



## ABANDONMENT PROGRAM

### OROGO LEVEL I WELLBORE

PARAMOUNT ET AL LIARD K-29A

WID # 2030

POTENTIAL H<sub>2</sub>S: 0.50%

Potential Co<sub>2</sub>: 20.0%

## PROCEDURE APPROVAL & DISTRIBUTION

DATE: October 14, 2022  
WELL NAME: Paramount et al Liard K-29A  
UWID: 300/K-29-6030-12330/3  
OPERATIONS AREA: Liard West                      PROVINCE: NWT  
OBJECTIVE: Abandon wellbore in accordance with OROGO guidelines.  
PARAMOUNT WI (%): 88.41053%  
AFE No:  
AMOUNT: \$  
PRL Supplier Coding: PR210-9231-xxx (Abandonment program)

### REGULATORY APPROVALS:

REQUIRED: YES

TYPE: OROGO Operations Authorization and ACW.

AUTHORIZATION RECEIVED by:

DATE:

PROCEDURE COMPLIES WITH CONDITIONS OF AUTHORIZATION: YES  NO

TYPE OF WORKOVER: (Abandonment):

### PROCEDURE COMPLIES WITH PARAMOUNT RESOURCES LTD. POLICIES ON:

- 1) Paramount Well Control Manual
- 2) AER Servicing BOP Class III well.

### DISTRIBUTION:

FIELD:

CALGARY:

WRITTEN BY:

Richard Bean

DATE: October 14, 2022

REVIEWED AND  
APPROVED BY:

Tim Wood P.Eng (Manager ARO)

DATE: October 18, 2022

## REVISED ABANDONMENT PROGRAM

### OBJECTIVE

Suspended Level I wellbore. Abandon production zones and ensure porous intervals and BGW are isolated to abandon the well as per approved ACW and OROGO guidelines. Cut and cap well.

### SAFETY

A safety meeting is to be held with all service company personnel prior to each job. Wellsite supervisor must notify Contractors of known hazards of which Contractor(s) may be unaware. Wellsite supervisor must ensure that workers are aware of their responsibilities and duties under OH&S regulations and that workers comply with regulations. All service companies supplying materials will review Material Safety Data Sheets at this meeting for all products supplied and maintain these Material Safety Data Sheets available for worker's examination on location in compliance with WHIMIS regulations. All safety meetings will be recorded on the Paramount daily report and on the daily tour sheet.

Whenever possible, plan and conduct all workover procedures in a manner which will avoid the mixing of air & hydrocarbons in the well bore and connected surface piping. If mixing does occur, purge prior to pressurizing or exposing mixture to any other possible source of ignition.

Rig anchor locations if required will be approved by Paramount Wellsite Supervisor prior to installation.

### REGULATIONS

All applicable regulations, including, but not limited to the specific approved OROGO ACW approval, OROGO Well Suspension and Abandonment Guidelines, Oil and Gas Occupational Safety and Health Regulations (NWT) and Occupational Health and Safety (OHS) Regulations (NWT) are to be strictly adhered to. Written instructions must be posted in doghouse or other conspicuous area prior to the wellsite supervisor leaving the lease. Wellsite supervisor must designate, in writing (see attached Form), a competent person to carry out principal contractor's responsibilities. All verbal notifications and approvals from government regulatory agencies will be recorded on Paramount's daily report tour sheet. The name of the individual contacted and the subject matter of approval or notification should be recorded on same.

Paramount shall provide all staff and contractors for this program with the OROGO 24-hour incident reporting phone number (867-445-8551) prior to commencing any work or activity.

Paramount shall submit to OROGO an updated operator contact list for this program prior to any work or activity by email at [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca).

Paramount shall submit to OROGO certificates and inspection documents for any service rig, well control and associated equipment (including boilers) at least 10 days prior to the rig commencing work by e mail at [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca).

Paramount shall submit to OROGO all reports required under the Oil and Gas Drilling and Production Regulations in a timely manner to OROGO by email at [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca).

Paramount shall submit to OROGO, completed Change of Well Status form 30 days after the service rig release date or when the abandonment operation has been finished.



## **WORK ORDERS/FIELD TICKETS**

Delivery and field tickets for all work, services performed, or materials purchased must be signed by a Company wellsite supervisor. Record the AFE number and well location on all purchase and work tickets.

## **MATERIAL TRANSFERS**

All materials shipped to this location that are not used must be transferred to an appropriate warehouse point. Transfers of any tubular materials must include complete tally. Company wellsite supervisor will complete such transfers and forward both copies to Calgary office for approval and further handling.

## **WELL HISTORY**

Well was originally drilled by Northcor Energy through the winter of 1986 with rig release February 25, 1987. Well was vertically drilled to 3149m TD and logged. Logging determined that the target formation was missed. The decision was made to plug back the vertical at 2080m. Abandonment plugs were set in the vertical section and a whipstock plug was set. After several attempts to cut a window, drilling resumed to TD at 3749m. The well was completed in the Lower Nahanni and testing results indicated high water cut and uneconomic gas. The lower Nahanni intervals were abandoned under permanent bridge plugs and capped with cement. The middle and upper Nahanni were completed and production tubing was installed with a packer. The well was DH suspended in 2008 with a permanent bridge plug capped with thermal cement at 2903mKB. A second permanent BP was set in tubing and not capped with cement at 57.0 mKB. The well remains suspended.

## **PROGRAM SUMMARY**

- Move in class III free standing service rig.
- Stump test and install 279.0mm class III BOP
- Pressure test well bore to 7 Mpa x 10 min.
- Pick up 73mm work string open ended w/ PSN. Run in and tag top of bridge plug at 1734.5 mKB
- Circulate well over to clean fresh water.
- Rig in cementing equipment and circulate down with 2m<sup>3</sup> thermal cement and place on BP (30m linear cement on Bridge Plug).
- Pull out of cement and backwash. Pull and stand 73mm tubing
- Rig in wire line. Run in with GR/CCL/RBL logging tools. Log from 100m below cement top to surface.
- Run noise/temp logs as needed to identify SCVF source.
- Run in and perforate for zonal isolation or SCVF intervals. (To be confirmed)
- Establish feed rate and run/test retainer to prep for cement squeeze.
- Squeeze or circulate cement to surface (Cement program TBD once feed rate or circulation is established)
- Repeat above perforating/cementing steps until zonal isolation is complete and SCVF repair is complete.
- Lay down remaining tubing, remove BOP and install wellhead.
- Confirm no SCVF or GM present
- Move equipment off location.
- Cut and cap well at surface



# PARAMOUNT ET AL LIARD K-29A ABANDONMENT PROGRAM

## WELL DATA AND WELLBORE CONFIGURATION

### WELL DATA:

**Surface Location:** LAT: 60.28.41.0, LONG: 123.35.4.1 (NAD 83)  
**Bottomhole Location:** LAT: 60.29.18.7, LONG: 123.35.60 (NAD 83)  
**UWI:** 300/K-29-6030-12330/3  
**Profile:** Vertical  
**BGWP:** 600m GL (Default)  
**WID#:** 2030  
**OPERATING LICENCE#**  
**LAND USE PERMIT#**  
**WATER LICENCE #**  
**OROGO OA#** TBD  
**OROGO ACW#** TBD  
**Spud Date:** August 22, 2005  
**Rig Release Date:** October 12, 2005  
**KB:** 416.4m  
**GL:** 409.6m  
**KB-GL:** 6.4m  
**KB-THF** 4.40m  
**PBTD:** 1734.75m KB (BP 2013)  
**TD:** 3620.0m KB (MD) 2661.8 mKB (TVD)

**Surface Hole:** 444.5 mm to 711 mKB  
**Surface Casing:** 339.7 mm, 101.19 kg/m, K-55, BT&C set @ 701 mKB. Cemented with 84.9 m<sup>3</sup> 1:1:2 + 0.5% D65 + 0.2%D46 lead cement followed by 8.4 m<sup>3</sup> RFC + 1%S1 + 0.2%D46. 17.0 m<sup>3</sup> cement returns to surface.

**Intermediate Hole:** 311 mm to 2500 mMD  
**Intermediate Casing:** 244.5 mm, 64.94 kg/m, K-55, BT&C casing from surface to 1600 mKB & 69.9 kg/m K-55 BT&C casing from 1600 to 2500 mKB. Cemented with 78 t 1:1:2 class 'G' + 0.5% D65+0.1%B71+0.8% D160+0.2%D46 lead cement followed by 23 t 0:1:0 class 'G' cement + 0.5% D65 + 0.7% D160 + 0.1% D136 + 0.2% D28 + 0.35% D66 + 0.2% D46. 6.5 m<sup>3</sup> cement returns to surface. Permanent bridge plugs set at 1734.75 m KB and a bridge plug at 2509.8 m KB capped w/ 12.5m linear cement.

**Main Hole:** Whipstock top at 1853 mKb  
216 mm to 2567 mKB  
**Sidetrack at 2295 mMD**  
**Drilled directionally with an inclination of approximately 42° to the liner shoe at 2567 mMD.**

**Production Liner:** 177.8 mm, 38.67 kg/m, L-80 casing from liner hanger at 1744.52 mKB to 2567 mKB. Cemented with 19 tonne thermal 40 cement +1.2 class% TLF-HT + 0.8% THR-1+0.1% TWR 2

**Open Hole:** 156 mm 2567 to 3620 mMD (2661.8 mTVD)  
**Drilled directionally from the liner shoe to an inclination of approximately 80° at TD**



**Open Hole Section:** Nahanni: 2567 mMD - 3620 mMD  
 Estimated BHP: 23,000 kPa  
 Estimated H<sub>2</sub>S Content: 0.5%  
 Estimated CO<sub>2</sub> Content: 20%  
 Estimated Temperature: 160<sup>0</sup> C

**Formation Tops**  
 geoSCOUT Ref Elev(m): **+723.0**

Formation	TVD (m)	Elev (m)	MD
Mbesa r U	300.0	+118.8	300.0
Mexshaw	1351.3	-932.5	1354.0
Dbesa rvL	1477.9	-1059.1	1482.7
Dmuskwa	2225.0	-2061.0	2232.8
Dnahanni	2479.8	-2497.4	3000.0

**Capacities:**

Capacity of 244.5 mm 64.94 kg/m casing: 0.0390m<sup>3</sup>/m  
 Capacity of 177.8 mm 38.69 kg/m casing: 0.0200m<sup>3</sup>/m  
 Capacity of 156mm Open Hole: 0.019009m<sup>3</sup>/m  
 Capacity of 73mm 9.67Kg/m L-80 EUE: (Work String) 0.0030m<sup>3</sup>/m

**Tubing/Casing Data:**

	Surface Casing	Int. Casing	Liner	Work String
Size O.D. (mm)	339.0	244.5	177.8	73.0
Weight (kg/m)	101.9	64.94	38.69	9.67
Grade	K-55	K-55	L-80	L-80
Connection	BT&C	BT&C	LT&C	EUE
Drift I.D. (mm)	311.36	218.41	156.24	72.82
I.D. (mm)	315.34	222.38	159.41	76.00
Capacity (m <sup>3</sup> /m)	0.1854	0.0794	0.0200	0.0045
Collapse (MPa)	62.4	51.3	29.9	72.57
Burst (MPa)	77.7	54.5	34.3	70.00
Tension (daN)	199500	855000	212000	92167
Annular Volume (m <sup>3</sup> /m)				
Depth (mKB)	701.0	2500.0	1744.5-2567.0	



**Reservoir Data:**

Formation	Nahanni	
Open Hole	2567.0 – 3620.0	
Reservoir Pressure	28,796 Kpa (est)	
Shut-in Tubing Pressure	0 Kpa -2021 well inspection	
Pipeline Pressure @ Tie-in	N/A	
Reservoir Temperature	157 deg C (est)	
H <sub>2</sub> S %	0.50	
Expected Gas Rate	Nil	
Expected Condensate Rate	Nil	
Expected Water Rate	Nil	

**Kill Fluid:** - Fresh water (Hydrostatic = 31,353 Kpa @ 3196m)

**SCVF:** Yes. Vent flow tested positive during 2013 suspension operations and subsequent well inspections.

Vent flow source - TBD



## **GENERAL REQUIREMENTS**

- **Daily reports shall be e-mailed to the Operator's office by 7:00am each day.**
- Before commencing operations, the Wellsite Supervisor will complete a list of nearest available emergency services. This list along with a detailed and accurate description of directions to the location is to be posted in a conspicuous and accessible location known to all personnel.
- Emergency contact list should be completed, posted and available to all on site.
- Ensure that all personnel receive a Paramount orientation, are briefed on the wellsite hazards, safety and first aid equipment locations, escape routes and muster points upon their arrival to the lease. All personnel must be signed in after receiving their briefing and all personnel must sign out when departing the work site.
- Safety and well plan meeting to be held with all service company personnel prior to each job and meetings must be recorded on the Paramount's daily report and on the daily tour sheet.
- All applicable regulations, including, but not limited to the specific approved OROGO ACW approval, OROGO Well Suspension and Abandonment Guidelines, Oil and Gas Occupational Safety and Health Regulations (NWT) and Occupational Health and Safety (OHS) Regulations (NWT) are to be strictly adhered to. Written instructions must be posted in doghouse or other commonly visited area prior to Wellsite Supervisor leaving lease.
- The Wellsite Supervisor is responsible for assessing all worker's competency and ability to perform work.
- All service companies supplying materials will provide Material Safety Data Sheets for all products supplied and maintain these Material Safety Data Sheets available for worker's examination on location in compliance with WHIMIS regulations.
- The Wellsite Supervisor will ensure that dangerous goods shipped or received are classified, packaged, marked, labelled and documented in compliance with the Transportation of Dangerous Goods Regulations. If required, placards must be attached to vehicles transporting dangerous goods. All shipping documents must be forwarded to the Calgary office for filing.
- All operations carried out on behalf of the Operator shall be conducted in a safe and efficient manner in compliance with the Operator's safety regulations and all applicable acts and regulations.
- The Operator expects that all operations conducted will be designed to protect and maintain the quality and integrity of the environment and comply with all environmental acts and regulations.
- BOP equipment will be tested at least once daily, and any equipment found defective should be made serviceable before operations are resumed. Blowout prevention and man-down drills are to be performed weekly and are to be recorded on both the morning reports and tour reports.
- Whenever possible, plan and conduct all completion / workover procedures in a manner which will avoid the mixing of air & hydrocarbons in the wellbore and connected surface piping. If mixing does occur, purge prior to pressurizing or exposing mixture to any other possible source of ignition.
- During the absence of the Wellsite Supervisor, a qualified and competent alternate shall be designated, in writing, to carry out the principal Contractor's responsibilities. Written instructions must be posted in a conspicuous and accessible location known to all personnel prior to the Wellsite Supervisor leaving the location.



- All verbal notifications and approvals received on location from any regulatory agency must be documented and recorded on both morning reports and tour reports and should include a contact name from the agency, phone number and details of the subject matter.
- All field tickets and other supporting documentation submitted for materials purchased and/or services rendered require a correct AFE#, G/L number and accurate identification of the well location along with the Wellsite Supervisor's signature indicating acceptance to the same.





# Paramount et al Liard K-29A ABANDONMENT PROGRAM

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## ABANDONMENT PROGRAM

1. Submit certificates and inspection documents for any service rig, well control and associated equipment (including boilers) at least 10 days prior to the rig commencing work by e mail at [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca)
2. **The Wellsite Supervisor is responsible to** notify (or verify notification has been completed) the OROGO, a **minimum of 24 hrs prior** to any well servicing abandonment operation.
3. **The Wellsite Supervisor is responsible to** notify (or verify notification has been completed) the OROGO, a **minimum of 24 hours prior** to any planned flaring operation. When a permit is applicable for sour gas flaring, a copy of such permit must be on site during any flaring operation and requirements of such permit must be strictly adhered to
4. **The Wellsite Supervisor is responsible to** verify notifications have been completed to all applicable residents, industrial operators, trappers & guiders within the categorized radius and/or within the emergency planning zone (EPZ) if applicable **a minimum of 24 hours prior** to any flaring operation.
5. Paramount shall provide all staff and contractors for this program with the OROGO 24-hour incident reporting phone number (867-445-8551) prior to commencing any work or activity.
6. Obtain safe work permit from operations to turn over responsibility of well to the well site supervisor. The well site supervisor will then permit all other services.
7. Complete lease access and well handover process. Complete lease inspection, program review and obtain well access permit with the production operator. Note the condition of the lease, record any clean-up operations required to address any spills and record any other noteworthy findings on the first morning report. Discuss the transportation arrangements for the tanks and fluid with respect to other activity in the surrounding field area.
8. Prepare location for rig & support equipment.
9. MIRU service rig complete with a 35 MPa Class III BOP stack. 88.9 mm rams, kill spool, rig pump, clean tank, and related auxiliary equipment to OROGO, OH&S and PRL regulations and guidelines. Ensure Corporate Policies and Procedures are followed prior to commencing operations (see attached). Space out equipment in accordance with AER and OH&S requirements.
  - Ensure all necessary safety equipment is strategically positioned, on site and tested to ensure proper operating condition prior to commencing with the workover operations.
  - All personnel must be familiar with the operation of all emergency equipment. Safety and BOP drills are to be conducted on a regular basis and recorded on the "Daily Completion / Workover Report"
  - Conduct a complete inspection of the service rig per requirements of AER Directive 37 and PRL guideline policy. Identify and remediate any deficiencies prior to initiating completion operations
  - Conduct an operational and safety meeting prior to installing BOPs onto the wellhead and pressure testing.
10. If necessary, install temporary rig anchors and conduct pull tests on each anchor to 20000 lbs. Install escape line anchor and pull test to 3000 lbs. Ensure PRL ground disturbance procedures are followed.



11. Haul in approximately 60 m<sup>3</sup> of fresh water.
12. Conduct daily pre-job safety meeting and equipment inspection.
13. Tie in circulating lines with a return line tied into 'P' tank. Properly stake surface lines and pressure test lines and manifold to 1,400kPa (low) and 35,000kPa (high) and hold each for ten (10) minutes.
14. Ensure the well is dead. Install the working spool and BOPs onto the BOP test stump. If required warm up the BOP stack with steam. Function test the blind rams and pipe rams on the test stump. Close the blind rams and pressure test the working spool, the blind rams and BOP flange to 1.4 and 35MPa for 10 minutes each. Install a ported tubing pup and stabbing valve through the BOPs on the BOP test stump. Pressure test the pipe rams and stabbing valve to 1.4MPa and 35MPa for 10 minutes each.
15. Conduct an accumulator function test. Recharge the accumulator, shut off the pump and record the accumulator pressure. Close each ram and record the start and end pressures and the time to close each ram. Recharge the accumulator and record the time for the accumulator to recharge to the original pressure. Ensure that hand wheels are available and are the correct type and size for all the BOP rams. Record the number of turns to close each ram manually.
16. Remove wellhead top section and nipple up the rig BOPs. Install tubing hanger and pup joint and secure in tubing spool. Pressure test BOP to 1.4 Mpa low and 35 Mpa high for 10 min. Pressure test casing to 7 Mpa x 10 min.
17. Pick up 73mm work string and run in hole to tag top of existing permanent bridge plug at 1734.75 mKB.
18. Circulate well over to clean fresh water. **Pressure Test Bridge Plug 7MPa x 10min.**
19. Rig in cementing services and pump 2m<sup>3</sup> thermal cement down tubing to balance on top of BP. Slowly pull tubing out of cement and backwash tubing clean (30m linear cement on top of Bridge Plug)
20. Pull and stand 73mm tubing in derrick.
21. Pick up wire line. Run in to perform GR/CCL/RBL log from 100m below cement top to surface. Run in with Noise/Temp/GR logging tools and perform noise/temp log from PBSD to surface. Forward logs to Calgary for analysis.

## ZONAL ISOLATION/SCVF REPAIR PROCEDURE

22. MIRU E-line unit with lubricator and BOPs. Purge and pressure test the lubricator to 1400kPa (low) and 14MPa (high) with Nitrogen gas. Purge the lubricator each time before running in the hole with tools. Hang the wireline sheave in the derrick.
23. **Depending on where the cement top is confirmed and source of existing vent flow is identified, the following interval for perforating and cement squeezing may be required:**
  - Muskwa 1705.0 – 1706.0 mKB (MD) (Above existing BP)
  - Besa River: 1482.5 – 1483.5 mKB (MD)
  - Exshaw: 1354.0 – 1355.0 mKB (MD)



24. Makeup and RIH with 1.0m x 127mm ERHSC c/w 20gm BH charges @ 20SPM & 60° phasing. Log onto depth and perforate the porous intervals as required.
25. POOH with perf assembly and inspect same for performance.
26. Pump down casing with fresh water and record feed rate or circulation results.
27. RIH on wireline with cement retainer for 177.8mm casing and set retainer ~2.0m above the perforations. Fill casing with fresh water and pressure test casing and retainer to 7.0MPa and hold for 10.0mins. Rig out and release wireline unit.
28. Pick up and RIH with stinger on tallied and drifted 73mm work string equipped with a PSN one joint from bottom. Sting into retainer and perform function and pressure tests.
29. Fill tubing with fresh water and attempt to break circulation to surface; otherwise perform a feed rate test. Note and record results of same. Contact Calgary Superintendent with results.
30. Move in and tie in cementers with single pumping unit, squeeze manifold and chart recorder. Conduct a pre-job treatment safety/orientation meeting with all personnel on location detailing the program, pressure limitations, personnel responsibilities, and safety precautions. Pressure test surface lines and equipment to 1,400kPa (low) and 14,000kPa (high) and hold each for 10 mins.
31. Fill tubing with fresh water and re-establish circulation/feed rate and check to ensure string is free of debris. Note and record same.
32. Pull stinger from retainer, mix, pump and circulate the prescribed cement design to tubing bottom. (Program TBD). Sting back into the retainer and perform remedial cement treatment. Catch and retain a minimum of 3 samples (beginning, middle & end of mixing) to monitor surface samples for “setting” conditions. Record and report same
33. Pull stinger from retainer, circulate a 15.0m balanced cement plug over the retainer and backwash string clean with fresh water. POOH sideways with 73 mm tubing and stinger.
34. Repeat steps 30-39 for any additional zonal isolation or SCVF intervals identified.
35. POOH sideways with 73 mm and stinger.
36. Ensure the fluid level is down at least 3 m to prevent freezing and to facilitate the cut and cap.
37. Remove BOPs. Install wellhead. Rig out.
38. Cut and cap the casing strings with vented cap as per the attached procedure in the Appendix.



## CORPORATE CONTACTS

Paramount Resources Ltd.  
2800, 421 - 7<sup>th</sup> Avenue, SW  
Calgary, AB  
T2P 4KP

### IWT (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Richard Bean Abandonment Superintendent E-mail: <a href="mailto:richard.bean@paramountres.com">richard.bean@paramountres.com</a>	(403) 303-1929		(403) 793-4586	
Tim Wood P.Eng Manager Construction/Workover/ARO E-mail: <a href="mailto:Tim.wood@paramountres.com">Tim.wood@paramountres.com</a>	(403) 290-2919		(403) 803-8410	

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### PRODUCTION (District Office):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
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### MORNING REPORTS (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Richard Bean Abandonment Supt E-mail: <a href="mailto:richard.bean@paramountres.com">richard.bean@paramountres.com</a>	(403) 303-1929		(403) 793-4586	(403) 261-1349
Tim Wood P.Eng Manager Construction/Workover/ARO E-mail: <a href="mailto:Tim.wood@paramountres.com">Tim.wood@paramountres.com</a>	(403) 290-2919		(403) 803-8410	



## CORPORATE POLICY & PROCEDURES

- All operations carried out on behalf of the Operator shall be conducted in a safe and efficient manner in compliance with the Operator's safety regulations and all applicable acts and regulations.
- The Operator expects that all operations conducted will be designed to protect and maintain the quality and integrity of the environment and comply with all environmental acts and regulations.
- All contractors on location must have as a minimum a valid H<sub>2</sub>S ticket (if necessary), WHMIS, and be fully covered by the NWT Worker's Compensation Board (WCB) where applicable, carry a minimum of \$2,000,000 liability insurance.
- Before commencing operations, the Wellsite Supervisor will complete a list of nearest available emergency services. This list along with a detailed and accurate description of directions to the location is to be posted in a conspicuous and accessible location known to all personnel.
- Any excavation or installation of anchors on location shall follow Paramount's Ground Disturbance Requirements:
  - a. Contact 1<sup>st</sup> Call (Review Paramount's Grey book)
  - b. Prior to excavation – obtain Ground Disturbance Permit
    - i. If pipeline in area, arrange for Hydrovac and hand expose lines within 5 meters of excavation.
- Prior to commencing operations, the Wellsite Supervisor shall:
  - Read and record SIP(s). Examine surface casing vent for blow or suction, record and report findings. Check and monitor LEL and H<sub>2</sub>S levels at wellhead and investigate for evidence of gas migration at surface.
  - Bleed off SISCVP. Shut in SCV, install chart recorder, monitor 24-hour build-ups, report same and complete AER's "Surface Casing Vent Flow/Gas Migration" form.
- Before commencing operations, the Wellsite Supervisor in conjunction with the Rig Manager will conduct an initial rig inspection using a CAODC or equivalent inspection form. A detailed rig inspection is to be completed weekly thereafter. Confirmation of these inspections is to be recorded on both the morning report and tour report.
- Have on-site a access to the AER Drilling/ Servicing Regulations - Directive 36, Workplace Health and Safety Regulations, NWT Oil and Gas Operations Act, NWT Drilling and Production Regulations, OROGO Well Suspension and Abandonment Guidelines.
- The Wellsite Supervisor and Rig Manager will conduct daily walk-around inspections and complete a daily rig inspection report in an effort to identify deficiencies regarding well control and safety related items.
- The Wellsite Supervisor must ensure that all pertinent data (tubulars, logs, tests etc.) are properly recorded on the tour sheets and that samples, where required are collected as required by well licence. Also, the Wellsite Supervisor must ensure that trip sheets are properly completed and maintained.
- During cold weather operations, the Wellsite Supervisor must ensure that the blowdown line from the BOP stack to the choke manifold to the degasser is filled with a water/antifreeze solution.
- The Wellsite Supervisor must ensure that all personnel are advised and instructed not to trespass off the demised property.
- Safety meetings are to be held every day with wellsite personnel and recorded on both the morning reports and tour reports. Pre-job safety/orientation meetings are to be held prior to commencing new or non-routine work at which time the Wellsite Supervisor shall advise all personnel of known hazards, special pre-cautions and procedures. Hazard assessments must be conducted in accordance to Workplace Health and Safety Regulations and documented accordingly.
- BOP equipment will be function tested at least once daily and any equipment found defective should be made serviceable before operations are resumed. Blowout prevention drills are to be performed weekly and are to be recorded on both the



morning reports and tour reports. **All appropriate Certifications for equipment used will be on-site and available for review.** Communicate this information with the contracted services.

- The Wellsite Supervisor will ensure that service companies supplying products and/or materials that require Material Safety Data Sheets review and advise wellsite personnel with the potential hazards associated and the appropriate emergency response to be undertaken when handling the same. As well, in compliance with WHMIS regulations, all MSDS are to be posted in a conspicuous and accessible place known to all personnel for their information and emergency reference. Site Specific Orientation to all personnel on-site must be given for all chemicals and materials used.
- The Wellsite Supervisor will ensure that dangerous goods shipped or received are classified, packaged, marked, labeled and documented in compliance with the Transportation of Dangerous Goods Regulations. If required, placards must be attached to vehicles transporting dangerous goods. All shipping documents must be forwarded to the Calgary office for filing.
- The Operator expects full compliance with all conditions detailed on the Land Use Permit and Water Permit, OA and ACW.
- During the absence of the Wellsite Supervisor, a qualified and competent alternate shall be designated, in writing, to carry out the principal Contractor's responsibilities. Written instructions must be posted in a conspicuous and accessible location known to all personnel prior to the Wellsite Supervisor leaving the location.
- All verbal notifications and approvals received on location from any regulatory agency must be documented and recorded on both morning reports and tour reports and should include a contact name from the agency, phone number and details of the subject matter.
- Daily reports shall be e-mailed (faxed) to the Operator's office by 07:00Hrs. every morning. Copy will be forwarded to Calgary. A daily operations report will be provided to the Wellsite Supervisor.
- All field tickets and other supporting documentation submitted for materials purchased and/or services rendered require a correct AFE# and accurate identification of the well location along with the Wellsite Supervisor's signature indicating acceptance to the same.
- All rental equipment must be accounted for and returned promptly upon conclusion of operations. Rental Sheets must be utilized.
- All surplus material and/or equipment must be accounted for and either returned for credit or material transferred to the appropriate warehouse point accordingly.
- All Accidents or Incidents shall be reported **immediately** to the Calgary Office - Attention: Richard Bean and /or Don Jones. Complete the Paramount Safe Incident Report and conduct the necessary Investigations immediately. Fax copy to Calgary within 6 hours of incident.
- Upon conclusion of operations:

- Fill out the following forms:

**AER "Surface Casing Vent Flow/Gas Migration Data Sheet"  
Paramount's Suspended /Abandonment Action form**

Email / Fax a copy of the above completed form/s to the Calgary office.

- Ensure that all garbage and debris has been removed from the location in accordance with AER Guide G-58 and that any environmental concern has been addressed. Contact the Construction foreman with any concerns.
- Ensure that all flange bolts are properly torqued in accordance with the manufacturer's specifications and that all valves are properly lubricated.



- Prepare a final wellbore diagram with all pertinent information recorded.
- Forward all paperwork including field logs and computer data files to the Calgary office including copies of all field logs. A paper and digital copy of all Paramount operation reports should be provided. All field tickets, Material Transfers, Incident Reports, well test reports, rig inspection reports and service reports shall be included with the operation report package.
- Notify the District Production Foreman of the well status.



## APPENDIX 1

### **SURFACE CASING VENT FLOWS:**

- If a SCVF issue exists, bleed off well and allow well to stand for a minimum of twenty-four (24) hours with the SCV left in the “open” position to allow well to stabilize prior to Noise-Temperature logging.
- Perform “bubble” test as per AEUB Directive 20 and complete the “Surface Casing Vent Flow / Gas Migration Data Sheet”.

### **NOISE-TEMPERATURE LOGGING:**

- When Noise-Temperature Logging, RIH with Noise-Temperature Logging Tools and, correlated to a cased-hole log provided, run the Temperature Log while running in hole to PBTD. Note and record results.
- Pull the Noise Log to surface and obtain readings every five (5) meters. Over “high” noise level intervals and possible origin(s) of the vent flow, reduce increments to one (1) meter readings. Note and record results of same.
- Upon conclusion of logging operations, forward copy of log to Calgary office for inspection prior to proceeding with the balance of the program.

### **CEMENT DUMPBAILING:**

On way in hole with loaded bailer, stop just above plug and make careful detailed note of line weight  
Dump cement on plug by breaking glass bottom by either method above  
DO Not stroke bailer repeatedly to insure glass is broken. Use only a single hard jar  
Pick up 1-2m off plug and wait ~5 minutes to let cement displace from bailer  
Pick up above estimated cement top and check line weight for indication of loss of cement  
If obvious weight/cement loss, pull out of the hole slowly for 1<sup>st</sup> ~20m so not to swab cement up hole  
If no weight loss, jar on bottom again and repeat steps above

Ensure to not inhibit wellbore fluid until after cement is dumped.

### **CEMENT-RETAINER CIRCULATIONS/SQUEEZES:**

- Ensure a representative sample of make-up water has been forwarded to cementers for compatibility testing.
- Set retainer two (2.0) meters above perms avoiding a casing collar and pressure test to 7.0 MPa.
- RIH with stinger, sting into and perform pressure and function tests.
- Perform feed rate test to perms with fresh produced water.
- Tie in single-pumping unit cementer with squeeze manifold and chart recorder.
- Pressure test surface lines to 1,400kPa (low) and 14,000kPa (high).
- Pull stinger from retainer, mix, pump and circulate prescribed cement design to tubing bottom.
- Sting back into retainer and perform cement circulation/squeeze.

#### **NOTE:**

- Where circulation was not established and, after displacing the lead cement, monitor tubing to determine if plug is gravity feeding. If so and if cement setting times permit, allow well to gravity feed at a controlled rate of not more than 0.50 m<sup>3</sup>/min. as best possible with manifold valve or by pulling the stinger into the “neutral” position. When the well no longer gravity feeds, commence hesitation squeezes in 0.50 m<sup>3</sup> increments/stage unless breakdown is observed while pumping a stage at which time pumping should be stopped immediately ending that particular stage. Wait thirty (30) minutes or as appropriate, depending on actual conditions between stages. Attempt to achieve a stabilized lock-up pressure to 7.0 MPa and hold for ten (10) minutes with chart recorder. Record and report same.
- Do not over displace cement squeeze.
- Be prepared to batch mix and pump an additional 1.50 m<sup>3</sup> – 3.00 m<sup>3</sup> cement, if necessary.





- Do not exceed a pump rate of 1.0 m<sup>3</sup>/min. or frac gradient (18.0 kPa/m) when feed rate testing or cementing.

Eg. Maximum allowable surface pump pressure when using 1030 kg/m<sup>3</sup> fluid @ a depth of 300 m:

$$\begin{aligned}
 &= \text{Frac pressure} - \text{Hydrostatic pressure} \\
 &= (300 \text{ m} \times 18.0 \text{ kPa/m}) - (300 \text{ m} \times 1030 \text{ kg/m}^3 \times 0.00981) \\
 &= 5,400 \text{ kPa} - 3,031 \text{ kPa} \\
 &= 2,369 \text{ kPa}
 \end{aligned}$$

- Pull stinger from retainer, displace an eight (15.0) meter balanced cement plug over the retainer, raise string out of balanced cement plug, backwash string clean with fresh water and POOH with stinger.
- Shut in casing valves and WOC as prescribed.

#### SUSPENSION & ABANDONMENT PLUGS:

- Bridge plugs and cement retainers used for zonal suspension or abandonment and set in compliance with OROGO Well Suspension and Abandonment Guidelines, must be pressure tested to 7000 Kpa prior to capping with fifteen (15) meters of circulated cement for Level II wells and thirty (30) meters of circulated cement for Level I wells.

#### PRL CUTTING & CAPPING PROCEDURES:

- Move in 'B'-ticket welder, backhoe, unit and steamer, if required. If flowlines are present hydrovac may be required.
- Read and record SIP(s). Check and monitor LEL and H2S levels at wellhead and investigate for evidence of gas migration at surface. Examine surface casing vent for blow or suction. Record and report findings. If present, stop work and hold a safety meeting to review working procedures. If required, contact the Calgary office for further direction. Proceed with work only when conditions are able to be managed safely.

#### NOTE:

- When ambient temperatures are below freezing, tarp in wellhead and steam wellhead to ensure that wellhead and piping are not frozen.
- Remove all plugs and function test all wellhead valves to confirm there is no pressure built up in the wellhead or casing. Disassemble the SCV piping assembly and visually inspect that the vent is not plugged with cement or ice.
- Review corporate ground disturbance package and policies with all on-site personnel prior to commencing excavation around the wellhead. Hydrovac expose all underground facilities (casing, flowlines etc.) within five (5.0) meters of area to be excavated and excavate a 6.0m x 2.5m bell hole around the wellhead ensuring that walls of the bell hole are properly sloped for safe entry and egress and to prevent sloughing in. Check and monitor LEL and H2S levels and investigate for evidence of gas migration.
- While exercising caution, weld cut a small hole 30 cm below the surface casing bowl and investigate for trapped gas and fluids. Check and monitor LEL and H2S levels. With closed hooks and shackles, connect backhoe bucket to wellhead and pull into tension slightly more than the weight of the wellhead. Weld cut three (3) windows in the surface casing to access the innermost casing string ensuring that 50% of the circumferential metal remains to prevent possible collapse of the surface casing from the weight of the wellhead. While exercising caution, weld cut the innermost string.

#### NOTE:

- Innermost string can be expected to suddenly drop once completely cut. Do not place pry bars, hands or fingers in the windows.



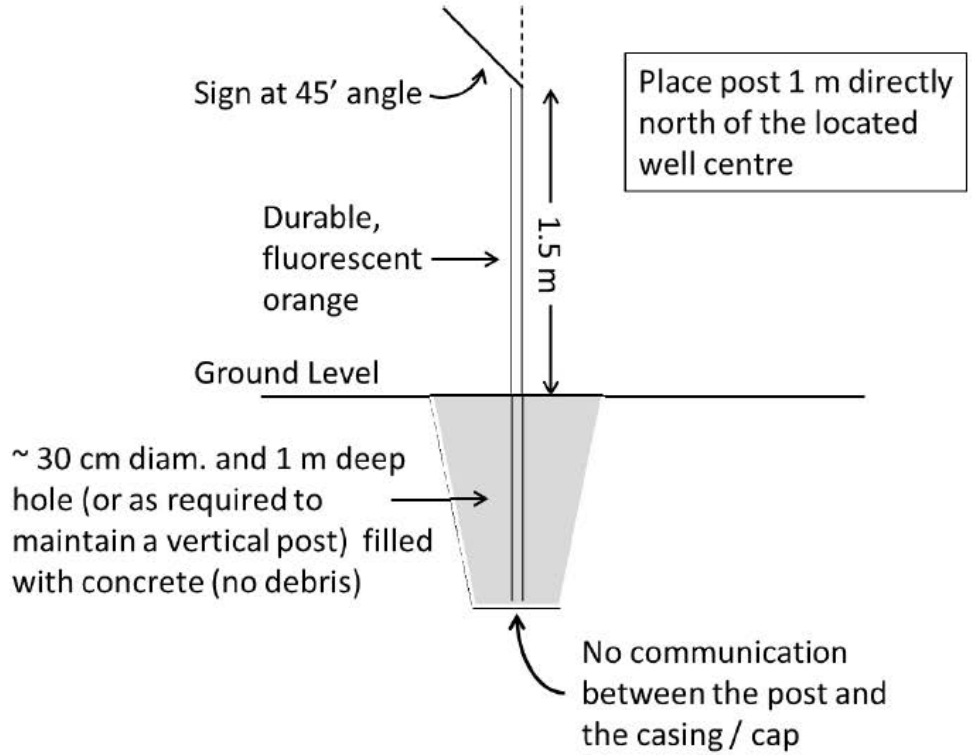
- Complete weld cut of the surface casing, lift and remove wellhead from bellhole with backhoe.
- Cut off the casing strings so that the top of the Protective Cap will be a minimum of 1.5 meters below the surveyed ground elevation. The surface casing and production casing are to be cut off at the same depth.
- Fabricate the Protective Cap and slip on collar using the surplus surface casing material.
- Dress the casing stubs. Using compatible metallurgical material, install and seal weld a 12.7 mm steel plate “donut” and vent assembly over the surface casing and production casing annulus, and a 12.7 mm steel plate and vent assembly over the inner most casing string. Required vent assemblies are as shown on the Capping Schematic.

**NOTE:**

- All seal welds are to be pre & post-heated to 3000C.
- Install and tack weld the Protective Cap to the surface casing. Weld inscribe the LSD on top of the Protective Cap and document with a digital photograph.
- Fabricate and install durable post and sign as noted below. Backfill and compact the excavation, clean up lease and rig out and release all services.
- Complete material transfer(s) and forward equipment for servicing and/or storage.
- Note: OROGO guidelines state that field verified coordinates for the well center must be provided as part of the Well Operations report as follows:
  - The geodetic datum must be specified (NAD83 is recommended); and
  - Coordinates must be provided:
    - In decimal degrees to 4 decimal places or more, or
    - In degrees, minutes and seconds to 2 decimal places, if decimal coordinates are not possible.
- A field sketch of the area must be also be submitted as part of the Well Operations Report.
- After surface abandonment is completed, all abandoned wells must be marked with a durable post and a sign as per below:



### Post Requirements



### Sign Requirements

