

March 1, 2023

Office of the Regulator of Oil and Gas Operations

PO Box 1320
Yellowknife NT, X1A 2L9

By Email: orogo@gov.nt.ca

RE: Information Request No. 3: ACW-2021-SOG-N-28-WID 1753 Request for Variation #3

ELM Inc, acting on behalf of Alvarez & Marsal Canada Inc in their capacity as the receiver for Strategic Oil and Gas Ltd is responding to the above noted information request sent on February 28, 2023.

3.1 Justification for Dump Bailing

OROGO has reviewed the previously submitted request for dump bailing and requests further information.

Several attempts to circulate this well have been made in the process of removing the sand from the top of the WR plug at 1475 mKB. On February 25th the first attempt to circulate sand off was made, with a pumping rate of 300 litres per minute and no circulation. On February 26th another attempt was made, with the rig pump nearly maxed out at 500 litres per minute to try to remove the sand. In each attempt the water was pumped down the tubing to try to scour the sand off the WR plug and lift it into the open perforations that were taking all the fluid. At no time was circulation back to surface successful.

ELM believes that the cause of the lost circulation is primarily due to the Slave Point perforations. Once opened, the well has needed approximately 100 litres per minute to maintain a column of kill fluid. Increasing the pumping rate has not filled up the well faster, the well just takes fluid faster. To date, over 400 m3 has been pumped into this well, most of it the inhibited water from other wells that would otherwise go to disposal.

ELM proposes to dump bail cement on the permanent bridge plug for the Keg River formation. For the permanent bridge plug on the Sulphur Point formation, once the plug is set ELM will attempt to establish circulation. If successful, the cement plug will be circulated in place. If unsuccessful, a contingency plan will be in the program for dump bailing after OROGO has been notified.

Should you have any questions or require further information, please contact the undersigned at christopher@elminc.ca

Sincerely,

Christopher Gagnon, EIT

ELM Inc, acting as a consultant to Alvarez & Marsal Canada Inc



ELM
Environmental Liability Management

Routine Well Abandonment Program

Strategic Oil and Gas Ltd. C/O Alvarez & Marsal Canada
Inc.

STRATEGIC ET AL CAMERON N-28
300/N28 60-10N 117-30W

Elm Inc. Project Number: STRA050

Developed by: Christopher Gagnon EIT
Reviewed by: Malcolm McKean P.Eng

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ROUTINE ABANDONMENT PROGRAM

BACKGROUND:

- Suspended gas well
- Well completed in the Slave Point, Sulphur Point, and Keg River formations
- Suspended with tubing plugs and a WR plug

ABSTRACT:

- Move on service rig
- Use slickline to retrieve tubing plugs
- Pull out tubing and first packer
- Fish out second packer
- Recover two WR plugs
- Abandon Slave Point, Sulphur Point, and Keg River zones with bridge plugs and cement
- Run bond log, and remedial cement as necessary
- Abandon liner top with cement plug
- Cut and cap the well

CONTACTS:

Elm Inc. Calgary Office

Elm Inc. Calgary Office		
Malcolm McKean P.Eng, Vice President Liability	██████████ – Cell	Malcolm@elminc.ca
Christopher Gagnon EIT, Operations Engineer	██████████ – Cell	Christopher@elminc.ca

Elm Inc. Field Staff

Elm Inc. Field Staff		
To be determined	To be determined	To be determined

Client Contact

Client Contact		
Duncan MacRae – Director, A&M	██████████ - Cell	dmacrae@alvarzeandmarsal.com

Regulator Contact

Regulator Contact		
OROGO - Office	867-767-9097	orogo@gov.nt.ca
OROGO - 24-hour emergency line	1-867-445-8551	
NWT Spill Line	1-867-920-8130	

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WELL INFORMATION:

WELL NAME: STRATEGIC ET AL CAMERON N-28
UNIQUE ID: 300/N28 60-10N 117-30W
SURFACE LOCATION: 60.133041, -117.586697
LICENSE #: 1753
STATUS: Suspended
TOTAL DEPTH: 1590.5 mKB
ELEVATIONS: **GL:** 760.1 m **KB:** 764.1 m
BGWP: 600.0 mKB
PLUG BACK: 1531 mKB (Cement on PBP)
H₂S DATA: Slave Point: 1.57% - Gas Analysis April 9, 2001
 Sulphur Point: 1.57% - Gas Analysis April 9, 2001
 Keg River: Unknown, assume worst case 2 %
SCVF: None, last tested September 25, 2022
GAS MIGRATION: None, last tested October 30, 2021
SITP: 131 kPa
SICP: 0 kPa
RESERVOIR PRESSURE: Slave Point: 4394 kPa measured February 24, 2006
 Sulphur Point: 4394 kPa measured February 24, 2006
 Keg River: 10,588 kPa measured February 7, 1993
MAX FLARE VOLUME: 1.5 x wellbore volume at 10 MPa = 5.1 e3m3

LANDOWNER: Crown

DIRECTIONS: Refer to maps

COMPLETION:

Keg River: 1541.5 – 1543.0 mKB (Abandoned)
 Keg River: 1538.0 – 1539.0 mKB (Abandoned)
 Permanent Bridge Plug and Cement: 1531.0 – 1536.0 mKB
 Keg River: 1521.0 – 1526.0 mKB (Suspended)
 Keg River: 1511.0 – 1518.0 mKB (Suspended)
 WR Plug: 1500.0 (plug is leaking)
 WR Plug: 1480.0
 Sulphur Point: 1415.0 – 1420.0 mKB (Suspended)
 Sulphur Point: 1409.0 – 1413.0 mKB (Suspended)

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Sulphur Point: 1404.5 – 1406.0 mKB (Suspended)

Slave Point: 1353.0 – 1361.5 mKB (Suspended)

FORMATIONS:

Formation	MD (m)
Wabamun	531.0
Twin Falls	845.0
Slave Point	1347.0
Watt Mountain	1396.0
Sulphur Point	1398.0
Muskeg	1421.0
Keg River	1511.0
Pre Devonian	1573.0
TOTAL DEPTH	1590.5

TUBULARS:**SURFACE CASING:**

298.5 mm, 62.5kg/m, H-40, ST&C. Casing landed at 202.3 mKB. Cemented with 28 T 0-1-0 Class G + 2.0% CaCl₂, **“Good Cement Returns”** No volume stated.

INTERMED CASING:

219.1mm, 35.72 kg/m, IK-55, ST&C. Casing Landed at 834.0 mKB. Cemented with 18.0 T 0-1-8 Class G + 0.75% T-10 and 14.3 T 0-1-0 Class G + 0.8% NFL + 0.1% SPC 1200.

“Good Cement Returns to surface” No volume stated.

LINER CASING:

139.7mm, 23.07 kg/m, IK-55, LT&C

Casing landed at 1590.5 mKB. Hanger at 732.0 mKB.

Cemented with 35.6 T 0-1-4 Class G + 0.5% T-10 and 29 T 0-1-0 Class G + 0.8% NFL + 0.1% SPC 12000.

13.7 m³ cement returns

Cement bond log was run in 1991 over the liner.

Appears to be good bond throughout.

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PRODUCTION STRING: 73mm, 9.67 kg/m, J-55, EUE tubing with 2 double grip packers, profile nipples, and tubing plugs as described in the attached well diagram.

Casing size and weight	Casing ID (mm)	Casing Drift (mm)	Casing Capacity (m3/m)	Top of Plugback	Casing Capacity to Plugback (m3)
298.5mm 62.5 kg/m	281.53	277.57	0.062252	N/A	N/A
219.1 mm 35.72 kg/m	205.66	202.49	0.033221	732	24.31
139.7mm 23.07kg/m	125.73	122.56	0.012416	1531	9.92
TOTAL CAPACITY					34.23

DOCUMENTATION & REPORTING:

Daily operation reports are to be emailed prior to 7:00 am the next day following operations. They are to be sent to the ELM Inc office via ElmDownholeOffice@elminc.ca

Daily reports are to include a detailed description of the day's events along with all third party services that were utilized and their respective billing charges. These billing charges are to be added and represented by a daily operational cost. These total daily operational costs are to be reflected in a to-date accumulative cost. Along with the daily report the email must include a brief description of the work that was done that day, as well as a 24 hour forecast for the work to be done the following day.

Any incident or injury is to be reported immediately, after appropriate first- and/or medical-aid has been administered to the Elm Inc. office staff in Calgary. After the situation has been placed under control and all affected parties have been aided or corrected, an incident investigation is to take place and attempt to gather all necessary information via written witness statements and summarized in an incident investigation form. Elm Inc. Calgary office staff will then inform the appropriate client representatives of what has taken place.

After the abandonment has been completed, the well site supervisor is to provide the office staff in Calgary with all third-party purchase orders and field tickets/service reports, material transfers, waste manifests along with all appropriate field safety documents. This needs to be completed immediately following the job.

March 1, 2023**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 worker comply with regulations. All service companies supplying materials will review Safety Data Sheets at this meeting for all products supplied and maintain these Safety Data Sheets available for worker's examination on location in compliance with WHIMIS regulations. All Safety meetings will be recorded on the daily reports.

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.

All applicable regulations, including, but not limited to the NWT Office of the Regulator of Oil and Gas Operations (OROGO) and Occupational Health and Safety regulations, are to be strictly adhered to. Written instructions must be posted in the 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 the daily report. The name of the individual contacted, and the subject matter of approval or notification should be recorded on the same.

REGULATORY:

OROGO regulations require that the Well Approval as signed by the regulator must be posted in a clearly visible location on the work site. The well approval, its additional terms, and this well abandonment program must be precisely followed. Any deviations from the program must be approved by OROGO and clearly documented on the morning report. Include the time, name of person approving changes, and the important points of the phone conversation.

March 1, 2023**ABANDONMENT PROGRAM:****Pre-Operations Notifications:**

1. Notify the Area Foreman 48 hours before operations to begin.

Mobilize and Inspections:

2. Mobilize to location and inspect access. Ensure that access is clear to allow two-way traffic in and out of the site.
3. Mobilize and move in a Class III service rig, pump and tank unit, crew shack, equipment truck, mobile boiler, pressure tank with flare, a 400 BBL tank for extra fluids, and air safety hand with air trailer.
4. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and prepare a site-specific ERP.
5. Read and record the shut-in pressures on casing and tubing.
6. Disassemble the SCVF piping and ensure that it is not blocked. Re assemble the piping and install a bottle and hose type tester. Watch tester and ensure there are no bubbles in 10 minutes. Document test on daily report and on the "Surface Casing Vent Flow" form. If using a non-freezing liquid (example windshield washer fluid) for the test, document the liquid used and the density.

Rig up service rig

7. Rig up service rig.
8. Transfer minimum 86 m³ water to rig tank and the 400 BBL tank and mix with H₂S scavenger as per manufacturers specifications.
 - NOTE: Formations are under pressured and can be controlled with fresh water.
 - NOTE: OROGO has raised concerns on similar wells about ensuring there is sufficient fluid on location to keep the well under control while tripping in and out to remove dual packer systems. Ensure that there is 1.5 times hole volume available on surface (51.3 m³) until both sets of perforations are abandoned.

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9. Lay circulating lines with connection to the pressure tank. Pressure test lines and manifold to 1.4 Mpa and 21 Mpa, 10 minutes for each test.
10. Bleed off tubing pressure to the pressure tank.
11. Fill tubing with water and pressure test the tubing to 7 Mpa for 10 minutes
12. Bleed off casing pressure to the pressure tank.
13. Pressure test casing to 7 Mpa for 10 minutes.
14. Stump test the BOP stack. Test ram preventors to 1.4 Mpa and 21 Mpa, 10 minutes for each test. Test the annular preventor to 1.4 Mpa and 7 Mpa, 10 minutes for each test.
15. Function test the accumulator system.
16. Disassemble the wellhead top section. Install a tubing pup and the stabbing valve into the tubing hanger.
17. Strip on the BOP stack.
18. Close pipe rams and pressure test all connections to 1.4 Mpa and 21 Mpa, 10 minutes for each test.

Pull tubing plugs

19. Mobilize and rig up slickline unit.
20. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify site-specific ERP if necessary.
21. Run in hole with gauge ring to the top tubing plug at 1348 mKB. Pull out.
22. Run in with retrieval tool and retrieve the OTIS PX plug from the profile at 1348.0 mKB
23. Run in with retrieval tool and retrieve the OTIS PX plug from the profile at 1377.0 mKB.
24. Rig out the slickline unit
25. Pump down tubing as required to kill well

March 1, 2023**Pull out tubing**

26. Unset the upper packer with right hand torque. Allow 15 minutes for the packer elements to relax.
27. Pull out of hole with tubing and packer. Take care to not swab out kill fluid and top up well to make up for pipe displacement. Lay out recovered packer.
 - NOTE: The on off tool is a “no jay” system. Should be able to pick up and come off.
28. Run in hole with an extended neck overshot (with “jay”) on 73 mm tubing. Latch onto packer at 1379.4 mKB
29. Unset packer with right hand torque. Allow 15 minutes for the packer elements to relax.
30. Pull out of hole with tubing and packer. Take care to not swab out kill fluid and top up well to make up for pipe displacement. Lay out recovered packer.

Pull out the WR plug

31. Move on tool hand with retrieval tool. Run in hole with a retrieval tool for Cardium WR plugs.
32. Trip in slowly for the last 20 meters. Tag the top of the WR plug at 1480 mKB.
33. Tie in circulating lines, circulate any sand off the plug. Stop circulating and lower tool onto fish neck and open the equalizing port. Allow pressures to equalize.
 - NOTE: Formation pressure is less than 10 Mpa. With well and tubing full of fresh water the pressure is overbalanced.
 - NOTE: If necessary, engage rig pump to trickle water into the well to keep full. Bring on additional load water as necessary.
34. Unset WR plug with straight pull.
35. Wait 15 minutes to allow the plug elements to relax. Pull out of hole with the WR plug. Inspect to make sure all parts of the plug have been recovered.
36. Run in hole with a retrieval tool for Cardium WR plugs.
37. Trip in slowly for the last 20 meters. Tag the top of the WR plug at 1500 mKB.

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38. Tie in circulating lines, circulate any sand off the plug. Stop circulating and lower tool onto fish neck and open the equalizing port. Allow pressures to equalize.
 - NOTE: Formation pressure is less than 10 Mpa. With well and tubing full of fresh water the pressure is overbalanced.
39. Unset WR plug with straight pull.
40. Wait 15 minutes to allow the plug elements to relax. Pull out of hole with the WR plug. Inspect to make sure all parts of the plug have been recovered.

Abandon the Keg River

41. Make up and run-in hole with at 139.7 mm casing scraper. Scrape down to 1510 mKB. If necessary, circulate out any debris encountered. Pull out of hole with scraper.
 - NOTE: Take caution while approaching the liner top. Gently enter liner and resume regular tripping speed.
42. Make up and run-in hole with a 139.7mm bridge plug on baker style setting tool and packer in tandem.
 - NOTE: Take caution while approaching the liner top. Gently enter liner and resume regular tripping speed.
43. Land bridge plug at 1504 mKB. Set plug as per manufacturer's instructions.
 - NOTE: A bridge plug must not be set within 5 meters of a casing collar. The casing collars are located at +/- 1498.2 mKB and +/-1510.9 mKB
44. Disconnect from bridge plug. Pull up, set packer and pressure test the plug to 7 Mpa for 10 minutes.
 - NOTE: If plug does not pressure test, unset packer and ensure it is operating properly. If necessary, pull out and run a freshly rebuilt packer.
45. Pull out of hole with tubing and stand in derrick. Lay down packer and setting tool.
46. Run in hole with dump bailer sub.
47. Mix 250 L of cement in mixing barrel. Pour cement into tubing. Spud bailer on the bridge plug and allow cement to settle onto the bridge plug.

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48. Slowly pull out of the cement plug, then pull out of hole with tubing and stand in the derrick.

Abandon the Sulphur Point

49. Make up and run-in hole with a 139.7mm bridge plug on baker style setting tool and packer in tandem.
 - NOTE: Take caution while approaching the liner top. Gently enter liner and resume regular tripping speed.
50. Land bridge plug at 1399 mKB. Set plug as per manufacturer's instructions.
 - NOTE: A bridge plug must not be set within 5 meters of a casing collar. The casing collars are located at +/- 1405.5 mKB and +/-1393.2 mKB
51. Disconnect from bridge plug. Pull up, set packer and pressure test the plug to 7 Mpa for 10 minutes.
 - NOTE: If plug does not pressure test, unset packer and ensure it is operating properly. If necessary, pull out and run a freshly rebuilt packer
52. Unset packer. Attempt to establish circulation to surface. If unsuccessful, contact Calgary office for permission to use "Contingency – Unable to circulate."
53. Pull out of hole with tubing and stand in derrick. Lay down packer and setting tool.
54. Run in hole with tubing open ended. Land tubing just above the bridge plug.
55. Mix 250 L of cement in mixing barrel. Pour cement into tubing and circulate onto bridge plug as per attached procedure.
56. Slowly pull out of the cement plug, then pull out of hole with tubing and stand in the derrick.

Contingency – Unable to Circulate

To be used during the Abandonment of the Sulphur Point if unable to circulate. Calgary must be contacted, and permission granted to be used. Calgary must notify OROGO and receive permission. These steps replace 54 – 56.

57. Run in hole with bailer sub.

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58. Mix 250 L of cement in mixing barrel. Pour cement into tubing. Spud bailer on the bridge plug and allow cement to settle onto the bridge plug.
59. Slowly pull out of the cement plug, then pull out of hole with tubing and stand in the derrick.

Abandon the Slave Point

60. Make up and run-in hole with a 139.7mm bridge plug “HM” type setting tool.
 - NOTE: Take caution while approaching the liner top. Gently enter liner and resume regular tripping speed
61. Land bridge plug at 1347 mKB. Set plug as per manufacturer's instructions.
 - NOTE: A bridge plug must not be set within 5 meters of a casing collar. The casing collars are located at +/- 1352.7 mKB and +/-1340.0 mKB
62. Disconnect from bridge plug as per manufacturer's directions.
63. Pressure test down casing to 7 Mpa for 10 minutes.
64. Circulate well bore over to fresh water. Over displace by 2 m³ to ensure well is fresh water.
65. Mix 250 L of cement in mixing barrel. Pour cement into tubing and circulate onto bridge plug as per attached procedure.
66. Slowly pull out of the cement plug, then pull out of hole with tubing and stand in the derrick.

Run cement bond log

67. Mobilize to location with wireline unit.
68. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify the site-specific ERP if necessary
69. Run in with a gauge ring and casing collar locator to PBTD. Pull out with tools.
70. Run in with radial bond tools and record a high-speed log on trip in to PBTD. Run a full radial bond log from PBTD to surface. Send completed logs to wireline company for analysis, and to OROGO and Calgary office.

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71. Calgary office will review the log and determine which of the next operations will be taken
- OPTION 1: Porosity isolations are required inside of the liner
 - i. Perforate inside liner
 - ii. Squeeze using cement retainer or balanced plug inside liner
 - iii. Abandon liner top with rig
 - iv. Perforate the intermediate casing as needed
 - v. Squeeze cement inside intermediate casing as needed
 - vi. Cut and cap well

 - OPTION 2: Porosity isolations are required on the intermediate casing
 - i. Abandon liner top with rig
 - ii. Perforate the intermediate casing as needed
 - iii. Squeeze cement inside intermediate casing as needed
 - iv. Cut and cap well

 - OPTION 3: Porosity isolations are not required
 - i. Abandon liner top service rig
 - ii. Rig out service rig
 - iii. Cut and cap well

Calgary office will contact OROGO and determine which option to use. Each option lists a number of steps, which are fully expanded upon below. Use the appropriate section to carry out the abandonment.

NOTE: The tubing head (and the BOP stack) have an internal diameter of 179.4 mm. A permanent bridge plug or cement retainer designed to fit inside of 219.1mm casing is 180.9 mm or more (depending on the manufacturer).

Remedial Perforation (inside liner or production casing)

72. Move on wireline unit.
73. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify site specific ERP if necessary.
74. Rig in wireline lubricator.
75. Run in hole with a 1 meter, 86mm ERHSC perforating gun loaded with 25 gram charges at 17 shots per meter and 60 degree phasing. Correlate gun based on previous bond log. Perforating depth to be determined by Calgary office. Pull out spent guns and inspect to ensure all shots have fired.

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- NOTE: Wireline company to confirm availability of perforating gun. Contact Calgary and OROGO if substituting for another perforating gun.
76. Close blind rams. Pump down the casing and evaluate feed rate into the perforations. Attempt to establish circulation to surface. Contact Calgary office to confirm cementing plan. Options will be “Remedial Cementing Option 1 – Cement Retainer” or “Remedial Cementing Option 2 – Balanced Plug”.
- NOTE: If a feed rate is not established Calgary will have to confirm further operational plans with OROGO, with potential for further up hole isolations.
77. Rig out the wireline unit.
78. Proceed to remedial cementing section as per Calgary.

Remedial Cementing Option 1 – Cement Retainer (for use in liner only)

79. Pick up a cement retainer for 139.7mm casing and setting tool.
80. Run in hole with retainer on 73 mm tubing and set as per Calgary’s direction.
- NOTE: Check Calgary’s order against the collar log from the bond log. A cement retainer must not be placed within 5 meters of a casing collar. If required, contact Calgary to adjust retainer depth.
81. Sting out of cement retainer and pressure test down casing to 7 Mpa for 10 minutes.
82. Sting into retainer and confirm feed rates and pressures for cementing company to prepare a treatment program.
83. Pull into neutral and pressure test tubing to 5 Mpa above the pressure established during the feed rate in previous step. Do not exceed 21 Mpa.
84. Move on remedial cementing crew and vacuum truck.
85. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify site specific ERP if necessary.
86. Mix cement as per cementing program.
87. Pump cement down tubing and through retainer. Squeeze cement into formation / circulate to surface as per cementing program.

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- NOTE: if circulating cement to surface, do not shut-in surface casing vent until minimum 0.5 m³ of cement has returned to surface.
88. Squeeze cement to final pressure as per cementing program. If cement was circulated to surface, shut in the vent for the squeeze.
 89. Sting out of retainer and balance remaining cement on the retainer.
 90. Slowly pull out 2 joints of tubing and tie in circulating equipment. Reverse circulate excess cement out of well, leaving at least 15 lineal meters of cement on top of the retainer. Circulate minimum 2 tubing volumes of fresh water and continue circulating with fresh water until returns are clean. Direct returns to vacuum truck and mix with sugar in truck to prevent cement from setting up.
 91. Pull out tubing to recover stinger. Stand enough tubing in the derrick for the next operation.
 92. Calgary office and OROGO to determine if another perforation and cement squeeze is required. If so, go back to the “Remedial Perforation” section.
 93. Proceed to next step as per Calgary.

Remedial Cementing Option 2 – Balanced Plug (can be used in liner or intermediate csg)

94. Run in hole with tubing open ended and land 16 meters below the perforations.
95. Move on remedial cementing crew and vacuum truck.
96. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify site specific ERP if necessary.
97. Mix cement as per cementing program.
98. Pump cement down tubing and balance in well as per cementing program.
99. Slowly pull tubing above estimated cement top and reverse circulate 2 tubing volumes of fresh water to clean up tubing.
100. Squeeze cement into formation as per cementing program. Final squeeze pressure must exceed 7 Mpa.

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101. Once cement has flat lined, close in well with pressure and rig off cementers. Clean up equipment into vacuum truck and mix sugar in truck to prevent cement from setting up.
102. After cement has set up (overnight at minimum) run in with tubing and probe cement plug. Apply 1800 decanewtons to confirm top of plug.
103. Pressure test plug and casing to 7 MPA for 10 minutes.
104. Pull tubing and stand enough in derrick for next operation.
105. Calgary office and OROGO to determine if another perforation and cement squeeze is required. If so, go back to the "Remedial Perforation" section.
106. Proceed to next step as per Calgary.

Abandon liner top with rig

107. Run in hole with tubing and land at 754 mKB. (22 meters below liner hanger)
108. Move on remedial cementing crew and vacuum truck.
109. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and modify site specific ERP if necessary.
110. Mix 1 m³ of cement as per cementing program.
111. Pump cement down tubing as per cementing program and balance in well as per cementing program
112. Slowly pull tubing out of cement plug, projected cement top is at +/- 710 (22 meters above liner hanger). Land tubing intake two joints above cement top.
113. Reverse circulate 2 tubing volumes of fresh water to clean up tubing. Continue reverse circulating as required until returns are clean.
114. Rig off cementers. Clean up equipment into vacuum truck and mix sugar in truck to prevent cement from setting up.
115. After cement has set up (overnight at minimum) run in with tubing and probe cement plug. Apply 1800 decanewtons to confirm top of plug.

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116. Pressure test well to 7 Mpa for 10 minutes.
117. Pull out of hole with tubing. Stand enough tubing for the next operations or lay down if there are none further.
118. Top up well with fresh water but leave fluid level down 10 meters to prevent freeze up.
119. Proceed to next step as per Calgary.

Rig out the service rig

120. Pull tubing and lay down, stopping with 5 joints left for a final circulation to fresh water. Pull out last 5 joints but do not top up to prevent wellhead from freezing solid.
121. Remove BOP stack and re install wellhead. If proceeding to the cut and cap section, then also remove the master valve that was previously installed.
122. Rig out the service rig. Clean the rig tank and take to slop tank at battery or to next location to use as kill fluid.
123. Ensure location is cleaned of all garbage and debris.
124. Demobilize equipment from location. Inform area foreman that well is ready to cut and cap.
125. Proceed to next step as per Calgary.

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126. Move in waterjet cut and cap crew and equipment.
127. Hold and record a safety and procedure meeting with all personnel on location. Perform a walk around inspection to ensure no hazards on the site. Document meeting topics and prepare a site-specific ERP.
128. Install a bottle and hose type tester on the vent assembly. Watch tester and ensure there are no bubbles in 10 minutes. Document test on daily report and on the "Surface Casing Vent Flow" form. If using a non-freezing liquid (example windshield washer fluid) for the test, document the liquid used and the density.
129. Rig in the waterjet cut and cap crew. Cut and cap the well 1.5 meters below ground level following the waterjet company procedures. Take pictures of the well before the cut, with the wellhead removed, the cut surface, and the vented cap before and during instillation.
130. Backfill open excavation. Photograph the backfill.
131. Install abandoned well sign 1 meter north of the well. Sign is to meet the requirements as outlined in the attachment.
132. Release all services. Field operations are complete.

Final Reporting

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133. Prepare a final downhole diagram showing the final well configuration
134. Ensure that all tickets and costs are recorded on the morning reports. If a vendor has not submitted their tickets, then put in an estimated cost.
135. Tickets are to be coded with the well name, AFE number, date, and field supervisor's signature. Ensure vendors send all invoices to

ELM Inc
#1000, 205 – 5th Ave SW
Calgary AB T2P 2V7
AP@Elminc.ca

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Elm Inc. Terms of Service:

1. The price estimate for this well is presented as a most probable cost based on similar repair operations and is to be used for AFE purposes only. This estimate is only as good as the information provided to Elm. Elm will co-ordinate and supervise the entire operation, pay all third party services and submit a final invoice based on actual costs incurred for equipment and services. Depending on the complexity of the abandonment, location and age of the well, Elm recommends adding 10-25% contingency to the estimates attached.
2. This estimate does not contain any lease clean up costs other than back filling around the wellhead after it has been cut off. If requested Elm's Reclamation Division will perform a site assessment that will be used to determine a cost estimate for surface reclamation. A preferential price to do the site assessment will be given if done in conjunction with the downhole abandonment.
3. Elm does not accept any liability for the well, lease, facility and or property it is working on. Elm acts as an independent consultant, providing mainly consulting and supervision services, with some specialized equipment included.
4. Elm will accept liability for the proper placement of bridge plugs and / or cement plugs that we set, however we do not accept liability for any unforeseen or unmentioned down hole problems. This would include failure of the casing to pressure test, collapsed casing, stuck pipe, tubing or rods, scale and or wax build up, surface casing vent flows, gas migration etc.
5. Elm does accept the responsibility of Prime Contractor for sites that have an agreement assigning the Prime Contractor Status.
6. The cost estimate included services and third party costs as listed, if other services are required they will be billed as per our cost schedule. The client will be informed of any costs to be incurred outside of this summary prior to the work being done. These services usually include: disposal costs, stuck and towing or cat work for access, rental and / or trucking of work strings, trucking of tubing, rods, and / or well heads, sour service, required safety equipment and extra charges associated working in hot or cold temperatures.

Elm's objective is to offer the safest and most efficient abandonment while saving the operator both time and money. We feel that by working with you on this project, we can achieve our goals and maintain the high level of professionalism that is reflected in the end product.