

GRMR Oil & Gas, LLC

Stover Federal 9-12 1D

SHL: 1859' FSL & 390' FWL NWSW S9 T4N R90W

BHL: 383' FNL & 734' FWL NWNW S16 T4N R90W

Moffat County, Colorado

DRILLING PROGRAM**Application for Permit to Drill**

U.S. Department of the Interior, Bureau of Land Management

Directional Niobrara Exploration Well**Stover Federal 9-12 1D**

All lease and/or unit operations will be conducted in such a manner that full compliance is made with applicable laws, regulations (CFR 43, Part 3160), Onshore Oil & Gas Order No.1, No. 2, and the approved plan of operations. The operator is fully responsible for the actions of its subcontractors. A copy of the approved application for permit to drill, or sundry, and accompanying surface use operations, along with the conditions of approval will be available to authorized personnel at the drillsite whenever active construction or drilling operations are underway to insure compliance.

1. Estimated Tops of Important Geologic Markers

<u>Formation Name</u>	<u>Depth (ft, TVD)</u>	<u>Depth (ft, MD)</u>
Mancos	19	19
Morapos Crk	102	102
B/ Morapos Crk	282	282
<i>Surface Casing</i>	<i>500</i>	<i>500</i>
Buck Peak	2875	3277
Niobrara	3289	3817
<i>Intermediate Casing</i>	<i>3365</i>	<i>3916</i>
TD	4119	4900

2. Estimated Depths of Oil, Gas, Water, and Other Mineral Bearing Zones

The estimated depths at which the top and bottom of the anticipated water, oil, gas or other mineral bearing formations are expected to be encountered are as follows:

<u>Substance</u>	<u>Formation</u>	<u>Depth (ft, TVD)</u>	<u>Depth (ft, MD)</u>
Fresh Water	Morapos Crk	102	282
Oil	Niobrara	3289	3817

All fresh water and prospectively valuable minerals encountered during drilling will be recorded by depth and adequately protected with casing and cement.

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3. Operator's Minimum Specifications for Pressure Control Equipment

- A. **Surface:** No Pressure Control Equipment is anticipated or required on this hole section.
- B. **All other hole sections:** A 13-5/8" 3M BOP (minimum pressure rating) will be configured and tested assuming a maximum anticipated surface pressure 906 psi (0.22 psi/ft * 4119' TVD) (see attached BOP schematic).
- C. All BOP connections subject to pressure shall be flanged, welded, or clamped.
- D. Associated Equipment:
 - i. Pipe ram (3M)
 - ii. Blind ram (3M)
 - iii. Annular Preventer (3M)
 - iv. Rotating head (500 psi operating pressure)
 - v. Kelly cock (or IBOP if a top drive is used)
 - vi. Stab in valve(s) with appropriate tool joint configuration(s)
 - vii. 3M choke manifold with one (1) remote operated choke control valve and one (1) manual choke valve. All valves and connections (exc choke valves) will be tested to 3M. All tees will be targeted.
 - viii. Hard or flexible choke line (as available). If a flexible choke line is used, it will be inspected and free damage.
 - ix. 1500 psi rotating head.
- E. Other equipment: Stab-in valves for all connection types will be available on the rig floor.
- F. Accumulator:
 - i. The accumulator system will have sufficient capacity to open the hydraulically controlled choke line valve (if equipped), close all rams, and the annular preventer, while retaining a minimum of 200 psi above precharge pressure on the closing manifold without the use of closing pumps.
 - ii. The fluid reservoir capacity will be double the usable fluid volume of the accumulator system capacity and the fluid level will be maintained at manufacturer's specifications.
 - iii. The accumulator system will have two independent power sources and will maintain a pressure charge equal to the manufacturer's specifications. Power to the closing pumps will always be available. The pumps will automatically

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start when the closing valve manifold pressure has decreased to the pre-set level.

- iv. Accumulator precharge pressure will be tested prior to use and at least once every six months thereafter.
- v. The accumulator pump capacity will be sufficient to open the HCR and close the annular preventer on the smallest drill-pipe size within 2 minutes and obtain a minimum of 200 psi over accumulator precharge pressure.
- vi. A manual locking device (hand wheels) or automatic locking devices will be installed on all BOP systems rated for 2M or greater. A valve will be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve will be maintained in the "open" position and will be close only when the power source for the accumulator system is inoperative.
- vii. A remote BOP actuator panel will be available to the driller. The remote panel will be capable of operating (opening and closing) all preventers.

G. Testing:

- i. All tests will be performed with water or a clear liquid suitable for sub-freezing temperatures with a similar viscosity to water.
- ii. Ram type preventers and associated equipment will be tested to the approved stack working pressure if isolated by a test plug or to 70% of the internal yield pressure of the casing if the BOP stack is not isolated from the casing.
- iii. Tests will last at least 10 minutes or until requirements are met, whichever is longer.
- iv. If the BOP is isolated from the casing, no bleed off pressure will be acceptable. For a test not utilizing a test plug to isolate the BOP from the casing, a pressure decline of 10 % or less in 30 minutes will be considered acceptable.
- v. If a test plug is used to isolate the BOP from the casing, a wellhead valve below the plug will be left open during testing.
- vi. These tests will be performed on all rams, valves, and flanges when first installed, whenever a seal on one of the previous components has been broken, following related repairs, and at 30 day intervals.
- vii. Valves will be tested with all downstream valves left in the open position.
- viii. When testing the kill line valve(s), the check valve will be held open or the ball will be removed.

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- ix. Annular preventers will be function tested at least weekly.
- x. Pipe and blind rams will be function tested on each trip, not to necessarily exceed more than once a day.

4. A) Casing Program:

	Interval (MD)	Hole Size (in)	Csg Spec (Size, Wt, Grade, CXN)	CLPS (psi)	BURST (psi)	TEN (kips)	Condition
Conductor	0-60	26	20" 104 X40 Welded	-	-	-	New
Surface	0-500	17-1/2"	13-3/8" 54.50 J-55 STC	1130	2730	514	New
Intermediate	0-3916	12-1/4	9-5/8 36 J-55 LTC	2020	3520	453	New
Production	0-4900	8-3/4	5-1/2 15.50 J-55 LTC	4040	4810	217	New

Other Casing Information:

- A. All casing is designed to meet the following safety factor criteria: Collapse: 1.20, Burst: 1.20, Tension: 1.60.
- B. Any change in the casing design will be approved by the BLM prior to running and cementing the casing string.
- C. All casing will be new or reconditioned and tested to meet or exceed API standards for new casing.
- D. All casing strings below the conductor shall be pressure tested to 0.22 psi/ft of casing string length or 1500 psi, whichever is greater, but not to exceed 70% of the minimum internal yield. If pressure declines more than 10% in 30 minutes, corrective action will be taken.

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5. Cementing Program:

**The conductor will be cemented with 6 yards of ready mix concrete, or if hole conditions necessitate, 210 sacks of 15.8 ppg (1.18 cuft/sk) class G neat cement with 2% CaCl₂*

	Section	Surface	Intermediate	Production Liner
Hole Geometry	Csg OD	13.375	9.625	5.5
	Csg ID	12.615	8.921	4.95
	Hole Size	17.5	12.25	8.75
	Csg Depth	500	3916	4900
Lead Cement	Top	0	0	Uncemented
	Hole XS	100%	50%	
	Vol (ft^3)	671.0	1551.6	
	Wgt (ppg)	13.5	12.0	
	Yld (ft^3/sk)	1.664	2.345	
	Lead SX	410	670	
	Cmnt Type	Class G	Class G	
	Add:	0.125 % CelloFlake	0.125% CelloFlake	
	Add:	0.25% Sawdust	0.25% Sawdust	
	Water (bbl)	91.4	198.4	
Tail Cement	Top		3416	
	Hole XS		50%	
	Vol (ft^3)		252.3	
	Wgt (ppg)		13.5	
	Yld (ft^3/sk)		1.664	
	Tail SX		160	
	Cmnt Type		Class G	
	Add:		0.125 % CelloFlake	
	Add:		0.25% Sawdust	
	Water (bbl)		35.7	

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Other Cementing Information:

- A. Centralizers:
 - a. Surface Casing: At a minimum, the surface casing will have centralizers on the bottom three (3) joints, starting with the shoe joint.
 - b. Intermediate Casing: At a minimum, the intermediate casing will have centralizers on the bottom three (3) joints, starting with the shoe joint. Other centralizers will be placed to ensure a minimum of 70% standoff in the open hole.
- B. Production Casing: The production casing will be left uncemented in this well to allow for pressure/production control and force all produced fluids to travel through the shoe. No centralization is planned.
- C. Any change in cement design will be approved by the BLM prior to running and cementing the casing string.
- D. A Well Completion Report and log, along with a copy of the cement company's materials ticket and job log will be submitted to this office within 30 working days following the running and cementing of all casing strings.
- E. A formation integrity test will be performed at the surface casing shoe and intermediate casing shoe to an EMW of 9.5 ppge after drilling no more than 20' below the shoe.

6. Mud Program**Summary of anticipated drilling fluids by hole section.**

Interval	Hole Size (in)	Depth to (ft, MD)	Type	MW (ppg)	pH	FL (mL/30 min)	Vis (s/qt)
Surface	17-1/2	500	FW/Gel	8.4 – 8.6	8.0 – 10.0	N/C	28 - 40
Intermediate	12-1/4	3916	FW/Amine	8.4 – 9.0	8.5 – 10.5	<10.0	36 - 45
Production	8-3/4	4900	N2/FW/Amine	8.4 – 9.0	8.5 – 10.5	<10.0	28 - 40

- A. Maximum anticipated mud weight is 9.0 #/gal. If necessary, mud weight may be raised to supplement formation integrity for logging and casing operations.
- B. In the production hole a Nitrogen/mist system will be utilized. See Special Drilling Operations below.

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- C. Mud tests will be performed every 24 hours to determine, as applicable, density, viscosity, gel strength, filtration, and pH.
- D. Sufficient quantities of mud weighting materials will be maintained at the well site, at all times for the purpose of assuring well control.
- E. Visual and electronic monitoring of the mud system will be done to determine volume changes.
- F. A flare box will be utilized in the intermediate and production hole sections.

Special Drilling Operations:

Pursuant to Onshore Order No 2, III (E), Special Drilling Operations – The production hole will be drilled using a Nitrogen/Mist system. Volume requirements to adequately clean the hole and protect the MWD system will be approximately 2,100 scf/min (+/-) of N₂ + 20 – 40 gpm of FW/amine liquid. Nitrogen will be generated through a Nitrogen Purification Unit (NPU) and be no less than 93% pure. Liquid (mist) phase will have the same basic properties as the drilling fluid used on the intermediate hole section. At all times the Operator shall have in operation, the following equipment:

- A. Properly lubricated and maintained rotating head.
- B. Spark arrestors on engines or water cooled exhaust.
- C. Blooie line discharge 100' from the wellbore and securely anchored.
- D. Straight run on the blooie line unless otherwise approved.
 - a. *Request for variance*: Operator will ensure that the fewest obstructions are present in the blooie line; i.e. Operator will employ a few 90 deg elbows to adequately and efficiently route blooie gas to the flare box. We are in a topographically challenging location. See attached location diagram illustrating blooie route.
- E. Deduster equipment (not applicable due to the amine mist that will be pumped downhole).
- F. All cuttings and circulating medium will be directed into a reserve or blooie pit.
- G. Float valve above the bit. String floats will also be utilized periodically to increase safety and connection efficiency.
- H. Automatic igniter or continuous pilot light on the blooie line.
- I. The blooie line will:

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- a. Have a remote operated (remote at driller's console) globe valve at the rotating head to isolate the well.
- b. Discharge into a flare box
- c. Have a backflow preventer prior to entering the flare box
- d. A dedicated venturi assist at the end of the blooie line
- J. Compressors located in the opposite direction from the blooie line a minimum of 100 feet from the well bore.
- K. Mud circulating equipment, water, and mud materials (not premixed) sufficient to maintain the capacity of the hole and circulating tanks or pits.

7. Testing, Coring, and Logging

Mud Logging: Gas detection and mud return monitoring equipment shall be utilized throughout the well. Cuttings samples will be collected every 30' from the base of conductor to TD.

Coring: None Planned

Drillstem Tests: No DSTs planned.

Electric Logging:

- Triple Combo: GR, CAL, SP, RES (Shallow, Mid, and Deep), PE, DNL, & DIL.
- MWD: MWD GR logs will be run throughout the intermediate and production hole sections.
- CBL: A Cement Bond Log will be run on the surface and intermediate strings.

Directional Surveys: MWD surveys from the base of conductor to TD at a minimum interval of 100'. See attached Directional Plan for this well.

8. Abnormal Pressures and Hydrogen Sulfide

- A. Normal to subnormal pressure gradients expected to the top of the Niobrara. Subnormal pressures are expected in the Niobrara section (+/- 0.27 psi/ft).
- B. Maximum expected BHT @ TD: ~125 deg F.

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- C. Maximum anticipated BHP @ TD: 5.2 ppge (based on offset information) * 4119' TVD * 0.052 = 1113 psi.
- D. No H₂S gas is anticipated.

9. Other Information

Additional well information:

- A. Anticipated time to start drilling operations is early May and expected to last approximately 20 days.
- B. This well is planned as an "open-hole" completion with an uncemented production casing string back to surface, no fracture stimulating of the prospective Niobrara producing zone is planned.
- C. General plan of completion operations:
 - i. Run and set 5-1/2" casing in open hole to within 100' of TD. A float shoe and/or collar will be run on the casing string to allow for circulating/washing the shoe to TD and provide for well control.
 - ii. RDMO drilling rig. MIRU pulling unit.
 - iii. Drill out float collar and/or shoe with Nitrogen unit.
 - iv. POOH and LD bit/mill.
 - v. RIH with TAC and S/N open ended.
 - vi. Swab well to clean up.
 - vii. RIH with rod pump.
 - viii. Turn over to production facilities.
- D. Cuttings Management:
 - i. A closed-loop circulating system will be utilized throughout drilling operations.
 - ii. Cuttings generated while on FW/Gel or FW/Amine drilling fluid will be separated and deposited into a steel tank where they will be scooped out and processed (dried) on location in another steel tank. These cuttings (generated before encountering oil in the Niobrara) will be dried and placed into the toe of the cut slope for subsequent burial during interim reclamation. All cuttings that will be buried will be tested and cleared in accordance with COGCC regulations.
 - iii. All cuttings that are exposed to Niobrara oil will be dried separated, dried, and hauled to an approved disposal facility and NOT buried on location.

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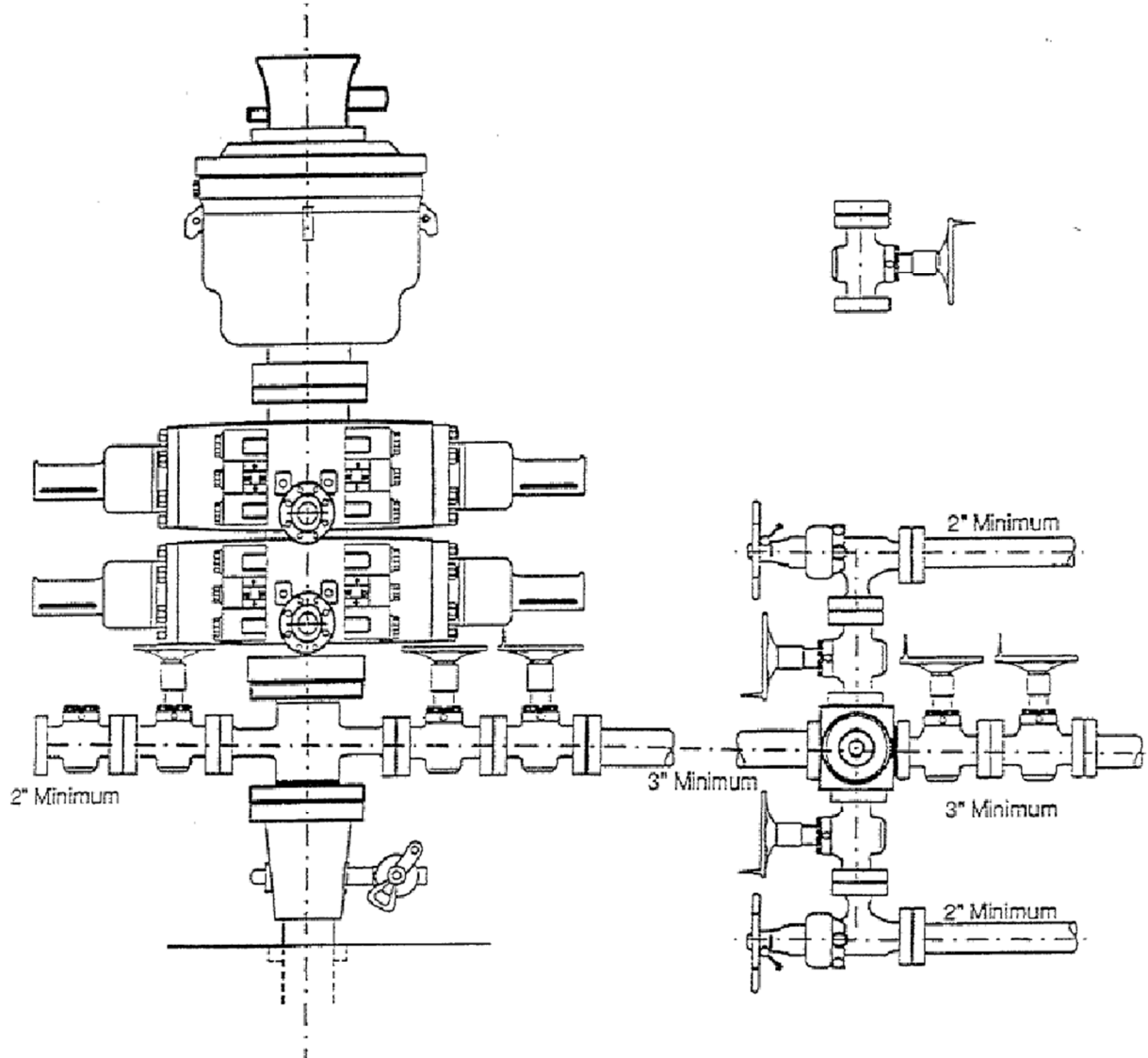
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3M BOP Schematic:



3M Choke Manifold Schematic:

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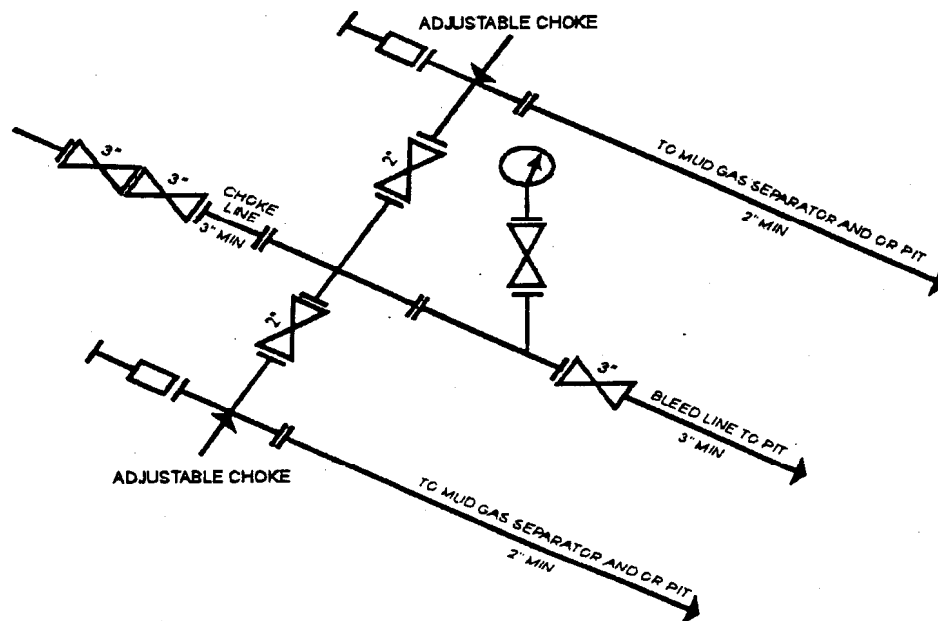
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3M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY
[54 FR 39528, Sept. 27, 1989]