Form 3160-5
(August 2007)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

NMOCD
Artesia

FORM APPROVED
OMB NO. 1004-0135
Expires: July 31, 2010

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on reverse side.

5. Lease Serial No.
NMNM030752

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
WAR HORSE FED COM 1H

2. Name of Operator
MURCHISON OIL & GAS INC

Contact: CINDY COTTRELL
E-Mail: ccottrell@jdmii.com

9. API Well No.
30-015-41013-00-X1

3a. Address
LEGACY TOWER ONE 7250 DALLAS PKY, STE 1400
PLANO, TX 75024

3b. Phone No. (include area code)
Ph: 972-931-0700

10. Field and Pool, or Exploratory
PALMILLO

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Sec 21 T18S R29E NENE 350FNL 175FEL

11. County or Parish, and State
EDDY COUNTY, NM

12. CHECK APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☒ Alter Casing	☐ Fracture Treat	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation (clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports shall be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 shall be filed once testing has been completed. Final Abandonment Notices shall be filed only after all requirements, including reclamation, have been completed, and the operator has determined that the site is ready for final inspection.)

Murchison Oil & Gas, Inc. would like permission to change the casing design. We propose setting the 9-5/8? casing at 3,000? in the San Andres formation. Then drilling 8.75? hole to TD and setting 5.5?, 20#, P-110 casing. Cement volumes will be adjusted in order to get cement to surface. The revised Drilling Prognosis is attached. Please remove the wellbore schematic dated 12/18/2013.

NM OIL CONSERVATION
ARTESIA DISTRICT
JAN 25 2016

CRD 1/26/16
Accepted for record
NMOCD

SEE ATTACHED FOR CONDITIONS OF APPROVAL

RECEIVED

14. I hereby certify that the foregoing is true and correct.
Electronic Submission #301866 verified by the BLM Well Information System
For MURCHISON OIL & GAS INC, sent to the Carlsbad
Committed to AFMSS for processing by JENNIFER SANCHEZ on 11/13/2015 (16JAS1104SE)

Name (Printed/Typed) RUSTY COOPER — Title ENGINEERING MANAGER

Signature (Electronic Submission) — Date 05/15/2015

APPROVED
JAN 15 2016
BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By — Title — Date

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

Office

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.

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

Murchison Oil and Gas
Drilling Prognosis
War Horse Fed Com #1H

Revision date: May 11, 2015

Surface Location:	632,777.8usft N, 621,766.69usft E 350' FNL, 175' FEL Section 21, T-18-S, R-29-E Eddy County, New Mexico
Bottom Hole Target:	632,762.42usft N, 616,992.79usft E 350' FNL, 330' FWL Section 21, T-18-S, R-29-E Eddy County, New Mexico
Planned Total Depth:	7800' TVD /12216' MD
RKB: 3514.4'	GL: 3496.4'
Preparer:	Rusty Cooper

Contents

Article I. Well Overview:

The War Horse Fed Com #1H will be a horizontal well. The well will be drilled to TD with surface casing and intermediate casing. The production casing will be run and then cemented and perforated. The well will then be hydraulically fractured.

Article II. Estimated Formation Tops (geoprognosis with TVD's adjusted to actual KB):

Formation	TVD	Subsea	Thickness	Type
Salt	284'	-3230'		
Salt Base	844'	-2670'		
Tansil	884'	-2630'		
Yates	1024'	-2490'		
Seven Rivers	1394'	-2120'		
Queen	2034'	-1480'		
Grayburg	2384'	-1130		
San Andres	2864'	-650'		
Bone Spring Lime	3894'	-380'		
1st Bone Spring	6564'	3050'	200'	Hydrocarbon
2nd Bone Spring	7562'	3995'	400'	Hydrocarbon

Article III. Pressure Control:

A 13-5/8" 5M BOP and 5M choke manifold will be used. See schematics.
BOP test shall be conducted:

A. when initially installed
B. whenever any seal subject to test pressure is broken
C. following related repairs
D. at 30 day intervals

BOP, choke, kill lines, Kelly cock, inside BOP, etc. will be hydro tested to 250psi(low) and 5,000psi(high). The annular will be tested to 250psi (low) and 2500psi (high).

BOP will be function tested on each trip.

Article IV. Casing Program (minimum):

All casing is new API casing.

Hole Size	Casing	Weight lb/ft	Grade	Conn	MD/RKB	Stage
	20"				120'	Conductor
16"	13.375"	48	H-40	STC	280'	Surface
12.25"	9.625"	36	J-55	STC	3000'	Intermediate
8.75"	5.5"	20	P-110	LTC	12216'	Production

Size	Collapse psi	SF	Burst psi	SF	Tension Klbs	SF
13.375	740	5.71	1730	6.18	322	23.96
9.625	2020	1.29	3520	2.24	394	3.64
5.5	11,100	3.01	12,640	1.58	548	2.24

13.375" casing will be set above the salt zone
9.625" casing will be set in the San Andres formation

Article V. ***Cement Program:***

Section 5.01 13.375" Surface Casing

Tail: Surface to TD

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
14.8ppg	1.34cuft/sk	225	6.35	100%	Class C + 2% CACL2 + Additives

Circulate cement to surface. If cement does not circulate a 1" grout string will be used to perform a top job.

Cement volumes will be adjusted respectively once actual casing depth is determined.

Section 5.02 9.625" Intermediate Casing

Lead: Surface – 2500'

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
12.5ppg	2.13 cuft/sk	620	11.17	80%	(35:65) Poz (Fly Ash):Class C Cement + 5% bwow Salt + 0.125 lbs/sack CelloFlake + 1% bwoc Sodium Metasilicate + Additives

Tail: 6000'-6500'

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
14.8ppg	1.33cuft/sk	225	6.32	80%	Class C Cement + Additives

Circulate cement to surface. If cement does not circulate to surface a top squeeze job or casing perforation will be used.
This will be discussed with the BLM prior to commencing remedial cement job. As well, a temperature survey or CBL will be performed. This will be discussed with the BLM prior to either being run.

Cement volumes will be adjusted accordingly once actual casing depth is determined.

Section 5.03 5.5" Production Casing

Lead: Surface-7875'

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
12.4 ppg	1.99 cuft/sk	1520	11.01	80%	35:65 Class H Poz + 6% gel + Additives

Tail: 7875'-TD

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
14.2 ppg	1.30 cuft/sk	1020	5.81	20%	50:50 Class H Poz + 2% gel + additives.

Circulate cement to surface. If cement does not circulate to surface a top squeeze job or casing perforation will be used.
This will be discussed with the BLM prior to commencing remedial cement job. As well, a temperature survey or CBL will be performed. This will be discussed with the BLM prior to either being run.

Cement volumes will be adjusted accordingly once actual casing depth is determined.

Article VI. ***Product Descriptions:***

Gel
Bentonite

CSE-2
An additive which contributes to low density, high compressive strength development of cement slurries at all temperature ranges. This material also controls free water without the need for standard extenders.

Calcium Chloride
A powdered, flaked or pelletized material used to decrease thickening time and increase the rate of strength development.

Cello Flake
Graded (3/8 to 3/4 inch) cellophane flakes used as a lost circulation material.

Class C Cement
Intended for use from surface to 6000 ft., and for conditions requiring high early strength and/or sulfate resistance.

Class H Cement
Class H cement is an API type, all purpose oil well cement which is used without modification in wells up to 8,000 ft. It possesses a moderate sulfate resistance. With the use of accelerators or retarders, it can be used in a wide range of well depths and temperatures.

FL-25
An all purpose salt-tolerant fluid loss additive that provides exceptional fluid loss control across a wide range of temperatures and salinity conditions and remedial cementing applications.

FL-52
A water soluble, high molecular weight fluid loss additive used in medium to low density slurries. It is functional from low to high temperature ranges.

FP-6L
A clear liquid that decreases foaming in slurries during mixing.

LCM-1
A graded (8 to 60 mesh) naturally occurring hydrocarbon, asphaltite. It is used as a lost circulation material at low to moderate temperatures and will act as a slurry extender. Cement compressive strength is reduced.

MPA-5
Used to enhance compressive and tensile strength development and reduce permeability.

Poz (Fly Ash)
A synthetic pozzolan, (primarily Silicon Dioxide). When blended with cement, Pozzolan can be used to create lightweight cement slurries used as either a filler slurry or a sulfate resistant completion cement.

Sodium Chloride
At low concentrations, it is used to protect against clay swelling.

Sodium Metasilicate
An extender used to produce economical, low density cement slurry.

Static Free
An anti-static additive used to prevent air entrainment due to agglomerated particles. Can be used in Cementing and Fracturing operations to aid in the flow of dry materials.

Article VII. Mud Program:

Depth	Hole	Type	MW	PV	YP	WL	pH	Sol %
0-280	16"	Fresh Water	8.4-8.9	10-12	12-15	NC	9.5	<3.0
280-3000	12.25"	Brine	10	1	1	NC	9.5	<1.0
3000-KOP	8.75"	Cut Brine	8.4-8.6	1	1	NC	9.5	<1.0
KOP-TD	8.75"	Cut Brine	8.9-9.1	4-6	4-6	18-20	9.5	<3.0

Sufficient mud will be on location to control any abnormal conditions encountered. Such as but not limited to a kick, lost circulation and hole sloughing.

Article VIII. Mud Monitoring System:

A Pason PVT system will be rigged up prior to spudding the well. A volume monitoring system that measures, calculates, and displays readings from the mud system on the rig to alert the rig crew of impending gas kicks and lost circulation issues.

Components

a) PVT Pit Bull monitor:
Acts as the heart of the system, containing all the controls, switches, and alarms. Typically, it is mounted near the driller's console.

b) Junction box:
Provides a safe, convenient place for making the wiring connections.

c) Mud probes:
Measure the volume of drilling fluid in each individual tank.

d) Flow sensor:
Measures the relative amount of mud flowing in the return line.

Article IX. Logging, Drill stem testing and Coring:

2 man mud logging will start after intermediate casing has been set.

8.75" hole will have LWD (Gamma Ray) to section TD.

Article X. Bottom Hole:

Temperature is expected to be 142°F and the bottom hole pressure is expected to be 4300 psi maximum using offset data

Article XI. Abnormal Conditions:

No abnormal conditions are expected. Temperature is expected to be normal. All zones are expected to be normal pressure.

Lost circulation is possible in both the 16" and 12.25" hole sections. A 50bbl pill of 50ppb LCM will be premixed in the slug pit in case lost circulation is encountered. Subsequently 20ppb of LCM will be maintained in the active system if severe losses do occur. If complete loss circulation is encountered in the Capitan Reef the Brine will be switched over to fresh water. The BLM will be notified of this and an inspector requested to witness the drilling fluid swap.

Article XII. H2S:

No H2S is expected. But there is the possibility of the presence of H2S. Attached is the H2S response plan.

Article XIII. Directional:

Directional survey plan and plot attached.

Article XIV. Drilling Recorder:

Rig up EDR & PVT prior to spud to record drilling times and other drilling parameters from surface to TD.

PECOS DISTRICT
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Murchison Oil & Gas
LEASE NO.:	NM030752
WELL NAME & NO.:	1H War Horse Fed Com
SURFACE HOLE FOOTAGE:	350'/ FNL & 175'/ FEL
BOTTOM HOLE FOOTAGE	350'/ FNL & 330'/ FWL
LOCATION:	Section 21, T.18 S., R.29 E., NMPM
COUNTY:	Eddy County, New Mexico
API:	30-015-41013

The original COA still stand with the following drilling modifications:

A. DRILLING OPERATIONS REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ **Eddy County**
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

1. **Hydrogen Sulfide has been reported as a hazard, but no measurements have been recorded. It is recommended that monitoring equipment be onsite for potential Hydrogen Sulfide. If Hydrogen Sulfide is encountered, please report measurements and formations to the BLM.**

2. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval. **If the drilling rig is removed without approval – an Incident of Non-Compliance will be written and will be a "Major" violation.**

3. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works is located, this does not include the dog house or stairway area.

4. **The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) will be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.**

B. CASING

Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

Centralizers required on surface casing per Onshore Order 2.III.B.1.f.

Wait on cement (WOC) for Water Basin:
After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements.

No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

Possible lost circulation in the Grayburg and San Andres formations.
Possible water and brine flows in the Salado and Artesia Groups.

1. The **13-3/8** inch surface casing shall be set at approximately **280** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.

b. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry.**

c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.

d. If cement falls back, remedial cementing will be done prior to drilling out that string.

Formation below the 13-3/8" shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe and the mud weight anticipated to control the formation pressure to the next casing depth. Report results to BLM office.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing, which shall be set at approximately **3,000** feet (**in the San Andres formation**), is:

   ☒ Cement to surface. If cement does not circulate see B.1.a, c-d above.

Formation below the 9-5/8" shoe to be tested according to Onshore Order 2.III.B.1.i. Test to be done as a mud equivalency test using the mud weight necessary for the pore pressure of the formation below the shoe (not the mud weight required to prevent dissolving the salt formation) and the mud weight anticipated to control the formation pressure to the next casing depth. Report results to BLM office.

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:

   ☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office.

4. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

C. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi. **5M system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.**

3. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

    a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

    b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**.

    c. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

    d. The results of the test shall be reported to the appropriate BLM office.

    e. All tests are required to be recorded on a calibrated test chart. **A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.**

    f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

D. DRILL STEM TEST

If drill stem tests are performed, Onshore Order 2.III.D shall be followed.

E. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

JAM 011516