
AUSTRALIA PACIFIC LNG LIMITED

GENERIC DRILLING PROGRAMME

ATP 692P

TALINGA DEVELOPMENT WELL

Distribution (e-copy)

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1. PROJECT

1.1. Description

The third round of Walloons drilling will be undertaken in the in the Talinga Field. The Field is located south west of Chinchilla in South East Queensland. This drilling program covers the drilling of a generic development well. This well will be drilled by Ensign International using Rig 50. A separate programme covers the completion operations.

The 12¼” surface hole will be drilled to 65-75 m and 5-6 joints of 9⅝” casing will be run and cemented. The 8½ - 8-3/4” hole will be drilled to total depth (TD) through the coals of the Juandah and Taroom Coal measures. The wells will TD approximately 50 m below the last significant coal of the Taroom CM. Wireline logs will be run. One well, Talinga 26, will be subject to three drill stem tests. Selected wells will be under-reamed through the coal sections. The wells will be cased with a mix of pre-perforated and non perforated 7” production casing. An External Casing Packer / Stage Collar will be used to cement the casing from above the top coal to surface. There will be no mud logging crew on site.

This document outlines the processes for management and the technical procedures for drilling, casing, cementing, testing and suspending this well.

1.2. Management

The **Group Manager, Subsurface** is accountable for this project.

The drilling project **Customer** is the **Origin Energy / Australia Pacific LNG Limited consortium**, whose designated representative is the **GM, Queensland CSG**. The Customer Representative will ensure that all environmental approvals, landowner agreements, Joint Venture and AFE approvals are in place prior to the commencement of the project.

The drilling of the well will be conducted on a stand-alone well site that is being managed by the **OE Drilling & Completions Group** on behalf of the CSG Exploration Team. The OE Drilling & Completions Group has contracted Ensign as the principal contractor to undertake the drilling activities outlined in this programme.

The **Manager, Drilling and Completions CSG** is responsible for ensuring that all activities associated with the drilling operations are undertaken in full compliance with statutory regulations and are consistent with Origin Energy policy.

The **Drilling Engineer** and **Origin Energy (OE) Well Site Representative** are the delegated representatives of the **Manager, Drilling** with duties as outlined below.

The **Drilling Engineer** is responsible for the implementation of the project encompassing design, procurement, cost control, operational, environmental and safety aspects of the project. This includes ensuring that all Regulatory approvals are in place prior to project commencement.

The **OE Well Site Representative** is the site representative reporting to the **Drilling Engineer** in the Brisbane Office and is responsible for ensuring that well site operations are conducted in a safe and environmentally sound manner and in accordance with the approved programme. The **OE Well Site Representative** is responsible for ensuring that all personnel participating in the project receive a suitable Site Specific Induction prior to commencement of activities at the well site. The **OE Well Site Representative** will liaise with the **Ensign Rig Manager** and any 3rd Party Service Provider Supervisors to ensure that HS&E and operational requirements for the program are met. The **OE Well Site Representative** will liaise with the **Talinga Field Superintendent** and the **Roma Field Services Group (FSG)** prior to the rig mobilising to the well site to discuss local issues that may impact on the project. *OE Weed Hygiene Declaration* forms must be faxed to the **OE Well Site Representative** prior to mobilising equipment to the area. The **OE Well Site Representative** will indicate the level of inspection/wash down required. Vehicles/equipment will not be allowed on location until an *Authority to Enter - Vehicle/Equipment* form has been issued.

The **Field Superintendent** will handle landholder liaison.

Lease construction and rehabilitation activities are being managed by the **Origin Energy Field Services Group (FSG)** based in Roma.

The **Ensign Rig Manager** reports to the **OE Well Site Representative** and is responsible for safe and efficient operation of all Ensign supplied crew and equipment while conducting the operations contained in the approved programme. The **Ensign Rig Manager** is to ensure that all operations are carried out in accordance with the Ensign Safety Management Plan, Standard Operating Procedures, Induction Manual and any other relevant Ensign procedures.

The **OE Well Site Representative** will liaise with the **Ensign Rig Manager** during the drilling operations to confirm project execution as per the approved programme. Any changes required to the approved programme are to be approved by the OE Brisbane Office. The **OE Well Site Representative** will liaise with the **Ensign Rig Manager** to resolve any operational issues that arise whilst on site. Issues unable to be resolved on site should be referred to OECSG Brisbane Office (**Drilling Engineer** in the 1st instance). This drilling campaign will be carried out on a nominal 24-hour per day basis.

Site Document List - Required on Site prior to Spud

Drilling Programme;

Well Specific Programme Overview;

Wellsite Safety Management Plan and Risk Assessments - April 2008;

Risk Register-Conventional Drilling with DST-January 07;

Wellsite Emergency Response Manual October 2008;

Walloons Environmental Management Plan-April 2008

Onshore Permit to Work System;

Upstream Waste Management Plan-February 2005

Petroleum & Gas (Production & Safety) Regulation 2004.

2. SAFETY

All operations conducted in the course of drilling these wells shall be in accordance with the safety requirements specified by the following documents:

- *Wellsite Safety Management Plan and Risk Assessments - April 2008;*
- *Risk Register-Conventional Drilling with DST-January 2007*
- *Wellsite Emergency Response Plan - October 2008;*
- *Queensland Petroleum and Gas (Production and Safety) Act 2004;and Regulations 2004;*
- *The Origin Energy Drilling Manuals; (Reference only)*
- *Walloon Environmental Management Plan-April 2008*
- *Ensign Procedure Manual;*
- *Ensign Health Safety and Environment Manual;*
- *Ensign Hazards Manual.*

The procedures listed in this programme form a guide for the drilling operations and may need to be modified, in consultation with the Origin Energy Brisbane office, as the work progresses. If circumstances arise where there is a conflict between safety issues and this programme, the **OE Well Site Representative** and the **OE Drilling Engineer** (if present) and the relevant third party Supervisor should apply judgment and common sense to ensure that safe operations are undertaken as a priority.

It is the philosophy of OE that human life is more important than plant, equipment and the environment. Under no circumstances are personnel to put their life in danger for the sake of plant, equipment and/or the environment. When in doubt evacuate the area.

It is Origin's Policy that; "If at any time anyone feels that safety may be compromised, that person is expected by Origin Energy Management to stop the job until steps have been taken to ensure that the job can be performed safely. Stopping unsafe practices is an important part of everyone's job and no one will be criticised or adversely treated for stopping an unsafe job. If you do not think a job is safe, don't do it. If you see someone working in an unsafe manner, stop them".

1. Origin Energy requires all personnel involved in drilling and well servicing operations to be adequately trained and experienced in the relevant operations. Qualifications of key contractor personnel are to be reviewed prior to project start up.
2. The Origin Energy Well Site Representative will attend "Safety Meetings" at the well site with all the rig crewmembers and other third party personnel prior to and during the drilling, logging, casing and cementing processes.
3. Toolbox meetings (TBM) and/or Job Safety Analysis (JSA) meetings must be conducted prior to

any new or critical operation.

4. Relevant SOPs are to be reviewed prior to performing the task; all personnel need to be trained in the SOP.

3. CONTROL OF WELLSITES

STAGE	FROM	TO	DOCUMENT	ATTACHMENT
Pre-drilling	Walloons Operations (Talinga)	Origin Energy Well Site Representative	Well handover form - oil/csm well	Site specific issues
Post cementing Prod Casing	Origin Energy Well Site Representative	Walloons Operations (Talinga)	As above	Site specific issues

4. EMERGENCY RESPONSE

Detailed emergency response procedures are documented in the Origin Energy **Onshore Australia - WELLSITE EMERGENCY RESPONSE PLAN, October, 2008**. This document contains the **Site Specific Information**.

The latest Contact Numbers are included in this document. In the event of an emergency situation the first call should be to **000** from landline/mobile or **112** from some mobile phones.

*In all Emergency situations the protection of personnel is paramount.
No attempt should be made to enter a designated emergency area.*

5. FORMATION EVALUATION

5.1. Wellsite Geologists

No wellsite geologist will be onsite for this well.

5.2. Ditch Cuttings

No sample collection is programmed for this well.

5.3. Mud Logging

No mud logging is programmed for this well.

5.4. Coring

No coring is programmed for this well.

5.5. Testing

Some Talinga development wells will be subject to DST's. Appendix 2 outlines the DST running procedure. More specifics with regards to DST's will be contained in the well specific **Drilling Well Overview**.

5.6. Wireline Logging

The well will be logged prior to running the 7" casing. As a minimum, Gamma Ray, Caliper and Density wireline logs will be acquired. Sonic log is optional on wells positioned on seismic lines. Some wells will be subject to under-reaming. Post under-reaming logging will be selected for some talinga development wells Refer to Section 10 and the **Drilling Programme Overview** for details.

5.7. Sidewall Coring

No sidewall coring is programmed for this well.

5.8. Velocity Survey

No velocity survey is programmed for this well.

6. SEQUENCE OF OPERATIONS

R.T. reference height above ground: 4.15 metres (GL to RT). All depths referred to throughout this programme unless otherwise noted refer to "along hole measured depth below rotary table". This reference point to be used for all drilling and logging activities.

6.1. Pre-spud

- 6.1.1. Before the rig moves on site, the location will be surveyed; access roads, rig and camp locations will be built; a cellar will be installed; and a 14" conductor will be pre-set at 6 m. The site will be inspected and accepted by the Rig Manager prior to commencement of rig move.
- 6.1.2. Move in rig and rig up. The rig will be put in safe and good housekeeping order prior to spudding the well. **The OE Well Site Representative** is to complete a Rig Safety and Environmental Audit Check and **forward** it to the On-Call Engineer in the Brisbane office. A Hazard Hunt and an Emergency Response Drill are to be carried out prior to spudding the well (1 hour duration or as deemed necessary by **OE Well Site Representative**). **Attachments should be filed in IDS for ease of access.**
- 6.1.3. Pre-spud safety and environmental meetings are to be held with all crews to outline the Drilling Programme and to reinforce the need for all personnel to be aware of and to work in a safe manner, in accordance with the governing documents for the well.
- 6.1.4. Layout and strap BHA. All measurements including OD's, ID's and fish necks etc must be recorded and entered into IDS.

6.2. 12¼" Hole Section

- Section Total Depth:** Nominal 75 m. See **Drilling Programme Overview**
- Drilling Fluid:** Water with gel sweeps
- Hazards:** Potential hole instability, mud rings, loss of circulation, communication to surface at conductor shoe
- 6.2.1. Use Bit 1 (See **Drilling Programme Overview**), and make up the 12¼" BHA 1 as per the BHA programme (Refer 'Section 8.2 - Bottom Hole Assemblies').
 - 6.2.2. Drill with reduced parameters until second collar is drilled.
 - 6.2.3. Drill to section TD using water as per the drilling parameters in the **Drilling Programme Overview**.
 - Sweep hole with high viscosity pills as required and ream every connection to ensure the hole is free.
 - 6.2.4. At section TD, the hole will be circulated clean prior to pulling out of hole to run casing.
 - A high viscosity pill, with a minimum viscosity of 45 seconds, should be pumped during the final circulation prior to running casing (see 'Section 9 - Mud Programme').

6.3. 9⅝" Casing and Cementing

Casing Setting Depth: Nominal 72 m. See **Drilling Programme Overview**

Casing Details: 36 lb/ft, K55, BTC

Accessories: 1 x Guide/Float shoe, HWE plug (optional), bow type centralisers, 1 x stop ring, threadlock compound

6.3.1. Clean threads, drift, strap and tally casing before spudding the well.

6.3.2. Run 9 $\frac{5}{8}$ " casing .

- a) Install guide/float shoe on 1st joint and secure with threadlock;
- b) Run one (1) joint of casing with a centraliser mid joint secured with the stop ring.
- c) Install centralisers on the collars between joints 2/3 and joints 4/5;
- d) Run the casing and landing joint. Install cement head and circulate at least the total volume of casing;
- e) Space and land the casing collar such that the installation of the BOP stack, bell nipple and flow line do not need modification. Refer 'Figure 1 - 9 $\frac{5}{8}$ " Spaceout' to get the correct space out;
- f) If not secured by top drive, chain casing down prior to mixing and pumping cement.

6.3.3. Cement 9 $\frac{5}{8}$ " casing.

- a) Pressure test all lines to 2000 psi;
- b) Mix and pump cement slurry (see **Drilling Programme Overview** for slurry details), monitoring pressure on cement unit. Take two cement samples;
- c) Release HWE top plug and displace with clean water. Optional omission of wiper plug to allow under displacement of cement;
- d) Monitor for returns during cement job;
 - A top up cement job can be performed if there are no returns to surface.
- e) Bump plug with 200 psi over final displacing pressure and hold for 5 minutes. If plug does not bump do not over displace more than 0.5bbbls. If no wiper plug is used, under displace cement once good cement returns are seen at the cellar. If no returns under displace the equivalent theoretical volume of 1 joint of 9-5/8" casing. If plug is not bumped, casing integrity will be tested during the BOP pressure test.
- f) Flush conductor riser and flowline with water.

6.4. Install and test BOP

Reservoir Pressure: See **Drilling Programme Overview**.

Wellhead: 'A' section: 11" 3000 psi x 9 $\frac{5}{8}$ " Wellhead, supplied by Wood Group. 11' x 9" DSA.

BOP stack: One (1) Annular, Townsend, 9" x 3000 psi, Two (2) Single Ram preventers, Townsend 9" x 3000 psi

- 6.4.1. Wait on cement for 4 hours; check surface samples are set before proceeding.
- 6.4.2. Slack off on casing, break out and lay out landing joint and install 'A' section wellhead following manufacturer's instructions.
- 6.4.3. Nipple up 11" x 9" DSA and 9" BOP stack (Refer 'Figure 2 - BOP Stackup') and pressure test according to BOP test programme.

6.5. 8-3/4" Hole Section

Section Total Depth:	Nominal 350 - 800 m. See Drilling Programme Overview
Drilling Fluid:	Water/PacR or Gel mud
Hazards:	Water influx from shallow aquifers, differential sticking in permeable water sands, gas influx from Walloon Coals, loss of circulation in permeable sands and coal seams, loss into zones depleted by production from adjacent wells

- 6.5.1. Use Bit 2 (See **Drilling Programme Overview**), and make up BHA 2 as per the BHA programme (Refer 'Section 8.2 - Bottom Hole Assemblies'). Ensure all BHA measurements are captured in IDS.
- 6.5.2. RIH and tag cement. Drill out cement plug and shoe track with water and reduced parameters to avoid damaging the casing.
- 6.5.3. Perform FIT as per 'Section 12 - Formation Integrity Test Procedure'.
- 6.5.4. Drill to section TD using Water/PacR based drilling fluid(confirmed by office) - Mud constituents as per the drilling parameters in the **Drilling Programme Overview**.
 - Sweep hole with high viscosity pills as required and ream every connection to ensure the hole is free (see 'Section 9 - Mud Programme).

NOTE 1: Carefully monitor fluid returns. Treat loss circulation to avoid potential for flow from differing pressured coal seams.

NOTE 2: TD is prognosed only. Actual TD may be adjusted during drilling - with the approval of the Brisbane Office. This adjustment will be made such that TD for each well will be ~50m below the last significant coal of the Taroom CM. The coals can be picked from monitoring drill breaks and from gas peaks shown on the Pason monitoring system.

NOTE 3: The driller is to monitor and record drilling breaks to ascertain approximate coal depths & thicknesses and alert **OE Well Site Representative** as drilling breaks are encountered.

- 6.5.5. At section TD, the hole will be circulated clean and a wiper trip made to surface casing shoe, prior to pulling out of the hole for logging.
 - A high viscosity pill will be pumped to improve hole cleaning.

6.6. Logging

- 6.6.1. Rig up and run logs as per Section 10. In the event of severe fluid losses to the formation where keeping the hole full is not possible, consult Brisbane office for decision to run wireline pack-off or lubricator.

NOTE 4: **OE Well Site Representative** is to ensure that a fast copy of logs (PDF) is sent to the **On-Call Geologist** (Walloon Operations phone 0438 742 925), for coal depth confirmation. Logs to be attached to IDS.

6.6.2. In the case of under-reaming, logs will be used to confirm underreaming depths and placement of pre-perforated casing joints with on-call engineer.

6.7. Testing

6.7.1. On a number of select wells a DST may be required to define reservoir characteristics. Appendix 2 outlines the generic testing program. More specifics with respect to testing requirements will be outlined in the Drilling Overview.

6.8. Under-reaming

Under-reaming will be carried out on selected wells as notified by Origin Energy Brisbane office.

From logs the under-reamed sections will be determined and confirmed by Origin Energy Brisbane office.

6.8.1. Make up 7.5" x 12" under-reamer and BHA as per page 17

6.8.2. RIH to pre-determined intervals of the upper, lower and Taroom coal measures. Under-ream intervals. Refer to manufacturers operating guidelines. Under-reamed sequence will be bottom interval to top interval.

6.8.3. Once targeted intervals have been under-reamed, POOH for wiper trip.

6.8.4. Make up 8-3/4" bit and BHA. RIH too top of Upper Juandah coal measures. Wash and ream to TD. Circulate bottoms up hi-vis pills and ensure hole is clean. POOH to run logs.

6.8.5. Select wells will be subject to post under-ream logging. **Refer to drilling overview.** Run GR-Caliper (two arm) to TD as per section 10. Not all under-reamed wells will require post under-ream logging. **Refer to drilling overview.** In the event of severe fluid losses to the formation, where keeping the hole full is not possible, consult Origin Energy Brisbane office for decision to run wireline pack-off lubricator. POOH and rig down loggers. Download data and send to "on-call" Engineer and attach to IDS.

6.8.6. Make up clean out BHA and perform wiper trip to TD prior to running casing.

ALTERNATE: On wells where under-reaming does not take place the wells a freshwater pill will be displaced from TD to above top coal prior to running casing:

- RIH with bit, 2 x DC, Stabiliser, 6 x DC
- At top coal. Wash down, with pipe rotation, through coal sequences in the Juandah and Taroom coal measures.
- RIH to TD and circulate the hole clean. Pump high viscosity sweep. Displace well to freshwater from TD to above top coal. Mud to remain in well from above top coal to surface. Fluid remaining in well will be water/mud (or a higher density fluid if stated in the **Drilling Programme Overview**).

6.9. 7" Casing and Cementing

Section Total Depth: See Drilling Programme Overview

Casing details: 23 lb/ft, K55, BTC

Accessories: 1 x guide shoe, pre-perforated and normal 7" casing as required to above top Juandah coal, 1 x 7" float collar, 1 x 7" Adaptor Baffle (to receive 1 x shut-off plug), External Casing pack (ECP), Hydraulic Stage Cementer (with closing plug), bow type centralisers, stop rings, 1 x cement baskets

6.9.1. Clean threads, drift, strap and tally casing while drilling 8-3/4" hole.

NOTE: Casing Design will be determined from coal seam depths defined on wireline logs. Final design to be provided by Origin on-call engineer.

6.9.2. Run 7" casing:

Note that running pre-perforated casing can potentially compromise kick control. The upper 3m of each pre-perforated joint of casing has been left unperforated. In the event of a kick while running pre-perforated casing, the string must be lowered to place the perforations below the annular BOP. Refer Procedure - Appendix 1.

- a) Install guide shoe on 1st joint and secure with threadlock;
- b) Run one (1) joint of casing with a centraliser mid joint secured with the stop ring;
- c) Run casing to above the top Juandah coal, placing pre-perforated joints across significant coals of the Taroom and Juandah Coal Measures;
- d) Install additional centralisers at the following points:
 - On the 3rd and 5th couplings;
 - On every 3rd collar to the top of the Juandah coal seam;
 - On collar of joint below ECP (~12 m below ECP);
- e) Install float collar (**must be threadlocked**) and Adaptor Baffle (seat for shut-off plug) in casing connection, one non-perforated joint below ECP;
- f) Install cement basket on joint below ECP, secured with lock ring;
- g) Space out casing to install ECP above top Juandah coal;

Placement of ECP to be confirmed by Origin Brisbane office.
- h) Install and threadlock ECP;
- i) Install and threadlock stage cementing tool immediately above ECP;
- j) Threadlock the first joint above the stage cementing tool;
- k) Run non-perforated casing from top stage cementing tool to surface;
- l) Install centralisers at the following points:
 - On collar of first joint above ECP (~12 m above ECP);
 - On every 3rd collar thereafter until the surface casing shoe;
- m) Run casing and pick up landing joint. Circulate at least the total volume of the casing;

- n) Space out and land casing at the correct height (Refer 'Figure 3 - 7" Spaceout') and install cement head.

6.9.3. Cement 7" casing.

- a) Pressure test all surface lines to 3000 psi;
- b) Establish circulation, drop shut-off plug;
- c) Displace plug to seat in Adaptor Baffle. Bump plug and pressure to 500 psi to confirm seat;
- d) Set ECP - refer to manufacturers operating instructions. Pressure up casing to 1050psi and then slowly to 1100psi to inflate ECP. (The inflate pressures refer to **TAMCAP packer** and should be confirmed for each brand of packer);
- e) Stop pumping and monitor pressure. Pressure will decline as packer inflates;
- f) Increase pressure to above closing pin pressure. (Confirm details for each packer);
- g) Bleed off pressure to lock ECP;
- h) Open stage cementing tool - refer to manufacturers operating instructions. Increase pressure to approximately 1650 psi to hydraulically open tool and establish circulation. (The opening pressure refers to the **Halliburton Type H ES Cementer** and should be confirmed for each brand of stage tool, as well as confirming correct number of shear pins installed);
- i) Circulate well with mud for a minimum 1 casing volume;
- j) Load stage tool closing plug;
- k) Mix and pump 10 bbl pre-flush brine with 6kg SAPP/bbl. The density of the brine must be at least equal to the mud weight equivalent of the permeable zones;
- l) Mix and pump cement slurry (see **Drilling Programme Overview** for slurry details), monitoring for returns during cement job;
- m) Take two cement samples;
- n) Release stage tool closing plug and displace with clean water. Bump plug and pressure to 2000 psi to close tool. Hold pressure for 5 minutes; Should issues arise with regards to not being able to pressure up, the well will need to be shut in at the cement head until cement sets. Information needs to be collected and noted for well handovers with regards to completion activities at a later date.
- o) Bleed off pressure and check tool has closed. WOC;
- p) Flush BOPs and well head;
- q) When cement samples set (wait minimum 6 hours), slack off string weight and ensure casing is held in place. Remove landing joint.

6.10. Suspend well

6.10.1. Suspend well.

- a) Nipple down BOPs;
- b) Install casing protector on 7" casing collar;
- c) Remove 11" casing head;

- d) If required, top up annulus with cement;
- e) Dump mud to sump and clean mud tanks;
- f) Release rig.

7. POTENTIAL HAZARDS

A full copy of the Identified Hazards and Control Measures is included in the Wellsite Safety Management Plan and Risk Assessments - October 2008.

8. BITS, HYDRAULICS AND BHA

8.1. Hydraulics

The rig is equipped with 1 x TSM-750 triplex pump. Hydraulics will be designed to maximise the flow rate with a PDC bit. The initial circulating rate will be approximately 460 gpm, reducing as required as the SPP rises.

Ensure pressure relief valves on pumps are set to **maximum 1500 psi**, to limit pressure in the surface system.

Table 1: Rig Hydraulics

PUMP	1	1
Type	TSM 750	TSM 750
Stroke	8"	8"
Liners Available	6"	6.5"
Output per stroke	2.93 gal	3.45 gal
Max. Pressure Permitted	2250 psi	2315psi
Max. Pump Rate - spm	145	145

8.2. Bottom Hole Assemblies

Hole deviation problems are not anticipated during the drilling of this well. The bottom hole assemblies previously mentioned are listed below:

Table 2: Bottom Hole Assemblies

BHA 1		BHA 2	
Qty	Tool	Qty	Tool
1	12¼" Bit - PDC or back up tricone	1	8-3/4" Bit - PDC
1	Bit Sub	1	Bit Sub with float valve
6	6½" Drill Collars	1	Sub with float valve
1	Cross Over	2	6-1/2" Drill Collar
	4" HWDP	1	8-1/2" blade stabiliser
		6	6-1/2" Drill Collars
		1	Cross Over
		6	4" HWDP
		-	4" Grade TSS95 15.7# Drill Pipe

BHA 3 (UNDER-REAMING)	
Qty	Tool
1	8-3/4" Bit - PDC
1	4-1/2" Reg Box x 4-1/2" IF Box
1	7.5" x 12" Under-reamer tool
1	4-1/2" IF Pin x 4-1/2" Reg box (Bit sub with float)
1	Sub with float valve
6	6-1/2" Drill Collars
1	Cross over
6	4" HWDP
-	4" Grade TSS95 15.7# Drill Pipe

RUN ADEQUATE BHA TO HAVE 12KLBS AVAILABLE FOR WOB WITH 15% SAFETY MARGIN.

9. MUD PROGRAMME

9.1. 12¼" Hole

Spud the 12¼" hole with the water:

- Maintain pH at 9.0-9.5 with Soda Ash.
- Natural clays will contribute to viscosity building. Gel sweeps will complement the drilling fluid in order to sweep hole clean.
- Water can be added at the flow line to maintain volume and to minimise density increase.

High viscosity pills (5-10 bbl) should be utilised as required while drilling to clean the hole. A high viscosity sweep will be used to circulate the hole clean at TD prior to tripping and running casing.

- A high viscosity pill can be formulated with 9 bbl fresh water and 6 sacks of Bentonite (55 lb/sack) and pre-hydrated to allow gel to yield. For a viscosity of 40-50 sec/qt, add a small quantity of PAC R Polymer.

9.2. 8-3/4" Hole

Unless otherwise stated by Brisbane office the primary drilling fluid for production hole will be a Water/PacR based system. Fill mud tanks with water and add PacR (concentration 1 lb per bbl).

Drill out the cement and casing shoe with water on short system.

Conduct Formation Integrity Test. If leak off is considered excessive, increase viscosity with gel and retest. Notify "on-call" engineer of results.

Continue drilling with Water/PacR drilling fluid. Mud density should be kept to a minimum (or to a specified density if stated in the **Drilling Programme Overview**) and this will be achieved by running the finest possible shaker screens and utilising the settling capacity of both the mud tank and designated solids settling tank. Water addition may be used to dilute the system to maintain the mud density below 1.08SG (9 ppg).

At TD, the hole should be circulated clean with a high viscosity sweep.

A freshwater pill will be spotted from TD to above the top coal prior to pulling out of hole to run casing.

In the event that a higher mud density is required, increase density by using KCl.

Lost circulation will be treated with LCM and results monitored to assess potential risk of the well flowing if annular level drops. **Consult with Origin Brisbane office if it is not possible to keep the hole full.**

NOTE: Additions of any diesel or hydrocarbon based chemicals are not to be made without prior approval of the **Manager, Drilling and Completions, CSG**. Any such additions must be fully documented.

Biocide will be used to control SRB's. An initial 'shock dose' of 20 litres per 150 bbl will be required for the initial tank volume of drilling fluid for both surface and production sections. On going treatment there after will consist of 4 litre additions per 150 bbl of drilling fluid.

10. PREDICTED FORMATION PRESSURES

Talinga 16 (Upper Juandah CM)	209.2 m	305.13psi	8.55 ppg
Talinga 18	Water Gradient		
Talinga 19	Water Gradient		

11. WIRELINE LOGGING

The standard wireline-logging programme is as follows:

RUN	TOOLS	INTERVAL
1	GR	TD to Surface
1	Cal- High Res Density	TD to Surface Casing Shoe
2	Sonic	Optional log - TD to Surface Casing Shoe
3	Caliper-GR	TD-surface casing

NOTE: Runs 2 and 3 will be run on selected wells only. Please refer to the **well specific drilling overview** for confirmation of logging programme.

Log scales are to be as follows:

Density:	1 to 3 g/cc
Density correction:	0.25 to -0.25 g/cc
GR:	0 to 200 API
Sonic	40 - 140 US/F
Caliper:	6 to 16 inches
Bit Size:	6 to 16 inches
Hole Volume:	m ³

Note(s):

- a) Two copies of the logs are to be supplied to the **OE Well Site Representative** at the completion of logging each well. A CD copy of the logs is to be provided to the **OE Geologist** in the Brisbane office ASAP.
- b) Digital copies of logs in LAS format are to be supplied on compact disk, to the **OE Well Site Representative** at the completion of each well.
- c) Three final copies of open hole logs are to be supplied to OE Brisbane Office within two weeks of logging the last well of this campaign.
- d) **OE Well Site Representative** is to ensure that a fast copy of logs (PDF) is sent to the **On-Call Geologist** (Walloons Operations phone 0438 742 925), for coal depth confirmation.

Figure 1: 9 5/8" Spaceout

Ensign Rig 50

SETTING DEPTH FOR 9-5/8" CASING

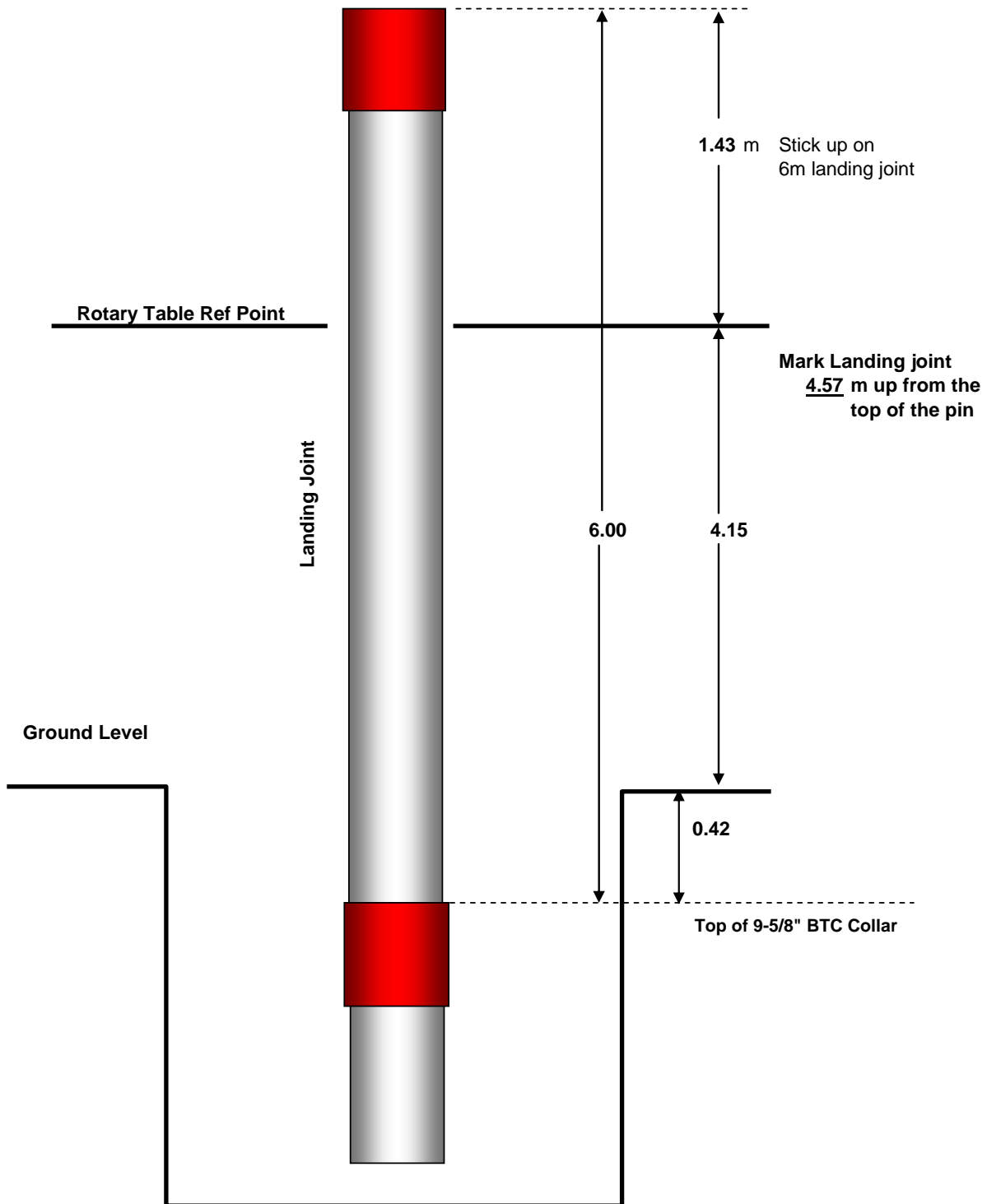


Figure 2: BOP Stackup

Ensign Rig 50

8-1/2" SECTION BOP STACKUP

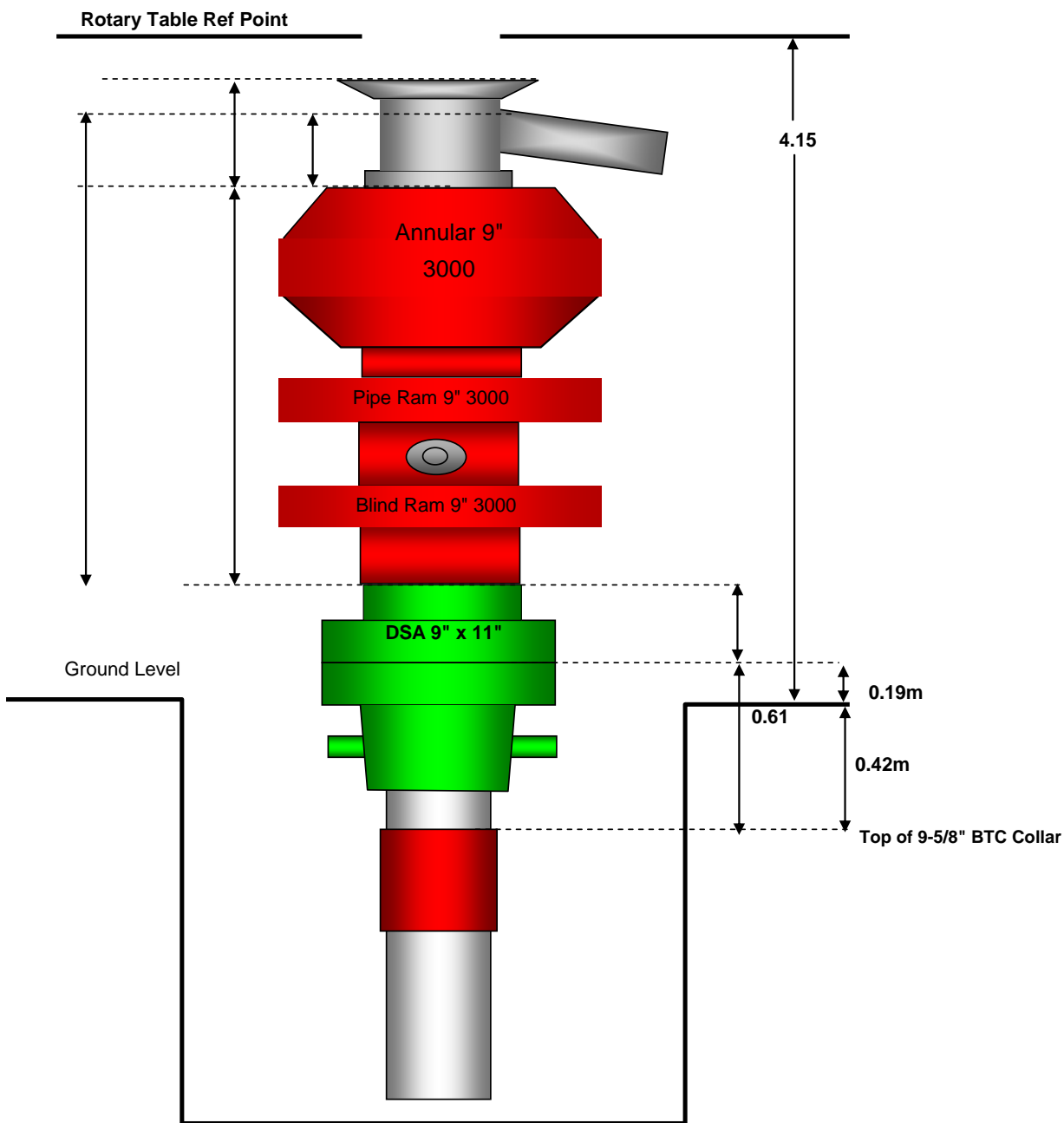
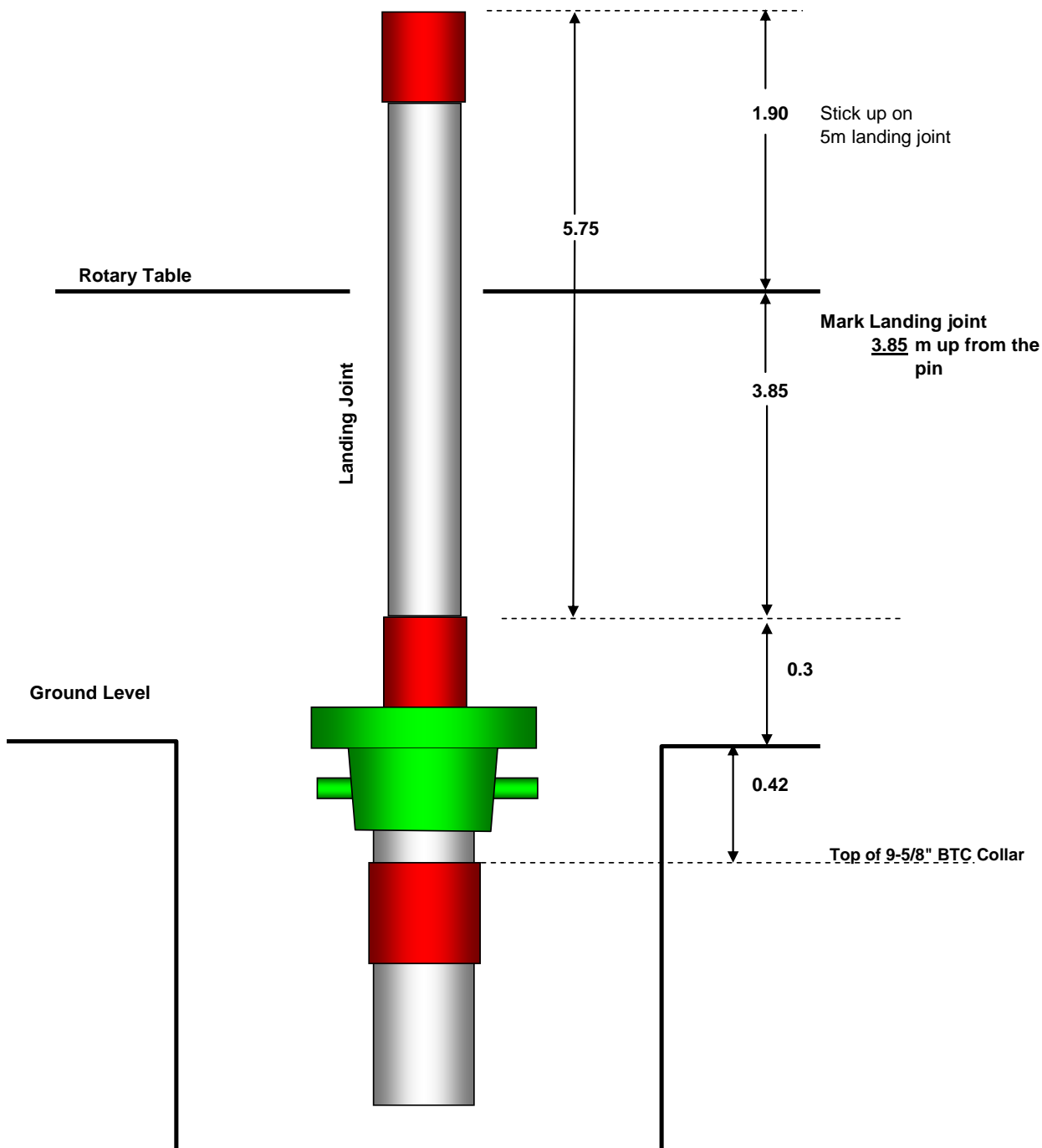


Figure 3: 7" Spaceout

Ensign Rig 50

SETTING DEPTH FOR 7" CASING



12. PRESSURE TESTING

Table 3: Pressure Testing Requirements for BOPs

EQUIPMENT	PRESSURE (psi)	TIME (minutes)	PRESSURE (psi)	TIME (minutes)
SURFACE CASING				
Casing, Blind Rams, Pie Rams, HCR	250	10	2000	10
Choke Manifold				
Rear Valves	250	5	2000	5
Mid Valves	250	5	2000	5
Front Valves	250	5	2000	5
Annular Preventer	250	5	1000	5
Kelly Cocks	250	5	2000	5
Kill Line Valves	250	5	2000	5

A BOP Pressure Test Checklist should be completed and submitted to Brisbane office together with any relevant pressure recording charts.

Well Control Safety

- (1) Whenever drilling breaks are encountered drill two (2) metres into the break, stop drilling and conduct a flow check.
- (2) The kick control techniques in the Operations Manual and Emergency Response Manual are to be followed in the event of any kick being encountered when drilling, tripping or during any other operations.
- (3) Slow Pump Rate tests are to be carried out every 150m of hole drilled, following increases in mud weight and prior to tripping out of hole. SPR's are to be recorded in tour report.
- (4) BOP drills are to be held on a frequent basis. ESD should be tested on a regular basis and reported in the daily report
- (5) **Hard Shut-in procedure to be followed.** After shut-in all personnel should assemble and remain at the muster point until both the **OE Well Site Representative** and the **Ensign Rig Manager** have assessed the situation and planned subsequent operations.

13. FORMATION INTEGRITY TESTING PROCEDURE

A formation Integrity Test is to be conducted to determine the strength of the open hole formation and to estimate the maximum allowable casing pressure (MACP) for well control procedures.

The applied surface pressure for the formation Integrity test is 50 psi (EMW approx 12.4 ppg).

The FIT should be conducted after drilling out the cement and the 9 5/8" casing shoe.

Procedure

1. Drill out the 9 5/8" casing shoe with water and drill 3-5 m of new formation;
2. Circulate to ensure mud column is balanced and cuttings are circulated out;
3. Pull bit inside the 9 5/8" casing shoe;
4. Shut the well in using the annular or pipe rams. Close the kelly cock;
5. Rig up the pressure testing unit and pump down the annulus at a constant rate of approximately 0.05 - 0.1 bbl/min until an FIT Test pressure of 50 psi is reached and stabilised. Observe the pressure over a 5 minute interval (looking for any drop in pressure); and
6. Bleed off the pressure and record the volume of fluid recovered. Any difference between the volume bled back and the volume pumped is volume that has been lost to the hole.

NOTE: If 50psi cannot be maintained spot a hig vis gel pill on bottom and re-attempt FIT.

Calculation

The maximum allowable mud density is calculated as follows:

$$MAMD = P_T (\text{psi}) / 0.170612 / \text{TVD (m)} + \text{MW (ppg)}$$

Where:

- | | | |
|----------------|---|--|
| MAMD | = | maximum allowable mud density (ppg) |
| P _T | = | Maximum Test Pressure achieved (psi), normally 200 psi |
| TVD | = | drilled depth (m) |
| MW | = | test mud weight (ppg) |

The TVD used in this calculation should either be the casing shoe setting depth, the drilled depth at which the formation integrity test is done, or the depth of the suspected weakest formation in the open hole section.

14. COMPLETION

The well will be cased and suspended for production. Separate completion programmes will be distributed when the workover/completion scheduling is finalised.

15. COMMUNICATIONS

15.1. Origin Phone Numbers

Communication to the Joint Venture participants will only take place through Origin's office in Brisbane.

Operations Contact: Quinton Cahill (Drilling Engineer)

Direct Telephone (07) 3867 0340
Office Facsimile (07) 3369 7840
E mail Quinton.Cahill@originenergy.com.au

Operations Mobile 0429 998 089

15.2. Daily Reports

Daily reports covering 0000 - 2400 hours, to be complete and posted on the IDS website for review by the Drilling Engineer by 0700 hours Eastern Standard Time.

15.3. Rig Phone Numbers

Mobile TBA

15.4. Origin After Hours Contact Telephone Numbers

	Name & Position	Work	Home	Mobile
1.	Drilling Operations Supervisor - 24 HRS on call			
2.	Karen Stanley Manager, Drilling	07 3858 0228		0429 674 825
3.	Kerry Clancy Central Stores/Procurement Supervisor	07 4620 1513		0418 759 556
4.	Tim Maiden Manager, Field Services Group	07 4620 1506		0419 421 137

15.5. Priority Listing

Name & Position	Work	Home	Mobile
Paul Zealand General Manager, Oil & Gas Production	07 3858 0681		0428 729 009
Martin Riley Manager, CSG and Oil & Gas Production (Qld)	07 3858 0613	07 3378 0576	0417 762 767
Tim Scholefield Group Manager, Subsurface	07 3858 0248		0419 955 626

15.6. Origin Offices

	OFFICE	Phone:	Fax:	Mobile:
1	Origin Brisbane	07 3858 0600	07 3369 7840	
2	Origin Talinga Plant	07 4662 7666		
3	Origin Roma	07 4622 2244	07 4622 2969	0427 262 244
4	Origin Roma Stores	07 4620 1512	07 4622 5167	0427 263 640

15.7. Emergency Response Numbers - (NOTE: 000 does not work from sat phones)

	Roma	Chinchilla	Wandoan	Miles
All	000	000	000	000
Hospital:	07 4622 1433 (McDowall St)	07 4662 8888 (Slessar St)	07 4627 4444 (Taroom Rd)	07 4628 5600 (Marian St)
Ambulance:	07 4622 4805	07 4662 7000	07 4627 4112	07 4627 1037
Police:	07 4622 9333	07 4662 7200	07 4627 4222	07 4627 1222
SES:	07 4622 2188 07 4622 4717 (AH)			
RFDS:	Charleville: 07 4654 1443 Rockhampton: 07 4931 7198			

15.8. Government and Joint Venture Contact Details

Government	Number
Department of Natural Resources and Mines Cnr Main & Vulture Streets Woolloongabba QLD 4102 Australia Andy Kozak	Reports to be emailed to: akozak@dme.qld.gov.au 07 3237 1491 (phone) 07 3237 1534 (fax)
DNRM Gas & Petroleum Emergencies	0419 888 575

15.9. Contractor Contact Details

Company	Contact	Work	Facsimile	A/H
Ensign International	Adam Watts	07 4699 1888	07 4699 1800	
Flower Earthmoving	Steve Flower	07 4626 8393	07 4626 8125	0427 623 384
Halliburton Australia Pty Ltd	Paul Larkins	07 4622 4588	07 4622 3674	07 4622 3172
AMC	Nick Santarelli	08 8359 6611	08 8349 6764	0408 497 371
Roma Transport Services	Ian Forbes	07 4622 5222	07 4622 4822	0411 455 397
Weatherford Logging	John Ferguson	07 4622 5303	07 4622 5372	0429 499 773

APPENDIX 1

WELL CONTROL WHILE RUNNING 7" PERFORATED CASING

The production wells in the Walloons development are designed with perforated casing set across significant coal seams. This will entail running pre-perforated casing over the lower 300-400m of the well. The perforated casing will be intermixed with non-perforated casing joints.

Risk Event

Well control event while running the perforated casing. The perforations allow communication from open hole - casing annulus into the casing and to atmosphere via perforations at surface (irrespective of any closure of BOP annular or rams).

Consequence

Personnel injury, equipment damage, environmental damage, discharge hydrocarbon gases (ignition risk).

Existing controls

Keep the hole full of fluid. If required, circulate fluid via top drive casing nubbin once each joint is lowered to the point where the perforations are below the flow nipple level.

BOP (annular and/or ram) for control of annulus. Casing running nubbin (for Ensign Rig 50) to seal off at top casing connection.

If a joint of perforated casing is being run at the time of the well control event, the casing should be lowered until the perforations are below the annular or rams, if practical and safe to do so. To facilitate this, each perforated joint remains non-perforated for 3m below the casing collar. This enables the joint to be lowered to the slips position, placing the top perforations below the annular BOP and/or rams. At this point the BOP can be closed, securing the well.

After each joint has been run, the well should be checked to ensure there is no flow prior to backing out the casing running nubbin. In the event the well flows during the period the drive nubbin is disengaged from the casing string, the nubbin should be made up to the casing joint in the slips, if practical and safe to do so, prior to shutting the annular and/or ram. If the casing running nubbin is engaged with the next casing joint to be run, personnel on the rig floor will have to assess if it is practical to stab the new joint of casing into the joint in the slips. Alternatively the nubbin could be backed out of the new joint prior to attempting to stab in to the joint in the slips. **HOWEVER**, the overriding consideration prior to taking any such action must be:

It is the philosophy of OECSG that human life is more important than plant, equipment and the environment. Under no circumstances are personnel to put their life in danger for the sake of plant, equipment and/or the environment. When in doubt evacuate the area.

After all the programmed perforated casing has been run, a float collar will be installed in the casing string to prevent any well fluids flowing back through the casing, and normal well control procedures will apply.

APPENDIX 2

DRILL STEM TEST PROCEDURE

For drill stem tests the following procedure will be adopted:

(This procedure is applicable to testing services provided by DST Australia, and should be read in conjunction with DST Australia procedures.)

- (1) Circulate until hole is clean.
- (2) Pull out of hole.
- (3) Conduct Safety Meeting regarding testing procedures and hazards.
- (4) Make up testing assembly. Tests should be conducted using standard drill string. A 30% water cushion will be run unless otherwise approved by Origin Energy Brisbane office.

NOTE: Due to the possibility of increase in depth of test intervals for this well, a number of drill collars may have to be dropped out and replaced with either HWDP or DP. This will allow more pulling capacity should it be required. Please confer with Brisbane office with regards to final string makeup.

- (5) Final test string configuration will be confirmed with testing contractor prior to test. Tools must include as a minimum, three (3) recorders (These are: electronic - inside, outside and recovery) plus two independent circulating subs, safety joint and sample chamber. The drill stem recovery will be circulated conventionally. Jars, if available, may be run above the DST BHA and used to release the packers at the completion of testing. If possible, fax or email proposed tool string to the Origin Energy Brisbane office before make up.
- (6) Check measurements with the testing operator to ensure that the desired interval is being tested. Record all measurements on the back of the Drill Stem Test Report Form.
- (7) Check that the flare line to the flare pit is clear and all valves on the line downstream from the choke are open.
- (8) Ensure all sources of ignition have been suppressed.
- (9) Contact Origin Energy Brisbane office to confirm flow and shut in periods. Nominal test period for coal seam tests are 5 minute pre-flow, 30 minute shut in, 60 main flow, 300-minute final shut in. Electronic recorders should be set to collect data at one-second intervals.
- (10) Install top drive compatible testing head. Rotate pipe to inflate the packers. Confirm packers are set.
- (11) Open valve - observe annulus to ascertain if the packers are holding. A fill up line should be directed to the annulus to top up lost fluids. If a sudden drop is seen in the annulus the tool should be picked up to close.

- (12) Conduct drill stem test with flow periods as instructed. In some cases main flow period will be contingent on surface observations based on consultation with company reservoir engineer during test.

N.B If bubble rate (flow rate into drill pipe) decreases significantly during main flow period (second flow) after a very strong blow initially, shut in tool immediately. Do not change pre-flow or shut in periods. Ensure full 60 minute main flow if little flow (weak bubbles).

- (13) Pull packer free. Observe the mud level in the hole for any returns.
Ensure hole remains full at all times.
- (14) Drop bar to open drop bar sub. In the event of failure of the drop bar sub, pressure up to activate the pump out sub. Have pumps on line to fill the annulus if needed.
- (15) Once the annulus is stable (and full), circulate conventionally a minimum of one hole volume or until any sign of gassiness is removed from the well bore fluid.
- (16) Pull out with test string. Ensure the hole is kept full at all times and that initially the tools are pulled slowly to avoid swabbing the well. At any stage during tripping the top drive may be made up and the well circulated to avoid/stop any influx of gas.

ORIGIN CONTACT - DRILL STEM TESTS

Chris White - Engineering Leader

(w) 3858 0642 (h) 3367 1383 (mob) 0430 430 585

Matt Groves - Petroleum Engineer

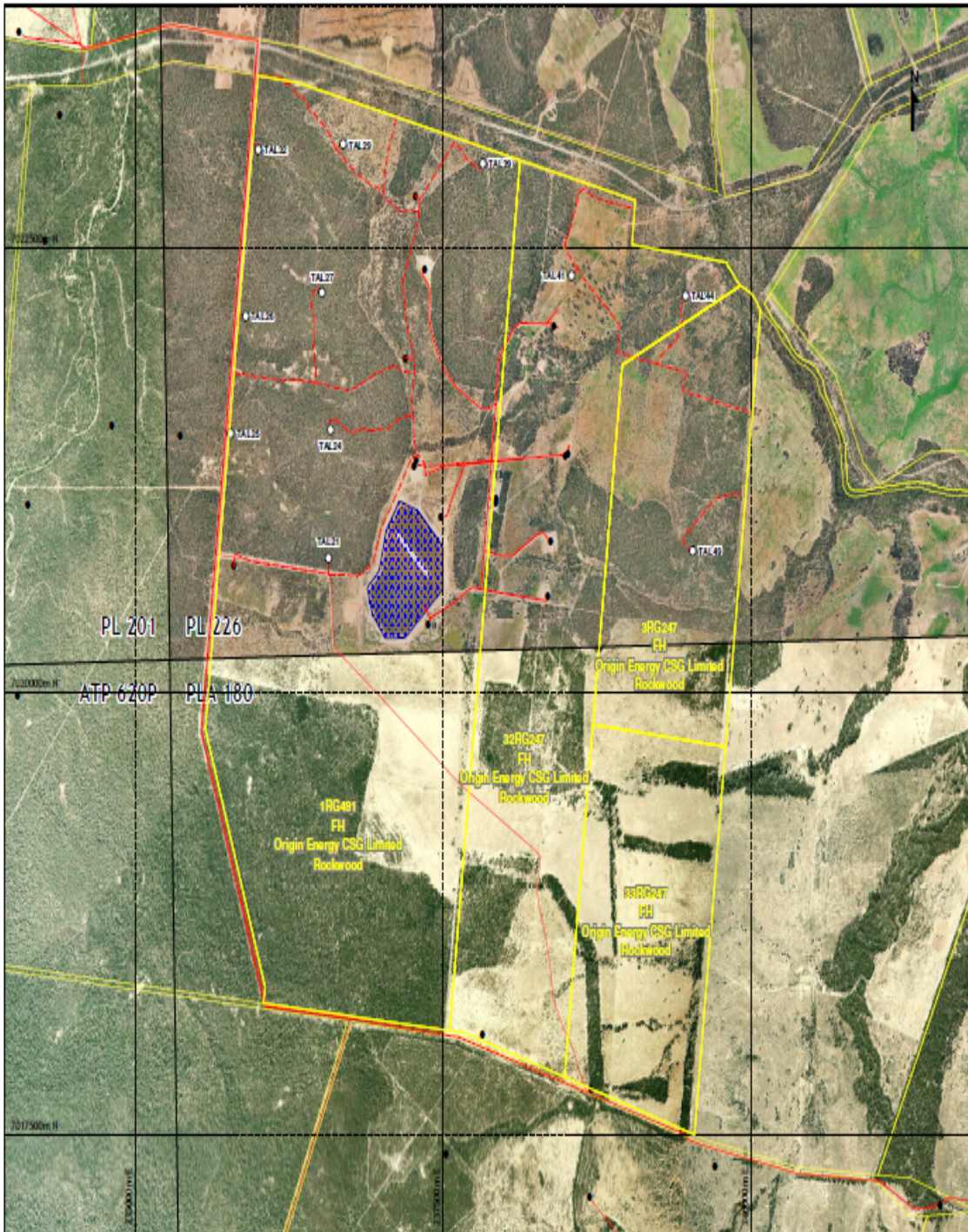
(w) 3858 0240 (mob) 0429 476 837

Formation Fluid Samples

No gas or water samples are required. Use a gas sniffer to analyse the flow from the bubble hose during the pre and main flow.

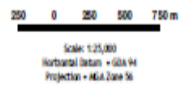
APPENDIX 3

LOCATION MAP



Talinga Expansion Programme
Rockwood
Imagery

- Existing
- Well
 - Pipeline
 - ▭ Pond
- Tenure
- ▭ Cadastral boundary
 - ▭ Permit



Map Reliability
Proposed infrastructure is subject to change without notification. Exercise caution when using this data.

Data Sources
Copyright Cadastral data The State of Queensland (Department of Natural Resources and Water) 2006.

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Printed: 10/11/2008

Map ID: G15-F-310-0095-2b