Form 3160-3
(August 1999)

FORM APPROVED
OMB No. 1004-0136
Expires November 30, 2000

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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070 Farmington NM

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No. **NMSF-078146 A**

6. If Indian, Allottee or Tribe Name **N/A**

7. If Unit or CA Agreement, Name and No. **N/A** 32167

1a. Type of Work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☐ Oil Well ☑ Gas Well ☐ Other ☑ Single Zone ☐ Multiple Zone

8. Lease Name and Well No. **HORTON 4 B**

2. Name of Operator **QUESTAR EXPLORATION & PRODUCTION COMPANY**

9. API Well No. **30-045-** 31417

3a. Address **1331 17th ST., SUITE 800 DENVER, CO 80202**

3b. Phone No. *(include area code)* **(303) 672-6916**

10. Field and Pool, or Exploratory **BLANCO MESA VERDE**

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*

At surface **1872' FSL & 1906' FWL**

At proposed prod. zone **SAME**

11. Sec., T., R., M., or Blk. and Survey or Area **K 27-32n-12w NMPM**

14. Distance in miles and direction from nearest town or post office* **6 AIR MILES ENE OF LaPLATA**

12. County or Parish **SAN JUAN**

13. State **NM**

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)	16. No. of Acres in lease	17. Spacing Unit dedicated to this well
734'	**320**	**320 ACRES (W2)**
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth	20. BLM/BIA Bond No. on file
128'	**5,400'**	**SL-6308873, BLM ES0019**
21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
6,138' GL	**APR. 1, 2003**	**30 DAYS**

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No.1, shall be attached to this form:

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO shall be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification.
6. Such other site specific information and/or plans as may be required by the authorized officer.

Comments

Archaeology report LAC 2000-51 filed 7-24-01

This action is subject to technical and procedural review pursuant to 43 CFR 3165.3 and appeal pursuant to 43 CFR 3165.4

DRILLING OPERATIONS AUTHORIZED ARE SUBJECT TO COMPLIANCE WITH ATTACHED "GENERAL REQUIREMENTS".

MAR 2003

cc: BLM, Lovseth, Nelsen, NMOCD (via BLM), Ohlman

25. Signature	Name *(Printed/Typed)*	Date
Brian Wood	**BRIAN WOOD**	**2-15-03**

Title **CONSULTANT** **PHONE: 505 466-8120** **FAX: 505 466-9682**

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
/s/ David J. Mankiewicz		MAR 17 2003

Title | Office

Application approval does not warrant or certify the the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NMOCD

State of New Mexico
Energy, Minerals & Mining Resources Department
OIL CONSERVATION DIVISION
2040 South Pacheco
Santa Fe, NM 87505

Form C - 102

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-045-31417	72319	BLANCO MESA VERDE

Property Code	Property Name	Well Number
32167	HORTON	4 B

OGRID No.	Operator Name	Elevation
23846	QUESTAR EXPLORATION & PRODUCTION	6138'

Surface Location

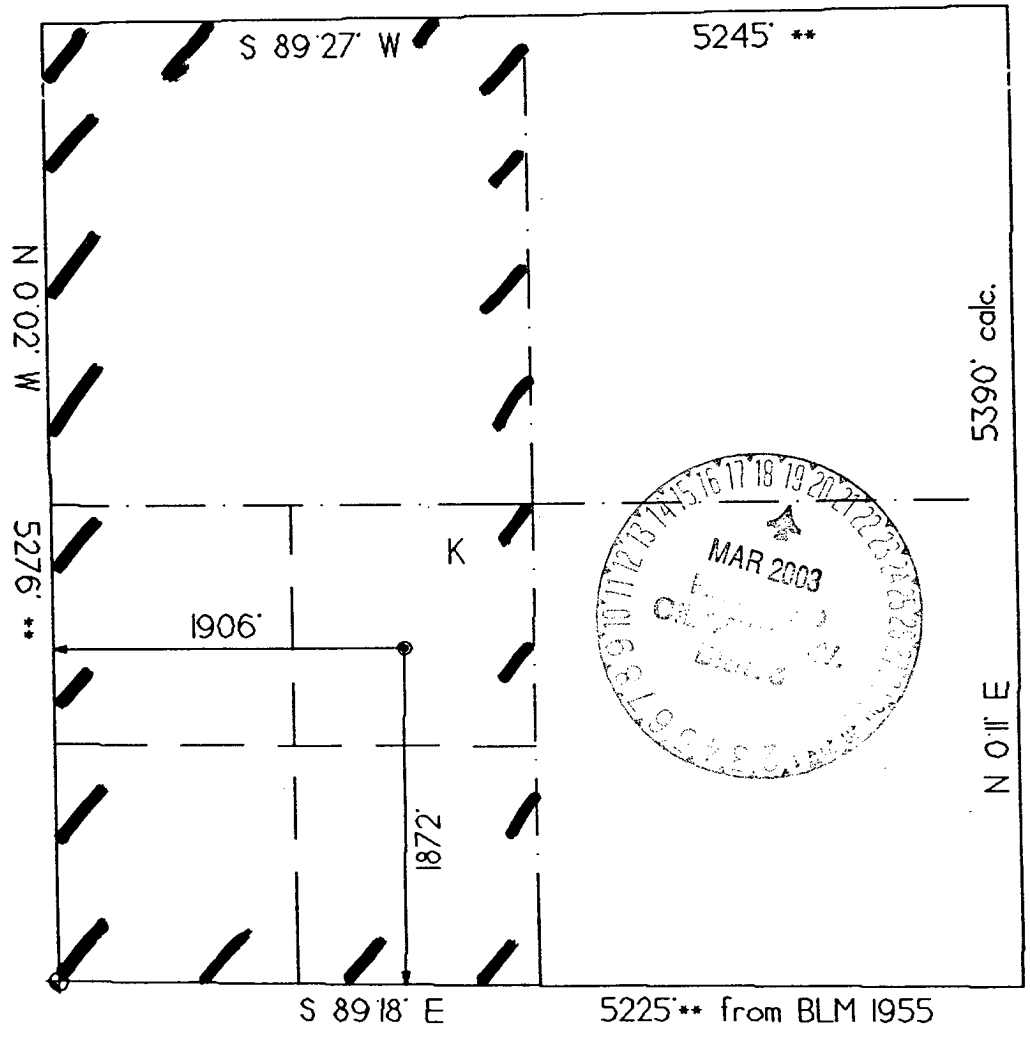
UL or Lot	Sec.	Twp.	Rge.	Lot Idn.	Feet from>	North/South	Feet from>	East/West	County
K	27	32 N.	12 W.		1872'	SOUTH	1906'	WEST	SAN JUAN

Bottom Hole Location If Different From Surface

UL or Lot	Sec.	Twp.	Rge.	Lot Idn.	Feet from>	North/South	Feet from>	East/West	County

Dedication	Joint ?	Consolidation	Order No.
320			

NO ALLOWABLE WILL ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Signature: B. Wood

Printed Name: BRIAN WOOD

Title: CONSULTANT

Date: FEB. 15, 2003

SURVEYOR CERTIFICATION

I hereby certify that the well location on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

Date of Survey: JULY 1999

Signature and Seal of Professional Surveyor: GERALD E. HUBBLESTON, NEW MEXICO, 6844, REGISTERED LAND SURVEYOR

Oil and gas shows will be tested and evaluated for commercial potential as determined by the company geologist. Goal is the Mesa Verde.

3. PRESSURE CONTROL (Also see PAGES 3 - 5)

The drilling contract has not yet been awarded, thus the exact type of BOP to be used is not now known. Diagrams of a typical 2,000 psi BOP stack and manifold are on PAGES 3 and 4.

Call BLM at (505) 599-8900 >24 hours before testing. BOP system will be installed and pressure tested before drilling the surface casing shoe. It will be retested if a pressure seal is broken or is 30 days have elapsed since the last successful test of the equipment. Test pressures are ...

Pipe rams	2,000 psi (high)	250 psi (low)
Choke manifold & lines	2,000 psi (high)	250 psi (low)

Will initially pressure test BOP and ancillary equipment to 250 psi for 5 minutes, followed by by a test to 2,000 psi for 10 minutes. Casing will be tested for 30 minutes. BOP equipment will remain in use until the well is completed or abandoned. Safety valve and sub with a full opening valve to fit the drill pipe and collars will be available on the rig floor in the open position at all time for use when the kelly is not in use.

All BOP mechanical and pressure tests will be recorded on the driller's log. BOPs will be inspected and opened and closed at least daily to assure good mechanical working order. These inspections will also be recorded on the daily drilling report.

Questar Exploration & Production Company
Horton 4 B
1872' FSL & 1906' FWL
Sec. 27, T. 32 N., R. 12 W.
San Juan County, New Mexico

4. CASING & CEMENTING

Design factors are: Collapse = 1.125
Burst = 1.00
Tension = 1.80
Area Fracture Gradient = 0.83 psi/foot

Casing Integrity Tests: test to 0.22 psi/foot or 1,500 psi whichever is more
(not to exceed 70% of the rated burst pressure of the casing)
Surface Casing: Test to 1,500 psi
(drill out surface casing ≤10' & test shoe to 12 ppg [estimate 75 psi with fresh H_2O in hole])
Intermediate Casing: Test to 1,500 psi
(with 8.5 pounds per gallon fluid in hole)
Production Casing: Test to 1,200 psi
(with 8.5 pounds per gallon fluid in hole)

Hole Size	O. D.	#/ft	Grade	Thread	Age	Collapse	Burst	Tensile	Depth
20"	14"-16"	Corrugated		Conductor	Used				0' - 40'
12-1/4"	9-5/8"	32	H-40	S T & C	New	1,370	2,270	254,000	0' - 200'
8-3/4"	7"	23	J-55	S T & C	New	3,270	4,360	284,000	0' ~~2,920'~~ 100' min overlap
6-1/4"	4-1/2"	9.5	J-55	S T & C	New	3,310	4,380	101,000	2,620' - TD

Conductor pipe will be cemented to the surface with ≈45 cubic feet of construction cement.

Surface casing (0' - 200') will be run as follows:
a) Guide shoe
b) One joint
c) Insert float
d) Remainder of casing
e) Three bow spring centralizers (10' above shoe joint, middle of the second joint, and one on the second to last joint)
f) Thread lock bottom joint of casing and float equipment. Reciprocate casing 20' while cementing. Land casing so casing head flange will be at ground level and the shoe joint is as near bottom as possible.

Surface casing will be cemented to the surface as follows:

a) Circulate and condition the hole until the returns are clean (≥1-1/2 times bottoms up or one internal casing volume, whichever is greater)
b) Pump ≈10 barrels fresh water
c) Slurry = 125 sacks Class G + 2% $CaCl_2$ + 1/4 lb/sk Cello Flake. Weight = 15.8 pounds per gallon. Yield = 1.16 cubic feet per sack. Mix water = 4.95 gallons per sack. Volume = 144 cubic feet based on 18 cubic feet for 40' of shoe joint + 63 cubic feet for annulus + 100 cubic feet excess (100%).
d) Use top wiper plug. Displace with water. Casing capacity = 12.6 barrels to the float collar.
e) Have ≈100 sacks Class G cement, 5 joints 1" line pipe, and enough $CaCl_2$ to mix 2% by volume with the top off cement to circulate top 100' of casing annulus if cement drops from surface. W. O. C. = 6 hours before cutting off and nipple up. Casing head flange= 9-5/8" x 11" 2,000 psi.

Intermediate casing (0' - 2,920') will be run as follows:

a) Float shoe
b) One joint
c) Float collar
d) Ten centralizers (two centralizers placed on joints 1, 6, 7, and 8 in the hole (10' from each end) and the third to the last joint run in the hole)
e) Lock shoe joint and float equipment with thread lock compound

Intermediate casing will be cemented to surface as follows:

a) Reciprocate casing ≈20' during cementing
b) Circulate and condition the hole until the returns are clean (≥1-1/2 times bottoms up or one internal casing volume, whichever is greater)
c) Pump ≈20 barrels fresh water
d) Lead slurry = 235 sacks 35/65 Poz-G + retarder for 2-1/2 hours pumpability at 95° F + friction reducer for turbulent flow at 5 barrels per minute + fluid loss additive. Weight =11.4 pounds per gallon. Yield = 2.90 cubic feet per sack. Mix water = 17.78 gallons per sack. Volume = 681.5 cubic feet.

e) Tail slurry = 165 sacks Class G + friction reducer + fluid loss additive. Weight = 13.5 pounds per gallon. Yield = 1.30 cubic feet per sack. Mix water = 5.48 gallons per sack. Volume = 214.5 cubic feet
f) Total intermediate casing cement volume = 893 cubic feet (9 cubic feet for shoe joint + 409 cubic feet open hole annulus + 33 cubic feet cased hole annulus + 442 cubic feet for 60% excess). Final volume calculations will be calculated from caliper log results.
g) Displacement volume to float collar = 113.5 barrels (displace with 10 barrels fresh water followed by mud)
h) After displacement, check to insure floats are holding. If they hold, then release pressure and start to nipple down. If not, hold 200 psi over plug, bumping pressure until floats hold, then start to nipple down.

Production liner (5,400' to 2,620') will be run as follows:
a) Float shoe
b) One joint
c) Float collar
d) Ten centralizers (two centralizers placed on joint 1 (10' from each end) and one on the third to the last joint in the hole - placement of the remaining centralizers will be determined from log analysis)
e) Lock shoe joint and float equipment with thread lock compound
f) Remainder of line (enough liner to overlap intermediate casing by 300')
f) Liner hanger and setting tool
g) drill pipe to TD

Production liner will be cemented by ...
a) Blow hole clean
b) Pump ≈20 barrels fresh water
c) Slurry = 393 sacks 50/50 Poz-G + retarder for 2-1/2 hours pumpability at 110° F + friction reducer for turbulent flow at 5 barrels per minute + fluid loss additive. Weight = 13.5 pounds per gallon. Yield = 1.30 cubic feet per sack. Mix water = 5.48 gallons per sack. Volume = 511 cubic feet (4 cubic feet for shoe joint + 254 cubic feet for open hole annulus + 33 cubic feet overlap annulus + 44 cubic feet for 200' on top of liner + 102 cubic

feet for 40% excess open hole annulus)

d) Final cement volume calculations will be based on caliper log results. Estimated top of cement will be 200' above the top of the liner (i. e., ≈2,420' since top of line will be ≈2,620')
e) Displace with 10 barrels of fresh water followed by 2% KCl water

5. MUD PROGRAM

Will circulate water through reserve pit, flocculate with lime, and run gel and/or polymer sweeps as needed to clean hole from surface to 200'. Will continue to circulate water through the reserve pit and running gel and polymer sweeps as necessary from the base of the surface casing to 100' above the Fruitland. Before entering the Fruitland coal, will lightly mud up with adequate viscosity and density to maintain a stable well bore. Estimated mud density = 9.0 - 9.5 pounds per gallon. Mud additives on location will include: barite (bulk and sack), gel, polymer, caustic soda, and lost circulation material.

Will air drill bottom 2,300'. Dust as long as possible before misting. If hole becomes too wet, may mud up.

Based on adjacent wells, all formations are expected to be sub-normally pressured. If virgin pressures are encountered, the maximum bottom hole pressure would be 2,338 psi (5,400' x 0.433 psi per foot).

6. CORES, TESTS, & LOGS

No cores, drill stem tests, or mud logs are planned. First logging run from intermediate casing TD to surface casing will be DIL/GR/SP/Neut./Den. Second logging run from final TD to intermediate casing will be DIL/GR/Neut/Den/Temp. CAL/TEN curves on all logs.