1/2" Stabiliser
3 x 9 1/2" Drill Collars
Cross-over
9 x 8" Drill Collars
Drilling Jar
2 x 8" Drill Collars
Crossover
15 x HWDP
Run corrosion coupon in first/second stand of drill-pipe.
Recommended Drilling Parameters:
WOB: 5000 lb
RPM: 30 (Surface)
Flow Rate: 1100 - 1200 gpm

2) Tag cement with pumps on and drill out shoetrack.

Note: Whether or not full returns are obtained, corrosion inhibition should be maintained. The seawater or mud should be treated with Noxygen and the pipe slugged when POH.

3) Drill ahead with 50bbl HI-Vis pills each half stand or stand down depending on ROP. Ream connections as necessary. Spot 50-7Sbbl Hi-Vis pill on connections.

4) Drill 17 1/2" hole to 875m +/- section TD (l0m rathole for casing).

5) Circulate the well clean with 100bbl Hi-vis pill.

6) Displace the hole to prehydrated gel.

7) POH and strap out.

8) Rig up and run casing

6. RUNNING/CEMENTING 13 3/8" CASING

1) Pre - casing running checks:

- Casing laid out, numbered, tallied, drifted, threads inspected. Check ID of casing (every 5 joints) to obtain average ID for displacement calculations.

  Note: the 13 3/8" casing will be run below the 18 3/4" housing.

- Ensure pipe tally is checked independently by at least 2 people.
- HWDP landing string drifted to 2.625in on last trip out.
- Running tool, plug launch mandrel and single of S135 DP to be drifted to 2.625in.
- Space out plugs below the RT/housing to ensure within the 13 3/8" casing.
- Attach centraliser in between two stop collars at mid-joint.
- Ensure adequate pit volume is available for mud returns while running casing/cementing.
- Run 1 threadlocked joint between float shoe/collar joint. Threadlock up to float collar connection. Check float collar and float shoe are functional.

2) Carry out JSA prior to running casing.

- The 350T side door elevator will be used to run the entire 13 3/8" casing string.
- Hand slips to be used for the entire string.
- Note that the link tilt needs to be attached to the casing bails for ease of handling the casing.
- Rig up packer fill up/circulating device (if needed).
- Run shoe joint. Fill with mud to check floats.
- Run float collar joint. Fill with mud to check floats.
- Casing to be filled every joint as it is run in the hole.
- Pit volume to be monitored while running casing.

Note: Makeup last 4 joints to maximum possible torque to minimise casing backing out during casing cutting at P/A.

3) After running casing, makeup to 18 3/4" housing and RIH with HWDP.

4) After making up top drive cement head, land casing with motion compensator supporting all but 5-10,000 lb of landing string weight. Check index measurement.

5) Break circulation. Circulate l00bbl seawater or mud (dependent on losses). Do not exceed 800psi or 10bbl/min.

6) Pressure test lines. Pump 20 bbl drillwater.

7) Drop ball and shear out bottom plug with +/- 1200psi.

8) Mix and pump cement in accordance with the Drilling Programme and final laboratory tests from Halliburton.

   - Collect cement slurry samples while mixing cement.
   - Leave 2bbl of cement on top of rubber plugs to allow for ease of drilling out.

9) Drop dart and shear out top plug with +/- 2500psi with total of 10bbl seawater. Slow pumps down to 1bbl/min to observe shear out. Rig pumps to displace remaining volume of seawater.

10) Slow down pumps prior to bumping. Bump plug to l000psi over final slow pump pressure. Hold for 5mins. If plug does not bump, pump extra volume equal to half the shoetrack volume.

11) Bleed back and check for flow.

12) Run BOPs in accordance with Sedco procedure and pressure test to the pressures specified in the Drilling Programme.

13) Complete the casing/cementing report and forward to the Shore base. Report final circulating pressure, percentage returns and estimated TOC.

7. DRILLING 12 1/4" HOLE

A) Well Design Considerations

The 12 1/4" hole will be drilled to 1777m total depth. A PDC bit will be used.

9 5/8" casing will be run if required for production testing.

The mud weight should be maintained as low as possible. Normal formation pressures are expected. Mud losses may occur in the Eastern View Coal Measures and lcm will be available if needed. The Demons Bluff formation contains a relatively reactive and dispersive claystone. The main objectiveA KCL/PHPA mud will be used.

B) General Operating Practices

1) Hard shut in technique to be used for well control.

2) Wiper trips to be made as needed.

3) Ream connections as required.

4) SCRs - to be taken at start of shift, change of mud weight, change of bit nozzles/BHA, extended length drilled.

5) Flow checks - Do prior to POH, hole fill/gain has deviated, when in doubt, when bit is inside shoe, before HWDP enters BOP.

6) A complete mud check is to be taken twice a day.

7) The torque limiter is to be set to the maximum level to allow for maximum torsional energy to be transmitted. This is particularly critical with PDC bits for maximising ROP.

8) Check fishing grapples are available for all tools run.

C) Operational Procedures

1) RIH with the following 12 1/4" BHA:

12 1/4" PDC Bit
8" Monel
1 x 8" Drill Collars
9 x 8" Drill Collars
Drilling Jar
2 x 8" Drill Collars
Crossover
15 x HWDP
Run corrosion coupon

1) Drill cement with seawater.

2) Drill to shoe. Displace to mud.

3) Cleanout rathole.

4) Drill 3m of new hole. Circulate until mud is sufficiently balanced.

5) Perform LOT (expected 1.6sg MWE +/-). Record SCRs.

6) Drill ahead. Do not use high RPMs until all of roller reamers are below the shoe.

7) Ream connections as necessary.

8) Drill to 12 1/4" section TD at 1777m +/- (l0m rathole for casing).

9) Circulate bottoms up.

10) Run Logs.

11) Run 9 5/8" casing for testing or plug and abandon as directed.

8. RUNNING/CEMENTING 9 5/8" CASING (IF REQUIRED FOR TESTING)

1) Pre - casing running checks:

- Casing laid out, numbered, tallied, drifted, threads inspected. Check ID of casing (every 5 joints) to obtain average ID for displacement calculations.
- Ensure pipe tally is checked independently by at least 2 people.
- HWDP landing string drifted to 2.625in on last trip out.
- Running tool, plug launch mandrel and single of S135 DP to be drifted to 2.625in.
- The casing hanger lock ring is to be left in.
- The float shoe joint will be sent to rig with a pre-installed solid aluminium centraliser. Only I centraliser will be run.
- Ensure adequate pit volume is available for mud returns while running casing/cementing.
- Run 1 threadlocked joint between float shoe/collar joint. Threadlock up to float collar connection. Check float collar and float shoe are functional.

2) Carry out JSA prior to running casing.

- The 350T side door elevator will be used to run the entire casing string.
- Hand slips to be used for the entire string.
- Rig up Tam packer fill up/circulating device (if supplied).
- Run shoe joint. Fill with mud to check floats.
- Run float collar joint. Fill with mud to check floats.
- Casing to be filled every joint as it is run in the hole.
- Pit volume to be monitored while running casing. Run casing as fast as possible without inducing losses (check surge pressures).

Note: Makeup last 6 joints to maximum possible torque to minimise casing backing out during casing cutting at P/A.

3) After running casing make up hanger with wellhead spacer and RIH with HWDP.

4) After making up top drive cement head, land casing with motion compensator supporting all but 5-10,000 lb of landing string. Check index measurement.

5) Break circulation - circulate casing volume. Do not exceed 800psi or 10bbl/min.

6) Pressure test lines. Pump 20 bbl drillwater.

6) Drop ball and shear out bottom plug with +/- l200psi.

7) Mix and pump cement in accordance with the Drilling Programme and final laboratory tests from Halliburton.

   - Collect cement slurry samples during mixing.
   - Leave 1 -2bbl cement above rubber plugs to allow for ease of drilling out the rubber plugs.

8) Drop dart and shear out top plug with +/- 2500psi with total of 10bbl seawater. Slow pumps down to 1bbl/min to observe shear out. Rig pumps to displace remaining volume of seawater.

9) Slow down pumps prior to bumping. Bump plug to l000psi over final slow pump pressure. Hold for 5mins. If plug does not bump, pump extra volume equal to half the shoetrack volume.

10) Bleed back and check for flow.

11) Set seal assembly

12) Pressure test seal assembly to the pressure specified in the Drilling Programme.

13) RIH and set 9 5/8" wear bushing.

14) Pressure BOPs to the pressures specified in the Drilling Programme.

15) Complete the casing/cementing report and forward to Shore base. Report final circulating pressure, percentage returns and estimated TOC.

9. WELL ABANDONMENT PROGRAMME

Actual plug depths will be advised after logs have been evaluated.

1. RIH with OEDP with stinger to xxxxm. Circulate bottoms up. Spot 8 cu.m (50 bbl) hi-vis pill.

2. Pull back to xxxxm and set cement plug across casing shoe from xxxx - xxxxm with Class G cement at 1.92 sg.

3. Pull back above toc and circulate clean. WOC. Tag plug with 5000kg and pressure test to 2500 psi.

4. Cut and recover 9 5/8" (if run) at xxxm.

5. Mix and pump surface cement plug from xxx - xxxm.

6. Pull BOPs.

7. Cut and recover 18 3/4"and 30" wellheads and PGB.

8. Conduct seabed survey with ROV.

10 DRILLING PROBLEMS

10.1 Hole Problems

Hole problems most likely to be encountered are:

(a) Mud rings, balling of stabilisers, DC assembly and bit, when drilling long shale sections.

(b) Unstable hole, due to sloughing or spalling clays/shales causing caving.

(c) Wallsticking and losses due to high mud weight, sticking due to key-seats, hole bridging or packing off.

10.1.1 Troublesome Formations

These formations may contain large proportions of claystones and unconsolidated clays and shales. When coming into contact with water, these "GUMBO" clays swell and slough into the hole. To minimise this sloughing, mud weights can sometimes be used which are high enough to counteract this effect.

The hydration and subsequent swelling of Gumbo clays will be reduced and retarded by the use of inhibitive drilling fluids.

- potassium/sodium chloride: restrict hydration;
- polymers, polyacrylamides: encapsulation of clay particles.

Older shales can have a more brittle nature and are often subjected to mechanical stresses and overpressures, causing spalling which results in caving of the hole. This type of hole instability can be prevented by a high mud gradient and low fluid loss of the mud.

The importance of solids control in these parts of the hole cannot be over-emphasised, and therefore all available solids removal equipment (shakers, desanders, desilters and centrifuges) should be used and be maintained at maximum efficiency. Smallest possible screen sizes should be used on shakers, without incurring excessive mud losses because of screen flooding.

The mud viscosity depends on the number and size (surface area) of suspended particles. Bentonite clays hydrate very easily, resulting in an increased surface area and inter-action between particles, and thus in a rapid increase of the viscosity. The ultimate effect of the particle interaction is the recombination into conglomerates – "mud rings". Therefore, the following points should be noted when drilling/working through these sections of the hole:

1. Obtain maximum annular velocities by using maximum possible circulating rates, combined with optimum lifting capacity of the mud and optimum flow profile.

2. SAPP can be effective in breaking these rings.

3. Increase the frequency of checktrips. Drill with reduced RPM if conditions permit.

4. When reaming large intervals, use minimum practical number of drillcollars and use minimum stabilisers.

5. If necessary, restrict the penetration rate in order to limit the generation of solids, to such a rate that the solids can be efficiently removed.

6. Allow adequate circulation time to clean the hole prior to pulling out for a round trip

7. Always shut down the pumps slowly and gradually, to avoid aggravating hole problems.

8. If problems are experienced with severe gas cutting (or trip gas), especially in case of deep holes and small size drill strings, it may be necessary to circulate bottoms up after a round trip prior to drilling ahead. This avoids confusion in determining the difference between trip and influx gas.

10.1.2 Tight Hole

Usually the causes or contributing factors can be recognised as follows:

1. Drilling through long sensitive shale sections.

2. Mud properties not up to standard, ie. shale inhibition, water loss, density, lubricity, rheology and lifting capacity, etc.

3. Insufficient annular velocity and insufficient circulating times to effect optimum hole cleaning and/or optimum mud conditioning and treatment.

4. Insufficient solids removal in the mechanical mud treating equipment, ie. shakers, desanders, desilters, etc.

5. Insufficient attention to mounting problems.

10.1.3 Causes and Discussion

The causes may be: insufficient inhibition - mud weight - lubricity - or hole cleaning. All these factors are important parameters, and comparison should be made between wells without any problems and which parameters were changed leading to the deterioration of the hole.

Tight hole problems start in most cases whilst coming out of the hole. It occurs sometimes where fresh hole has been drilled, or formations above reacting to changing hole conditions. Constant or spot-like overpull is experienced in excess of the normal when coming out of the hole.

The overpull could be the result of balling up of stabilisers and drillcollars by formation not removed, or from squeezing formations.

It is important to realise that this situation could lead to stuck pipe. To prevent this, the Drilling Supervisor should make certain that free movement, rotation and circulation is maintained at all times.

Ensure that the hole below, when pulling out (or above when running in), is in a good shape so as to be able to go back there to regain rotation and/or circulation.

Balling up of drillcollars and stabilisers under continued high overpulls results in loss of circulation, swabbing and finally sticking the string. In such circumstances, run back to a good part of the hole, condition the mud, add lubricants and maybe weight up the mud.

Try again to pull out (or run it) if it is decided that nothing more can be done.

It is not possible to lay down hard rules, which will successfully cover the wide variety of sensitive areas.

The following standing instructions should be adhered to at all times:

1. Establish normal drag, up and down, prior to and whilst tripping.

2. DO NOT continually overpull unless in spots only. In case the overpull is continuous and/or increasing immediately, install the kelly, circulate and REAM DOWN a few singles first. Condition the mud and strongly consider adding lubrication to the system. Try again to come out of the hole and do not hesitate to wait too long before installing the key and rotate/circulate out of the hole single by single.

3. Ensure free movement of the string below the tight hole area at all times.

4. Contact Sydney Office if no improvement can be achieved when trying to pull out again.

   Raising the mud weight over and above the weight normally used in the area is a last remedy to apply and should be confirmed by Sydney Office.

10.1.4 Stuck Pipe

General

Most stuck pipe problems not mentioned above can be attributed to differential pressure sticking, or what is more commonly referred to as "wall sticking". The primary indication of wall sticking is very obvious, i.e. the pipe sticks while motionless and thereafter cannot be rotated, and while full circulation at normal pump pressure can be maintained. Generally, these conditions occur while making connections or during a trip. It should be noted at this point that no drilled hole is absolutely vertical. This being the case, exerting a tremendous pulling force on the drill string would tend to align the pipe vertically and introduce the possibility of causing sticking above the original stuck point.

This sticking can take place in any interval where the hole is deviated even a small amount from the vertical. This is the reason to stick to the standard order pull slowly even when the hole is in good shape. Many preventive measures can be taken to minimise wall sticking.

The possibility of wall sticking is lessened by altering mud properties: decreasing the mud weight to lower the differential pressure is one method, but this is not always possible. Another method is by lessening the contact area between the pipe and wall cake. This depends upon cake thickness. For this reason, low filtration rates and minimum solids concentration are desirable. Materials that reduce the friction factor between the pipe and mud solids are also of value in minimising wall stuck pipe. Chemical oil emulsion muds, extreme pressure lubricants (bit lube) and detergents are all beneficial.

10.1.5 Methods of Freeing Stuck Pipe

In spite of all precautions, stuck pipe still occurs. The problem then is to free the pipe or fish by one of several methods:

1. Working it loose, washing over, connecting over shot.

2. Reduction of hydrostatic pressure by spotting a column of fluid lighter than the mud in use, such as water or oil.

3. Application of a drill-stem test tool. In the case of a full string in the hole, pipe must be backed of f first. The test tool is run in with open ended drill pipe below it. The string is latched on and when the DST tool is opened, the differential pressure is relieved, freeing the pipe.

4. Spotting of various fluids around the pipe, such as oil or oil base mud, invert oil muds, saturated salt water, acid, and special surface liquids (PIPELAX) added to crude oil, or diesel oil. For weighted mud, PIPELAX can be mixed with oil base muds corresponding to the weight of the mud in the hole. This would prevent the tendency of a short fluid column of less density floating up through the heavier drilling fluid.

After the fluid is spotted, the pipe must be worked. The best method is to put the pipe under compression by slacking off 4.5 Tonne (10,000 lbs). below the weight of the pipe and then applying torque by turning the string at drill floor ½ turn per 30Cm (1 ,000ft). Release torque and pick up the 4.5 Tonne (10,000 lbs). Repeat this cycle as necessary.

Most of the time, the pipe will come free on the compression cycle. It should be pointed out that working the string in tension or hoisting with over pull, the indicated weight of the string could cause the pipe to become stuck further up the hole due to wall sticking, key seat or dog legs.

1. Have mud in good shape.

2. Pull slowly out of the hole.

3. Reciprocate string continuously.

4. Do not circulate at one spot.

4. Prepare to make connections as fast as possible.

10.1.6 Drill String Back-off Procedure Job Preparation

Job Preparation

1. String should be worked as long as possible prior to rigging up to prevent the stuck point from moving up.

2. Obtain the following data:

    (a) Weight of string before sticking, as read on Martin Decker weight indicator (check if weight of kelly was included in this reading or not).

    (b) I.D., O.D. and weight of drill pipe or tubing (thread coupled).

    (c) I.D., O.D. and weight of drill collars.

    (d) Hole data: bit size, total depth, casing size and weight, depth of casing shoe.

    (e) Depth of drill pipe, drill collars, drilling bit.

    (f) Depth of jar, safety joint, overshot. Check if I.D. is smaller than I.D. of pipe.

    (g) Hole deviation.

3. Make a sketch of the string showing the above information.

    5. Establish back-off depth based on Free-Point indicator measurements on or stretch test.

    6. Calculate required left hand torque and pull:

LEFT HAND TORQUE:

Back-off Depth		**Turns per 300m(1 ,000ft)**
Drill Pipe: From	0 - 1 ,220m (0-4,000ft)	1/4 - ¾
	1,220 - 2,745m (4,000-9,000ft)	**1/21**

	over	2,745m (9,000ft)	3/4 – 1
Tubing: From		0 - 1 ,830m (0-6,000ft)	½ - ¾
	over	1,830 m (6,000ft)	3/4 – 1

PULL:

Hook load to be applied is equal to Martin Decker reading prior to sticking (2a) minus
buoyant weight of fish to be left in hole.

If Martin Decker reading is not available, the hook load to be applied is calculated as the buoyant weight of the pipe from the surface to back-off depth.

6. Check that tong and slip dies are sharp and of correct size to hold pipe

7. If tongs are used to apply torque, check that snub or dead lines and jerk lines are in good condition, snub or dead lines should be double checked.

   NB: NEVER REMOVE SNUB OR DEAD LINES

8. Tighten tool joints (especially for tubing), giving 30% more right hand torque than in the left hand torque calculated at step 5 (if not done previously).

   Method for applying torque with slips:

   (a) Make pull equal to value found in Step 5.

   (b) Set pipe in slips.

   (c) Tie slip handles with soft line.

   (d) Apply required right hand torque.

   (e) Let torque come out, counting number of turns.
   (f) Repeat, applying torque until all torque which has been put in comes out
   again.

   Note: This method in practice does not allow the right hand torque to be transferred to the stuck-point. Consultation with Sydney Office is advised if the corrèct procedure for transferral is unfamiliar.

9. Lock hook and elevators on travelling block.

10. Ascertain that mud level in pipe is not considerably lower than level in

annulus.

11. Select proper sling for attaching upper sheave (equal to twice the breaking strength of the cable). Hoist upper sheave in derrick and attach with sling to derrick structure. Do not hand sheave on travelling block or on sandline.

10.1.7 Preparation of the String

(To be done immediately before running back-off shot in the hole).

1. Pull on pipe with value calculated in point 5.

2. Set pipe in slips. Lower travelling block until elevators are well clear of tooljoint (leave elevators closed around drillpipe).

3. Tie slip handles together with piece of soft line.

4. **Apply left hand torque: number of turns as calculated in point 5.**

5. Release torque slowly and count how many turns come out.

6. If fewer turns come out than have been put in, repeat steps 4 and 5 until number of turns coming out = number of turns put in.

7. Re-apply left hand torque as in Step 4 and hold with rotary lock (or tongs).

10.1.8 Back-off Operation

1. Position back-off shot opposite collar by using CCL.

2. Check that derrick-floor is cleared of all personnel.

3. Fire back-off shot.

4. After detonation of the string shot, the connection is often found to have spun completely free. In some cases, however, the connection may only have partially back-off. To complete the back-off:

   (a) Apply up to half the original left hand torque used, noting the ammeter or rotary torque gauge for indications of back-off. If back-off is indicated, continue until complete.

   (b) If the torque is not lost, it is usually an indication that the hook load is incorrect. Correct this by applying half the original left hand torque with the rotary and holding it with the rig tongs. Pull the slips and adjust the hook load. When the load is correct, the torque will be released.

5. Pull up pipe a few feet to confirm that the pipe is free. Make certain that no residual torque remains when pipe is picked up. The CCL may be used to

check that the string has backedoff at the desired point.

If the back-off is not successful, the string shot may be increased by 2-3 strands of primer cord over the Electric Loggers recommended charge for a second attempt.

10.2 Lost Circulation

10.2.1 General

Lost circulation or lost returns may be defined as the loss of whole mud to the formation. The loss may vary from seepage of a few bblslhour to complete loss of returns. Lost circulation occurs when the pressure of the mud column exceeds the formation pressure. A properly planned casing program and good drilling practices can reduce the occurrence of lost circulation.

(a) Unconsolidated, Coarsely Permeable Formations

Unconsolidated formations of sand or pea gravel are usually found close to the surface, but may be found at any depth. Normally these are drilled (sometimes without returns) and cased off without difficulty. Controlled drilling rates may minimise this type of loss in larger holes.

(b) Cavernous and Vugular Formations

Cavernous or honeycombed zones are normally found in limestone and dolomite formations. This type of loss is usually predictable in a given area because it occurs in definite formations which are easily traceable. In this type of loss, abnormally rough drilling may precede the loss, and the bit may drop from a few inches to several feet. Returns will usually cease suddenly and completely. This type of loss is the most difficult to cure. Blind drilling usually is the most feasible solution if it can be done safely, although foam and air drilling have been applied.

(c) Fissures and/or Fractures

Any type of rock may have natural fractures. Fractures may be the result of jointing, fissuring or faulting. Loss in this type formation requires a bridging agent to seal the fractures.

(d) Mechanically induced Fractures

A formation (normally a shale zone) which did not have a loss of circulation when penetrated may have fractures induced during drilling operations. Excess pressure may break down these weakened zones already drilled and cause loss of circulation. Excess pressures can result from solids build-up from fast penetration rates, turbulent annular velocities, spudding the bit while circulating, pressuring up on a mud ring, and fast tripping. The loss is usually sudden and complete. Induced fractures should be suspected if the same interval has been drilled in offset wells without loss.

10.2.2 Procedure for Lost Circulation Prevention

1. Keep mud density to the minimum required to control pressure plus provide some safety margin. Pressure which will cause lost circulation (fracture pressure) at the shoe is determined through leak off tests.

2. In areas of known lost circulation, keep gel strengths and viscosity to a minimum.

3. Break circulation slowly. To minimise pressure surges, start pump while picking up pipe and rotating. N.B. especially after trip.

4. Use reduced pump pressure when drilling through known lost circulation zones in order to reduce bit pressure drop or utilise larger nozzles to reduce bit pressure drop.

5. Time drill known lost circulation zones to prevent loading the annulus with excess cuttings.

6. Avoid excess trips through lost circulation zones.

7. Avoid fast tripping.

8. Avoid pre-treating with lost circulation materials when possible. An LCM pill is often all that is required, and If properly spotted, will be just as effective as treating the whole system, while having the added advantage of keeping mechanical solids control equipment operable.

9. Drill with no returns through lost circulation zone when possible before treating for lost circulation, as the high cost of lost circulation treatments, coupled with bridging characteristics of materials and heating characteristics of formations make consolidation of all losses economically and operationally desirable. Drilling ‘blind” should only be carried out with approval of Drilling Manager.

10.2.3 Lost Circulation Whilst Drilling

The following procedure should be followed when surface losses become apparent:

(a) Check all surface equipment for open valves (HCR) on flare line etc.

(b) Slow pump rate to see if circulation returns.

(c) Determine actual losses at specific pump rates.

(d) Reduce mud weights if possible.

Notes

1. Minimise pressure surges by careful down-hole drill string handling. This can often reduce lost circulation problems.

2. Leave out stabilisers, in order to avoid swabbing out LCM pills when moving the pipe, if it is anticipated that these pills will have to be spotted.

3. It is usual practice to leave the jets out of bits if LCM spotting is anticipated.

10.2.4 Locating Loss Zones

Successful treatment of lost circulation depends upon accurately locating the interval in which fluids are lost. Unless caverns are encountered, most losses will be found above the bottom of the hole and may, in fact, be at or just below the bottom of the last casing shoe. Loss of time and materials will result if the loss zone is not located, especially if any type of plugs are to be set. Various methods are available, eg temperature surveys, and will be advised from main office.

10.2.5 Lost Circulation Materials

Two types of plugging materials are available:

(a) Non-acid soluble plugging materials:

eg. Mica, Mudfibre, Cellophane, Walnut shells, Peat.
These materials are suitable for combating mud losses in a non-productive formation. Many of these are available in various grinds for the differing applications.

(b) Acid soluble plugging materials:

eg. Calcium carbonate.
Above materials are usually applied to cure losses in productive zones, but should be treated with care.

10.2.6 Types of Losses and Procedure for Treatment

1. Light (Seepage) Losses

This is usually 0.5 to 3 barrels per hour loss indicated when flow does not return immediately after connections. The first step to cure would be to pull up and wait or to drill ahead with partial returns if the next casing point is coming up. Attempts to cure with flakes of cellophane or mica can help. "Kwikseal" or a similar product at 10-30 lb/bbl is effective. Any good water loss control agent will help as an effective filter cake should be built quite quickly.

2. Moderate Losses

These are indicated by~ drop in pit level. Mica fine (20 lb/bbl) with a nutplug medium to coarse (10-20 lb/bbl) to begin building the bridging material is effective. Squeezing by applying backpressure is effective and usually a good filter cake building mud will remedy the situation. The concentrations of the various products used is usually determined on site by factors such as pumpability and screen blinding.

3. **Complete Losses**

This is indicated by total loss of flow in flowline and immediate drop in pit level. Pump pressure will usually drop also. Many methods are available to overcome the problem. If LCM additions cannot control the losses, then more drastic procedures are required.

(a) "Flochek" Procedure

1. General

Halliburtons product, "Flochek', has been used successfully in Australian land operations.

Rig up cement pump truck and rig pumps to the floor using a "te&" manifold. The success of the operation depends on being able to alternate easily and quickly between rig and cement truck. The pump truck should be tied in to two storage tanks of at least 50 bbls each, and a fresh water supply to the unit supplied. A cutting blade is required to mix chemicals into the storage tanks.

The following is a typical treatment and may have to be repeated several times.

2. Solution Preparation - note: adequate fluid is prepared to allow for tank residual

SOLUTION A: Calcium Chloride solution - Mix 1,750 lbs $CaCl_2$ in 50 bbls of fresh water giving a 10% solution. Use rig mud tanks.

SOLUTION B: "Flochek" Solution. Prepare 50 bbls of solution using 25 bbls fresh water and 25 bbls "Flochek A". Use storage tank.

SOLUTION C: Cement Mixwater. Using the other storage tank completely dissolve 78 lbs of THIXSET A in 25 bbls fresh water followed by 40 lbs THIXSET B. Thoroughly mix and recirculate tank to ensure complete dissolution.

3. Procedure

- R.I.H. open ended drill pipe to suspected lost circulation zone: keep accurate check of pipe in hole.

Pump 20 bbls of Solution A;
Pump 10 bbls of fresh water;
Pump 20 bbls of Solution B;
Pump 10 bbls of fresh water;
Pump 20 bbls of Solution A;
Pump 10 bbls of fresh water;
Pump 20 bbls of Solution B;
Pump 10 bbls of fresh water.

Mix and pump 30 bbls of cement slurry

- 130 sx (94 lbs) neat Class "A" + 19.5 bbls SOLUTION C.

SlurryWt	14.8 ppg
Yield	1.32 ft/sk
Water Requirement	6.3 gal/sk

Displace cement to give balanced cement plug.

Pull back to top of cement and circulate with mud.

- Backpressure (up to 20psi) can be applied at any time returns are seen provided solution A is past the bottom of the drill pipe.

(b) Diesel Oil - **Bentonite - Cement Squeeze**

DOBC squeezes can be applied to lost circulation problems that cannot be remedied with any of the above. A DOBC slurry is prepared simply by mixing with a jet mixer, approximately 20 sx of cement and 20 sx of gel per 10 bbls of diesel oil. Each 10 bbls of diesel oil prepares 14 bbls of slurry.

Note: All pumping and mixing equipment through which the slurry will pass must be free of water. When displacing the slurry down the drill pipe, the slurry should be immediately preceded by 10 bbls of alcohol followed by 20 bbls of diesel oil and the slurry followed by 10 bbls of alcohol, then 10 bbls of diesel oil. Any slurry left in the bottom of the suction tank should be dumped. If the slurry is allowed to contact water, the bentonite and cement will hydrate and cause the slurry to begin to set.

DOBC squeezes have a number of significant advantages over neat cement squeezes. Rather than setting to a rigid mass, a DOBC slurry forms a tough, plastic-like plug which can deform as drilling proceeds. This reduces the likelihood of re losing circulation from a nonrigid thief zone. With a DOBC squeeze, there is not the danger of the squeeze job failing to seal the lost zone because of mud contamination, although contamination should be avoided.

PROCEDURE FOR PLUGGING LOST CIRCULATION ZONES WITH DIESEL OIL BENTONITE CEMENT SLURRY

(a)If possible, drill without returns through all the lost circulation zone.

(b)If (a) not possible, pull out of hole. Go in hole with open-end drill pipe.

(c)Set bottom of open-end drill pipe approximately 1O-15m (30-Soft) above lost circulation zone and rig up pump truck.

(d)Determine volume required and mix slurry as per above ratios.

(e)Pump in 10 bbls alcohol, then 20 bbls diesel oil ahead of the slurry.

(f)Displace slurry down the drill pipe and follow with 10 bbls of alcohol, then 10 bbls diesel oil.

(g)When the 20 bbls cushion of diesel oil reaches the bottom of the open-end drill pipe, close rams and start **pumping mud into the annulus** with rig pump while the slurry **is being pumped down the drill** pipe. Pumping rates should be controlled so that the ratio of slurry volume to mud is 2 to 1.

(h)Displace one-half the slurry into the formation at a fast pumping rate. The drill pipe may occasionally be reciprocated slowly to watch for any indication that the slurry might be moving up the annulus. If the weight indicator shows any increased drag, break the connections and raise the pipe until it is free. Make connection and continue displacement. Since the slurry has no pumping time limitations inside the pipe, there need be no concern over short shut-down period.

(I)Displace the next quarter of Volume of slurry (and mud) at one-half the rate used in Step)g).

(j)Displace the remaining quarter volume of slurry at a rate of one-half of the rate used in Step (I). Attempt hesitation squeeze in order to obtain a pressure build-up. Approximately 1 bbl of slurry should be left in the drill pipe at the completion of the squeeze. Do not attempt to reverse circulate, because mud will contact the slurry and "gel up" inside the drill pipe.

(k)POH and wait on gelation of minimum of eight hours before drilling out.

(c) **Barite Plug – Pressure**

In normal pressure control, a very critical situation can arise when a well begins kicking and losing circulation at the same time. Increasing the mud density to control the high pressure 'zone will only complicate the problem of lost circulation. When the abnormally-pressured zone lies below the thief zone, barite-plugging can be used to control the well.

An extremely heavy, high water-loss slurry is required for this technique. Bante-settling and deposition will form a solid plug in the open hole, weighing down and sealing off the high pressure zone. In addition, the high filter loss results in rapid dehydration, bridging the hole and further aiding in sealing off the pressured zone. Once a barite plug is in place, normal steps for regaining circulation may be taken with relative safety. Barite plugs weighting from 18-24 ppg may be prepared using barite, fresh water, phosphate (SAPP) and caustic soda.

No viscosifiers are used and **care must be taken to prevent contamination of the slurry** with **mud** because rapid settling of the barite, once it is spotted, is a necessity. The plug should be rapidly pumped, set as close to bottom as possible, and then the drill pipe withdrawn to avoid sticking.

Coarse grind barites are not recommended because they will not stay suspended long enough to spot. Brackish or salt water should not be used because the settling rate is drastically reduced.

A cementing truck should be used to mix the slurry. Barite is mixed with fresh water containing 1 lb/bbl sodium acid pyro-phosphate (SAPP) and 0.2 lb/bbl caustic soda. The lines from the cementing truck can be connected directly to the drill pipe through a plug valve.

To minimise the possibility of stuck pipe, the derrickman should be in the derrick and the elevators ready to come out of the hole immediately after pumping is completed.

Procedure for Setting Plug:

1. Determine how many feet of plug in the open hole is desired. 120-150m (400-500ft) is usually adequate.

2. Choose a slurry density (higher density weights are preferable).

3. Calculate bbls of slurry required and add 20 bbls.

4. Calculate amounts of barite, phosphate, caustic soda and fresh water needed.

S. Batch mix the slurry to an even consistency and pump it down the drill pipe. (Spot close to bottom and be ready to come out quickly).

6. Underdisplace by 5 bbls with mud.

7. Immediately pull up above the plug. Circulate until gas dissipates. Proceed with normal operations.

The Following Seven Points are Important

1. Too heavy a slurry will prevent bridging from occurring.

2. A minimum of 6 bpm rate down the drill pipe must be maintained during mixing or displacement or the barite will settle out in the drill pipe and can plug the bit.

3. The SAPP/water ratio is critical to obtain the best fluid loss for bridging.

4. You must use fresh water and the system should have a pH of 9.

5. A back pressure should be maintained during placement and stripping up out of the plug or more gas can enter the well bore and destroy the effectiveness of the plug.

6. Bulk barite is preferred so that 40 or more sacks can be mixed per minute.

7. A barite plug should not be followed immediately with cement. Firstly, see if it is effective and then run the cement.

Note: Constant consultation with Sydney Office would be required in this operation.

10.3 Fishing

10.3.1 General Practices

The standard fishing assembly is as follows:

OVERSHOT-JARS-DCs-ACCELERATOR-HWDP-DP-KELLY

The amount of D.C. run depends on what is left in the hole and what is available on the rig. To get maximum effect from jarring, however, the same amount of D.C. as left in the hole should be run on top of the jars.
If insufficient drillcollars are available, an Accelerator can be run on top of the drillcollars. The number of drill collars can then be substantially reduced - check with Sydney Office.

Do not run a safety joint. Experience has proven that jarring on a safety joint freezes this tool, and makes the tool useless. Also, it would not be possible to use a stringshot as no left-hand torque could be applied to the string.

The one exception to this rule is when a washover string is run. A full opening safety joint (drive joint made for jarring) is run below the standard fishing assembly so that internal cutters may be run when the washover string sticks and has to be backed off; on top of the W.O.S., a junk sub can be installed. When using a washover string, always use 5 - 10% diesel oil in the mud to reduce friction. When a twist-off occurs and penetration rates are high, circulate the hole clean first before pulling out of the hole.

Prior to connecting to the fish, circulate as required.

Always use a spiral grapple in preference to a basket grapple, whenever possible.

Do not use an overshot with oversize guide when a bent single is used.

If the overshot has engaged the fish and the backlash is out of the string, lower part of the string weight onto the over shot (±40% of fish string weight). Then pick up fish 1.5 to 2.5m (5 to 8ft) and drop string 0.6 to 1.2m (2 to 4ft) and catch it in the brake to make sure of a firm grip. Then POH. If an overshot is run after the fish has been milled over, always run an extension to avoid catching the fish on the milled part.

When fishing in an oversize hole, use a bent single (1 straight single below bent single if required) to facilitate screwing back on.

10.3.2 Jarring

Heavy pulling and jarring must be done with the kelly added to the string. On those rare occasions where this is not possible, the elevator latch should be secured by means of a rope or a chain, provided the tooljoint above the elevator has a square shoulder. Never use an elevator for jarring if the tool joints have an 180 shoulder taper.

Remove the kelly spinner (if externally mounted) if possible, before any jarring with the kelly is done to avoid damage and parts coming loose.

When sustained jarring is carried out, drilling line must be slipped at regular intervals to avoid permanent damage to the wireline at the crossover points. The time interval between slipping depends on the intensity of the jarring.

Regularly check the derrick and lifting equipment for loose bolts, etc.
Prior to jarring, always mark the string position at the rotary table.

The proper jarring method is to allow the jar to trip first with the required overpull before further overpull is applied.

NOTE:The use of 2 jars in tandem gives an additional insurance and increases the frequency of strokes which can be given in a certain time. Never, however, trip the upper jar until it is certain that the lower jar has tripped first. (Bleed some oil from the lower jar at surface to let it trip first.) If in doubt, do not trip any of the jars, but re-set them first.

10.3.3 Use of Junk, Reverse Circulating Junk Baskets

When using junk baskets, it is important to core approximately 15 cms (6) and then pick up the string to allow junk on the side of the basket to fall into the pilot hole, so that it can be recovered when coring is continued. Maximum length of core depends on the size of the basket, but is usually 0.4 - 0.6m (1½ to 2ff). Run a stabiliser on top of the basket to aid in dislodging junk stuck in the wall (undersized baskets only).

Use 1.3-2.7 Tonne (3-6,000 lbs) WOB, 45 RPM and circulate at 250-300 GPM.

If a basket is run, make sure that, after it is made up, the catcher fingers can rotate freely. Also check that the correct size basket is used for the junk in the hole.

10.3.4 Spears

The standard assembly for a spear is as follows:

Spear - Spearstop - Fishing jar (18" stroke) - hydraulic jar - DC - DP - Kelly.

The spear must be equipped with a pack-off rubber when circulation is required. Also a stop-ring or spear stop should be used (spaced as required), which will prevent stabbing too deep and will also make the release easier and prevents re-engaging deeper down. It is also needed to reset the jars. The distance from the stop ring to both 178mm (7") and 244mm (9") spears is 1.2-1 .8m (4-6ft).

When engaging the spear, always make sure that a tooljoint is at a workable distance above the rotary table. This may require using pup joints.

If the spear has to be released and knocking down on the spear does not free it, then install the surface jar (1 .22m - 4 ft stroke) below the kelly and jar down on the spear.

When a tap is used, DO run a safety joint, but leave out the jar.

NOTE: Check the spear stop O.D. when it is run in open hole, and use the stops only if hole conditions permit. Avoid using a full-circle spear. If done anyway, don't use a spear stop.

10.3.5 Lost S.W.S. Bullets

If bullets are lost in the hole, run in with a rockbit and junk sub, rotate and circulate along the places where the bullets were lost to attempt to dislodge the bullets from the wall of the hole. When on bottom, drill a few feet. If no significant torque is encountered, continue as per program.

If drilling indicates that there is junk on bottom, pull out and run a basket to fish for junk.

When it is reported that bullets are lost in the hole after an Electric Logging run and more runs have still to be made, Electric Loggers can do so, provided the guns are not lowered below the spots where bullets were lost.

10.3.6 Fishing Tools - Standard Wellsite Inventory

The following tools should be on site as a minimum.

- Overshots and oversized guides with grapples, baskets and extension subs to catch all sizes of tools in hole.
- Hydraulic jars to match the D.C. string in use.
- Reverse or straight circulating baskets for hole size required.
- Junk subs for required hole sizes.
- Fishing tools to catch any contractors' tools.

Optional are safety joints, tapertaps, accelerators to match jars, bumper and surface jars, casing spears with stop-rings and pack off assemblies.

Have a junk mill on site to match production hole size.

10.4 Drilling Coal

When drilling COAL, the Drilling Supervisor should ensure that the following procedures are followed:

1. Never attempt to drill more than five (5) ft of Coal without circulating. The circulating period does not have to be an extended one, 2 to 3 minutes is adequate. It is merely to give your drilling fluid a chance to move the mass of cuttings up hole. After circulating, slowly pull up above the Coal seam and attempt to run slowly back to bottom. If there is no fill on bottom, drill ahead another 2m (Sft), repeating the procedure and being sure to pull up above the first seam penetrated.

2. When working Coal seams, it is essential that the bit is pulled up so slowly that no swab pressure is exerted on the formation and reamed back to bottom in the same manner so that no surge pressures are created in the well bore. Both surge and swab pressures will cause pressure sensitive seams to slough or, in severe cases, literally explode into the well bore, increasing the problem dramatically.

3. If the Coal seams are stable and it is possible to drill ahead, maintain a close watch on the shale shaker. If the majority of your cuttings are Coal and your penetration rate indicates a formation other than Coal, then a Coal seam has sloughed up hole and Sydney Office should then be notified.

4. Under no circumstances, attempt to pull up through or jar through a Coal seam. The time lost circulating is very inexpensive compared to a fishing job.

5. Back reaming up through a Coal seam should also be viewed as a high risk operation, with the potential of an expensive fishing job being weighted against the cost of circulating for a few hours.

6. Slow trip times while running drill collars and BHA past Coal seams is essential to the stability of the seams.

11 FORMATION INTEGRITY TESTS (FIT)

Purpose

Formation Integrity Tests (FIT) are run to determine the strength of the formation exposed by the well bore and to check the integrity of the cement job. The results are used to calculate; the maximum equivalent mud weight that can be used to safely control formation pressure without losing circulation, maximum allowable casing pressure and kick tolerance.

11.1 Frequency

FIT's will be conducted:

- After drilling 2m of new hole beyond the rat hole below the casing shoe for casing sizes 340mm *(13-3/8")* through to T.D. unless specified otherwise in the Drilling Program.

- At other times, at the discretion of the well management team.

11.2 Casing Pressure Test Procedure

The casing is to be pressure tested as follows:

1. Test before drilling out the cement and shoe track by closing the blind/shear rams and pumping at 1/4 6PM down the choke line with the cement unit.

2. Measure the volume and plot at ¼ bbl increments vs pressure until the required test pressure is reached.

3. Shut down pump and hold pressure until convinced the casing is not leaking.

4. Bleed back and record volume recovered. Should be same as volume pumped.

5. Plot pressure vs volume data and use to establish a minimum volume line for the FIT to follow.

11.3 Formation Integrity Test

- For tests at the casing shoe drill 2m of new formation. Circulate bottoms up to ensure that new formation has been penetrated and that a uniform known mud weight is in the hole.

- Pull bit into the casing to avoid problems with stuck pipe. Do not slug pipe.

- Close the BOP rams and hang off drillpipe.

- Rig up cement unit to pump down the drillpipe and circulate the line to the drill floor with mud. Pressure test the line.

- Choose an appropriate range for the pressure chart recorder. Monitor the pressures and volumes and plot pressure against volume pumped on the FIT data sheet during the FIT.

- Pump down the drillpipe at a constant rate that has been selected so that the slope of the pressure volume plot is parallel to the minimum volume line constructed previously on the FIT data sheet. The pump rate can vary from ¼ bbl/min to 1-½ bbl/min where the filtration rate is high or a larger amount of open hole is exposed.

- The maximum surface pressure should go as high as the predicted fracture gradient for the area and should not exceed the equipment or casing specifications.

- The plot should be a straight line until leak-off when it should curve and flatten out. Pick the lead-off pressure as the last point on the established straight line.

- After a satisfactory FIT has occurred or the estimated fracture pressure has been reached, stop pumping immediately to minimise fracturing and note the instantaneous pressure drop on the graph. Record and plot the pressure every minute for 5 minutes or as necessary to establish stable readings.

- Bleed off the pump pressure and record the bleed-back volume; the volume should approximate the volume pumped.

- Complete the data sheet showing the equivalent mud weight calculations and transmit to operations office.

- Prepare a maximum allowable choke pressure versus mud weight graph and post is at the choke control unit. Take into consideration the pressure drop through the choke line especially if the maximum allowable choke pressure is low. This can be done by using the kill line pressure.

11.4 FIT Calculations

The pressure recorded at leak-off is used to calculate the formation fracture pressure (in terms of equivalent mud weight) as follows:

$$EMW = MW + \frac{\text{Leak-off Pressure}}{\text{Csg. Seat Depth x Conversion Constant}}$$

Example:

Data: 340mm (13-3/8\") casing set at 914m (3000')
TD = 920m (3020')
Mud Wt. = 1.08 SC (9.0 PPG)
Leak-off Pressure = 3795 kPa (550 psi)
Conversion Constant 1.0 SC = 9.81 kPa/m

$$EMW = 1.08\ SG \quad \frac{3795\ kPa}{914m \times 9.81}$$

$$= 1.5\ SG$$

Example:

Data: (Imperial Units) 340mm (13-3/8") casing set at 914m (3000')
TD = 920m (3020')
Mud Wt. = 1.08 SC (9.0 PPG)
Leak-off Pressure = 3795 kPa (550 psi)
Conversion Constant 1.0 PPG = 0.052 psi/ft

$$EMW = 9.0\ PPG + \frac{50psi}{3000' \times .052}$$

$$= 12.5\ PPG$$

APPENDIX A - REPORTING PROCEDURES

APPENDIX A - REPORTING PROCEDURES

1.0 General

Standard format reports will be used for all drilling operations as detailed in this section.

All reporting to the Government and Partners will be done by Globex.

2.0. Drilling and Operations Reports

2.1 Daily Drilling Report (ddr-bar.xls)

The Daily Drilling Report is in Excel format.

Units to be used will be as specified on the report form, nominally 'oilfield units' with depth measurements in metres and mud weights in Specific Gravity.

Reporting will be from midnight to midnight with an update to 0600 hours.

Time analysis should be consistent with the IADC form (any disagreement with the Contractor on time breakdown should be resolved before completion of the IADC form). See also Appendix A for definitions of time allocation.

Bulk stocks to be recorded on this form.

'Personnel on Rig' to reflect number of persons on the Rig site at midnight.

2.2 Afternoon Report (pm-rep.doc)

The Afternoon Report will be a brief update from 0600 hours to 1500 hours.

2.3 Costing (pngcost.xls)

A daily total of drilling costs will be maintained and added to the DDR prior to issue. This will be done in Sydney. An Excel spread sheet has been prepared to track costs. The spread sheet provides a daily, weekly and cumulative summary.

2.4 Operational Instructions (instr.doc)

All instructions to the drilling contractor at the Rig site are to be made in writing so there is no ambiguity as to the Supervisor's requirements. This is particularly important when there is only one Supervisor on site. This format should also be used by the Drilling Superintendent confirming instructions to the Drilling Supervisor.

2.5 Programme Amendment (pgamend.fax)

Departure from the approved Drilling Programme is not permitted without permission from Globex and the MRT (if required). Any amendment will be advised in writing to the Drilling Superintendent for on-passing to the Drilling Supervisor. The amendment may be initiated by KDC or Globex but shall not be acted upon without the written approval of Globex.

2.6 Incident Report (inc-rpt.doc)

All operational incidents (eg stuck pipe, well kicks, tool failure etc) shall be documented as to cause, consequence and action taken together with recommendations for prevention or improvement.

2.7 Rig Weekly Safety Inspection Report

The Drilling Contractor's forms will be used.

2.8 Accident Reporting

The Drilling Contractor's and Globex procedures will be used.

2.9 Drilling Fluids Report

The Drilling Fluids Engineer will provide a Daily Report including materials consumption. He will be responsible for mud stock control and advising the Drilling Supervisor of requirements.

2.10 Casing and Cementing Report (csg-cem.doc)

This report will be used in its entirety in the Well Completion Report.

The Cementing Service Engineer will provide an after job report including materials consumption. He will be responsible for cementing materials and accessories stock control and advising the Drilling Supervisor of requirements.

2.11 Casing Seat Pressure Integrity Test (lot.xls)

This report will be used in its entirety in the Well Completion Report.

2.12 Trip Sheet/Kick Control

The Drilling Contractor's Well Control Procedures will be followed and the Contractor's standard forms will be used.

2.13 Bit Record (bit-rec.doc)

This report will be used in its entirety in the Well Completion Report.

2.14Bottom Hole Assembly Record (bha-rec.doc)

This report will be used in its entirety in the Well Completion Report. A summary of the bha only is required (ie bit - bit sub - 12 1/4" NBS etc) as the DDR will include dimensional data.

2.15 Deviation Record (dev-rec.doc)

This report will be used in its entirety in the Well Completion Report.

2.16 Rental Tools Inventory

Format to be finalised.

2.17 Materials Inventory

Format to be finalised.

GLOBEX FAR EAST
DAILY DRILLING REPORT

WELL:	BARRAMUNDI-1	**DATE:**	
PERMIT:	T/27P	**REPORT #**	
RIG:	SEDCO 702	**D.F.S.**	

DEPTH 2400 Hrs:		STATUS @ 2400 Hrs:					
TVD:		FORMATION:					
24 HR PROGRESS:		LAST CASING:		@		SHOE L.O.T.:	
HOLE SIZE:		**WD (MSL):**		RT - SEABED/MSL:		MAASP:	
SURVEYS:							

MUD PROPERTIES		ADDITIVES
DENSITY(SG)		
VISCOSITY(Secs)		
pH		
PV/YP(cp/lb/100ft2)		
GELS 10/10		
WL API(cc/30min)		
WL HTHP(cc/30min)		
CAKE(mm)		
SOLIDS %		
SAND %		
CHLORIDES(mg/l)		
KCL %		
MBT(lb/bbl)		
TEMP °C		
HOLE VOL(m3/bbl)		
SURF VOL(m3/bbl)		
LOSSES(m3/bbl/hr)		
MUD Co		
MUD TYPE		

SOLIDS CONTROL			
	lpm	uf	hrs
DESILTER			
DESANDER			
MUD CLEANER			
CENTRIFUGE			
	1	2	3
SHAKERS			
SCREENS			
PUMPS	1	2	3
TYPE			
STROKE(in)			
LINER(in)			
SPM			
LPM			
AV-DP(m/min)			
AV-DC(m/min)			
SPP(kPa/psi)			
SCR @ 40			
SCR @ 50			

FORMATION DATA	
DEPTH	
TRIP GAS (%)	
CONN. GAS (%)	
B'GRD GAS (%)	
PORE PRESS (SG)	
ECD (SG)	
LITHOLOGY	

DRILLS / BOPS	
LAST BOP DRILL	
LAST FIRE DRILL	
LAST MOB DRILL	
LAST ABN. RIG DRILL	
LAST BOP TEST	
BOP TEST DUE	

BIT DATA		
BIT No.		
SIZE(mm/in)		
TYPE		
IADC CODE		
SERIAL No.		
NOZZLES(32in)		
DEPTH IN (m)		
DEPTH OUT (m)		
DRILLED (m cum/dly)		
HOURS (cum/dly)		
GRADE		
AVGE ROP (m/hr)		
WOB (mt)		
RPM		
JET VEL (m/sec)		
HHP @ BIT		

WEATHER / RIG RESPONSE		
WIND SPEED(kts)		
DIRECTION(°)		
TEMPERATURE(°C)		
BAR. PRESSURE(kPa)		
BAR. RISE / FALL(kPa)		
VISIBILITY(NM)		
WEATHER STATE		
SWELL / PER / DIR(m/sec/°)		
WAVES / PER / DIR(m/sec/°)		
HEAVE(m)		
PITCH(°)		
ROLL(°)		
ANCHOR TENSION-MIN(MT)		
ANCHOR TENSION-MAX(MT)		
RISER TENSION(MT)		
VARIABLE DECK LOAD(MT)		

BHA No.		BHA WEIGHT		STRING WT	

BHA Profile :

DOWNHOLE TOOLS	SERIAL No.	ROT/REAM HRS
DRILLING JAR		
DRILLING JAR		
SHOCK SUB		
PDM		

DRILLING DATA	
DRAG - UP (mt)	
DRAG - DOWN (mt)	
TORQUE-On Bottom (amps)	
TORQUE-Off Bottom (amps)	

	HRS	CUM
1. MOVE RIG		
2. RUN ANCHORS		
3. DRILLING		
4. TRIP		
5. WIPER TRIP		
6. SURVEY		
7. CIRC./COND		
8. HANDLE BHA		
9. CASE/CEMENT		
10. WELLHEAD		
11. BOPS		
12. LOT		
13. CORING		
14. LOGGING		
15. REAM/WASH		
16. FISH/STUCK		
17. LOSS CIRC		
18. KICK CONTROL		
19. SIDETRACK		
20. OTHER		
21. REP. SURF		
22. WELL TEST		
23. WO WEATHER		
24. WAIT - OTHER		
25. ABDN./SUSPEND		
26. RIG SERVICE		
27. SLIP/CUT LINE		
28. PULL ANCHORS		
29.		
TOTAL (HRS)	0	0

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GLOBEX FAR EAST
DAILY DRILLING REPORT

WELL: BARRAMUNDI-1
PERMIT: T/27P
RIG: SEDCO 702

DATE: 0-Jan-00
REPORT # 0
D.F.S. 0

FROM	TO	HOURS	
0:00			

OPERATIONS TO 0600 HRS:

PROGRAMME NEXT 24 HRS:

BULK	GEL(sx)	BARITE(sx)	CEMENT(sx)	DRILLWATER(mt)	POT WATER(mt)	DIESEL FUEL(lt)	HELI FUEL(lt)

PERSONNEL ON RIG		TRANSPORTATION	NAME	LOCATION	COSTS	
OPERATOR					DAILY MUD	
DRILLING CONT.		WORKBOAT			CUMULATIVE MUD	
SERVICE COMPS		WORKBOAT			DAILY WELL	
OTHER		STANDBY BOAT			CUMULATIVE WELL	
		HELICOPTER				
TOTAL		HELICOPTER				

SUPERVISOR(S)		ENGINEER			OIM	

GLOBEX FAR EAST - 1500 hrs Report

To: ....

cc: ....

Well:				**Permit:**			
Date:							
Depth:							
Operational Summary since 06:00 hrs*.							
Mud Data: Weight:							
Weight		Viscosity		PV/YP		Chlorides	
Comments/Requirements:							

From: ....
Drilling Supervisor

*(*Include relevant geological data)*

Barracuda Limited	INCIDENT REPORT

Report No:	Date:	Prepared By:
Well:	Operator:	Rig:

INCIDENT

WELL DATA/OPERATIONS PRECEEDING INCIDENT

EVALUATION OF INCIDENT (Cause, were procedures/orders followed?,

REMEDIAL WORK CARRIED OUT

RECOMMENDATIONS

GLOBEX FAR EAST

OPERATIONAL INSTRUCTIONS

To: Rig Superintendent/Toolpusher	
From: Drilling Supervisor	
Copy to:	
Well Name:	**Permit:**
Date:	**Time:**
Operational Instructions/Forward Plan for the period: hrs.to hrs.	

Prepared by: Signature:...................................... Drilling Supervisor	Received and Acknowledged by: Signature:................................... Contractor's Rig Superintendent/Toolpusher

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KELLY DOWN CONSULTANTS Pty Ltd

A.C.N. 008 152 207

Mail:
PO Box 573, St Leonards
N.S.W., 2065, AUSTRALIA

51, Chandos Street
St Leonards
N.S.W., 2065, AUSTRALIA

Tel: 61-2-9901-3422 Mobile:(018) 446-440 Fax: 61-2-9901-3635

FACSIMILE HEADER

TO:				
ATTN:				
FAX No:		No. of Pages		incl. this page
FROM:		DATE:		Ref:

SUBJECT: **Amendment to Drilling Programme**

Well Name:	**Amendment No:**
Amendment:	
Prepared by: Signature:	Approved by: Signature: ....
On behalf of Globex Far East	

pgamed-1.fax

IF YOU DO NOT RECEIVE ALL PAGES, PLEASE CONTACT THIS OFFICE IMMEDIATELY AT THE FOLLOWING TELEPHONE NUMBER 61-2-9901-3422

Incorporated in South Australia

CASING AND CEMENTING REPORT

Well Name:		TD (m):		Date:	
Hole Size:			RT to Top of Spool:		

CASING AND EQUIPMENT RECORD AS RUN FROM BOTTOM TO TOP:

Size O.D. (ins)	Weight (lb/ft)/ Grade	Thread Type	No. of Joints	Length (m)	From (m)	To (m)	Remarks
			Tally Total :		Casing Landed at :		

Wellhead Housing/Spool :					
Centralisers:					
Commence RIH		On bottom:		Hours:	

CEMENTING DETAILS:

Drilling Fluid Prior To Cementing :	
Preflush, Spacer Details :	

Cement	No. Sx	Mix Water (Gals/Sx	Excess	Slurry Weight (Sg)	Additive	Amount	Added To
Start mix:		Finish mix:		Hours:			

DISPLACEMENT

Displacement Fluid		Displaced With	
Bump Plug With (Psi)		Displacement Rate (bpm)	
Est. Top Of Cement		Displacement Vol (bbls)	
Start Disp.:	Bump Plug:	Hours:	

REMARKS:

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CASING SEAT PRESSURE TEST - xxx"SHOE

Well: **Rig:** **Date**

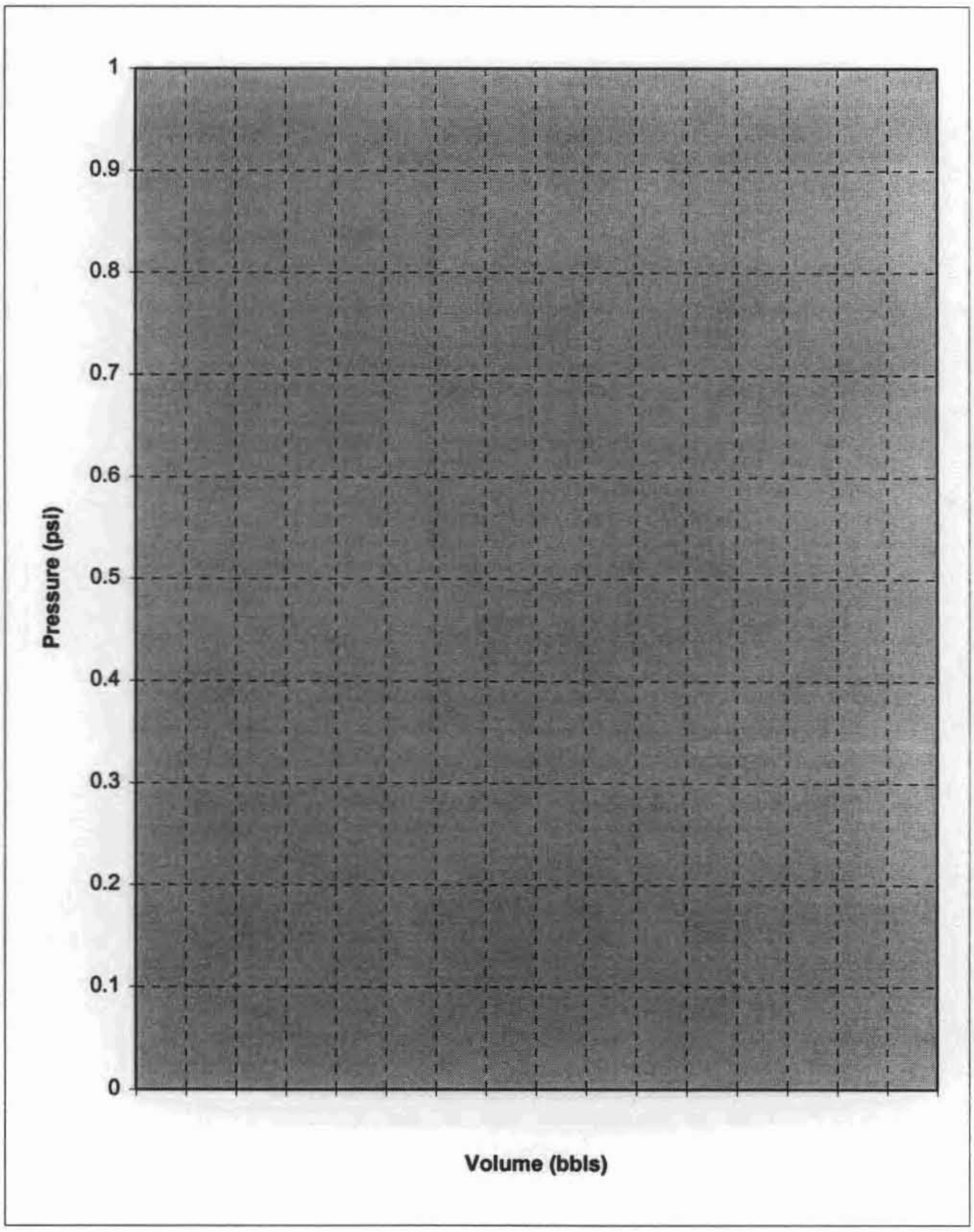
Test (FIT/LOT):

Mud Properties		Well Depth (m)		Vol pumped (bbls)	
Weight (ppg)		Well TVD (m)		Vol lost (bbls)	
PV (cp)		Casing size		Leak-off pressure(psi)	
YP(lb/100sq.ft)		Shoe Depth (m)		Pump rate(bbls/min)	
FL (cc)		Min.Burst (psi)		FIT/LOT-sg (EMW)*	#DIV/0!

$$\text{*FIT/LOT(EMW ppg)} = \frac{\text{Leak-off pressure (psi)}}{\text{Shoe Depth (m)} \times 0.171} + \text{Mud weight}$$

Time	Vol (bbls)	Ps (psi)

Ps = Surface pressure



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BIT RECORD

Bit No.	Size (ins)	Make	Type	IADC Code	Serial No.	Jets 32nds	Depth Out (m)	Drilled (m)	Hrs	ROP (m/hr)	WOB (m.kg)	RPM	Press (psi)	Pump (gpm)	MW (sg)	Dev (deg)	Grade						
																	I	O	D	L	B	G	R

BOTTOM HOLE ASSEMBLY SUMMARY

BHA No.	Hole Size (ins)	BHA Description	Depth in (m)	Depth out (m)

DEVIATION SUMMARY

Hole Size (ins)	Survey Type	Survey No.	Depth (m)	Angle (deg)	Bearing (deg)

MSS = Magnetic Single Shot

MMS = Magnetic Multi-Shot

GLOBEX FAR EAST

CASING TALLY SHEET

Well: Stanley-1 **Date:**

Size:		**Weight**		**Grade**		**Thread**		**Torque**	

Joint	Length	Joint	Length	Joint	Length	Joint	Length	Joint	Length
1		11		21		31		41	
2		12		22		32		42	
3		13		23		33		43	
4		14		24		34		44	
5		15		25		35		45	
6		16		26		36		46	
7		17		27		37		47	
8		18		28		38		48	
9		19		29		39		49	
10		20		30		40		50	
Total A	0	Total B	0	Total C	0	Total D	0	Total E	0

Joint	Length	Joint	Length	Joint	Length	Joint	Length	Joint	Length
51		61		71		81		91	
52		62		72		82		92	
53		63		73		83		93	
54		64		74		84		94	
55		65		75		85		95	
56		66		76		86		96	
57		67		77		87		97	
58		68		78		88		98	
59		69		79		89		99	
60		70		80		90		100	
Total F	0	Total G	0	Total H	0	Total I	0	Total J	0

Joint	Length	Joint	Length	Joint	Length	Joint	Length	Joint	Length
101		111		121		131		141	
102		112		122		132		142	
103		113		123		133		143	
104		114		124		134		144	
105		115		125		135		145	
106		116		126		136		146	
107		117		127		137		147	
108		118		128		138		148	
109		119		129		139		149	
110		120		130		140		150	
Total K	0	Total L	0	Total M	0	Total N	0	Total O	0

CUMULATIVE TOTALS A - O	0

Float Shoe	
Float Collar	
Centralisers on Joints:	

No.Jts Received	
No of Joints Run	
On Racks	

All measurements in metres

Prepared By:	

csgtally.xls/gr/6-6-98

SUMMARY

Form	Initiated by	Initial Recipient	Distribution	Completion by (time)
Daily Drilling Report	Drilling Supervisor	KDC Project Manager - check, add costs	Globex 'Distribution List'	To Sydney by 0730 hrs; To 'Distribution List' by 0930 hrs
Afternoon Report	Drilling Supervisor	KDC Project Manager	Globex 'Distribution List'	To Sydney by1530hrs; To 'Distribution List' by 1600 hrs
Costing	Project Manager	na	Globex 'Distribution List'	Forward to Houston with DDR
Operational Instructions (i)	Project Manager	Drilling Supervisor		As required
Operational Instructions (ii)	Drilling Supervisor	Rig Manager/ Toolpusher		As required
Programme Amendment	Globex or KDC	Project Manager	Project Manager to distribute to Drilling Supv./Operations Geologist/Drilling Contractor	As required
Incident Report	Drilling Supervisor (with Project Manager if necessary)	Project Manager	Project Manager to copy to: Globex - Ops Geo.	Within 7 days of 'operations normal' after the incident.
Rig Weekly Safety Inspection Report	Drilling Supervisor/ Contractor's Rig Manager	Project Manager	Drilling Contractor's Base Manager, DME	Every 7 days
Accident Reporting	Drilling Supervisor/ Contractor's Rig Manager with Project Manager or other third party if necessary.	Project Manager	Project Manager to copy to: Gov. Authorities Globex - Ops Geo.	
Drilling Fluids Report	Drilling Fluids Engineer	Drilling Supervisor/Rig Manager	Project Manager	Daily
Casing and Cementing Reports	Drilling Supervisor Cementing Supervisor	Drilling Supervisor	Project Manager	Within 48 hours of completion of job.
Casing Seat Pressure Integrity Test	Drilling Supervisor	Project Manager	Project Manager to copy to: Globex - Ops Geo.	Within 48 hours of completion of job.
Trip Sheet (Contractor's)	Driller	Drilling Supervisor		Each trip
Kick Control Worksheet	Drilling Supervisor/	Project Manager		Each occurrence

(Contractor's)	Contractor's Rig Manager			
Bit Record	Drilling Supervisor	Project Manager		Update during progress of well. Provide complete record to PM at end of well.
BHA Record	Drilling Supervisor	Project Manager		Update during progress of well. Provide complete record to PM at end of well.
Deviation Survey Record	Drilling Supervisor	Project Manager		Update during progress of well. Provide complete record to PM at end of well.
Rental Tools Inventory	Materials and Logistics Supervisor	Drilling Supervisor	Project Manager	Updated daily or as necessary - weekly report to PM.
Materials Inventory	Materials and Logistics Supervisor	Drilling Supervisor	Project Manager	Updated daily or as necessary - weekly report to PM.
Geological Reporting				
Daily Geology Report	Well site Geologist	Operations Geologist	Globex 'Distribution List'	To Sydney by 0730 hrs; To 'Distribution List' by 0900 hrs
Mud Log/Eng Report	Service Company Well site Geologist	Operations Geologist	Globex 'Distribution List'	To Sydney by 0730 hrs; To 'Distribution List' by 0900 hrs
Electric Logs	Service Company Well site Geologist	Operations Geologist	Globex 'Distribution List'	On completion of logging run.
Other Reports				As required

APPENDIX B - TIME ANALYSIS

APPENDIX B - TIME ANALYSIS

For simplification, the order of time breakdown on the Daily Drilling Report has been arranged in a similar way to the IADC Report. Additional categories more useful to Globex have been included. The definitions for each element are provided as guidelines when carrying out the time analysis in order to maintain consistency with different operations and for comparison or bench marking purposes.

Code	Element	IADC Code	Definition
1	Move Rig		All time from Rig release on last location to sub structure spotted on next location - often on a lump sum basis which includes Rig Up (2)
2	Rig Up	1	All time from sub base spotted on location until Rigged up and ready to make up the BHA.
3	Drilling	2	All time rotating on bottom 'making hole'
4	Ream/Wash	3	All time from pick up kelly/top drive to commence reaming or washing until trip can be recommenced or back on bottom drilling.
5	Coring	4	Includes time for trip to POH, make up core barrel, RIH, Core, POH, Lay down core barrel.
6	Circ./Cond	5	All time where the well is being circulated for the purpose of i) conditioning the mud and hole ii) prior to POH for bit trip or to run logs, casing or core barrel, iii) prior to LOT. Excludes time for circulating geological samples (see 27).
7	Trip	6	Trip for purpose of changing bit or bha. Where a top drive is used, the time to pick up and lay back stands of drillpipe should be included.
8	Wiper Trip		Trip for purpose of hole stability or conditioning while drilling.
9	Handle BHA		Time to make up or lay down BHA. Note:IADC does not allow for this and time is allocated in trip time.
10	Rig Service	7	Normal Rig lube time - max half hour per tour.
11	Rig Repair	8	All time where operations are suspended for Rig or equipment failure. Includes trip/circulating time if necessary ie a trip to pull back to the shoe while waiting on Rig repairs should be logged as Repair.
12	Slip/Cut Line	9	Time to slip and cut drilling line.
13	Survey	10	All time required for a directional survey including circulating prior to survey, running/recovery of survey barrel.
14	Logging	11	Includes time to POH to log, Rig up, run logs, Rig down (including wiper trip during logs).
15	Case/Cement	12	Includes time for wiper trip after logging, Rig up, run casing, cement, woc, time to drill out plugs, cement, shoe etc

16	Wellhead		Time for installation of slips, wellhead, spools, run/test pack-off etc.
17	BOPS	14	Install and pressure test BOPs, divertors, manifolds, kill and choke lines, inside BOPs.
18	LOT		Excludes time to circulate prior to LOT.
19	Lost Circulation		All time to cure lost circulation, including trip to lay back bha if required (ie to RIH OEDP), spotting of lcm, gunk squeezes, cement and time to drillout.
20	Kick Control		All time from recognition of kick until normal operations resumed.
21	Sidetrack	20	Includes time to set kick-off plug if side-track for fish is required - trips, circulating, cementing, dress plug etc. The trip to RIH to kick-off and subsequent operations are classified under normal time break down with the well having a 'side-track' designation.
22	Fish/Stuck	19	All time lost due to stuck pipe or fishing (twist off etc) including circulating, spotting fluid, jarring, back-off, trips with fishing tools etc. to the point where a side-track plug is required (see 21)
23	Well Test	16	All time from commencement/Rig up test equipment/tools.
24	W/O Weather		All time lost due to weather delays including trip out of hole (if necessary) to hang off.
25	Wait - Other		Any other delay causing lost time - specify reason
26	Abd./Suspend	17	i) All time to abandon or suspend the well including time required for trips to set cement plugs, cut casing/wellheads, lay down drill pipe. ii) All time to abandon the lower part of a well for the purpose of side-tracking to a new geological objective.
27	Other		eg. time to circulate geological samples for evaluation.

APPENDIX C PROVISIONAL LOAD OUT LIST

MATERIALS/EQUIPMENT LIST - GLOBEX - BARRAMUNDI-1

591062

Item	Description	Supplier	Qty	Serial/Pt No.	Comments
1	***Services***				
1.01	Helicopter - Bell 412	Lloyd			Based at Essendon
1.02	AHSV - Pacific Shogun	Swire			Based in Geelong
1.03	AHSV - Pacific Challenger	Swire			Based in Geelong
1.04	Logistics/Materials Handling	Toll Energy			Based in Melbourne/Geelong
1.05	Rig Positioning	Racal			
1.06	Rig Positioning - Quality Control	D.Evans			
1.07	Weather Forecasting	WNI			
1.08	Cementing Equipment (Dowell Unit)	Howco/DS			Installed on rig
1.09	ROV	Sonsub			Installed on rig
1.10	Mud Logging	Geoservices			Installed on rig
1.11	Electric Logging Unit/Tools	Schlumberger			Installed on rig
1.12	Drilling Fluids	Baroid			
1.13	Drilling Tools	Tasman			
1.14	Casing Running	Weatherford			
1.15	Coring	BHI			
1.16	DST Testing Equipment	Schlumberger			
1.17	Diesel Fuel	Esso/Shell			
1.17	Communications Equipment				
1.18	Waste Disposal	Hannon			

Item	Description	Supplier	Qty	Serial/Pt No.	Comments
2	***Service personnel required on rig prior to spud***				
2.01	Drilling Supervisors	WW/LK	2		Prior to move for handover
2.02	Wellsite Geologist	GC	2		First flight ex Essendon
2.03	Rig Positioning Crew	Fugro	2		Esso flight pre-move
2.04	Rig Positioning Quality Control Surveyor	D.Evans	1		Esso flight pre-move
2.05	Drilling Fluids Engineer	Baroid	2		One should be on-board for tow
2.06	Cementing Engineer	Howco/DS	2		Remain on-board for tow
2.07	Mud Logging Crew	BHI	4		Remain on-board for tow
2.08	ROV Crew	Son sub	3		Remain on-board for tow
2.09	Wellhead Engineer	Dril-Quip	1		Esso flight pre-move
2.10	Wireline Crew	Schlumberger	3		TBA - no logging until TD

3 Drill 36"/26" hole, set 30" conductor

Item	Description	Supplier	Qty	Serial/Pt No.	Comments
3.01	Drilling Fluids as per Baroid load out list	Baroid			
3.02	Drill water				
	Rock Bits				
3.03	26" Rock Bit/nozzles - DSJC (Rental)	Smith	1		PO A 98 005. Specify nozzles
3.04	26" Bit Breaker	Sedco	1		
	Drilling Tools				
3.05	36" Hole opener - 7 5/8" Reg Conns	Tasman	2		Specify jets required
3.06	36" Stabiliser - 7 5/8" Reg Conns	Tasman	1		
3.07	9 1/2" Pony Drill Collar	Tasman			
	Wellhead/Casing/Casing Running/Cementing				
3.08	30" Housing Type SS10 complete with Ext Joint - 1.5" wt, X52,HD90 Box	Drilquip	1		Back-up in Geelong
3.09	30" Cross-over Joint - HD90 pin x SF60 box	Drilquip	1		Back-up in Geelong
3.10	30" Intermediate Joint - SF60 pin x SF60 box	Drilquip	1		Back-up in Geelong
3.11	30" x 20" Shoe Joint - SF60 Pin	Drilquip	1		Back-up in Geelong
3.12	Permanent Guide base	Drilquip	1		Back-up in Geelong
3.13	Slope Indicator	Drilquip	1		Back-up in Geelong
3.14	20" Casing Drift	Weatherford	1		To gauge extension joint
3.15	Bestolife 2000 Thread Compound - 30lb Pails	Weatherford	2		
3.16	30" spider/slips				
3.17	30" side door elevator	Weatherford	2		
3.18	Cement - Class G	Halliburton	600 sx		Approx - recalculate on site
3.19	Calcium Chloride	Baroid	1200 lb		
3.20	De-Foamer - NF-3	Halliburton	2 gals		
	Wellhead Running Tools				
3.21	PGB Retrieval Tool	Drilquip	2	346002-2	
3.22	30" Wellhead Housing Running Tool	Drilquip	2	420284-02	
3.23	18 3/4" Housing Running Tool	Drilquip	2	420002-02	
3.24	18 3/4" BOP Test Tool	Drilquip	2	420004-02	
3.25	BOP Test Adaptor	Drilquip	2	420005-02	
3.26	18 3/4" Hanger/Seal Assembly R/T	Drilquip	2	420028-02	
3.27	18 3/4" Seal Assembly R/T	Drilquip	2	420150-02	
3.28	18 3/4" Multi-Purpose Tool	Drilquip	2	452006-02	
3.29	Bore Protector Running Adaptor	Drilquip	2	452007-02	
3.30	Wear Bushing Running Adapter	Drilquip	2	452008-02	
3.31	Bore Protector Retrieval Adaptor	Drilquip	2	452010-02	

3.32	Jet sub	Drilquip	2	452056-02	
3.33	Jet sub extension	Drilquip	2	452033-02	
3.34	Temp Abdonment Cap Running Tool	Drilquip	1	330012-08	Keep in Geelong
3.35	Emergency Drillpipe Hang Off Tool	Drilquip	2	2-400256-02	
3.36	Spares for running tools (as per DrilQuip list)	Drilquip			
3.37	Spare 'O' rings for connectors - 20" HD90	Drilquip	2		
3.38	Spare 'O' rings for connectors - 30" HD90	Drilquip	4		

4 Drill 17 1/2" hole, set 13 3/8" casing with HP Housing, install/test BOPs

Item	Description	Supplier	Qty	Ser.No	Comments
	Rock Bits				
4.01	17 1/2" Rock Bits And Nozzles - MSDSSHC	Smith	2		PO A 98-005. Specify nozzles
4.02	17 1/2" Rock Bit And Nozzles	na			
4.03	17 1/2" Rock Bit And Nozzles	na			
4.04	17 1/2" Bit Breaker	Sedco	1		
	Drilling Tools				
4.05	17 1/2" Near Bit IB Stabiliser - 7 5/8" Reg Conns	Tasman	1		
4.06	17 1/2" Near Bit IB Stabiliser - 7 5/8" Reg Conns	Tasman	1		
4.07	17 1/2" String IB Stabiliser - 7 5/8" Reg Conns	Tasman	1		
4.08	17 1/2" String IB Stabiliser - 7 5/8" Reg Conns	Tasman	1		
4.09	Magnetic Single Shot Survey Kit	Anadril	1		
4.10	8" Dailey Drilling Jars - 6 5/8" Reg Conns	Tasman	1		
4.11	8" Dailey Drilling Jars - 6 5/8" Reg Conns	Tasman	1		
4.12	9 1/2" Mud motor	Anadril	1		
4.13	9 1/2" Monel	Anadril	1		
4.14					
	Casing/Casing Running/Cementing				
4.15	18 3/4" Wellhead housing - Type SS10 c/w Ext Jt - 20" x .625" c/w HD90 Box.	Drilquip	1		Back-up in Geelong
4.16	Cross-over 20" HD90 x 13 3/8" BTC	Drilquip	1		Back-up in Geelong
4.17	18 3/4" x 12.375" Wear Bushing	Drilquip	1		
4.18	13 3/8" 68ppf, L80, BTC Casing	Esso	900m		
4.19	13 3/8" 68 ppf Casing Drift	Weatherford	1		
4.20	13 3/8" Casing Thread Protectors	Weatherford	3		
4.21	13 3/8" Float Shoe - Super Seal 11 - BTC	Halliburton	2		
4.22	13 3/8" Float Collar - Super Seal 11 - NR - BTC	Halliburton	2		
4.23	13 3/8" Centralisers	Halliburton	6		
4.24	13 3/8" Stop Collar	Halliburton	2		
4.25	13 3/8" Cement Plugs - Bottom - SSR	Halliburton	2		
4.26	13 3/8" Cement Plugs - Top - SSR	Halliburton	2		
4.27	Thread-Lok x 1lb Kit	Halliburton	6		
4.28	Bestolife 2000 Thread Compound - 30lb Pails	Weatherford	1		
4.29	13 3/8" BTC Circulating Swage	Halliburton	1		
4.30	SSR Plug Dropping Head	Halliburton	1		
4.31	Power tongs and hydraulic unit	Weatherford	1		
4.32	13 3/8" Manual Casing Tongs	Sedco	1		

4.33	13 3/8" Casing Slips CMS-XL	Sedco	1		
4.34	13 3/8" Side Door Elevator - 150 tonne	Sedco	1		
4.35	13 3/8" Single Joint Pick-up Elevator - 5 tonne	Sedco	1		
4.36	Slip Type Elevator and Spider - 500 tonne	Sedco	1 each		
4.37	Cement - Class G	Halliburton	1000 sx		Approx - recalculate on site
4.38	Cementing Chemicals	Halliburton	tba		
4.39	13 3/8" Cement Retainer/Bridge Plugs	Halliburton	1		
	Additional Service Personnel for 17 1/2" Hole				
4.40	Casing running crew - if needed	Weatherford	2/3		Check with Sedco if needed

5 **Drill 12 1/4" hole, set 9 5/8" (if required)**

Item	Description	Supplier	Qty		Comments
	Rock/PDC Bits				
5.01	12 1/4" Bits and Nozzles/Bit Breaker- PDC S91PX	Smith	1		PO A 98-005 - specify nozzles
5.02	12 1/4" Bits and Nozzles - 12 MD	Smith	1		PO A 98-005 - Consignment
5.03	12 1/4" Bits and Nozzles				
5.04	12 1/4" Bits and Nozzles				
5.05	12 1/4" Bits and Nozzles				
5.06	12 1/4" Bit Breaker	Sedco			
	Drilling Tools				
5.07	12 1/4" String IB Stabiliser - 6 5/8" Reg Conns	Tasman	1		
5.08	12 1/4" String IB Stabiliser - 6 5/8" Reg Conns	Tasman	1		
5.09	12 1/4" String IB Stabiliser - 6 5/8" Reg Conns	Tasman	1		
5.10	12 1/4" Near Bit IB Stabiliser - 6 5/8" Reg Conns	Tasman	1		
5.11	12 1/4" Near Bit IB Stabiliser - 6 5/8" Reg Conns	Tasman	1		
5.12	8" Shock Sub	Tasman	1		
5.13	8" Pony Drill Collar	Tasman	1		
5.14	8" Drilling Jars - 6 5/8" Reg Conns	Tasman	2		
5.15	8" Monel Drill Collar - 6 5/8" Reg Conns	Tasman	2		Contingency
5.16	9 1/2" Mud Motor	Anadrill	2		
5.17	Magnetic Single Shot Survey Equipment	Anadrill	1		
5.18	12 1/4" Flat Bottom Mill	Tasman	1		
5.19	12 1/4" Fishing Magnet	Tasman	1		
5.20	12 1/4" Reverse Circ Junk Basket	Tasman	1		
5.21	6 3/4" x 4" X 60' Core Barrel	BHI	1		
5.22	8 1/2" x 4" Core Heads	BHI	3		
5.23	6 3/4" x 4" Aluminium Inner Barrels x 9m	BHI	1		
5.24	Core Barrel Spares	BHI	1		
5.25	Core Saw	BHI	1		
5.26	Core Boxes	BHI			
5.27	Wellhead Recovery Tools	Weatherford			
	Casing/Casing Running/Cementing				
5.28	18 3/4" x 9 5/8" Casing Hanger - SS10C c/w 9 5/8" 47 ppf, L80, BTC Pup Joint (pin down)	Dril-Quip	1		Back-up in Geelong
5.29	Adaptor - Dummy hanger	Dril-Quip	1		Back-up in Geelong
5.30	18 3/4" Seal Assembly	Dril-Quip	1		Back-up in Geelong
5.31	18 3/4" x 9 5/8" Wear Bushing	Dril-Quip	1		

5.32	9 5/8", 47ppf, L80, LTC Casing	Esso	1800m		Retain in Sale until needed
5.33	9 5/8", 47ppf, L80, X/O, BTC Box x LTC Pin	Baker	2		Retain in Sale until needed
5.34	9 5/8" 47 ppf Casing Drift	Weatherford	1		
5.35	9 5/8" Casing Thread Protectors	Weatherford	3		
5.36	9 5/8" LTC Float Shoe	Halliburton	2		
5.37	9 5/8" LTC Float Collar	Halliburton	2		
5.38	9 5/8" Centralisers	Halliburton	10		
5.39	9 5/8" Stop Rings	Halliburton	10		
5.40	9 5/8" Cement Plugs - SSR	Halliburton	2		
5.41	9 5/8" Circulating Swage - LTC	Halliburton	2		
5.42	SSR Plug Dropping Head	Halliburton	1		
5.43	9 5/8" Safety Clamp	Sedco	1		
5.44	9 5/8" Side Door Elevator	Sedco	1		
5.45	9 5/8" Single Joint Pick-up Elevator	Sedco	1		
5.46	Slip Type Elevator/Spider Dressed for 9 5/8"	Sedco	1		
5.47	Power tongs and hydraulic unit	Weatherford	1		
5.48	Cement - Class G	Halliburton	tba		
5.49	Cementing Chemicals	Halliburton	tba		As per cement test
5.50	9 5/8" Cement Retainer/Bridge Plugs	Halliburton	1		
5.51	Mech Setting Tool	Halliburton	1		
5.52	9 5/8" RTTS	Halliburton	1		
	Additional Service Personnel for 12 1/4" Hole				
5.53	Casing running crew	Weatherford	2/3		

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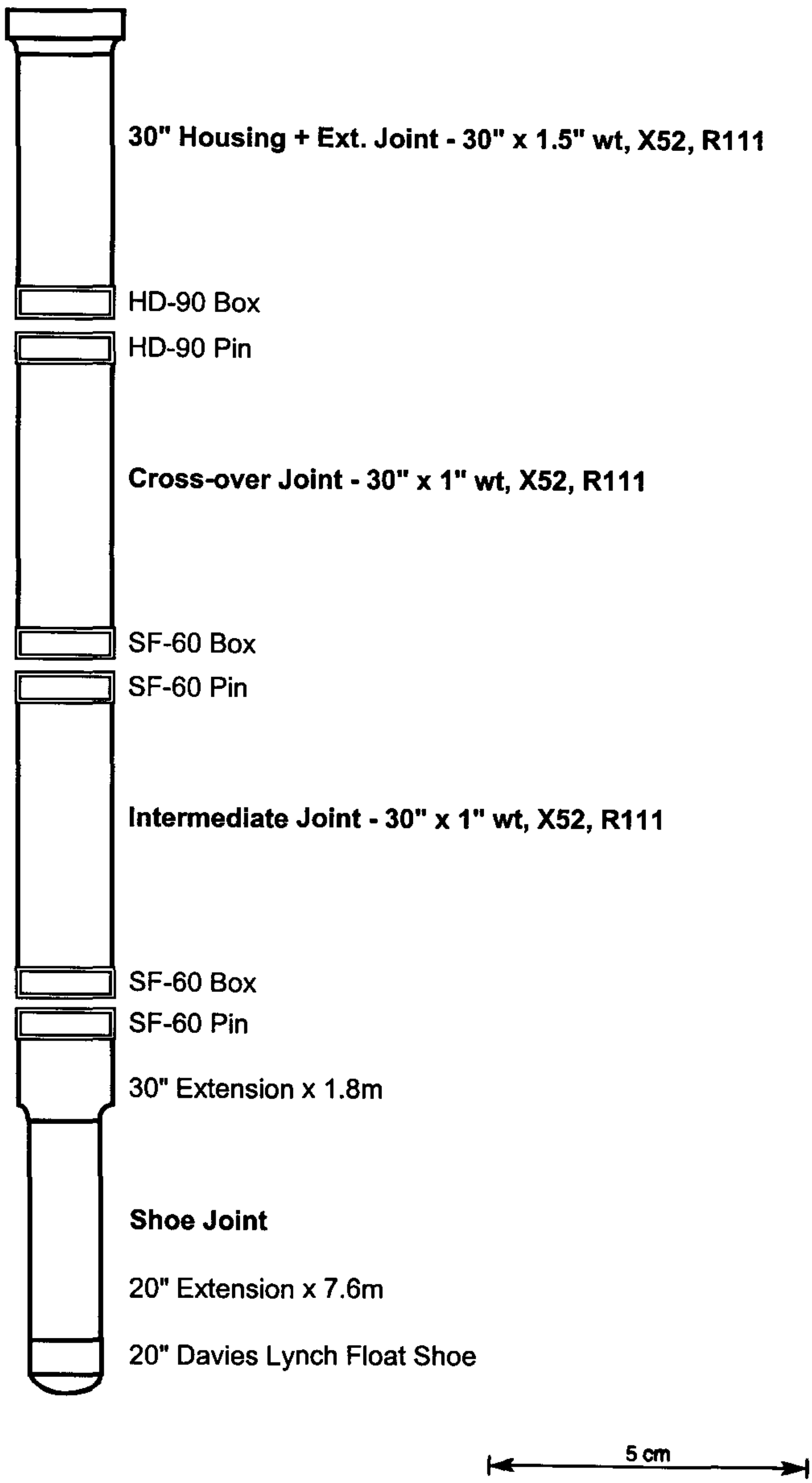
APPENDIX D - CASING DIAGRAMS

GLOBEX FAR EAST

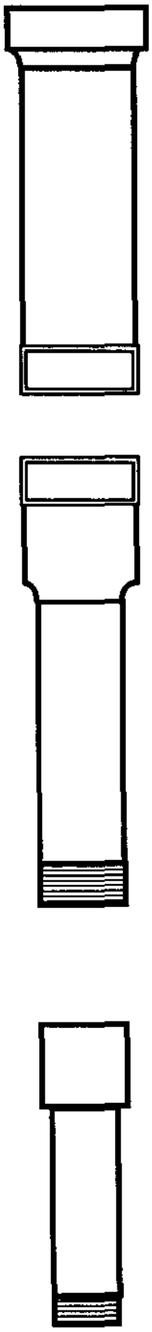
Barramundi-1 - 30" Wellhead/Casing



f:DQ-WHD.xls/gr/19-5-99

GLOBEX FAR EAST

Barramundi-1 - 18 3/4" Wellhead/Casing



18 3/4" Housing
+ Ext. Joint - 20" x 0.625" wt, X56 x 5.8m lg

HD-90 Box

HD-90 Pin

Cross-over Swedge - 20" x 13 3/8" x 4.5m approx
WP = 3000psi

13 3/8" 68ppf, L80 BTC Pin

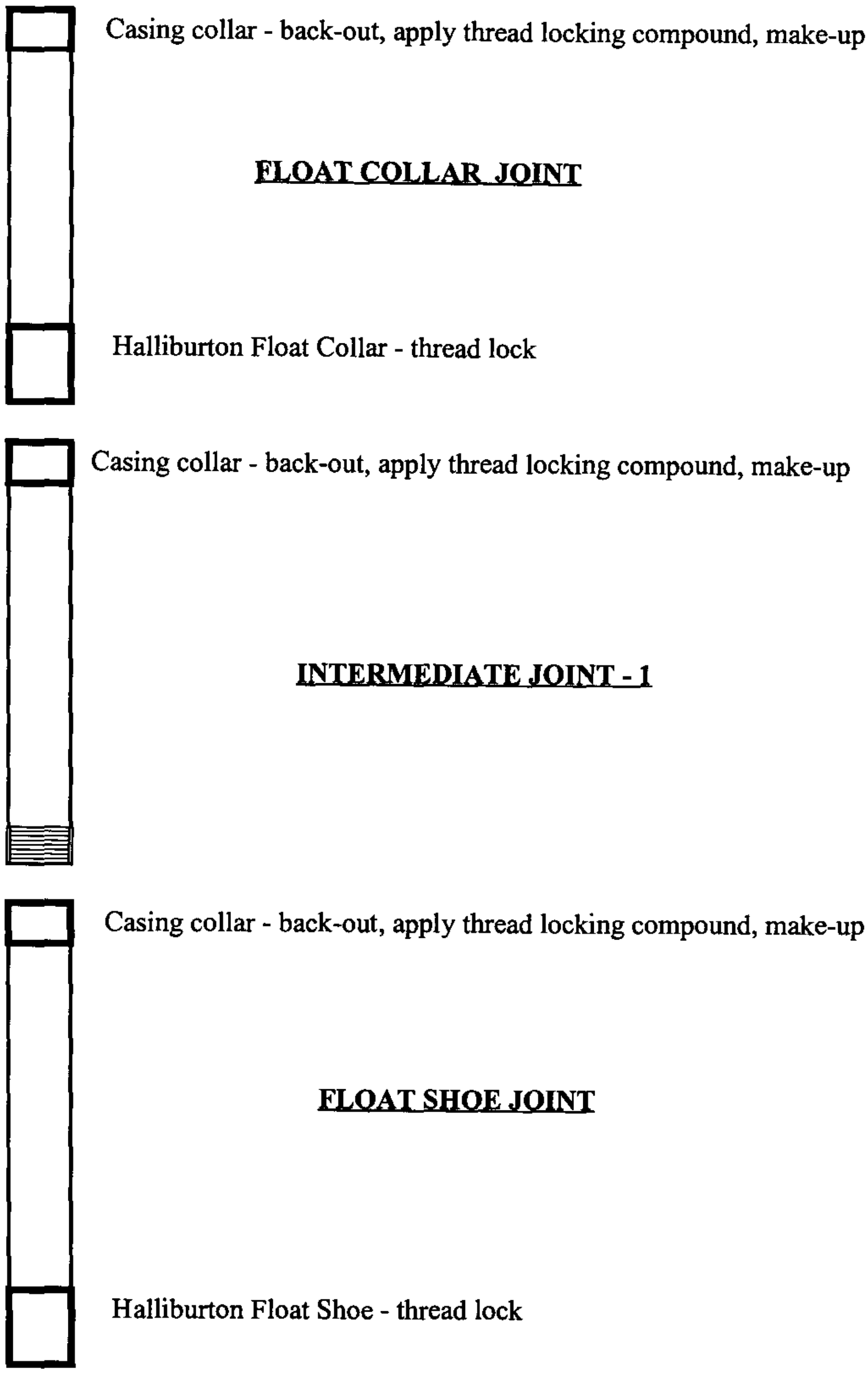
9 5/8" Casing Hanger

9 5/8" Pup Joint - 47ppf, L80, BTC x 3m approx

5 cm

f:DQ-WHD.xls/gr/19-5-99

CASING SHOE TRACKS - BARRAMUNDI-1



Requirement - 1 complete shoe tracks each size:

13 3/8", 68 ppf, K55, BTC Casing

9 5/8", 47 ppf, K55, LTC Casing

f:shoe-tk.doc

5 cm