



**Paramount**  
resources

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July 27, 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)**  
**Nogha B-23 (WID 1998)**

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) for Nogha B-23
- Details regarding the Application to Alter B-23
- Abandonment program for B-23 including downhole diagrams
- A signed original Information Disclosure Consent Form

A PDF version of the Application, including scanned copies of the above attachments will be provided to OROGO secure FTP site.

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

Furthermore, please accept this letter as permission to discuss this application and associated communications and operations with Paramount team members or Mr. Richard (Dick) Heenan of Heenan Energy Services Ltd. at (403) 818-4408 or [dickheenan@shaw.ca](mailto:dickheenan@shaw.ca) if required.

Regards,

A handwritten signature in black ink, appearing to read 'John Hawkins'.

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	MGM Apache Nogha B-23	Operator	MGM Energy
Well Type	Exploratory Well (if Other, specify _____)	Contractor	TBD

### RELATED LICENCES, PERMITS, AND AUTHORIZATIONS

Operating Licence No.	NWT-OL-2014-009	Operations Authorization	OA-2019-002-MGM
PRA Licence No.	Select <input type="text"/>	Station Keeping	Not Applicable
		Land Structure	Conventional Land
Land Use Permit No.	S19A-004	Issued by:	Sahtu Land and Water Board
Water Licence No.	S19L-003	Issued by:	Sahtu Land and Water Board

### ACTIVITY INFORMATION

Current Well Status	Suspended	Anticipated Well Status	Abandoned
Well Path	Select	Elevation KB/RT	316 m
Approximate Start Date	Jan 15 2024	Ground Level / Seafloor	311 m
Est. Days on Location	15 days	Anticipated Total Depth	1476 m KB

### WELL OPERATION PROGRAM

Activity Type	Top to Bottom Interval (m KB)	Comments
Abandonment	1420-1444	Abandon with bridge plug & cement on top of extg. pkr
Select	-	Cut & cap 1m below grade
Select	-	
Select	-	

Additional Information

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

Name	<u>John Hawkins</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><i>John Hawkins</i></u> John Hawkins <i>Responsible Officer of Company</i>	Date	<u>July 27, 2022</u>



**Application for Approval to  
Alter the Condition of a Well  
Nogha B-23 Abandonment**

**July 2022**

## Introduction

MGM Apache Nogha B-23 66-40-125-45 was drilled in 2004 by Apache Canada to a depth of 1476m and cased and cemented to surface. The Mount Clarke A and C were tested but due to test results and the remote location of the well it was suspended in 2005 with a retrievable tubing plug @ 1410m and a hookwall plug at 18mCF.

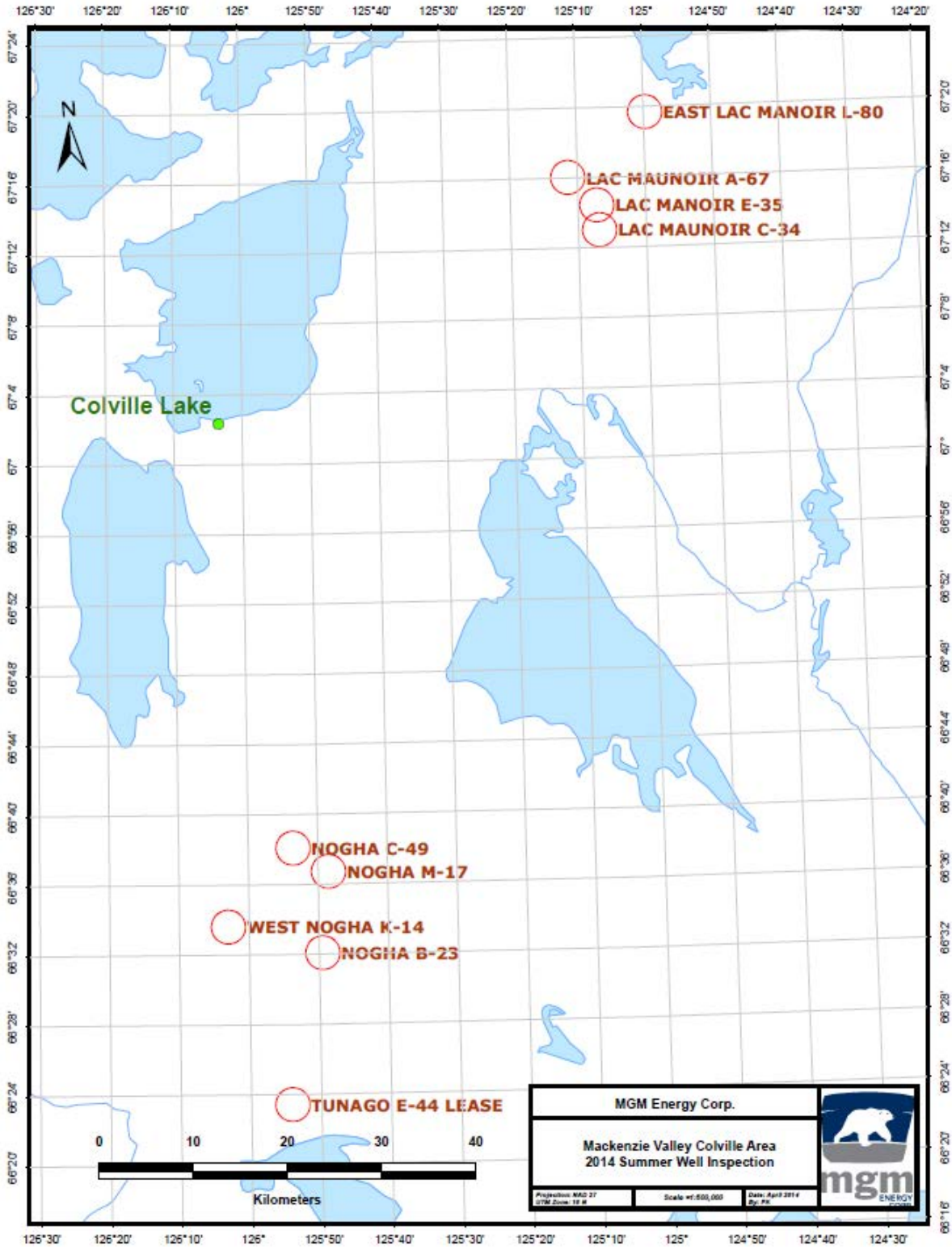
This well has been suspended for a significant period and there are no current plans to put it on production, MGM Energy (MGM), the current owner of record, intends to abandon it in compliance with the requirements of OROGO. Current plans are to abandon this well in conjunction with five others in the region in the winter of 2024. MGM has applied for an Operations Authorization for these wells. Circumstances and/or permitting issues may mean that it is more desirable to change the order and/or timing of the abandonments.

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

MGM Energy is a wholly owned subsidiary of Paramount Resources Ltd (Paramount). As indicated in the Application for Operations Authorization, operations will be performed using Paramount procedures, supervision, and contract personnel.

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 (for MGM) has consulted with the Aboriginal rights holders affected or potentially affected by these operations.

No concerns were raised by any of the parties involved.

The B-23 well is approximately 60km south of the Hamlet of Colville Lake and is only accessible by winter road.

The Engagement Plans and Engagement Records were supplied as part of the supporting information for the application for Operations Authorization for this project.

## **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 Nogha B-23.

## 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 surface casing was cemented from the base at 604m with 47 tonnes of Class G cement, but no returns were noted. Subsequently, a total of 9 tonnes of cement was staged into the annulus as a "top job". No bond log is available for this section, but it is reasonable to assume that any groundwater in the 0-600m region is successfully isolated from any hydrocarbons below and this in compliance with OROGO Guidelines 6A and 6B.

The production casing was cemented full length from 1476mKB to surface with 3m<sup>3</sup> of cement returns. In addition, cement bond log was run on the well as part of the completion. It showed good bond as follows:

- 560-570m (surface casing shoe at 604mKB)
  - 630-650m
  - 915-955m
  - 975-1030m
  - 1130-1185m
- with partial cement in most of the rest of the wellbore

The only potentially prospective hydrocarbon zones in the region are the Mount Cap (not prospective in this well) and the Mount Clarke – all below 1300m. As shown on the geological strip log, all the formations above 1328m consist of shale, dolomite, halite and anhydrite – none containing any hydrocarbons.

Shut-in well inspections show no indications of Surface Casing Vent Flow (SCVF) or visual indications of Gas Migration (GM).

A test for gas migration (GM) was performed in September 2021 (prior to freeze-up) with a DP-IR methane detector with a sensitivity of 1ppm. No methane was detected above background levels.

Based on the above, MGM has concluded that:



1. The cement top is near surface (110mKB)
2. Any zones of potential non-saline groundwater above 600m are effectively isolated from any formation fluids below this point. Surface casing is set at 604mKB.
3. No discrete oil or gas bearing zones are in communication with each other.
4. No further remedial cement operations are required.

Below is a summary of the proposed program. The full program is provided in the appendices, along with current and proposed abandonment diagrams.

MGM is proposing to abandon the Mount Clarke A and C together by setting a bridge plug above the existing packer and capping it with cement. The rationale for this is as follows:

- The upper perforation of the Mount Clark C and the lower perforation of the Mount Clark A are 21.5 meters apart and this it is unlikely that they have significantly different pressure regimes. In any case, they have been in communication inside the casing for approximately eighteen years and thus any attempt to separate them at this time would be pointless.
- The bridge plug would be set at approximately 1414mKB – 6 meters above the uppermost perforation of the Mount Clarke. This is “as close as practical” and thus in accordance with the most recent guidelines.
- The bottom hole pressure at 1420mKB (top of the Mount Clarke A) is 15,262kPa. This equates to a gradient of 10.7kPa/m. This would require a kill fluid of 1100 kg/m brine. As detailed below, MGM proposes to install a tubing plug in the packer before removing the BOPs and then leaving the packer in place. This provides the following advantages
  - There are always two independent tested barriers in place (packer/plug and BOPs) Vs the situation where the kill fluid is the primary well control method – this increasing safety
  - Eliminating the kill fluid avoids the risk of spill and environmental impact during the mixing, storage, and transportation to disposal (in Alberta).

#### Proposed Operations

1. Set a tubing plug in X profile @ 1414mKB (in existing packer connector)
2. Retrieve existing tubing leaving existing packers in place.  
The 2021 shut-in well inspection detected a shut-in casing pressure of 4,440 kPa and no shut-in tubing pressure. Considering the bottom hole pressure and the annular fluid (frac oil), this suggests a leak at the packer. As there is no previous indication of a packer leak, it is anticipated to be small.  
The program will employ a snubbing unit to address this issue.
3. Set a bridge plug on top of the existing packer & cap with 50m of cement.
4. Cut & cap per OROGO requirements.

A detailed program is provided under separate cover.

Current plans are to start construction of a winter road in December (subject to weather conditions and completion of the GNWT road to Colville Lake).

Downhole abandonment operations are planned to start late January and are estimated to take about 7 days. As there are a total of six 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 in Appendix 2 will comply with the requirements of OGDPR section 56.

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

The well site was checked for indications of gas migration in September 2021, in conjunction with regular shut-in well inspections. As above, there were no indications of GM or SCVF. 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 or 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 in Appendix 2 will comply with the *Well Suspension and Abandonment Guidelines and Interpretation Notes* provided by OROGO.

### **Information Disclosure Consent**

This form for the Nogha B-23 operations is supplied under separate cover. The form for the information associated with the Operations Authorization is included with that application.



**ABANDONMENT PROGRAM**  
**OROGO Deadline April 1, 2022**  
**OROGO LEVEL II WELLBORE**

**MGM WEST NOGHA B-23**  
**WID # 1998**  
**POTENTIAL H<sub>2</sub>S: 0.0%**

**PROCEDURE APPROVAL & DISTRIBUTION**

**DATE:** May 5, 2021 – Revised July 19, 2022  
**WELL NAME:** MGM WEST NOGHA B-23  
**UWID:** 300/B-23-6640-12545/2  
**OPERATIONS AREA:** Coleville Lake **PROVINCE:** NWT  
**OBJECTIVE:** Abandon Level II wellbore in accordance with OROGO abandonment guidelines.

**AFE No:** TBD  
**AMOUNT:**  
**PRL Supplier Coding:** PR210-9231-xxx (Abandonment program)

**REGULATORY APPROVALS:**  
**REQUIRED: YES**  
**TYPE: OROGO Operations Authorization and ACW.**  
**TYPE: Water License. Permit # TBD.**  
**TYPE: Land Use Permit. Permit# TBD.**

**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:** Corey Thomson/Well Files

**PREPARED BY:** Richard Heenan – Consultant **DATE: July 19, 2022**

**REVIEWED** Corey Thomson – Engineer (ARO) **DATE: July 2022**

**APPROVED BY:** Tim Wood - Manager (ARO) *[Signature]* **DATE: July 2022**

John Hawkins - Director (ARO) *[Signature]* **DATE: July 2022**

## ABANDONMENT PROGRAM

### OBJECTIVE

Suspended wellbore, OROGO Level II well bore. OROGO abandonment deadline April 1, 2022. Abandon the well as per approved ACW and OROGO guidelines. Cut and cap well.

### REPORTING

- All rig calls and Daily Reports are to be directed to Corey Thomson (Superintendent/Engineer ARO)
  - Office: 403-261-1250
  - Cell: 403-835-4447
  - E-mail: [corey.thomson@paramountres.com](mailto:corey.thomson@paramountres.com)

### PROGRAM SUMMARY

- Read & record SIP(s). MIRU Service Rig, P-tank and associated equipment
- Investigate status of SCVF/GM.
- MIRU slick line unit. Pull A-3 tubing plug from 18mcf.  
Pressure test tubing to 7000 kPa with water prior to pulling plug.  
Pull PX plug and prong from X profile at 1410.7m KB.
- Set plug in X profile @ 1414mKB
- Remove wellhead and install BOP's. – use snubbing unit due to annular pressure
- Release tubing from packer and POOH
- RIH bit and scraper for 177.8mm casing on 73mm tubing string to PBTD.  
Circulate clean. Pull bit and scraper.
- RIH with permanent bridge plug for 177.8mm casing on tubing.  
Set bridge plug within 15m of top perforation.  
Pressure test bridge plug to 7000 kPa for 10 minutes.
- Rotate off plug and set balanced 1m3 cement plug on bridge plug.  
Backwash with fresh water. Tag and pressure test plug.
- Pull out of hole and lay down tubing string.
- Cut and cap the casing strings with vented cap.

### SAFETY

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

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

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



## **REGULATIONS**

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

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

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

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

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

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

## **WORK ORDERS/FIELD TICKETS**

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

## **MATERIAL TRANSFERS**

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



# MGM WEST NOGHA B-23 ABANDONMENT

## WELL DATA AND WELLBORE CONFIGURATION

### WELL DATA:

**Surface Location:** LAT: 66°32'05.692" N LONG: 125°49'33.237" W NAD83  
**Bottom hole Location:** LAT: 66°33'39.492" N LONG: 126°3'9.504" WNAD83  
**UWI:** 300/B-23-6640-12542/2  
**Profile:** Slight Deviation (Refer to survey)  
**BGWP:** 600m GL (Default)  
**WID#:** 1998  
**OPERATING LICENCE#** **NWT-OL-2014-009**  
**OROGO OA#** **TBD**  
**OROGO ACW#** **TBD**  
**Spud Date:** January 29, 2004  
**Rig Release Date:** March 19, 2004  
**KB:** 315.75m  
**GL:** 311.27m  
**KB-GL:** 4.48m  
**PBTD Original:** 1456.0m KB  
**TD:** 1476.0m KB

### CONDUCTOR:

#### **Hole size 445mm to 60m KB.**

339.7mm, 101.71kg/m K-55 BT&C landed at 65m KB.  
Cemented with 10Tonne (7.4m<sup>3</sup>) Arctic Set cement + 0.5% D065, + 0.2% D046, + 1.0% D013. 3.0m<sup>3</sup> of cement returns.

### SURFACE:

#### **311 mm to 604mKB**

46 Joints. 244.5 mm, 53.50 kg/m, J-55, LT&C set at 604m KB.  
Cemented with 47 tonnes 0-1-0 Class "G " at 1900kg/m<sup>3</sup> and displaced with 23.3m<sup>3</sup> of fresh water. The plug was down at 1000 hours March 2,2004. There were no returns. The casing annulus was cemented from surface through 25.4mm pipe with 8 tonnes Arctic Set cement at 1900kg/m<sup>3</sup>. No returns were obtained. The rig waited on cement for 4 hours. The annulus was topped-up through annulus consisting of 0.825tonnes Arctic Set cement slurry at 1900kg/m<sup>3</sup> and gravel crush. Ran 0.25 tonnes through 25.4mm pipe to top fill annulus then waited on cement for 12 hours.

**NOTE: Extreme instances of losses occurred during operation**

### PRODUCTION:

#### **Hole Size 216 mm to 1476m KB.**

110 Joints. 177.8 mm, 43.16kg/m, L-80, LT&C set at 1404mKB. Cemented with 29Tonnes (22m<sup>3</sup>) 0:1:0 Class G Cement. 3m<sup>3</sup> of cement returns..

### PERFORATIONS:

1441.5 – 1444.5mKB Mount Clark C  
1420.0 - 1426.0mKB Mount Clark A



**Formation Tops**

geoSCOUT Ref Elev(m):

**+315.75**

Formation	TVD (m)	Elev (m)	
Csaln_rv	702.0	-386.3	
Csaln_sa	767.0	-451.3	
Csaln_cIL	898.9	-583.2	
Cmt_cap	1186.9	-871.2	
Cmt_clark	1418.8	-1103.1	
preCamb	1445.8	-1130.1	

**GEOLOGICAL MARKERS KB ELEVATION 315.75m. FROM GEOLOGICAL REPORT**

Formation	Sample Depth (m)	Log Depth (m)	Log Subsea (m)
Franklin Mtn - Cherty	-	160	155.8
Franklin Mtn - Rhythmic	-	547	-231.3
Franklin Mtn - Cyclic	604.0	604.0	-288.3
Saline River - Shale	702.0	702.0	-386.3
Saline River - Up salt	774.0	767.0	-451.3
Saline River - Lower Shale	894.5	899.0	-583.3
Saline River- Lower Salt	915.0	917.0	-601.3
Mt. Cap - Upper Shale	1184.0	1187.0	-871.3
Mt. Cap - Chert	1223.0	1228.0	-912.3
Mt. Cap - Lower Zone	1300.0	1335.0	-1019.3
Mt. Cap - Clastic Zone	1366.5	1365.5	-1049.8
Mt. Cap - Basal	1395.0	1395.0	-1079.3
Mt. Clarke - A Zone	1420.5	1419.0	-1103.3
Mt. Clarke - B Zone	1427.5	1427.5	-1111.8
Mt. Clarke - C Zone	1433.0	1433.0	-1117.3
Proterozoic	1447.5	1446.0	-1130.3
Total Depth	1476.0	1475.0	-1159.3

**SCVF:** No vent flow present.



**Tubing/Casing Data:**

	Surface Casing	Prod. Casing	Production Tubing String	
Size O.D. (mm)	244.5	177.8	73.0	
Weight (kg/m)	53.50	43.16	9.67	
Grade	J-55	L-80	L-80	
Connection	LT&C	LT&C	EUE	
Drift I.D. (mm)	222.63	153.90	59.61	
I.D. (mm)	226.59	157.07	62.0	
Capacity (m <sup>3</sup> /m)	0.040326	0.019377	0.003019	
Collapse (MPa)	13.9	48.4	76.9	
Burst (MPa)	24.3	56.3	72.9	
Tension (daN)	175 300	261,100	64 500	
Annular Volume (m <sup>3</sup> /m)			0.015189	
Depth (mKB)	604.0	1476.0	1439.1	

**Reservoir Data:**

Formation	Mount Clark A	Mount Clark C	
Perforations	1420.0 – 1426.0	1441.5 – 1444.5	
Reservoir Pressure	15,262 Kpa	15,526 Kpa	
Reservoir Temperature	24.8°C	25°C	
H <sub>2</sub> S %	0	0	



# MGM WEST NOGHA B-23 ABANDONMENT

## ABANDONMENT PROGRAM

1. **Submit certificates and inspection documents for any service rig, well control and associated equipment (including boilers) at least 10 days prior to the rig commencing work** by e mail at [orogo@gov.nt.ca](mailto:orogo@gov.nt.ca).
2. **The Wellsite Supervisor is responsible** to notify (or verify notification has been completed) the OROGO, a **minimum of 24 hrs** prior to any well servicing abandonment operation.
3. **The Wellsite Supervisor is responsible** to notify (or verify notification has been completed) the OROGO, a **minimum of 24 hours prior** to any planned flaring operation. When a permit is applicable for sour gas flaring, a copy of such permit must be on site during any flaring operation and requirements of such permit must be strictly adhered to.
4. **The Wellsite Supervisor is responsible** to verify notifications have been completed to all applicable residents, industrial operators, trappers & guiders within the categorized radius and/or within the emergency planning zone (EPZ) if applicable a **minimum of 24 hours prior** to any flaring operation.
5. Paramount shall provide all staff and contractors for this program with the OROGO 24-hour incident reporting phone number (867-445-8551) prior to commencing any work or activity.
6. Complete lease access and well handover process. Complete lease inspection. 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.
7. Prepare location for wireline unit, Service Rig, P-Tank and flare stack & support equipment.
8. Perform SCVF bubble-test, ensure SCV piping is exposed to determine if it is open and intact, read and record SIP's. Fill-out the 'Surface Casing Vent Flow / Gas Migration Data Sheet' and examine surface casing vent for blow or suction. Check and monitor LEL and H<sub>2</sub>S levels at wellhead and investigate for evidence of gas migration at surface.
9. Check for the presence of and confirm there is no H<sub>2</sub>S.
10. Note: this well is not tied into a flowline.
11. MIRU service rig complete with a 21 MPa Class III BOP stack. 73 mm rams, kill spool, rig pump, clean tank, and related auxiliary equipment (boiler) 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 OROGO 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.



12. 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.
13. Haul in approximately 30m<sup>3</sup> of fresh water.  
Haul in 73mm, 9.67kg/m L-80 EUE tubing work string.  
Ensure bits, scrapers and pressure test packers for 177.8mm are available.
14. Conduct daily pre-job safety meeting and equipment inspection.
15. MIRU slick line unit with lubricator and BOPs.  
Purge and pressure test the lubricator to **1400kPa** (low) and **14MPa** (high) with Nitrogen gas.  
Purge the lubricator each time before running in the hole with tools.  
Hang the wireline sheave in the derrick.
16. Pull slip-stop, **A-3** plug, and collar stop located at **18mcf**.  
“Hand jarring” will be required due to shallow depth.
17. Pull ‘**PX**’ prong and plug that is set in ‘**X**’ profile at **1410.68mKB**.
18. Run blind box to base of tubing at 1439m.
19. Brush X profile in On-off connector @ 1414mKB.
20. Set X plug in 58.75mm profile in On-off connector @ 1414mKB.
21. Fill tubing with water.  
Bleed off pressure and monitor for flow for 10 minutes (negative pressure test).  
(This gives approximately 1200 kPa underbalance for negative pressure test.)  
Pressure test to 7MPa for 10 minutes. Bleed off pressure.
22. Punch a hole in the 3 meter pup joint below the profile @ 1410mKB (and above plug @ 1414mKB).  
This is required to ensure against “hydraulic lock” setting the X plug.
23. Brush X profile @ 1410mKB.  
Set X plug in 58.75mm profile @ 1410mKB. Ensure tubing is still full of water.  
Release pressure on the tubing and monitor for pressure buildup/flow in the tubing for 10 minutes to ensure X plug is seated and holding.  
(Depending on the rate of buildup of annular pressure, this provides a negative pressure test of up to 1200kPa.  
Pressure test the X plug @ 1410mKB to 7 MPa for 10 minutes.  
Set slip stop on top of X plug.
24. Rig down slickline unit.
25. 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 **21MPa** 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 **21MPa** for **10 minutes** each. Pressure test annular preventer to **7000 KPa** for **10 minutes**.



26. 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.
27. Tie in circulating lines with a return line tied into 'P' tank or rig tank as required. Properly stake surface lines and pressure test lines and manifold to **1,400kPa** (low) and **21,000kPa** (high) and hold each for ten (10) minutes.
28. Confirm the tubing is dead.  
The casing side is anticipated to have a pressure of approximately 4489kPa.  
This is consistent with the bottomhole pressure, an annulus fluid of frac oil or diesel, and a leak at the packer.  
The magnitude of the leak is unknown.  
Attempt to bleed off annular pressure and monitor buildup to understand the magnitude of the leak
29. Remove wellhead top section. Install a 73mm landing pup with an open stabbing valve. Close the stabbing valve. Strip the BOPs over the landing pup and nipple up the stack.  
Do not release the hold-down screws on the tubing hanger until the snubbing jack is installed and operational and tubing hanger secured to a tubing joint in the snubbing jack  
Close the pipe rams on the landing pup and pressure test the BOP connection to the wellhead to 1.4MPa (low) and 21MPa (high) for 10 minutes each.
30. Rig up snubbing unit and pressure test as above.
31. Install stabbing valve on tubing and close it.  
Come off On/Off connector at **1414.14mKB** setting string in compression and turning left one – quarter turn.  
  
If unable to come off connector, chemical cut the tubing 1m above the X plug at 1414mKB.  
Note: this will require removal of plug at 1410mKB and subsequent replacement and retesting as above.  
  
Maintain grip on tubing with snubbing unit.
32. Pull out of hole (strip/snub if required) with 73.0mm string visually inspecting on the way out for re-use in work string and stand in derrick.  
NOTE: WET TRIP
33. RIH (snub if required) with bit and casing scraper for **177.8mm** casing to PBTD.  
Pull out of hole and stand tubing string.
34. Run in hole with **177.8mm** (nominal) permanent bridge plug on 73.0mm tubing.  
Set as close as practical above On-off connector; do not set higher than **1405.0mKB** if possible  
If desired, 'permanent bridge plug may be run on wireline instead of snubbing if pressure is present
35. Pressure test bridge plug to **7MPa** for **10 minutes** and POOH. Record on daily report.
36. If bridge plug was run on wireline, RIH with 73mm, 9,67kg/m, EUE open ended tubing to PBTD and tag.  
Record depth. Come off bottom.
37. Forward circulate with fresh water to remove all diesel from annulus.  
Store diesel in tanks on surface and haul to approved disposal.



- Record on tour sheet and daily report "Displaced well to fresh (non-saline) water" – use this exact wording.
38. Rig down snubbing unit. Conventional rig will be used to spot plug and pull tubing unless standalone snubbing unit was used for previous steps.
  39. Move in and rig up cementers. Pressure test the surface lines to **21 MPa**. Make sure mix water is between **20 to 25 deg C**. Mix water must be clean potable water.
  40. Circulate a **1m<sup>3</sup>** balanced (+/- 50 meter) cement plug. Catch and retain samples. Monitor surface samples for "setting" conditions. Record and report same.  
Pull tubing above cement top slowly. Circulate clean with fresh water.
  41. Wait on cement until surface samples are firm. RIH w/ 73mm tubing and tag cement top.  
Cement top must be 15m or more above top of bridge plug. A minimum of 1,800 decanewtons must be used to tag plug. Record results on daily report.
  42. Pull out of hole and lay down the 73mm tubing. Ensure thread protectors are used.
  43. RIH with tubing to 500m.  
This will displace 2m<sup>3</sup> of water to lower final fluid level to 100m to prevent freezing due to permafrost. POOH. Do not fill hole.
  44. Remove BOPs and rig out.  
Cover exposed flange securely if well is not to be immediately cut and capped.
  45. 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.

46. Confirm LEL and H2S are zero. Reconfirm no indications of gas migration.
47. 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.
48. 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:**

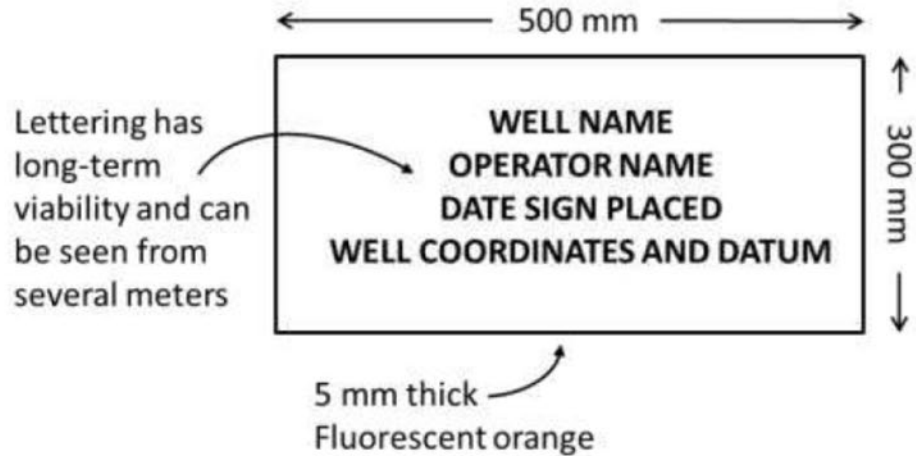
Innermost string can be expected to suddenly drop once completely cut.  
Do not place pry bars, hands or fingers in the windows.

49. Complete weld cut of the surface casing, lift and remove wellhead from bell hole.
50. 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.
51. 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



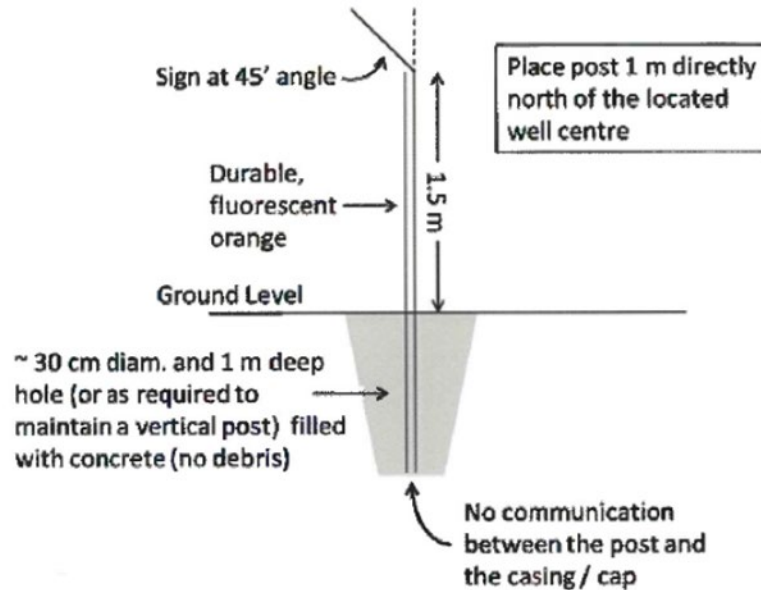
Record well coordinates on daily report.  
 A buried 5 gallon pail filled with cement may be helpful in supporting the well sign (as below)  
 DO NOT WELD SIGNPOST TO CASING.

**Sign Requirements**



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

**Post Requirements**



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



## CORPORATE CONTACTS

Paramount Resources Ltd.  
2800, 421 - 7<sup>th</sup> Avenue, SW  
Calgary, AB  
T2P 4K9

### ARO (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
<b>Corey Thomson</b> Engineer, Abandonments E-mail: <a href="mailto:corey.thomson@paramountres.com">corey.thomson@paramountres.com</a>	(403) 261-1250		(403) 835-4447	(403) 261-1349
<b>Tim Wood</b> Manager, ARO E-mail: <a href="mailto:Tim.Wood@paramountres.com">Tim.Wood@paramountres.com</a>	(403) 290-2919		(403) 803-8410	(403) 261-1349

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### PRODUCTION (District Office):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
Completions Sub-Surface Foremen				
Martin Doll /	(780) 683-8037		403 926-7192	
Kent Gillett	(780) 683-8037		403 350-2730	

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### MORNING REPORTS (Calgary):

	<u>Business</u>	<u>Residence</u>	<u>Cellular</u>	<u>Fax</u>
<b>Corey Thomson</b> Abandonment Engineer E-mail: <a href="mailto:Corey.Thomson@paramountres.com">Corey.Thomson@paramountres.com</a>	(403) 261-1250		(403) 835-4447	(403) 261-1349
<b>Tim Wood</b> Abandonment Manager E-mail: <a href="mailto:Tim.Wood@paramountres.com">Tim.Wood@paramountres.com</a>	(403) 290-2919		(403) 803-8410	(403) 261-1349
<b>Richard Bean</b> Abandonment Superintendent E-mail: <a href="mailto:Richard.Bean@paramountres.com">Richard.Bean@paramountres.com</a>	(403) 303-1929		(403) 793-4586	(403) 261-1349



## 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 \$5,000,000 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 (if required) 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.
- 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 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 Precautions are taken to prevent freezing of the bleed-off and kill lines
- 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 precautions 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 know 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 prepared by the Wellsite Supervisor and e-mailed (faxed) to the Operator's Calgary office by 07:00Hrs. every morning.

- 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. Disposition of scrap material must be documented.
- All Accidents or Incidents shall be reported immediately to the Calgary Office - Attention: Corey Thomson or Richard Bean Complete the Paramount Safe Incident Report and conduct the necessary Investigations immediately. Fax copy to Calgary within 6 hours of incident.
- Ensure that all garbage and debris has been removed from the location. and that any environmental concern has been addressed. Contact the Construction foreman with any concerns.
- 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.



## 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)





# Nooha B-23

WELL DIAGRAM - Proposed Abandonment - 2022

ALL DEPTHS ARE mKB

WELL NAME: Nooha B-23

PREPARED BY: R. Heenan (data from Apache 20040402) DATE: 2021-07-23

ELEVATIONS (meters): Licence No: WID 1998

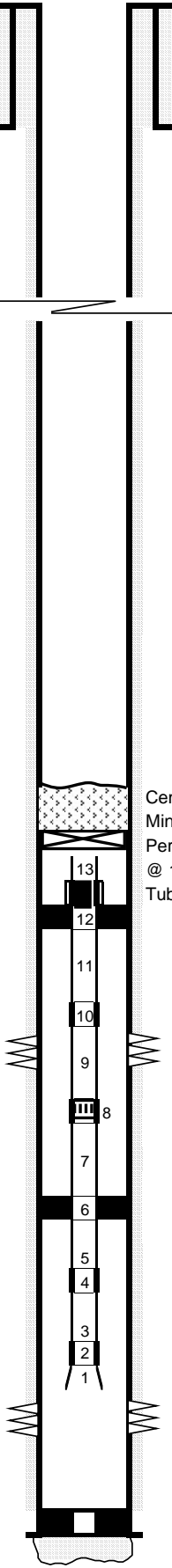
TD 1,476.00 KB Elev. 315.75 KB to CF Dist. H 3.94

PBTD 1,456.00 Ground Elev. 311.27 KB to Ground 4.48

CASING/TUBING	SIZE (mm)	WEIGHT (Kg/m)	GRADE	DEPTHS (m)
Surface Casing	244.50	53.50	J-55	604.00 46 Jts
			LT&C	
Production Casing	177.80	43.16	L-80	1,476.00 112 Jts
			LT&C	
Prod Liner				
Tubing	73.00	9.67	L-80	1,410.37 147 Jts
			EUE	

BOTTOM HOLE ASSEMBLY:

ITEM	DESCRIPTION	LENGTH (m)	Top at (m KB)
1	1 - 73.0 mm Wireline Re-entry Guide	0.15	1,438.93
2	1 - 73.0 mm Otis "RN" nipple w/55.58 mm profile & 51.05 mm no-go	0.50	1,438.43
3	1 - 73.0 mm EUE, 9.67 kg/m, L-80 pup jt	2.47	1,435.96
4	1 - 73.0 mm Otis "R" nipple w/55.58 mm profile	0.48	1,435.48
5	1 - 73.0 mm EUE, 9.67 kg/m, L-80 pup jt	2.47	1,433.01
6	1 - 177.8 mm Halliburton "G-77" 10K Hydraulic set production pkr	1.68	1,431.33
7	1 - 73.0 mm EUE, 9.67 kg/m, L-80 pup jt	1.25	1,430.08
8	1 - 73.0 mm Otis "XA" sliding sleeve c/w 58.75 mm "X" profile	1.12	1,428.96
9	1 - 73.0 mm EUE, 9.67 kg/m, L-80 tbg jt	9.63	1,419.33
10	1 - 73.0 mm Otis "X" nipple w/58.75 mm profile	0.37	1,418.96
11	1 - 73.0 mm EUE, 9.67 kg/m, L-80 pup jt	2.47	1,416.49
12	1 - 177.8 mm Halliburton "G-77" 10K Hydraulic set production pkr	1.68	1,414.81
13	1 - 177.8 mm Halliburton "XL" HD on-off tool w/58.75 mm "X" profile	0.67	1,414.14



Surf. Csg. @ 604.0

PBTD @ 1,456.0  
 Prod Csg @ 1,476.0

TD @ 1,476.0 m

PERFORATION INTERVALS

Upper Mount Clark 1,420.0 - 1,426.0 mKB  
 Lower Mount Clark 1,441.5 - 1,444.5 mKB

NOTE: Both Halliburton 177.8 "G-77" Hydraulic set packers are equipped with 11,000 DaN straight up pull emergency shear release.

Packers were set using diesel fuel. Packer and casing were P/T to 7.0 Mpa for 15 min - ok

**Supplement -- Cement Squeeze Procedure  
including perforations and acid (if required)  
Applicable to MGM Central Mackenzie Valley Wells  
B-23, C-34, C-49, E-35, I-78, K-14, M-17  
(as and 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 1m<sup>3</sup> 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 1m<sup>3</sup> 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 m<sup>3</sup> "Microfine cement" and 1.5m<sup>3</sup> 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 m<sup>3</sup> 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 m<sup>3</sup> 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 0.5m<sup>3</sup> 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 20220712

## 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* (OGOA) on May 10, 2016, the Regulator wishes to facilitate public access to information about the regulation of oil and gas works and activities under OGOA, 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 OGOA, 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;



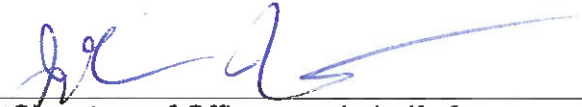
- The approved Authorization, including any conditions imposed by the Regulator;
- The completed application for any associated approvals (such as well approvals);
- Any associated approvals issued, including any conditions imposed by the Regulator;
- Subsequent amendments to any authorizations or approvals 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	<i>September 17, 2021</i>
Name of Applicant Company	Date
	John Hawkins, Director Asset Management
Signature of Officer, on behalf of Applicant	Name of Officer (print)

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

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

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