



ABANDONMENT PROGRAM

OROGO LEVEL II WELLBORE

PARAMOUNT ET AL LIARD K-29A

WID # 2030

POTENTIAL H₂S: 0.50%

Potential Co₂: 20.0%

PROCEDURE APPROVAL & DISTRIBUTION

DATE: April 19, 2023
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%
PRL Supplier Coding: PR210-9231-xxx (Abandonment program)

REGULATORY APPROVALS:

REQUIRED: YES

TYPE: OROGO Production License 2620-D-12-23 & 2520-D-12-4) : Approved
ACW: Pending.

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:

Corey Thomson

DATE: April 24, 2023

REVISED BY:

Dick Heenan

DATE: April 19, 2023

REVIEWED AND

APPROVED BY:

Tim Wood P.Eng (Manager ARO)

DATE: April 24, 2023

REVISED ABANDONMENT PROGRAM

OBJECTIVE

Suspended Level II 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 WHMIS 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.

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.

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.

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 2m³ 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 m³ 1:1:2 + 0.5% D65 + 0.2%D46 lead cement followed by 8.4 m³ RFC + 1%S1 + 0.2%D46. 17.0 m³ 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 m³ 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 H₂S Content: 0.5%
 Estimated CO₂ Content: 20%
 Estimated Temperature: 160⁰ 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: 0.0390m³/m
 Capacity of 177.8 mm 38.69 kg/m casing: 0.0200m³/m
 Capacity of 156mm Open Hole: 0.019009m³/m
 Capacity of 73mm 9.67Kg/m L-80 EUE: (Work String) 0.0030m³/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 ³ /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 ³ /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 ₂ 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

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
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 shall** request from OROGO, a variation to this well approval from the Regulator if it intends to conduct controlled venting and flaring as a part of well kill operations (ACW-2022-PAR-K-29A-WID2030). The request for variation should include the maximum daily flow rate and daily duration of the flaring or venting and should be submitted no later than December 15, 2022. Any flaring or venting not approved by the Regulator shall be reported to OROGO as an incident under section 75 of the Oil and Gas Drilling and Production Regulations
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 m³ 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. Pick up wire line. Run in to perform Noise/Temp/GR and GR/CCL/RBL log from PBTD (1734mKB) to surface. Forward logs to Calgary for analysis.
Note:
This configuration does not permit logging below the bridge plug at 1734mKB. Considering the difficulty of perforating two strings of casing and the questionable results from bond, temperature, and noise logs run through two strings of casing I.E., below 1744mKB), Paramount believes that a successful perforation and squeeze operation needs to be performed above the liner lap at 1744mKB and there is no benefit in drilling out the bridge plug at 1734mKB.
20. Rig in cementing services and pump 2m3 thermal cement down tubing to balance on top of BP. Slowly pull tubing out of cement and backwash tubing clean @ 1680mKB (estimate 50m linear cement on top of Bridge Plug)
Note: If planned squeeze interval is below 1670mKB, perform squeeze and eliminate separate cement cap.
21. Perform squeeze as per attached procedure, using intervals(s) determined from above logs. Repeat if needed.
22. Ensure the fluid level is down at least 3 m to prevent freezing and to facilitate the cut and cap.
23. Remove BOPs. Install wellhead. Rig out.
Cover exposed flange securely if well is not to be immediately cut and capped.



Prepare “as built” downhole abandonment diagram – using attached proposed diagram as a guide.

Surface Abandonment:

Cut and cap the casing strings at least 1 m below ground level with vented cap as per the procedure below or with Hydro jet vented cap system.

24. Confirm LEL and H2S are zero. Reconfirm no indications of gas migration.
25. Excavate a 2.5m deep bell hole around the wellhead ensuring that walls of the bell hole are sloped at a maximum of 45 degrees for safe entry and egress and to prevent sloughing in.
26. Confirm surface casing vent is open.
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.
Attach wellhead to lifting unit (rig, backhoe, picker, etc.). Pull slight tension
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.

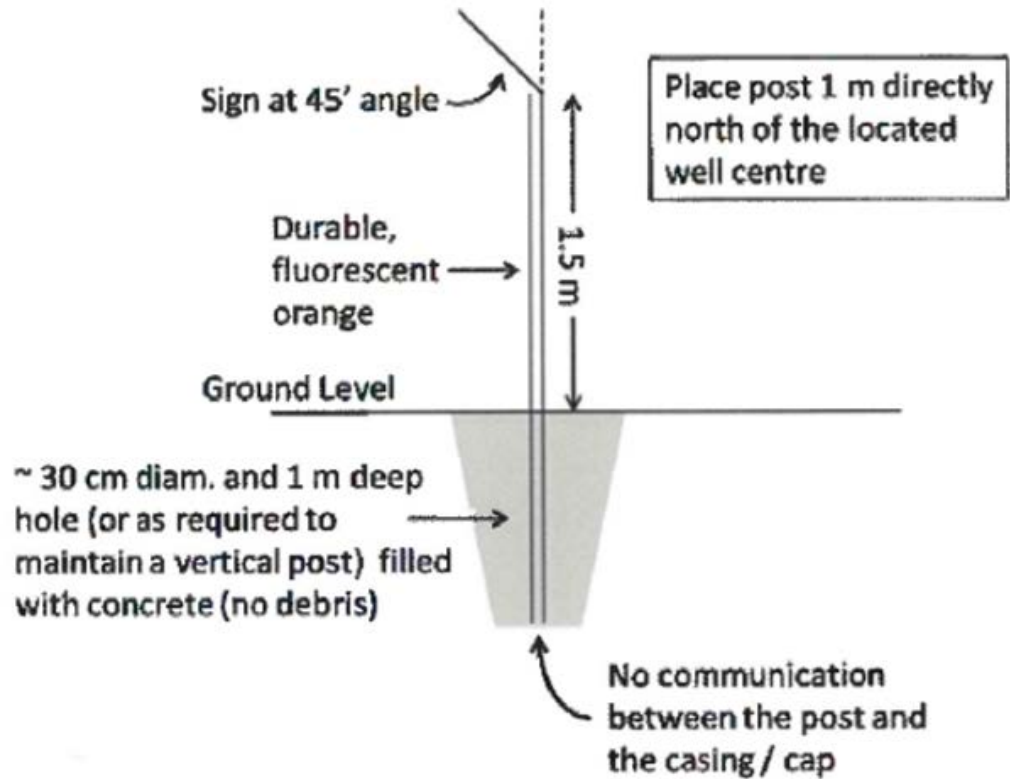
27. Complete weld cut of the surface casing, lift and remove wellhead from bell hole.
28. Stitch weld (non-sealing) steel plate “surface casing and production casing.
Weld inscribe the LSD on top of the steel plate and document with a digital photograph.
29. Install abandoned well sign as below.
Verify well coordinates (decimal format to 4 decimal places) in header with handheld GPS field measurement – use NAD 83 Datum
Record well coordinates on daily report.
A buried 5 gallon pail filled with cement may be helpful in supporting the well sign (as below)

DO NOT WELD SIGNPOST TO CASING.

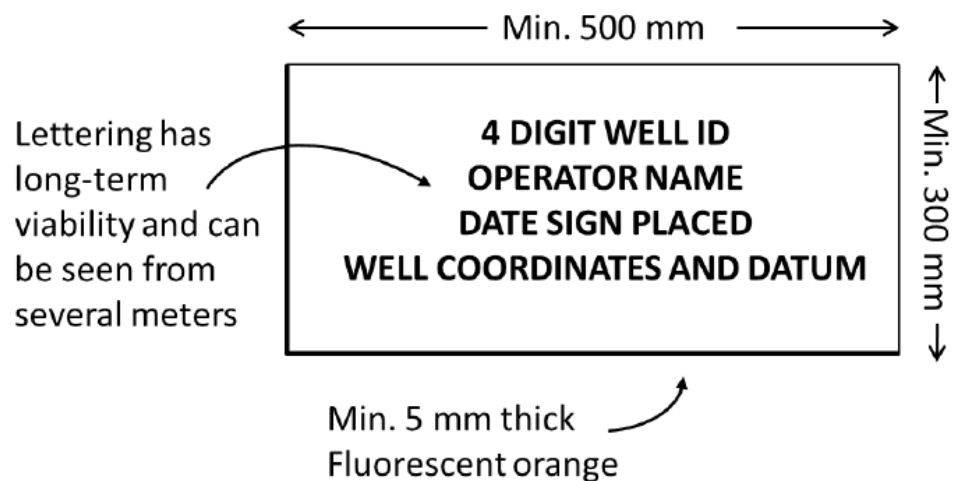


Well Suspension and Abandonment Guidelines and Interpretation Notes

Post Requirements



Sign Requirements



30. Prepare field sketch of lease indicating well location, signpost (1 meter north of well) and any relevant features. Submit with daily report.
31. Backfill and compact the excavation, clean up lease and rig out and release all services.

Alternate Cut and Cap Operation

If available, a proprietary Hydrojet cut and cap system may be used to cut the casing(s) a minimum of 1 m below ground level and install a vented (non-sealing) cap on the casing stub below ground level once all downhole operations have been completed and tested as per the program.

In summary the steps are:

- Remove wellhead from the top of the well (down to surface casing bowl flange)
- Place the hydraulic pipe cutter inside the innermost casing
- Apply high-pressure water and abrasive to the cutting tip (typically 1-2m below grade).
- Rotate the cutting tip to sever the casing from the inside out.
(Typically it takes 20 minutes to an hour to complete the cut)
- Remove tool and pull the casing stub out of the ground.
- Compression fit vented cap to the below-ground casing strings.
(Welded options are available for jurisdictions where this is required)
- Backfill the hole (typically about the diameter of the surface casing drill bit)
- Install independent well signpost as per OROGO requirements (detailed above)



CORPORATE CONTACTS

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

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Tim Wood P.Eng Manager Construction/Workover/ARO E-mail: Tim.wood@paramountres.com	(403) 290-2919		(403) 803-8410	

MORNING REPORTS (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Tim Wood P.Eng Manager Construction/Workover/ARO E-mail: Tim.wood@paramountres.com	(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 H₂S 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 1st 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 H₂S 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.



Supplement -- Cement Squeeze Procedure including perforations and acid (if required)

This procedure will be utilized if the bond log indicates insufficient isolation between zones or insufficient protection of uphole potable ground water in the subject well.
The interval to be perforated will be provided after evaluation of the bond log on site and discussion with Calgary office.

Ensure OROGO is informed if squeeze is required and of planned squeeze interval before commencing operations.

1) Perforation

- a) Conduct a pre-job safety/orientation meeting with all personnel on location detailing the planned operations, personnel responsibilities, and safety precautions.
Ensure radios and sources of electrical interference are turned off and perforating unit is properly grounded.
- b) Makeup and RIH with 127mm x 0.6m UZI **circulation** gun with 6 gm charges at 118 spm (Owen HSC-2500-302S Circulation charges penetration = 0.375 inches and EH diameter = 0.19 inch).
Note the gun comes in 0.3m lengths.
Perforation interval **TBD** _____ mKB. Correlate to the bond log previously run and ensure gun is not positioned across a collar.
(Note: ensure spare guns are on lease for use if required).
Ensure circulation charges are used.
- c) POOH with perf assembly and confirm shots fired..

2) Injection Test

- a) 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 21,000kPa (high) and hold each for 10 mins.
- b) Fill casing with fresh water and attempt to squeeze/circulate outside the casing with fresh water.
Begin at as low a rate as practical (e.g. 50 lpm depending on equipment capability.)
- c) Establish circulation to surface if possible – monitor surface casing vent for indications of flow or communication.
Monitor injection pressure - Do not exceed estimated parting pressure - BHP of 18 kPa/m at perforations – equaling a surface pressure of (**TBD** _____ kPa with fresh water and perforations at **TBD** _____ mKB).

If flow/returns are noted at the surface casing, rig for circulation and continue to circulate until returns are clean. Circulating rate may be increased as desired, not exceeding pressure above or if returns decrease/slow down decrease surface pressure/pumping rate
- d) If there are no indications of communication to surface (the expected result based upon cementing data available) perform step rate injection test.

Attempt injection at slow rate (e.g. 50 lpm) – continue injection until pressure stabilizes (minimum 5 minutes). Monitor pressure buildup and do not exceed estimated parting pressure calculated above (_____ kPa surface pressure).

- e) If stabilized pressure/injection rate is established at slow rate, perform step rate injection test, increasing at approximately 100 lpm (depending on equipment) per step for approximately 5 minutes.

Stop increasing steps when one of the following is reached.

- 500 lpm injection rate with water (considered unlikely)
- estimated parting pressure indicated above (_____ kPa)
- a discernable “break” (decrease) in pressure Vs injection rate

This is the maximum injection pressure to be used in squeezing cement.

If pressure at lowest injection rate reaches estimated parting pressure with negligible injection rate, shut down pump and observe bleed-off rate. After 50% bleed-off, pressure up again to determine the volume bled of and calculate the bleed-off rate.

Note: if lower pump rates are available they may be used to determine injection rate(s)

If no bleed off (less than 100 kPa in 15 minutes) contact Calgary office for instructions.

Target feed rate is 30liters/minute or more. If this cannot be achieved proceed to acidize as below.

30 lpm allows up to 1m³ fluid to be squeezed in ½ hour – actual squeeze rate of cement would be anticipated to be slower due to increased viscosity and solids content.

If feed rate is 30 liters/minute or more skip to set cement retainer.

3) Acidizing Procedure (if required)

- a) RIH with 73mm tubing to 1m below perforations.
- b) Rig for acid job, including shower truck and provision for neutralizing and disposing of spent acid.
- c) 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 21,000kPa (high) and hold each for 10 mins.
- d) “Pickle” the tubing.
Circulate one tubing volume of acid to end of tubing
15% HCl (or “Synthetic acid” – e.g. Stingray HCR 2000/7000) – do not over displace.
Wait 30 minutes.
Reversed circulate the spent acid, neutralize for disposal.
- e) Mix 1m³ 15% HCl (or “Synthetic acid” – e.g. Stingray HCR 2000/7000).
Circulate acid to bottom of tubing.
Close pipe rams and squeeze acid into perforations.
Do not exceed 18kPa/m gradient (_____ kPa as calculated above)
Reverse out any spent acid & neutralize for disposal at approved facility.
POOH.

4) Cement Squeeze Procedure

- a) RIH on wireline with cement retainer and correlated to the bond log.
Set retainer within +/- 2.0m above the perforations.
Ensure retainer is not positioned across a casing collar.
Fill casing with fresh water and pressure test casing and retainer to 7.0MPa and hold for 10.0mins. Rig out wireline unit.
- b) Pick up and RIH with stinger on tallied 73mm work string sting into retainer and perform function and pressure tests.
Sting into retainer and open – confirm feed into formation with fresh water.
Pull out of retainer and close – pressure test to 7MPa surface pressure.

c) Tie in cementers with 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 21,000kPa (high) and hold each for 10 mins.

d) Mix, pump and circulate cement design to tubing bottom.
Cement volumes anticipated to be 0.25 m³ "Microfine cement" and 1.5m³ Class G.
Target API fluid loss +/- 100cc (calculated from generic testing is acceptable – specific batch testing not required).
Microfine may be eliminated if good injection rates are obtained - Confirm with Calgary office and cement company.

Confirm minimum 3 hours setting time for cement at estimated temperature based on estimated well temperature.

Catch and retain cement samples and monitor for "setting" conditions.

Record and report same. (Downhole setting will be faster due to temperature.)

e) Sting back into the retainer and squeeze cement – maximum 1.0 m³ into formation.

Hypothetically this volume would result in 30m height in 311/244 mm annulus and 100m height in 216/178mm annulus – these volumes are not realistic as the annulus is unlikely to be completely void of cement and the injection of 1.0 m³ is optimistic – the cement volumes selected were chosen to provide a realistic minimum volume to ensure quality cement is delivered to the perforation interval rather than annular height.

Target final squeeze pressure is 7MPa at surface (minimum per OROGO).

Use hesitation technique if needed to achieve this pressure (not anticipated).

f) Pull out of retainer & set balanced cement plug with remaining cement.
Ensure a minimum of 0.5m³ cement remains in the casing (25 vertical meters) – top up with additional cement if needed.

g) Pull out of stinger and backwash string with clean with fresh water.

h) When surface samples have set, pressure test plug to 7MPa for 10 minutes.
RIH and tag cement top – minimum set down weight 1800Dan – minimum 15m cement above retainer. (Top up if needed.)
Record results in Daily Report and in Tour Book

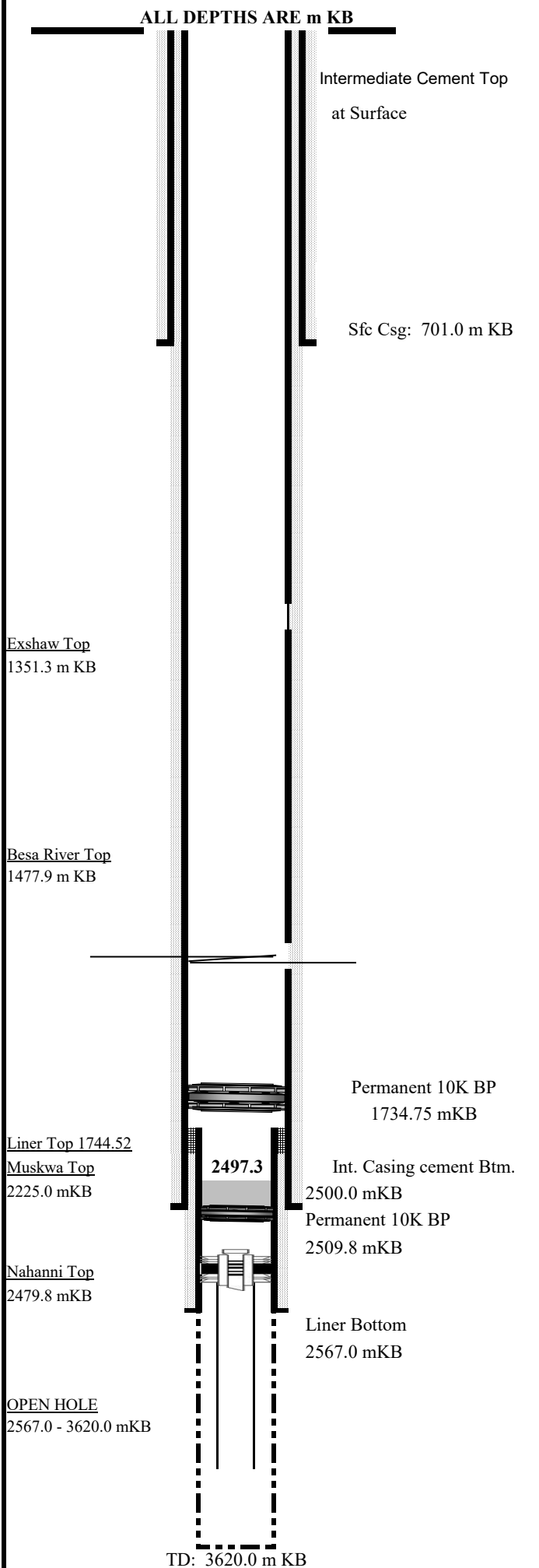
5) POOH and continue with program.

DH 20230419

PARAMOUNT RESOURCES LTD.

SCHEMATIC - EXISTING

ALL DEPTHS ARE m KB



WELL NAME: Paramount et al Liard K-29A NT WID#: 2030
 UWID: 300/K-25-6030-12330/3 PREPARED BY: Richard Bean Date: August 11, 22

ELEVATIONS:

KB (m):	416.40	KB-GL (m):	6.40	PBTD (m KB):	1734.8
GL (m):	409.60	KB-CF (m):		TD (m KB):	3620.0
Cut/Fill:		KB-THF (m):	4.40	Rig Released:	September 28, 2013

SURFACE HOLE SIZE:		444.5	x	711.00
	339.7	101.19	K-55 LT&C	x 701.00

Cemented to surface with 84.9m3 1:1:2 G + 0.5% D65 + 0.2% D46 + 8.4m3 RFC + 1% S1 + 0.2% D46. 17m3 cement returns to surface reported

INTERMEDIATE #1 HOLE SIZE:		311	x	2500.00
	244.5	64.94	K-55 BT&C	2,500.00 766.40

Cemented with 78t 1:1:2 G w/ 0.5% D65 + 0.7% D160 + 0.2% D46 + 23t 0:1:0 G + 0.5% D65 + 0.7% D160 + 0.1% D136 + 0.2% D28 + 0.35% D66 + 0.2% D46. 6.5m3 cement returns to surface reported.

Liner		222	x	3620.00
	177.8	38.67	L-80	1744.52 - 2567.0

Cemented with 19t thermal 40 cement + 1.2% TLF-HT + 0.8% THR-1 + 0.1% TWR2. Full returns reported.

PRODUCTION STRING: INSTALLED:

ITEM	DESCRIPTION	LENGTH (m)	Depth mKB
Equipment Left in Hole Below PBP			
	Pump out Plug		3121.8
	Hydril 533 centralizer		
	88.9mm tubing/pup joints		
	Hydril 533 centralizer		
	Baker Rockseal permanent packer		3089.6

NOTES:

PUMP AND ROD ASSEMBLY: INSTALLED: Feb 3, 2010

NIL

PERFORATION INTERVALS & EVENTS:

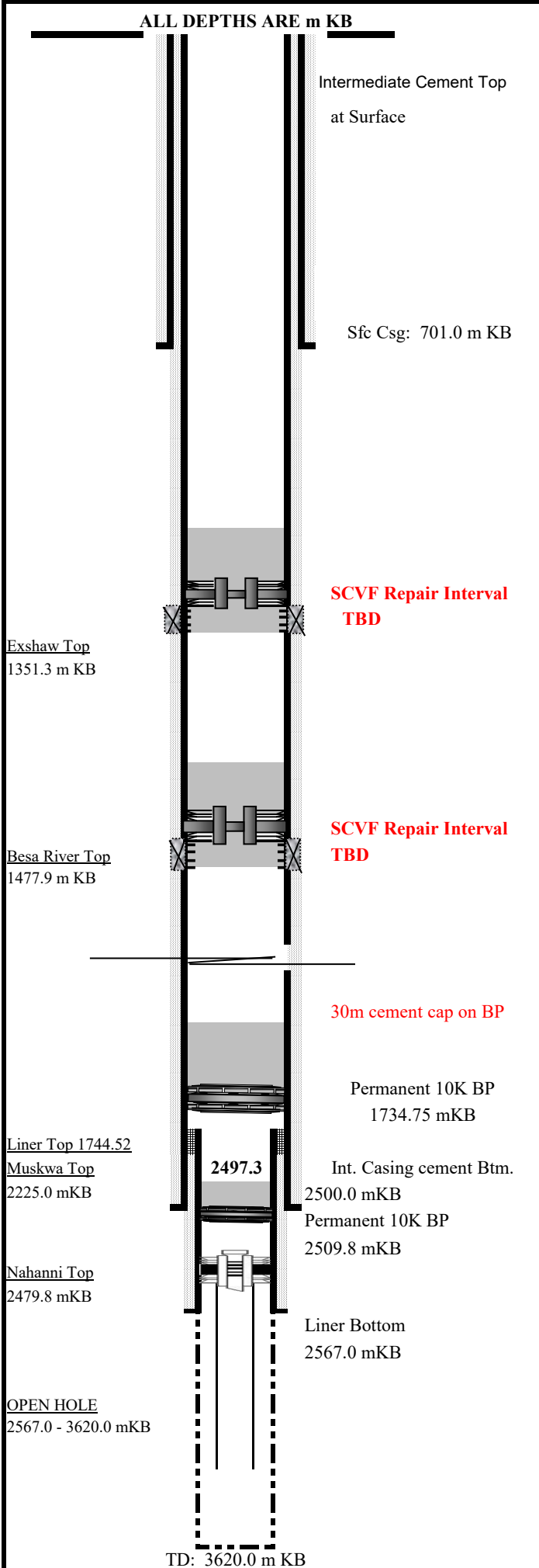
Event	Zone	Interval (m KB)	Date	Comments

NOTES:

RESERVOIR DATA			
ZONE	BHP	BHT	H ₂ S
Nahanni	28.8 Mpa	157 C	0.50%

PARAMOUNT RESOURCES LTD.

SCHEMATIC - PROPOSED



WELL NAME: Paramount et al Liard K-29A		NT WID#: 2030
UWID: 300/K-25-6030-12330/3	PREPARED BY: Richard Bean	Date: August 11, 22

ELEVATIONS:

KB (m): 416.40	KB-GL (m): 6.40	PBTD (m KB): 1734.8
GL (m): 409.60	KB-CF (m):	TD (m KB): 3620.0
Cut/Fill:	KB-THF (m): 4.40	Rig Released: September 28, 2013
SURFACE HOLE SIZE:		444.5 x 711.00
339.7	101.19	K-55 LT&C x 701.00

Cemented to surface with 84.9m³ 1:1:2 G + 0.5% D65 + 0.2% D46 + 8.4m³ RFC + 1% S1 + 0.2% D46. 17m³ cement returns to surface reported

INTERMEDIATE #1 HOLE SIZE:		311 x 2500.00
244.5	64.94	K-55 BT&C 2,500.00 766.40

Cemented with 78t 1:1:2 G w/ 0.5% D65 + 0.7% D160 + 0.2% D46 + 23t 0:1:0 G + 0.5% D65 + 0.7% D160 + 0.1% D136 + 0.2% D28 + 0.35% D66 + 0.2% D46. 6.5m³ cement returns to surface reported.

Liner		222 x 3620.00
177.8	38.67	L-80 1744.52 - 2567.0

Cemented with 19t thermal 40 cement + 1.2% TLF-HT + 0.8% THR-1 + 0.1% TWR2. Full returns reported.

PRODUCTION STRING: INSTALLED:

ITEM	DESCRIPTION	LENGTH (m)	Depth mKB
Equipment Left in Hole Below PBP			
	Pump out Plug		3121.8
	Hydril 533 centralizer		
	88.9mm tubing/pup joints		
	Hydril 533 centralizer		
	Baker Rockseal permanent packer		3089.6

NOTES:

PUMP AND ROD ASSEMBLY: INSTALLED: Feb 3, 2010

NIL

PERFORATION INTERVALS & EVENTS:

Event	Zone	Interval (m KB)	Date	Comments

NOTES:

RESERVOIR DATA			
ZONE	BHP	BHT	H ₂ S
Nahanni	28.8 Mpa	157 C	0.50%