



**Paramount**  
resources

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August 15, 2022

OROGO  
Department of Industry, Tourism and Investment  
Government of the Northwest Territories  
P.O. Box 1320  
Yellowknife NT  
X1A 2L9  
Canada

**Attn: Ms. Pauline de Jong**  
**Regulator**

**Re: Application to Alter the Condition of a Well (AACW)**  
**Liard 2M-25 (WID 2008)**

Paramount Resources Ltd. (Paramount) plans to abandon the above well:

Please find the following in support of this application:

- A signed original Application to Alter the Condition of a Well (AACW)
- Details regarding the Application to Alter
- Abandonment program including downhole diagrams
- A signed original Information Disclosure Consent Form

Should you require additional information regarding this application and project please contact me.

Regards,

John Hawkins, P. Eng.  
Director Asset Management  
Paramount Resources Ltd.

## APPROVAL TO ALTER THE CONDITION OF A WELL

This form is an application for a Well Approval under Section 10 of the *Oil and Gas Drilling and Production Regulations*.

### INSTRUCTIONS:

1. Complete both pages.
2. Send one electronic copy of this form and supporting technical documentation by email to [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca). If you wish to communicate with OROGO in hard copy, please do so using the courier address found at [www.orogo.gov.nt.ca](http://www.orogo.gov.nt.ca).

### WELL INFORMATION

Well Name	Paramount et al Liard 2M-25	Operator	Paramount Resources Ltd.
Well Type	Development Well (if Other, specify )	Contractor	TBD

### RELATED LICENCES, PERMITS, AND AUTHORIZATIONS

Operating Licence No.	NWT-OL-2014-014	Operations Authorization	POA 2620-D-14 / 2620-D-15-3
PRA Licence No.	Production Licence PL 9	Station Keeping	Not Applicable
		Land Structure	Conventional Land
Land Use Permit No.	MV2020A0009	Issued by:	Mackenzie Valley Land and Water Board
Water Licence No.	MV2020L1-0006	Issued by:	Mackenzie Valley Land and Water Board


### ACTIVITY INFORMATION

Current Well Status	Suspended	Anticipated Well Status	Abandoned
Well Path	Deviated	Elevation KB/RT	919 m
Approximate Start Date	January 2023	Ground Level / Seafloor	912 m
Est. Days on Location	10 days	Anticipated Total Depth	4324 m KB

### WELL OPERATION PROGRAM

Activity Type	Top to Bottom Interval (m KB)	Comments
Abandonment	3875-4324	Pressure test extg BP @ 1335mKB (w/ 99m cement)
Select	-	Above liner lap @ 1343mKB
Select	-	Top up extg BP @ 1335mKB w/ thermal cement
Select	-	
Additional Information	Surface abandonment	

**"I certify that the information provided on this form is true and correct"**

Name	<u>John Hawkins, P. Eng.</u>	Phone	<u>(403) 817-5074 Ext</u>
Title	<u>Director Asset Management</u>	E-Mail	<u>john.hawkins@paramountres.com</u>
Operator	<u>Paramount Resources Ltd.</u>		
Signature	 <u>Responsible Officer of Company</u>	Date	<u>August 15, 2022</u>



**Application for Approval to  
Alter the Condition of a Well  
Liard 2M-25 Abandonment**

**August 2022**

## **Introduction**

This well has been suspended for a significant period. Pending future development, OROGO requires this well be abandoned. Paramount Resources Ltd (Paramount) intends to abandon it in compliance with the requirements of OROGO. Current plans are to abandon this well in conjunction with six others in the region in the winter of 2023. Circumstances and/or permitting issues may mean that it is more desirable to change the order and/or timing of the abandonments.

As this well is part of an existing Production Licence and well operations are within the scope of the licence, no separate Operations Authorization is required.

Paramount intends to diligently pursue abandonment operations of these (and other) wells in OROGO jurisdiction, but to allow operational flexibility and minimize administrative overhead, Paramount requests that the Well Approval be valid until April 30, 2024.

For ease of review and completeness, this application will follow the format of the OROGO "Roadmap for applications".

## Area of Application



# **General Requirements for a Well Approval**

## **Obligation to Consult with Existing/Asserted Aboriginal Rights Holders**

Paramount has consulted with the Aboriginal rights holders affected or potentially affected by these operations as part of the application for renewal of the Land Use and Water Licence permits associated with this project (which have been granted).

No concerns were raised by any of the parties involved.

The 2M-25 well is approximately 20km north northwest of the Hamlet of Fort Liard and is only accessible after crossing the Liard River by barge or ice bridge.

The Engagement Plans were submitted to the Mackenzie Valley Land and Water Board February 26, 2021, and may be found on their website at the following URL.

[https://registry.mvlwb.ca/Documents/MV2020A0009/Paramount%20-%20Liard%20West%20-%20Engagement%20Plan%20V1.1%20-%20Feb19\\_21.pdf](https://registry.mvlwb.ca/Documents/MV2020A0009/Paramount%20-%20Liard%20West%20-%20Engagement%20Plan%20V1.1%20-%20Feb19_21.pdf)

## **Well Approval Application Form (AACW)**

The original of this form is attached to the covering letter.

# **Requirements of the Oil and Gas Drilling and Production Regulations (OGDPR)**

## **Requirement for a Well Approval – OGDPR S.10**

The operations contemplated under this program (well abandonment) require a Well Approval. This document is provided in support of MGM's application for a Well Approval for the abandonment of Liard 2M-25

## **Application to Drill - OGDPR S.11**

This application does not include any new drilling and thus this section of the OGDPR does not apply.

## **Application to Abandon a Well - OGDPR S.12**

The following is a summary of the abandonment program for 2M-25

1. RIH w/ 73mm tubing and tag Bridge Plug capped w/ cement @ 1335m.
2. Circulate at least 0.5m<sup>3</sup> of thermal cement on top of existing bridge plug.
3. Run bond log from ~ 650m below to surface. Evaluate for possible perforate & squeeze
4. Perforate & squeeze if required (depth TBD)
5. Cut and cap well at surface

A detailed program is provided with this application.

Current plans are to start construction of an ice bridge in December (subject to weather conditions). Downhole abandonment operations are planned to start late January and are estimated to take about 10 days. As there are a total of seven wells to be abandoned in the area, the exact order of operations and wells may vary but it is planned to abandon all six wells by the end of March.

Operations are subject to weather and site conditions, and to the availability of equipment and suitable personnel. For this reason, the timing, duration, and even order of the operations may change from those below.

## **Conditions for Abandonment- OGDPR S.56**

The abandonment of this well, as described above and in the program supplied with this application package, will comply with the requirements of OGDPR section 56.

## **Monitoring of Suspended Well - OGDPR S.57**

The well site will be checked for indications of gas migration during the summer, in conjunction with regular shut-in well inspections. Prior to and during abandonment operations, the well and immediately surrounding area will be monitored for surface casing vent flows and gas migration outside of the casing. Neither event was observed during shut-in well inspections to date. If any indication of gas migration of surface casing vent flow is observed, operations will be suspended, the program will be modified to address the issue, and OROGO will be notified.

Once the well has been cut and capped and reported as permanently abandoned no further monitoring is anticipated at this time.

### **Offshore Well- OGDPR S.58**

As this is not an offshore well, this section of the OGDPR does not apply.

## **Other Requirements**

### **The Well Suspension and Abandonment Guidelines and Interpretation Notes**

The abandonment of this well, as described above and in the program will comply with the *Well Suspension and Abandonment Guidelines and Interpretation Notes* provided by OROGO.

### **Information Disclosure Consent**

This form for the Liard 2M-25 operations is included in the application package.



**ABANDONMENT PROGRAM**

**OROGO LEVEL II WELLBORE**

**PARAMOUNT et al LIARD 2M-25**

**WID: N2008**

**POTENTIAL H<sub>2</sub>S: 0.5%**

**POTENTIAL CO<sub>2</sub>: 20%**

**PROCEDURE APPROVAL & DISTRIBUTION**

**DATE:** August 12, 2022  
**WELL NAME:** PARAMOUNT et al LIARD 2M-25  
**UWID:** 302/M-25-6030-12330/3  
**OPERATIONS AREA:** Liard West **PROVINCE:** NWT  
**OBJECTIVE:** Abandon wellbore in accordance with OROGO guidelines.  
**PARAMOUNT WI (%):** 88%  
**Cost Center:** W17920  
**AMOUNT:**

**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:** Well Files  
**PREPARED BY:** Dinah Asamoah-Barnieh **DATE:** August 12, 2022  
**REVIEWED AND APPROVED BY:** \_\_\_\_\_ **DATE:** \_\_\_\_\_  
**Richard Bean** Superintendent ARO

  
\_\_\_\_\_  
**Tim Wood** Manager (ARO/Construction) **DATE:** \_\_\_Aug 15, 2022\_\_

## ABANDONMENT PROGRAM

### **OBJECTIVE**

Abandon wellbore in accordance with ACW and OROGO guidelines. Cut and cap wellbore. OROGO deadline for submission - August 15, 2022.

### **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 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.



# PARAMOUNT et al LIARD 2M-25 ABANDONMENT PROGRAM

## WELL DATA AND WELLBORE CONFIGURATION

### WELL DATA:

**Surface Location:** LAT: 60.41413 deg N, LONG: 123.58811 deg W  
**Bottomhole Location:** LAT: 60.43609 deg N, LONG: 123.59526 deg W  
**UWI:** 302/M-25-6030-12330/3  
**Profile:** Vertical  
**BGWP:** 600m GL (Default)  
**WID#:** N2008  
**Spud Date:** March 31, 2004  
**Rig Release Date:** June 12, 2004  
**KB:** 919.0m  
**GL:** 910.0m  
**KB-GL:** 9.0m  
**TVD:** 3138.5m KB  
**TD:** 4722.0m KB

**SURFACE:** 444.5 mm to 385 mKB  
339.7 mm, 101.19 kg/m, K-55, BTC set @ 383 mKB. Cemented with 46.7 t class 'G' cement plus 2% CaCl<sub>2</sub>. 11.0 m<sup>3</sup> cement returns to surface.

**INTERMEDIATE:** 311 mm to 1512 mMD  
244.5 mm, 59.5 kg/m, L-80, LT&C casing set at 1509.7 mMD. Cemented with 65.3 t 1:1:2 'G' + 2% FWCA (+ 3% LCC-1 added to 15 t after 10 t mixed) followed by 9.7 t ThixMix II + 0.4% CFL-3 + 0.2% LTR. Logged cement top at 520 m

**MAIN HOLE:** 222 mm to 3876 mKB  
**Drilled directionally with an inclination of approximately 40° to 3670 mMD to an inclination of approximately 70° at the liner shoe.**

**LINER** 177.8 mm, 43.2 & 38.7 kg/m L-80 Hydril SLX casing set at 3875 mKB. Top of liner PBR at 1343.3 mMD. Cemented with 29 t LW-14 + 1.1% HTR + 2% FWCA followed by 12.8 t Thermal-40 + 1% CFR + 1.1% CFL-2 + 2.1% HTR.

**TUBING:** 127mm Tubing - Cut Off (Top below 2990m)

**OPENHOLE:** 152.4 mm to 4324 mMD (3138.6 mTVD).  
**Drilled directionally from the liner shoe to an inclination of approximately 89° at TD.**



## **PROGRAM SUMMARY**

- MIRU service rig and associated equipment.
- Read and record SICP, SITP
- Check for SCVF & H2S
- Stump test & Function test Class III BOPs.
- Kill well with clean fresh water
- Remove wellhead and Install Class III BOPs (11" 35MPa BOP required). Pressure Test BOPs 1400kpa low and 35000kPa high.
- RIH w/ 73mm tubing and tag Bridge Plug capped w/ cement @ 1335m. POOH.
- Move on cementing units and circulate at least 0.5m<sup>3</sup> of thermal cement down tubing on top of existing Bridge Plug capped w/ cement@ 1335m. POOH 73.0mm tubing string. Rig Out cementing unit.
- MIRU Wireline Unit. Pressure test lubricator 7MPa w/ N<sub>2</sub>.
- RIH w/ GR/RBL/CCL logs from ~ 650m below to surface.
- Perform remedial squeezes as required (NB: Based on wellfile info, at least one cement squeeze might be needed between 520m – 600m KB)
- Ensure no SCVF exist
- Rig Out
- Cut & Cap wellbore



**Open Hole Section:** Muskwa: 3875 mMD - 4324 mMD  
 Estimated BHP: 23,000 kPa (Est. May 2011)  
 Estimated H<sub>2</sub>S Content: 0.5% (Est. May 2011)  
 Estimated CO<sub>2</sub> Content: 20% (Est. May 2011)  
 Estimated Temperature: 160° C (Est. May 2011)

**Formation Tops**

geoSCOUT Ref Elev(m): +918.0

Formation	TVD (m)	Elev (m)	MD (m)	Formation	TVD (m)	Elev(m)	MD (m)
Qpleist	Cased	Cased	Cased	Dmuskwa	2789.9	-1871.9	3424.0
Mflett	140.0	+778.0	140.0	Dnahanni	3078.5	-2160.5	3857.0
Mbesa_r_U	901.4	+16.6	941.0	/FAULT/	3137.9	-2219.9	4305.9
Mexshaw	1908.7	-990.7	2264.0	Dmuskwa	3137.9	-2219.9	4306.0
Dbesa_rvL	2277.9	-1359.9	2752.0				

**Current Well Operation Summary:**

Date	Summary
14-Sep-11	<b>Received kick while drilling through Bp @ 75 meters.</b> Held meeting discussing event and shut-in procedures afterwards. Concord crew documented minutes. All personnel signed off on safety meeting discussion. Killed tubing with fresh water and continued to drill out BP. RIH to +/- 130 meters to ensure BP not stuck in casing collar. POOH while keeping well dead by pumping @ reduced rates. Locked blind rams and secured well for night.
19-Sep-11	Pumped 194 m3 fresh water to well today. Pulled pipe into tension. <b>RIH and cut 127mm casing off @ 2943 mKB with E-Line jet cutter.</b>
20-23 Sep-11	Attempted to free tubing by pulling to 112 daN with rig. Alternating between killing well and working tubing string throughout day. No success in getting tubing moving. Killed well with fresh water. Total of 76m3 pumped today. <b>E-Line "jet cut" tubing @ 2920 mKB.</b> Worked string with rig to part. String weight now 60 daN
	Well kicked through annulus while rigging in power tongs. Well was secured, safety meeting was called discussing event handling. Killed well, rigged in power tong and lay down equipment. Pulled 62 joints + pups (heavy wall) 20 joints of 22.32 kg/m tubing before securing for night. Pumped 162m3 water to well today.



24-Sep-11	Killed well with fresh water. <b>Pulled and lay out remaining 127mm tubulars. (245 total)</b>
25-Sep-11	Ran gauge ring to liner top @ 1340 mKB. Unable to enter line with gauge ring. Ran and set a <b>10k permanent bridge plug @ 2900 mKB</b> . Plug had to be pumped through deviation into position. <b>Pressure tested BP @ 2900 mKB to 14 MPa for 15 minutes. Held solid.</b> Made test run with dry cement bailer and attempted to enter liner @ 1340 mKB. No success despite trying several different options. Pressure tested BP @ 2900 mKB to same. GOOD. <b>Completed cement plug job.</b> Pulled out of hole 73 joints 60.3mm onto pipe racks.
12-Oct-11	Continued pulling out of hole 60.3mm tubing laid out 140 joints, stood remainder in derrick. <b>Ran in hole gauge ring, ran in hole and set bridge plug.</b> Pressure tested BP 14mpa, held good 5 minutes.
13-Oct-11	<b>Completed balanced plug cement job.</b> Pulled 10 joint's 60.3mm. Completed back wash. Rigged out cementers and moved off location by tow tractor. Pulled out of hole 139 joint's

**Capacities:**

Capacity of 339.7 mm 101.19 kg/m Surface Casing:	0.07810m <sup>3</sup> /m
Capacity of 244.5 mm 59.5 kg/m Interm. casing:	0.03955m <sup>3</sup> /m
Capacity of 177.8 mm 43.2 kg/m Liner:	0.0194m <sup>3</sup> /m
Capacity of 177.8mm 38.7kg/m Liner:	0.0200m <sup>3</sup> /m
Annular Capacity (Surface - Interm Casing):	0.03855m <sup>3</sup> /m
Annular Volume (Interm & Surface Casing):	14.76m <sup>3</sup>
Annular Volume (Surface shoe – PBTB):	37.65m <sup>3</sup>
<b>Total Annular Volume</b>	<b>52.42 m<sup>3</sup></b>
 Volume (Intermediate Casing):	 59.70m <sup>3</sup>
<b>Total Volume</b>	<b>112.49m<sup>3</sup></b>

**SCVF**

None (August 20, 2021 Well Inspection Report: Evidence of SCVF – No)



### Kill Fluid

Estimated reservoir pressure (2008 program) – 23000kPa

TVD: 3138.5m

Minimum kill fluid density required ~ **747 kg/m3**

Kill fluid: **Water @ 1000kg/m3**

### Tubing/Casing Data:

	Surface Casing	Intermediate. Casing	Liner	Liner
Size O.D. (mm)	339.7	244.5	177.8	177.8
Weight (kg/m)	101.19	59.50	43.16	38.69
Grade	K-55	L-80	L-80	L-80*
Connection	BT&C	LT&C		
Drift I.D. (mm)	311.38	220.45	160.81	156.24
I.D. (mm)	315.34	224.41	163.98	159.41
Capacity (m <sup>3</sup> /m)	0.07810	0.03819	0.0194	0.0200
Collapse (MPa)	13.44	17.72	13.65	29.79
Burst (MPa)	23.79	27.2	18.75	34.3
Tension (daN)	578,300	231,300	-	-
Annular Volume (m <sup>3</sup> /m)				
Depth (mKB)	383	1509.7	3875	3875

\*used J-55 Grade

### Reservoir Data:



<b>Formation</b>	<b>Muskwa</b>
<b>Perforations</b>	<b>Open Hole 3876 mMD - 4324 mMD</b>
<b>Reservoir Pressure</b>	N/A
<b>Shut-in Tubing Pressure</b>	N/A
<b>Pipeline Pressure @ Tie-in</b>	N/A
<b>Reservoir Temperature</b>	160 deg C (est.)
<b>H<sub>2</sub>S %</b>	0.5% (Well Program– 2011)
<b>Expected Gas Rate</b>	N/A
<b>Expected Condensate Rate</b>	N/A
<b>Expected Water Rate</b>	N/A



## **GENERAL REQUIREMENTS**

- **Daily reports shall be completed in Wellview 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 number and accurate identification of the well location along with the Wellsite Supervisor's signature indicating acceptance to the same.



# PARAMOUNT et al LIARD 2M-25 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.

## **ABANDONMENT PROGRAM TO ABANDON 302/M-25-6030-12330/3 WELLBORE**

6. Move in and rig up Service Rig, P tank, safety trailer and related auxiliary equipment to AER, OH&S and PRL regulations and guidelines. Ensure OROGO Guidelines, Corporate Policies and Procedures are followed prior to commencing operations.
7. Conduct daily pre-job safety meeting and equipment inspection. Identify daily potential hazards and discuss at safety meetings.
8. Haul in approximately 120m<sup>3</sup> of fresh water
9. Tie in circulating lines with return line tied into 'P' tank. Properly stake surface lines and pressure test lines and manifold to 1.4 MPa (low) and 35MPa (high) and hold each for 10 minutes.
10. Check SCVF and presence of H<sub>2</sub>S
11. Record casing pressure SICP
12. Stump test Class III 11" BOP, accumulator hose and function test each element of the BOP to 1.4 MPa low and 35 MPa high. Stump test the annular preventer to 1.4 MPa low and 10 MPa high. Remove wellhead. Nipple Up Class III BOPs. Pressure test pipe rams and ring groves to 1.4MPa low 35MPa high for 10min



13. RIH w/ 73mm tubing and tag existing cement top at 1335m.
14. Move on cementing units. Circulate at least 0.5m<sup>3</sup> of thermal cement down tubing **and balance** on top of existing Bridge Plug capped w/ cement@ 1335m. Slowly pull 73mm tubing out of cement. Backwash tubing string clean with fresh water. POOH 73.0mm tubing string. Rig out cementing units.
15. 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.
16. RIH w/ GR/RBL/CCL logs from ~ 650m below to surface. Remedial squeezes as required (NB: Based on wellfile info, at least one cement squeeze might be needed between 520m – 600m KB)  
**Discuss with Calgary Superintendent prior to remedial cement squeezes.**
17. Remove BOPs. Install wellhead. Pressure test wellhead and seals. Rig out.
18. Cut and cap wellbore as per the attached procedure in the Appendix.



## CORPORATE CONTACTS

Paramount Resources Ltd.  
1000, 700 - 9<sup>th</sup> Avenue, SW  
Calgary, AB  
T2P 3V4

### IWT (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Tim Wood Manager – ARO & Construction E-mail: <a href="mailto:tim.wood@paramountres.com">tim.wood@paramountres.com</a>	(403) 290-2919		(403) 803-8410	(403) 261-1349
Richard Bean Superintendent E-mail: <a href="mailto:richard.bean@paramountres.com">richard.bean@paramountres.com</a>	(403) 290-3640		(403) 793-4586	(403) 261-1349
Dinah Asamoah-Barnieh Completions Engineer E-mail: <a href="mailto:dinah.asamoah-barnieh@paramountres.com">dinah.asamoah-barnieh@paramountres.com</a>	(403) 290-6266		(780) 904-2638	(403) 261-1349

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### PRODUCTION (District Office):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
<u>Production Foreman, Well Services</u> Martin Doll <a href="mailto:martin.doll@paramountres.com">martin.doll@paramountres.com</a>	(780) 683-8037		780-926-7192	

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## 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 license. 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 perfs 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 perfs 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.



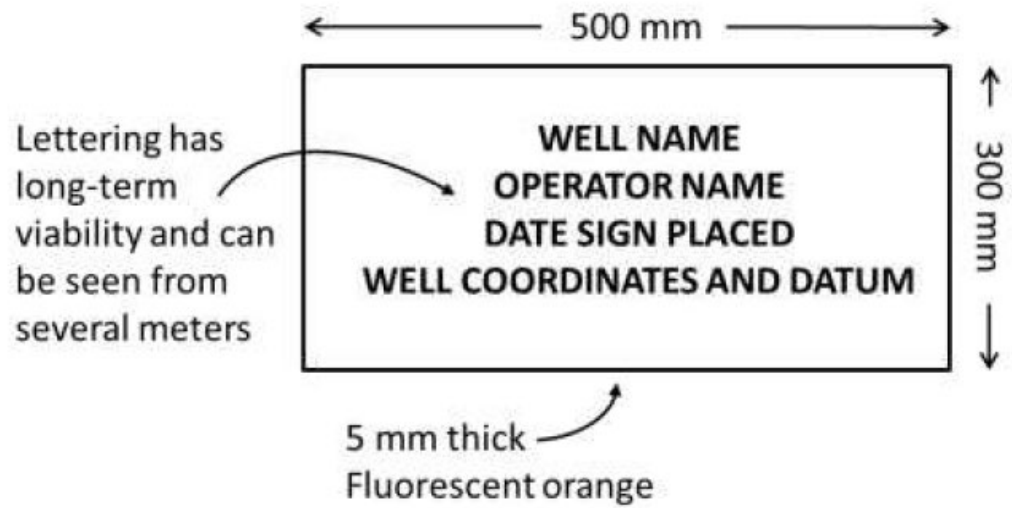
- Complete weld cut of the surface casing, lift and remove wellhead from bellhole with backhoe.
- Cut off the casing strings so that the top of the Protective Cap will be a minimum of 1.5 meters below the surveyed ground elevation. The surface casing and production casing are to be cut off at the same 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:

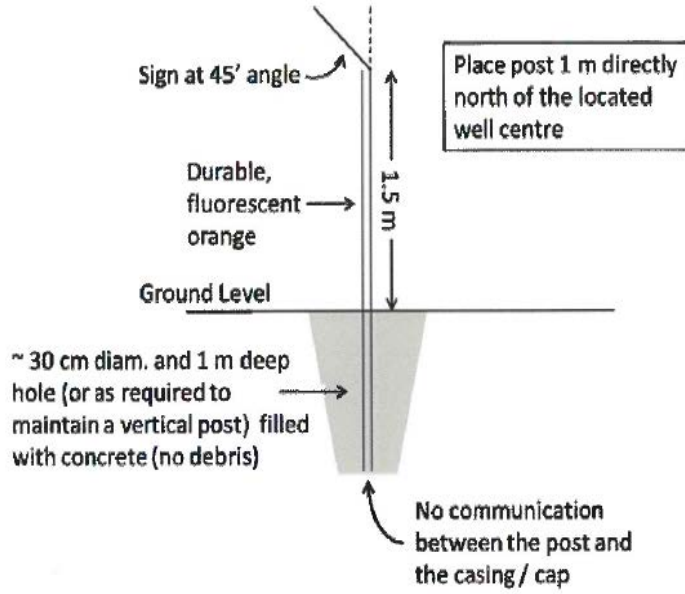


## Sign Requirements



**Well Suspension and Abandonment Guidelines and Interpretation Notes**

**Post Requirements**



# Paramount et al Liard 2M-25

(grid section 60° 30',  
WID: N2008

(EXISTING DIAGRAM) as @ October 22, 2011



Prepared By:

Dinah Asamoah-Barnieh

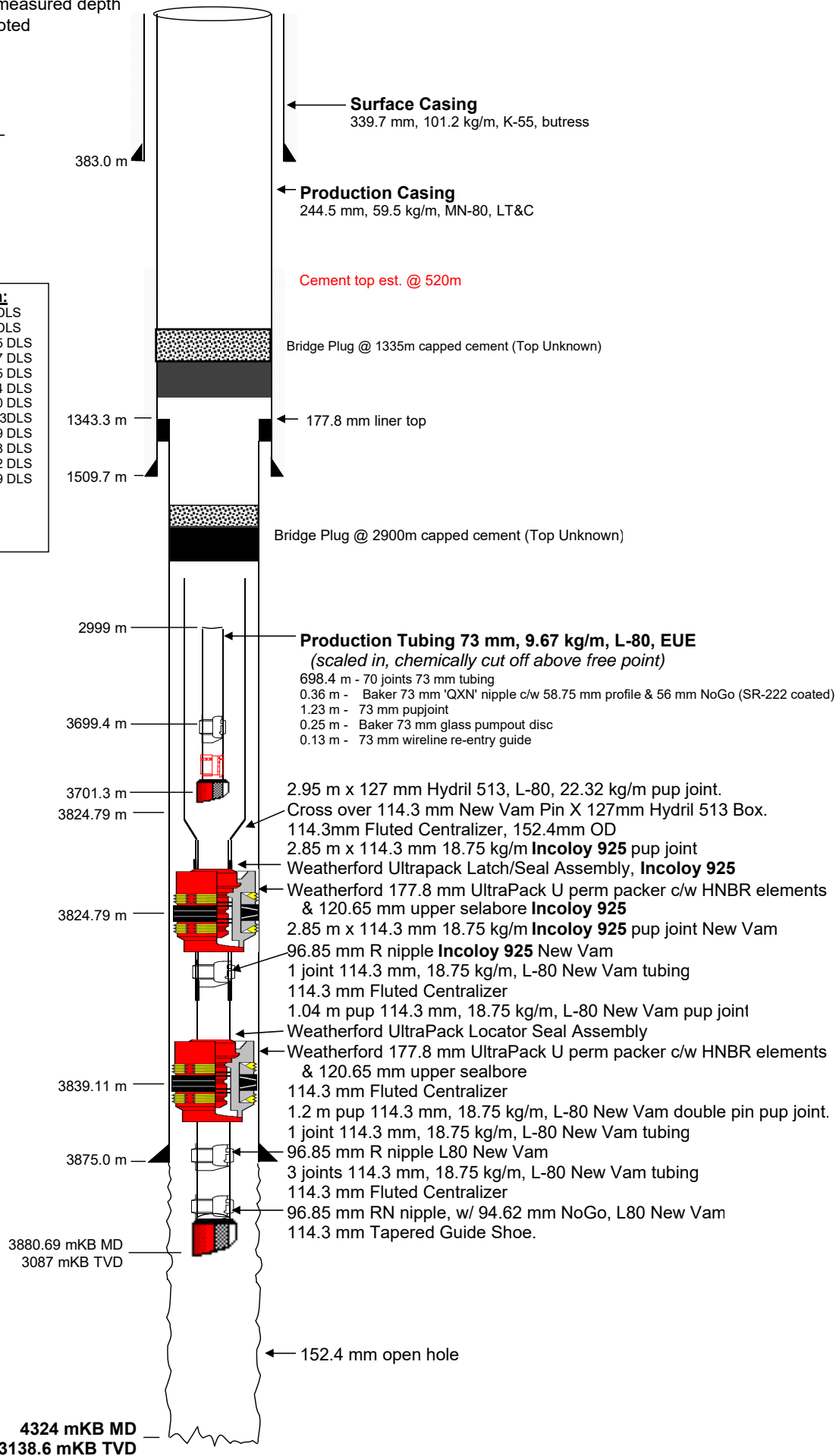
All depths in mKB measured depth unless otherwise noted

**Elevations:**

KB 919 mASL  
GL 911.6 mASL  
KB to GL 7.4 m  
KB to CF 7.4 m  
KB to TSF 6 m

**Wellbore Deviation:**

300 mKB	0.0 deg	0 DLS
500 mKB	8.3 deg	3 DLS
700 mKB	22.4 deg	3.5 DLS
923 mKB	37.5 deg	2.7 DLS
1000mKB	38.3 deg	.55 DLS
2000mKB	40.6 deg	1.4 DLS
3000mKB	41.2 deg	2.0 DLS
3200mKB	40.7 deg	2.3DLS
3800mKB	60.5 deg	6.9 DLS
3946mKB	75.3 deg	3.8 DLS
4100mKB	86.6 deg	5.2 DLS
4324mKB	89.3 deg	5.9 DLS



# Paramount et al Liard 2M-25

(grid section 60° 30',  
WID: N2008

(PROPOSED DIAGRAM)



Prepared By:

Dinah Asamoah-Barnieh

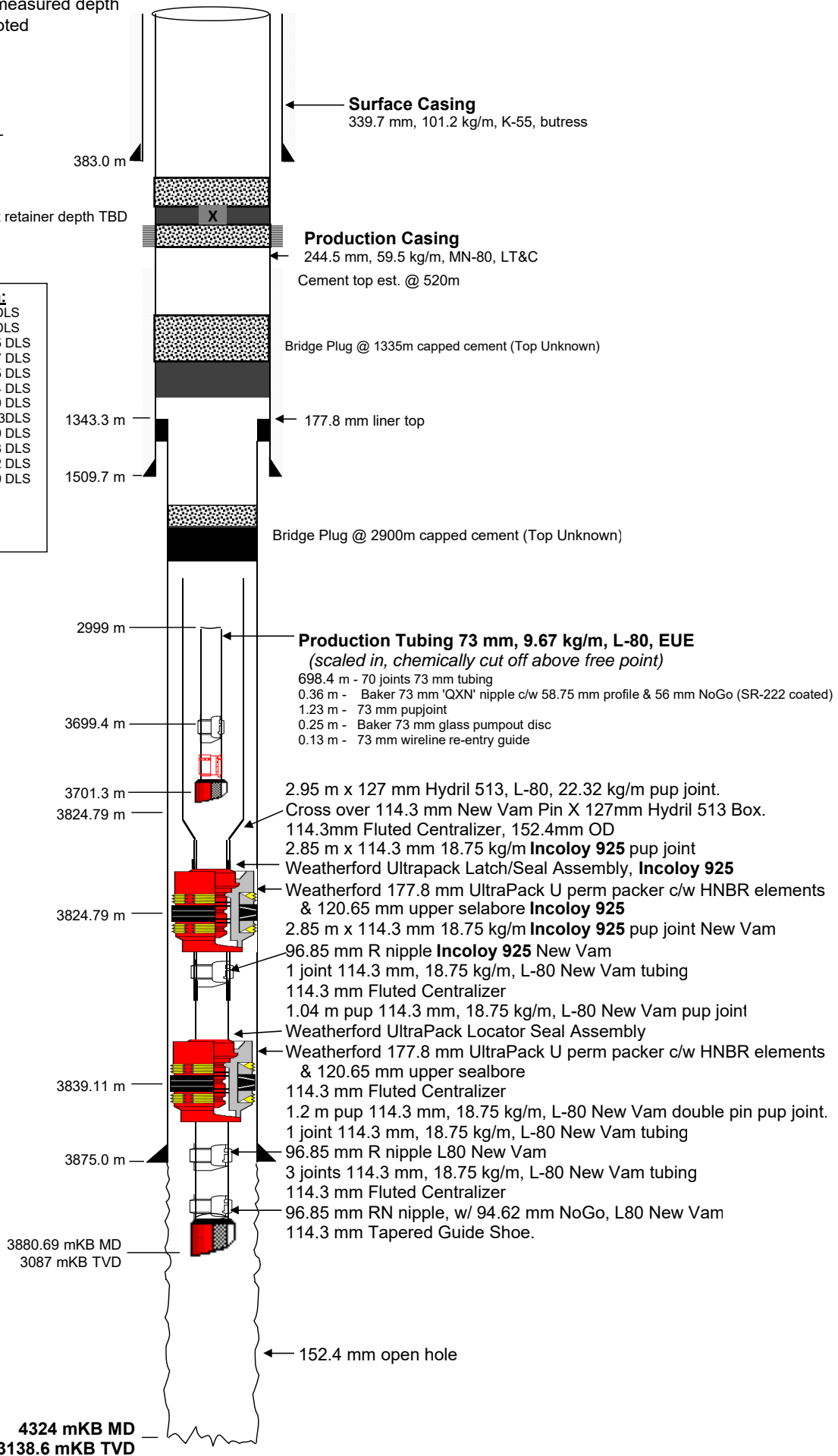
All depths in mKB measured depth unless otherwise noted

**Elevations:**

KB 919 mASL  
GL 911.6 mASL  
KB to GL 7.4 m  
KB to CF 7.4 m  
KB to TSF 6 m  
Cement retainer depth TBD

**Wellbore Deviation:**

300 mKB	0.0 deg	0 DLS
500 mKB	8.3 deg	3 DLS
700 mKB	22.4 deg	3.5 DLS
923 mKB	37.5 deg	2.7 DLS
1000mKB	38.3 deg	.55 DLS
2000mKB	40.6 deg	1.4 DLS
3000mKB	41.2 deg	2.0 DLS
3200mKB	40.7 deg	2.3DLS
3800mKB	60.5 deg	6.9 DLS
3946mKB	75.3 deg	3.8 DLS
4100mKB	86.6 deg	5.2 DLS
4324mKB	89.3 deg	5.9 DLS



## INFORMATION DISCLOSURE CONSENT FORM

Pursuant to subsection 91(3) of the *Petroleum Resources Act* (PRA)

Subject to its obligations under section 91 of the PRA and the objectives expressed by the Government of the Northwest Territories Oil and Gas Regulator (Regulator) in its *Information Disclosure Guidelines*, issued under section 18 of the *Oil and Gas Operations Act* (OGO) on May 10, 2016, the Regulator wishes to facilitate public access to information about the regulation of oil and gas works and activities under OGO, while protecting an applicant's right to maintain privilege over certain information.

Paramount Resources Ltd (the Applicant), requires authorizations, approvals, orders, or other consents from the Regulator in respect of the following works or activities:  
South Liard Well Abandonment

The Applicant (please mark box or boxes):

- Does not consent** to the public disclosure of any information with respect to the above-noted works or activities, other than information or documentation that the Regulator is already permitted to disclose under section 91 of the PRA, and has provided a rationale for non-disclosure in the space provided on the reverse of this form.

or

**Consents** to the public disclosure of all the information indicated by the Applicant below with respect to the above-noted works or activities, with the exception of any information noted in the space provided on the reverse of this form where accompanied by a rationale for non-disclosure:

- This completed *Information Disclosure Consent* form
- A brief project description (approximately 1-5 pages) that includes the name of the applicant, the scope, purpose, location, timing and nature of the proposed work or activity. This project description may be used for the purposes of a preliminary screening under Part V of the *Mackenzie Valley Resource Management Act*.
- The contents of an application for an Authorization under section 10(1)(b) of OGO, including but not limited to:
- The completed application for the Authorization;
  - All required documentation supporting the application, including the safety plan and environmental protection plan where applicable;
  - Correspondence and Information Requests between the Regulator and the Applicant;

- The approved Authorization, including any conditions imposed by the Regulator;
- The completed application for any associated approvals (such as well approvals);
- Any associated approvals issued, including any conditions imposed by the Regulator;
- Subsequent amendments to any authorizations or approvals issued by the Regulator; and
- Any requests to vary or seek exemption from a regulatory requirement under section 54 of OGOA.

Classes of information or documentation obtained by the Regulator as a result of carrying on a work or activity that is authorized under OGOA, as described in subsection 91(8) of PRA, remain privileged for the periods of time described in that subsection.

By providing its consent to the disclosure of the above information, the Applicant hereby releases OROGO, its officers, agents or employees from any claims, demands, losses or liability arising out of or related to the disclosure of the information.

This consent remains in effect until it is revoked or amended by written notice to OROGO, in which case the amended consent would apply to information provided to the Regulator after the date of the written notice.

The Applicant hereby affirms that it has read and fully understands this Information Disclosure Consent Form and release of liability.

Paramount Resources Ltd

Name of Applicant Company

September 17, 2021

Date



Signature of Officer, on behalf of Applicant

John Hawkins, Director Asset Management

Name of Officer (print)

**Information the Applicant Does Not Consent to Disclose:**

**Rationale for Non-Disclosure (use additional paper if necessary):**

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