

## R-111-POTASH

## HIGH CAVEKARST

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENTFORM APPROVED  
OMB No. 1004-0137  
Expires July 31, 2010

BHL

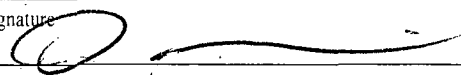
## APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: <input checked="" type="checkbox"/> DRILL <input type="checkbox"/> REENTER		7. If Unit or CA Agreement, Name and No. NM70992X	
1b. Type of Well: <input checked="" type="checkbox"/> Oil Well <input type="checkbox"/> Gas Well <input type="checkbox"/> Other <input checked="" type="checkbox"/> Single Zone <input type="checkbox"/> Multiple Zone		8. Lease Name and Well No. Nash Unit Fed Com #106H	
2. Name of Operator Murchison Oil and Gas		9. API Well No. 30-015-43082	
3a. Address 1100 Mira Vista Blvd Plano, TX 75093	3b. Phone No. (include area code) 972-931-0700	10. Field and Pool, or Exploratory Nash Draw Bone Spring	
4. Location of Well (Report location clearly and in accordance with any State requirements.)* At surface 700 FNL 1615 FWL At proposed prod. zone 330FNL 2260FWL		11. Sec., T. R. M. or Blk. and Survey or Area SHL: Sec. 18 T23S R30E BHL: Sec. 6 T23S R30E	
14. Distance in miles and direction from nearest town or post office* Approximately 13 mi NE of Loving, NM		12. County or Parish Eddy	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 1480	17. Spacing Unit dedicated to this well 320	
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. See 1 mile radius map	19. Proposed Depth 9206' TVD/20,228' MD 20,246	20. BLM/BIA Bond No. on file NM 2163	
21. Elevations (Show whether DF, KDB, RT, GL, etc.) GL: 3016' RKB:3038'	22. Approximate date work will start* 09/15/2014	23. Estimated duration 45 days	

## 24. Attachments

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

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

25. Signature 	Name (Printed/Typed) Steve Morris	Date 06/26/2014
Title Senior Drilling Engineer		
Approved by (Signature) /s/George MacDonell	Name (Printed/Typed)	Date APR 21 2015
Title FIELD MANAGER	Office CARLSBAD FIELD OFFICE	

Application approval 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.  
Conditions of approval, if any, are attached.

APPROVAL FOR TWO YEARS

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.

(Continued on page 2)

\*(Instructions on page 2)

NM OIL CONSERVATION  
ARTESIA DISTRICT

Carlsbad Controlled Water Basin

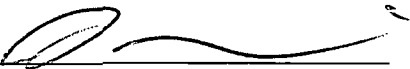
APR 27 2015

APD  
4/28/15RECEIVED  
Approval Subject to General Requirements  
& Special Stipulations AttachedSEE ATTACHED FOR  
CONDITIONS OF APPROVAL

## Murchison Oil and Gas

**Operator Certification:** Application for Permit to Drill  
Nash Unit #106H  
Eddy County, New Mexico

I hereby certify that I, or persons under my direct supervision, have inspected the proposed drill site and access route; that I am familiar with the conditions which presently exist; that the statements made in the Application for Permit to Drill (APD) package are, to the best of my knowledge, true and correct; and that the work associated with the operations proposed herein will be performed by Murchison Oil and Gas, and its contractors and subcontractors in conformity with this plan and the terms and conditions under which it is approved. I also certify responsibility for the operations conducted on that portion of the leased lands associated with this application with bond coverage provided by BLM Bond Number NM-2163. This statement is subject to the provisions of the 18U.S.C.1001 for filing a false statement.

Signed:   
Steve Morris  
Senior Drilling Engineer

Dated: 7/22/14

District II  
 1525 N. French Dr., Hobbs, NM 88240  
 Phone: (575) 393-6161 Fax: (575) 393-0720  
 District III  
 811 S. First St., Artesia, NM 87210  
 Phone: (575) 748-1283 Fax: (575) 748-9720  
 District III  
 1600 Rio Brazos Road, Aztec, NM 87410  
 Phone: (505) 334-6178 Fax: (505) 334-6170  
 District III  
 1220 S. St. Francis Dr., Santa Fe, NM 87505  
 Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico  
 Energy, Minerals & Natural Resources Department  
 OIL CONSERVATION DIVISION  
 1220 South St. Francis Dr.  
 Santa Fe, NM 87505

Form C-102  
 Revised August 1, 2011  
 Submit one copy to appropriate  
 District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number <b>30-015-43082</b>		2 Pool Code <b>47545</b>		3 Pool Name <b>Nash Draw; Delaware/BS</b>	
4 Property Code <b>8131 314783</b>		5 Property Name <b>NASH UNIT FED COM</b>		6 Well Number <b>10611</b>	
7 OGRID No. <b>15363</b>		8 Operator Name <b>MURCHISON OIL &amp; GAS, INC.</b>		9 Elevation <b>3016.5</b>	
10 Surface Location					
UL or lot no. <b>C</b>	Section <b>18</b>	Township <b>23 S</b>	Range <b>30 E</b>	Feet from the <b>700</b>	North/South line <b>NORTH</b>
				Feet from the <b>1615</b>	East/West line <b>WEST</b>
				County <b>EDDY</b>	
11 Bottom Hole Location If Different From Surface					
UL or lot no. <b>3</b>	Section <b>6</b>	Township <b>23 S</b>	Range <b>30 E</b>	Feet from the <b>330</b>	North/South line <b>NORTH</b>
				Feet from the <b>2260</b>	East/West line <b>WEST</b>
				County <b>EDDY</b>	
12 Dedicated Acres <b>320</b>		13 Joint or Infill		14 Consolidation Code	
				15 Order No.	

No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

		<p><b>16 OPERATOR CERTIFICATION</b></p> <p>I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or released mineral interest in the land including the proposed bottom hole location or has a right to drill this well in this location pursuant to a contract with an owner of such a mineral or working interest, or in a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.</p> <p>Signature: <u>Steve Morris</u> Date: <u>07/10/14</u></p> <p>Printed Name: <u>Steve Morris</u></p> <p>E-mail Address: <u>smorris@jdmii.com</u></p>
<p><b>17 SURVEYOR CERTIFICATION</b></p> <p>I hereby certify that the well location shown 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.</p> <p>Signature and Seal of Licensed Surveyor: <u>[Signature]</u></p> <p>Certificate Number: <u>FRANCO F. JARAMILLO, PLS 12797</u></p> <p>SURVEY NO. 2244</p>		

**Murchison Oil and Gas**  
**PSOA**  
**Nash Unit Fed Com #106H**

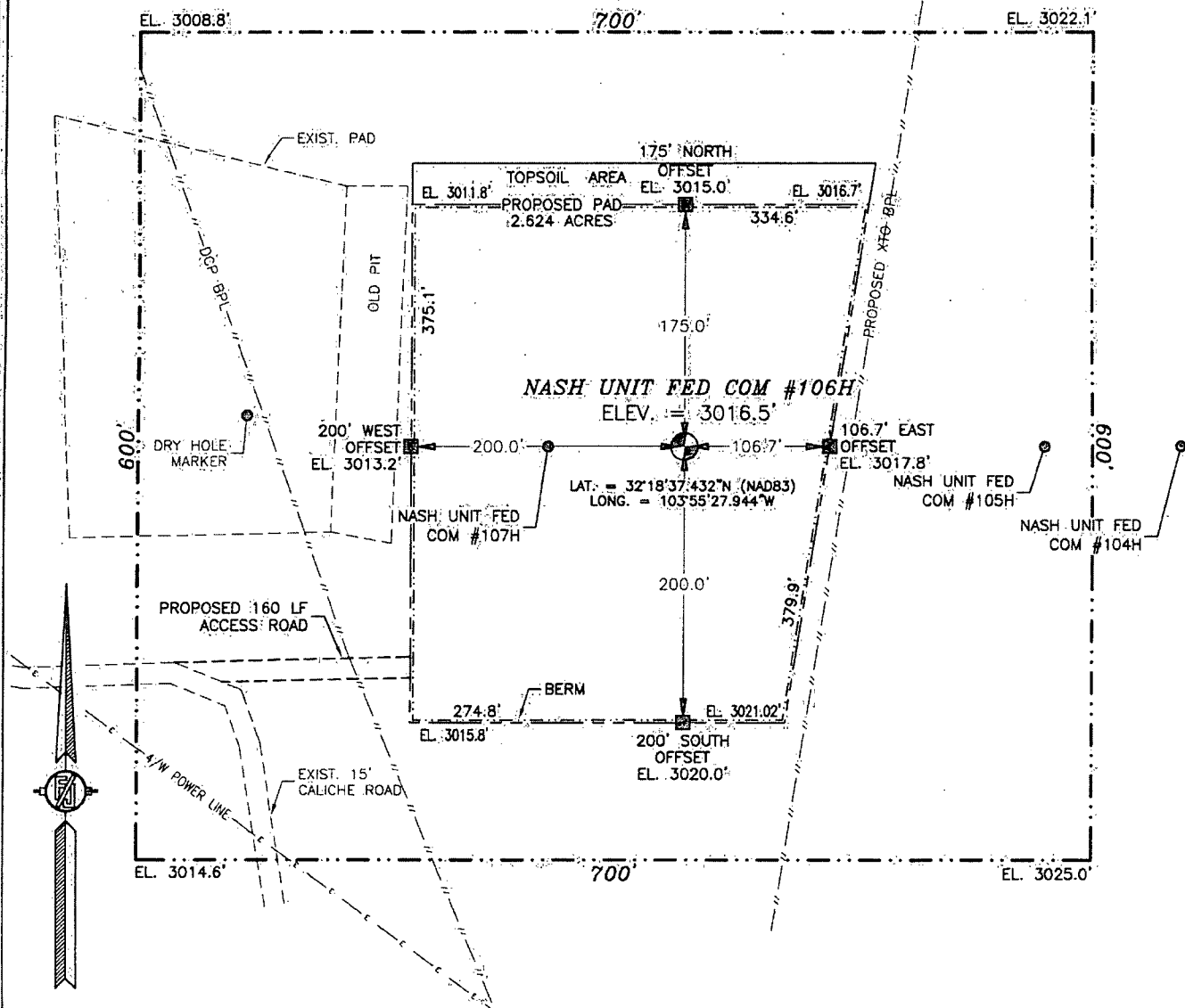
- a. The surface ownership of the proposed project is federal.  
Surface Owner: J. Mobley 3515 Standpipe road, Carlsbad NM 88220
- b. A surface use agreement was obtained from the surface owner regarding the proposed project.
- c. A good faith effort will be made to provide a copy of the APD Surface Use Plan of Operations to the private surface owner.



SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

SITE MAP

NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83). LISTED NEW MEXICO STATE PLANE EAST COORDINATES ARE GRID (NAD83). BASIS OF BEARING AND DISTANCES USED ARE NEW MEXICO STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE



0 12 60 120 240

SCALE 1" = 120'

DIRECTIONS TO LOCATION

FROM STATE HIGHWAY 128 AND PAVED CR 793 (RAWHIDE) GO SOUTH ON CR 793 2.6 MILES, TURN LEFT ON CALICHE ROAD AND GO EAST 0.25 MILES TO A PROPOSED ROAD SURVEY AND FOLLOW FLAGS EAST 160' TO THE SOUTHWEST CORNER OF PAD FOR THIS LOCATION

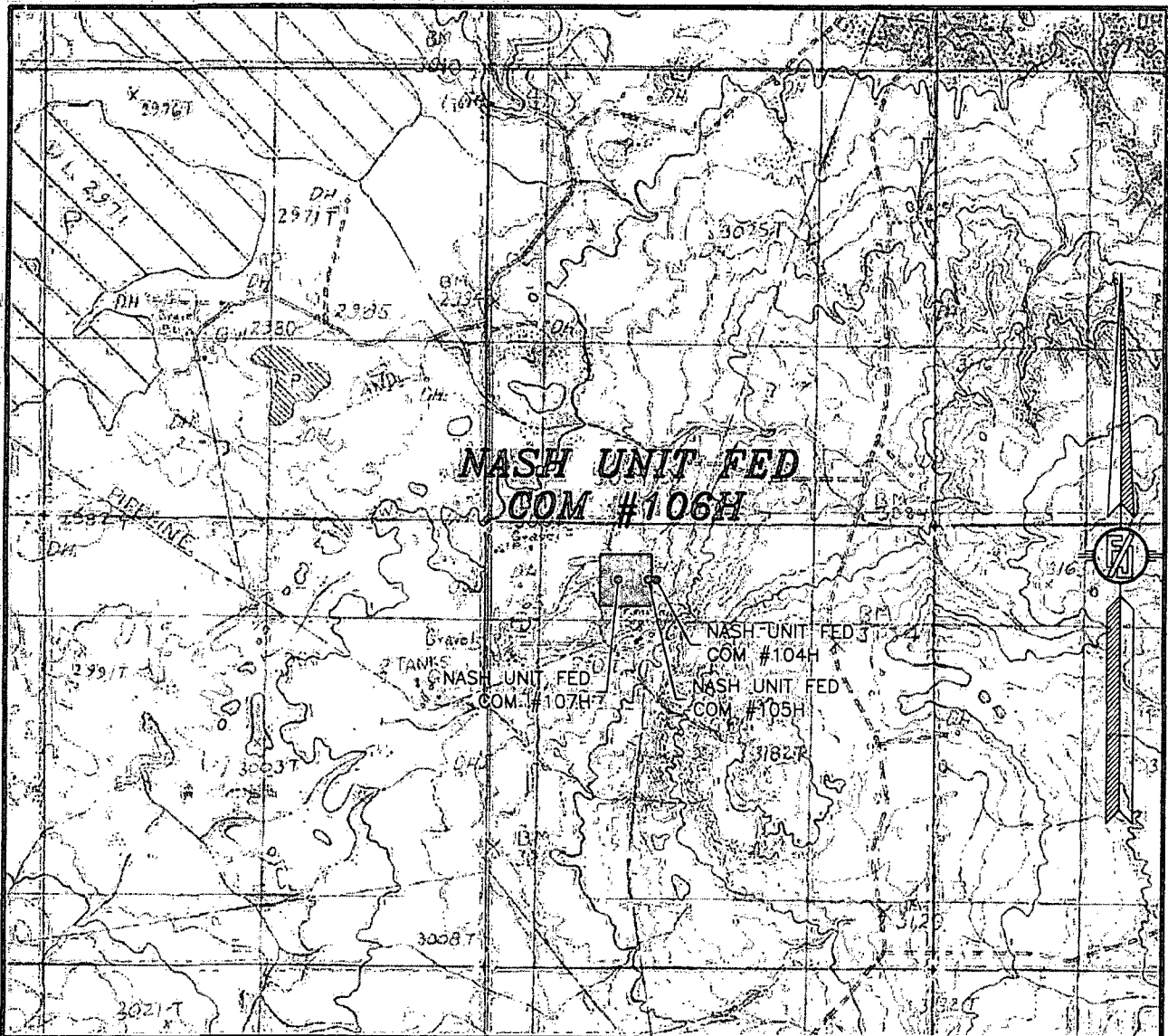
MURCHISON OIL & GAS, INC.  
**NASH UNIT FED COM #106H**  
LOCATED 700 FT. FROM THE NORTH LINE  
AND 1615 FT. FROM THE WEST LINE OF  
SECTION 18, TOWNSHIP 23 SOUTH,  
RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO (575) 234-3341

SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO  
LOCATION VERIFICATION MAP



USGS QUAD MAP:  
REMUDA BASIN

NOT TO SCALE

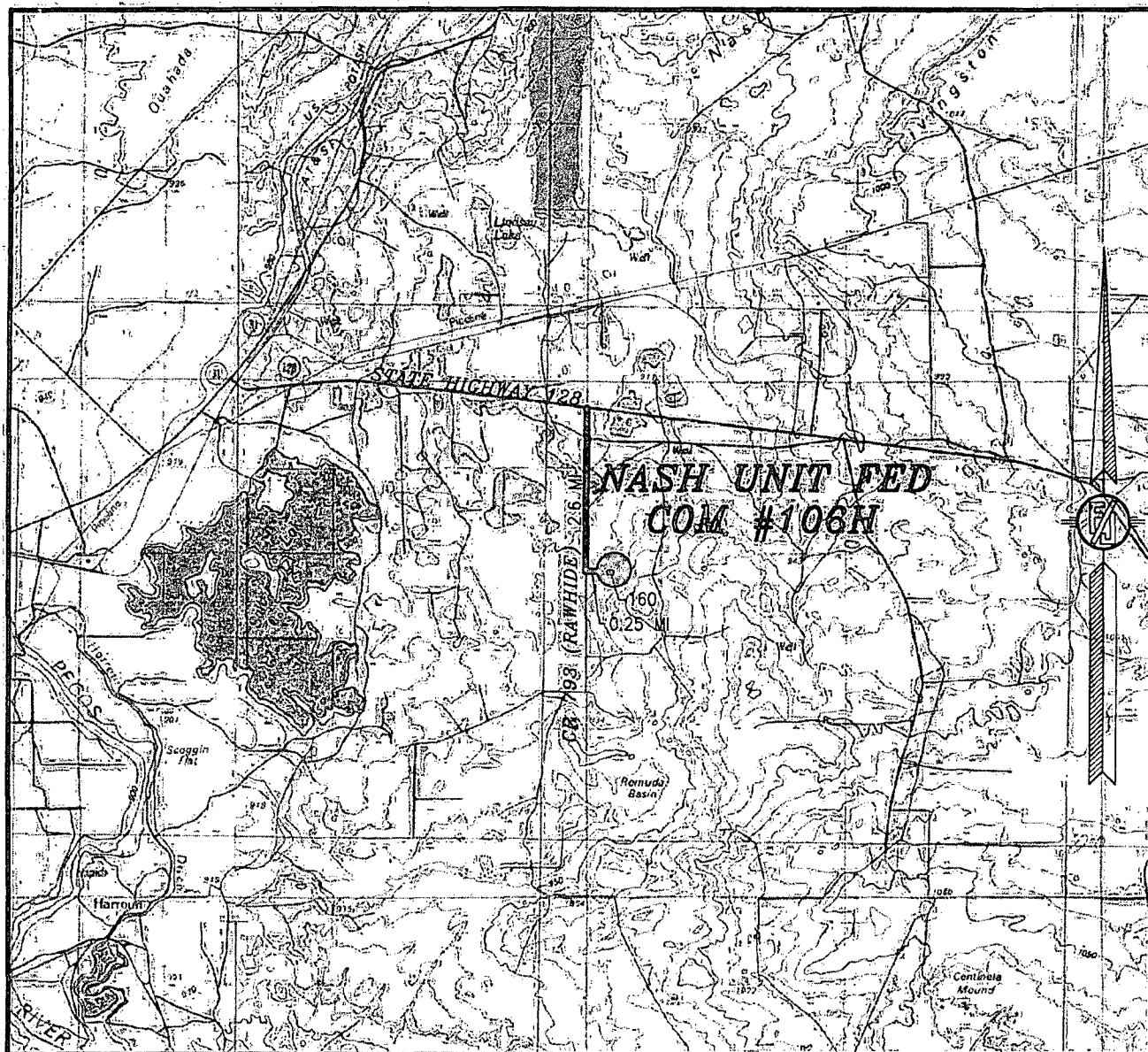
MURCHISON OIL & GAS, INC.  
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LOCATED 700 FT. FROM THE NORTH LINE  
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SECTION 18, TOWNSHIP 23 SOUTH,  
RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 3011 SOUTH CANAL, CARLSBAD, NEW MEXICO  
(575) 234-3341

SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO  
VICINITY MAP



DISTANCES IN MILES

NOT TO SCALE

**DIRECTIONS TO LOCATION**

FROM STATE HIGHWAY 128 AND PAVED CR 793 (RAWHIDE) GO SOUTH ON CR 793 2.6 MILES, TURN LEFT ON CALICHE ROAD AND GO EAST 0.25 MILES TO A PROPOSED ROAD SURVEY AND FOLLOW FLAGS EAST 160' TO THE SOUTHWEST CORNER OF PAD FOR THIS LOCATION.

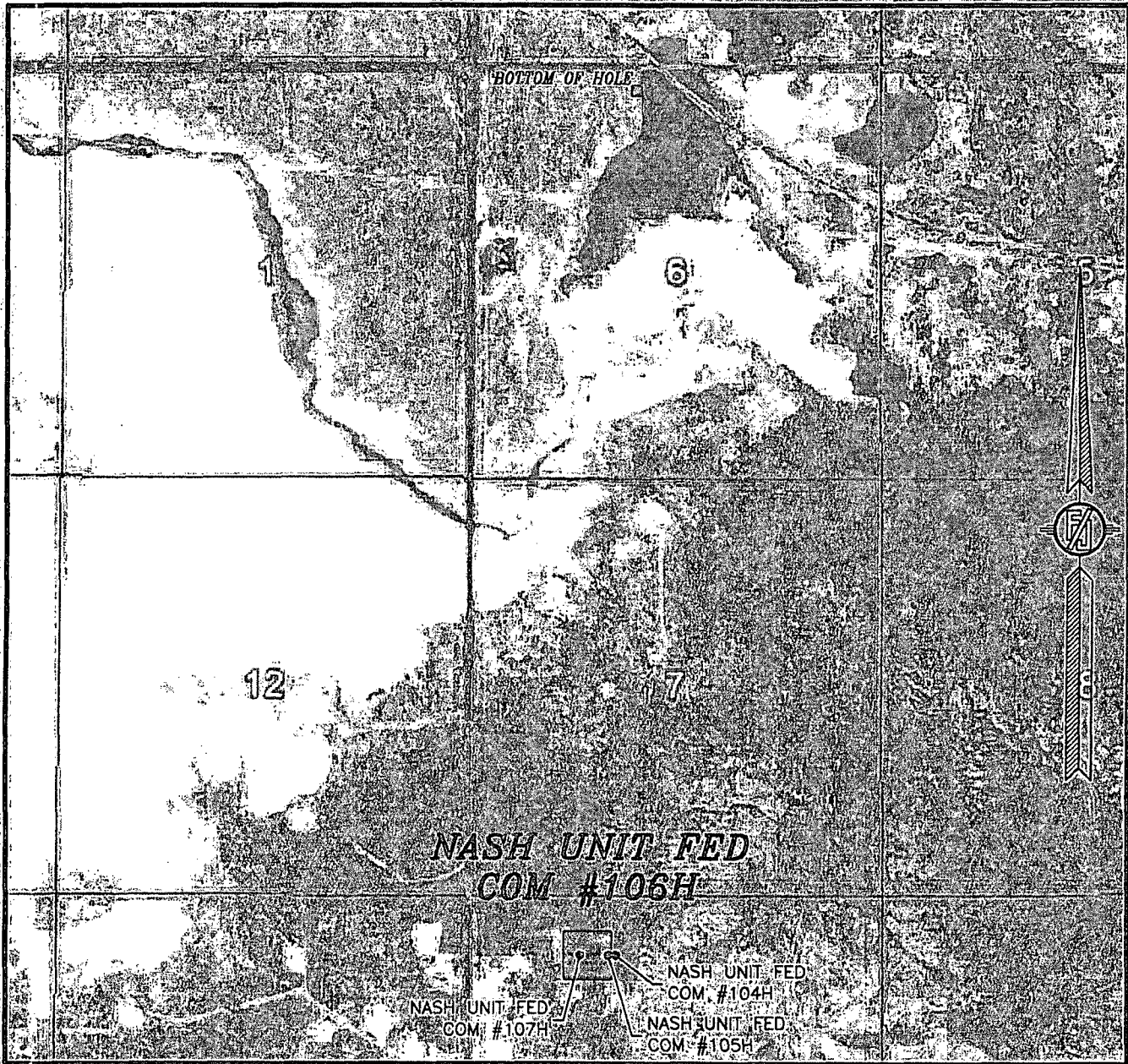
MURCHISON OIL & GAS, INC.  
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SECTION 18, TOWNSHIP 23 SOUTH,  
RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO  
AERIAL PHOTO



NOT TO SCALE  
AERIAL PHOTO:  
GOOGLE EARTH  
MARCH 2012

MURCHISON OIL & GAS, INC.  
NASH UNIT FED COM #106H  
LOCATED 700 FT. FROM THE NORTH LINE  
AND 1615 FT. FROM THE WEST LINE OF  
SECTION 18, TOWNSHIP 23 SOUTH,  
RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 301 SOUTH CANAL CARLSBAD, NEW MEXICO  
(575) 234-3341



SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO  
ACCESS AERIAL ROUTE MAP



NOT TO SCALE  
AERIAL PHOTO:  
GOOGLE EARTH  
MARCH 2012

MURCHISON OIL & GAS, INC.  
NASH UNIT FED COM #106H  
LOCATED 700 FT. FROM THE NORTH LINE  
AND 1615 FT. FROM THE WEST LINE OF  
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RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO



# New Mexico Office of the State Engineer

## Active & Inactive Points of Diversion

(with Ownership Information)

(R=POD has been replaced

and no longer serves this file, (quarters are 1=NW 2=NE 3=SW 4=SE)

C=the file is closed)

(quarters are smallest to largest) (NAD83 UTM in meters)

(acre ft per annum)

WR File Nbr	Sub	basin	Use	Diversion	Owner	County	POD Number	Code	Grant	Source	q	q	q	Sec	Tws	Rng	X	Y
C 03720		CUB	MON		0 MOSAIC POTASH CARLSBAD INC	ED	C 03720 POD1			6416.4	1	1	1	07	23S	30E	600886	3577029

Record Count: 1

### PLSS Search:

Section(s): 6, 7, 18

Township: 23S

Range: 30E

Sorted by: File Number

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

5/9/14 1:21 PM

Page 1 of 1

ACTIVE & INACTIVE POINTS OF DIVERSION



# New Mexico Office of the State Engineer

## Water Right Summary



get image list

WR File Number: C 03720

Primary Purpose: MON MONITORING WELL

Primary Status: PMT PERMIT


Total Acres:

Total Diversion: 0

Agent: MOSAIC POTASH CARLSBAD INC


Contact: SARAH GONZALES

### Documents on File

Trn #	Doc	File/Act	Status		Transaction Desc.	From/		Acres	Diversion	Consumptive
			1	2		To				
 <a href="#">get images</a>	539451	EXPL	2014-01-18	PMT	APR C-3720	T		0	0	

### Current Points of Diversion

(NAD83 UTM in meters)

POD Number	Source	Q	Q	Q	6416 4	Sec	Tws	Rng	X	Y	Other Location Desc
<u>C 03720 POD1</u>		1	1	1	07	23S	30E		600886	3577029	 MOS-23

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.



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# *New Mexico Office of the State Engineer* **Water Column/Average Depth to Water**

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No records found.

**PLSS Search:**

**Section(s):** 6, 7, 18

**Township:** 23S

**Range:** 30E

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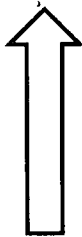
The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

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# Nash Unit Fed Com #106H

350'



North

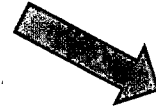
Foot Path



Secondary Muster Point with Wind Sock



Caution/ Danger Sign

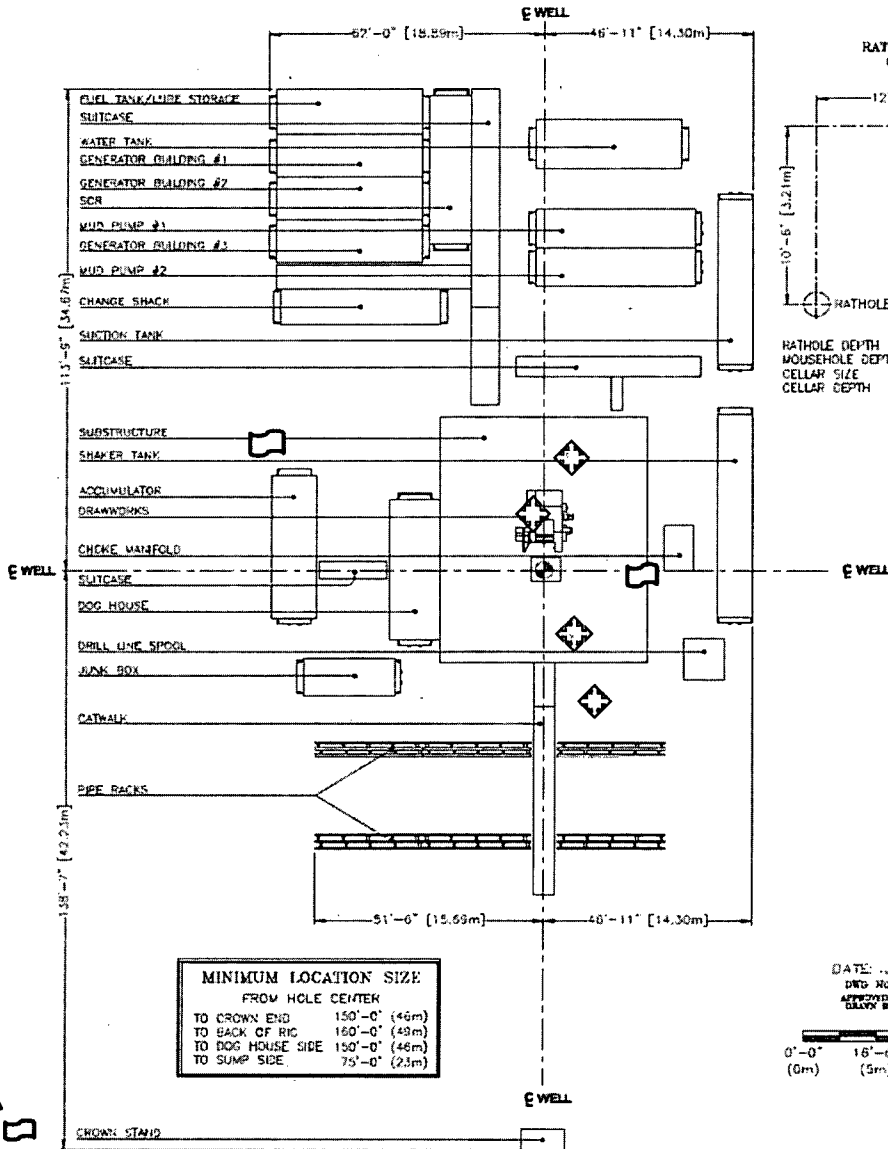


Wind direction

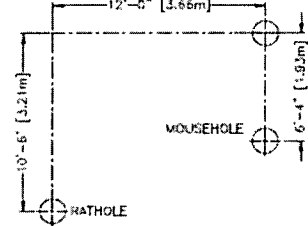
Alarm



Windsock



RATHOLE, MOUSEHOLE CONFIGURATION (SCALE: 4x)



RATHOLE DEPTH 24' (7.3m)  
MOUSEHOLE DEPTH 10' (3.0m)  
CELLAR SIZE 8'x8' (2.4m x 2.4m)  
CELLAR DEPTH (m)

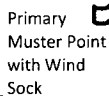


Flare Pit

MINIMUM LOCATION SIZE FROM HOLE CENTER	
TO CROWN END	150'-0" (46m)
TO BACK OF RIC	160'-0" (49m)
TO DOG HOUSE SIDE	150'-0" (46m)
TO SUMP SIDE	75'-0" (23m)

DATE: JUN 16, 2009  
DWG No.: 631-076-12  
APPROVED BY: [Signature]  
CHECKED BY: [Signature]

0'-0" (0m) 16'-6" (5m) 33'-0" (10m) 49'-6" (15m)



Primary Muster Point with Wind Sock

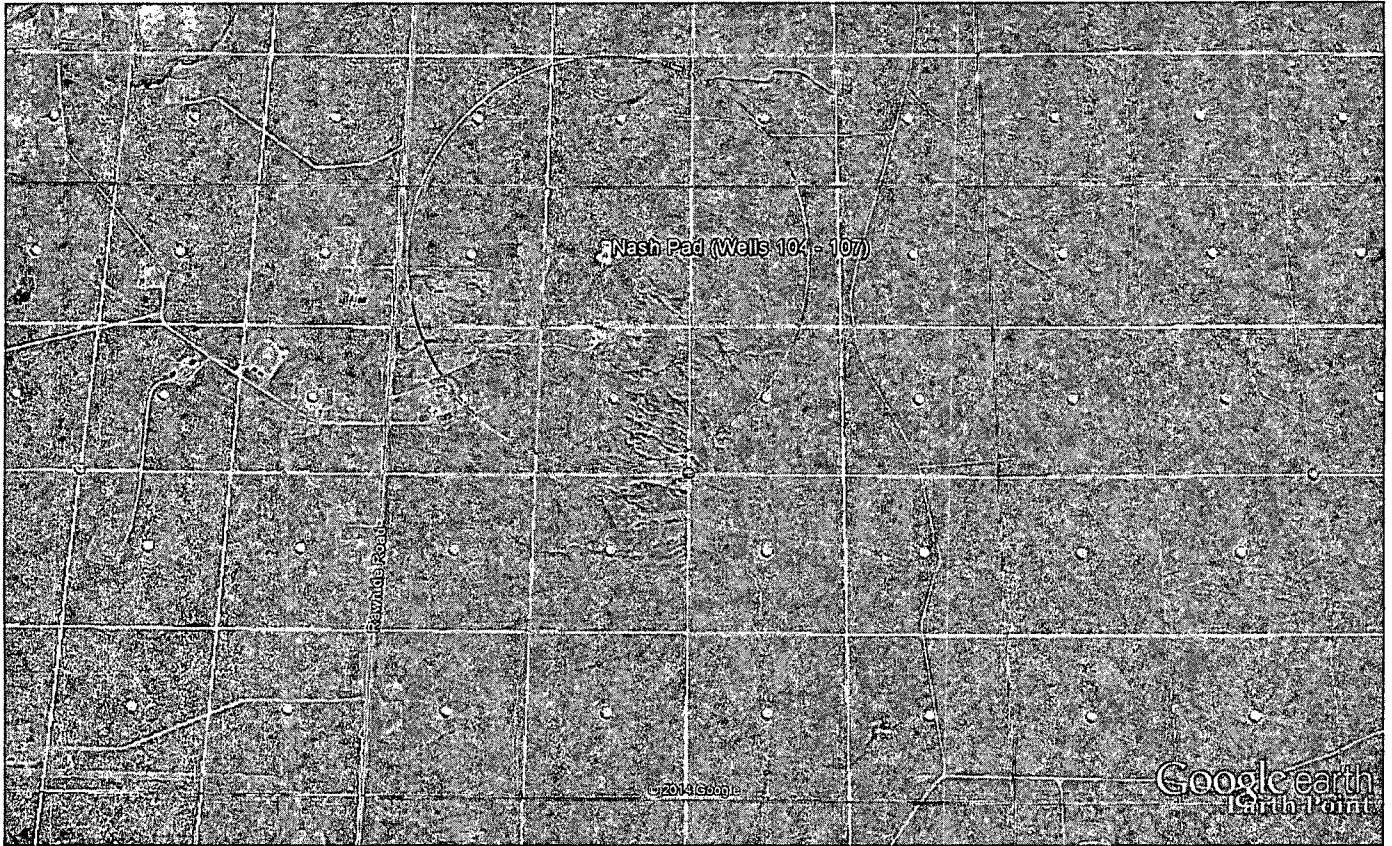


Caution/ Danger Sign

375'

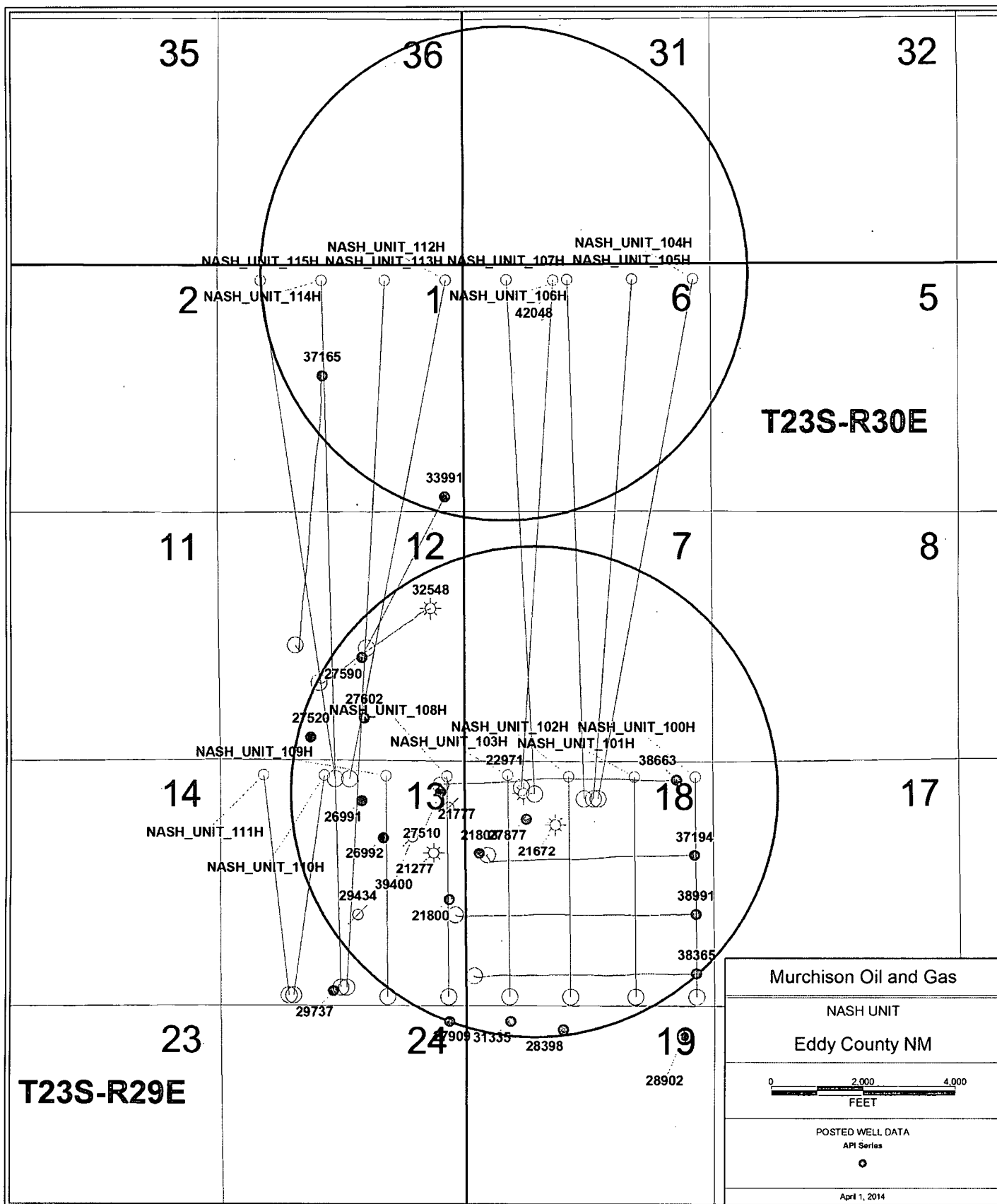
Primary Road Access

Nash Pad (Wells 104 - 107) - 3000' ROE



Google earth





**Murchison Oil and Gas  
Drilling Prognosis  
Nash Unit Fed Com #106H**

Revision date: July 23, 2014

Surface Location: 476896.049usft N, 667664.578usft E  
700' FNL, 1615' FWL

Section 18, T-23-S, R-30-E  
Eddy County, New Mexico

Bottom Hole: 476896.05usft N, 667664.58usft E  
330' FNL, 2260' FWL

Section 6, T-23-S, R-30-E  
Eddy County, New Mexico

Planned Total Depth: 9206' TVD /20,228' MD

RKB: 3038' GL: 3016'

Preparer: Steve Morris

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**Article I. Well Overview:**

The Nash Unit Fed Com #106H will be a horizontal well in the Second Bone Spring Sand.

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

Formation	TVD	Subsea	Thickness	Type
Salado	176'	-2861'		
Salt Base	3038'	1'		
Delaware	3246'	209'	3755'	Hydrocarbon
Bone Spring	7001'	3964'		
1 <sup>st</sup> Bone Spring	8027'	4990'	875'	Hydrocarbon
2 <sup>nd</sup> Bone Spring	8902'	5865'	640'	Hydrocarbon

No shallow water zones as per the attached POD and water column report.

**Article III. Pressure Control:**

A 13-5/8" 5M BOP and 5M choke manifold will be used. See schematics below.

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

*See COA*

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.

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 59 Sec. 17

Minimum Working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 9-5/8 inch intermediate casing show shall be 5000 (5M) psi. 5M system requires an HCR valve, remote kill line ad annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

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

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 pug. BOP/BOPE testing can begin after cut-off or once cement reaches 500PSI 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).

The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the

casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater prior to initiating the test (see casing segment as lead cement may be critical item).

- a. The results of the test shall be reported to the appropriate BLM office.
- b. 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.
- c. 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.

A Co-Flex hose may be used from the BOP to the Choke Manifold. If this is used the manufacture specifications and certifications will be furnished prior to use as well will be on location. A variance is requested for the use of the co-flex hose. Below is an example of the documentation.

See  
COA



Fluid Technology  
Quality Document

<b>QUALITY CONTROL</b>				CERT. N°: 205	
<b>INSPECTION AND TEST CERTIFICATE</b>					
PURCHASER: ContiTech Beattie Co.			P.O. N°: 004790		
CONTITECH ORDER N°: 493177		HOSE TYPE: 3" ID		Choke and Kill Hose	
HOSE SERIAL N°: 60296		NOMINAL / ACTUAL LENGTH: 10,67 m / 10,67 m			
W.P. 68,9 MPa 10000 psi		T.P. 103,4 MPa 15000 psi		Duration: 60 min.	
Pressure test with water at ambient temperature					
See attachment. ( 1 page )					
↑ 10 mm = 10 Min. → 10 mm = 20 MPa					
COUPLINGS Type:		Serial N°		Quality	
3" coupling with		226 229		AISI 4130	
4 1/16" Swivel Flange end				AISI 4130	
Hub				AISI 4130	
				H0434	
				31742	
				G9486	
ASSET NO.: 66-0628				API Spec 16 C	
				Temperature rate:"B"	
All metal parts are flawless					
WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.					
STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements.					
COUNTRY OF ORIGIN HUNGARY/EU					
Date:		Inspector		Quality Control	
21. February 2011.				ContiTech Rubber Industrial Kft. Quality Control Dept. (1)	

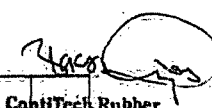
See  
COA



ATTACHMENT OF QUALITY CONTROL INSPECTION AND TEST CERTIFICATE

NO. 203, 205, 200

Page: 1/1

  
 Contitech Rubber  
 Industrial Kft.  
 Quality Control Dept.  
 (1)

GN	+19.26	°C	014:30	60	70	80
RD	+19.26	°C	14:30			
BL	+1952	bar	14:30			
GN	+19.75	°C	14:30			
RD	+19.75	°C	14:30			
BL	+1954	bar	14:30			
GN	+19.13	°C	14:10			
RD	+19.13	°C	14:10			
BL	+1956	bar	14:10			
GN	+19.73	°C	14:00			
RD	+19.73	°C	14:00			
BL	+1957	bar	14:00			
GN	+19.88	°C	13:50			
RD	+19.88	°C	13:50			
BL	+1959	bar	13:50			
GN	+19.87	°C	13:40			
RD	+19.87	°C	13:40			
BL	+1962	bar	13:40			
GN	+19.25	°C	13:30			
RD	+19.25	°C	13:30			
BL	+1964	bar	13:30			
9						
8						
	60293, 60295, 60296		3:00			
	60293, 60295, 60296		2:50			
7						

Downstream of the Choke Manifold assembly 1502(15,000psi working pressure) hammer unions may be used to connect the mud/gas separator. See choke manifold diagram for hammer union possible placement. A variance is requested for the use of these hammer unions.

The well head will be a conventional type well head and **NOT** a multi-bowl well head.

## Article IV.

Casing Program (minimum):

\*All casing is new API casing.\*

Hole Size	Casing	Weight lb/ft	Grade	Conn	MD/RKB	Stage
	20"				0-200	Conductor
16"	13.375"	88 <del>88</del> 48	J-55	STC	0-3048	Surface
12.25"	9.625"	47	HCL-80 (special drill)	LTC	0-7900	Intermediate
8.5"	5.5"	17	P-110	BTC	0-20228	Production
					20246	

See COA

Size	Collapse psi	SF	Burst psi	SF	Tension Klbs	SF	Max Setting Depth TVD
13.375	1950	1.45	3450	2.3	675	3.25	4431'
9.625	7100	1.37	6870	1.86	1027	2.76	16,100'
5.5	7480	1.25	10640	1.31	568	3.64	17,000'

13.375" casing will be set 10' below the Salt

9.625" casing will be set in the Bone Spring Lime

~~3048~~ - Anhydrite - 3150  
See COA

## Article V.

Cement Program:

## Section 5.01 Conductor

Conductor will have cement circulated to surface with the use of a cement head. Cement will set a minimum of 24 hours before the rig will be moved on to location.

## Section 5.02 13.375" Surface Casing

Lead: 0 - 2548'

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
13.5ppg	1.93cuft/sk	1134	9.71	100%	ClassC+4%bwoc Bentonite II+ 2%bwoc Calcium Chloride +0.25lbs/sack Cello Flake + 0.005%bwoc Static Free +0.005gps FP-6L

Tail: 2548 - 3048'

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
14.8ppg	1.34cuft/sk	187	6.35	100%	Class C + 1.5% bwoc Calcium Chloride + 0.005 lbs/sack Static Free + 0.005 gps FP-6L

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 proportionately once actual casing depth is determined and washout from a fluid caliper.

### Section 5.03 9.625" Intermediate Casing

**Lead: 0 – 7400'**

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
12.6ppg	2.13cuft/sk	1472	8.81	50%	Class C (35:65) + Poz (Fly Ash) + 4% bwoc Bentonite II + 5% bwoc MPA-5 + 0.25% bwoc FL-52 + 5 lbs/sack LCM-1 + 0.125 lbs/sack Cello Flake + 0.005 lbs/sack Static Free + 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride

**Tail: 7400 – 7900'**

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
14.8ppg	1.35cuft/sk	187	6.35	50%	Class C

Circulate cement to surface. If cement does not circulate to surface a top squeeze job or casing perforation will be used. As well, a temperature survey or CBL will be performed.

Cement volumes will be adjusted accordingly once actual casing depth is determined and washout from a fluid caliper.

### Section 5.04 5.5" Production Casing

**Lead: 0-10900'**

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
11.9ppg	2.38cuft/sk	2200	13.22	75%	Class H (50:50) + Poz (Fly Ash) + 10% bwoc Bentonite II + 5% bwow Sodium Chloride + 5 lbs/sack LCM-1 + 0.005 lbs/sack Static Free + 0.005 gps FP-6L

**Tail: 10900'-TD**

Slurry WT	Yield	Sx	Gallons/ Sack	Excess	Additives
13.2ppg	1.62cuft/sk	2200	9.45	20%	Class H (15:61:11) Poz (Fly Ash): Class H Cement: CSE-2 + 4% bwow Sodium Chloride + 3 lbs/sack LCM-1 + 0.6% bwoc FL-25 + 0.005 gps FP-6L + 0.005% bwoc Static Free

SEL COA

Circulate cement to surface. If cement does not circulate to surface a top squeeze job or casing perforation will be used. As well, a temperature survey or CBL will be performed.

Cement volumes will be adjusted accordingly once actual casing depth is determined and washout from a fluid caliper.

*Article VI.                      Product Descriptions:*

**Bentonite II**  
P105

**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 enhanced compressive, tensile, flexural strength development and reduced 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- 3048	16"	Brine	9.8-10	2-4	2-4	NC	9.5-9.7	<3.0
3048-7900	12.25"	Cut Brine	8.6-8.9	1-2	1-2	NC	9.5-9.7	<1.0
7900-KOP	8.5"	Cut Brine	8.4-8.6	1-2	1-2	NC	9.5-9.7	<1.0
KOP-TD	8.5"	Cut Brine	8.9-9.1	4-6	4-6	18-20	9.5-9.7	<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 surface casing has been set.

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

*Article X. Bottom Hole:*

Temperature is expected to be 149°F, using a 0.76°/100' gradient. The bottom hole pressure is expected to be 4048psi maximum using a pressure gradient of 0.44psi/ft. With a partially evacuated hole and a gradient of 0.22psi the maximum surface pressure would be 2024psi.

*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. 20ppb of LCM will be maintained in the active system at all times while drilling these sections. As well, a 50bbl pill of 50ppb LCM will be premixed in the slug pit in case lost circulation is encountered.

*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.

Project: Nash Unit  
 Site: Nash Unit Fed Com 106H  
 Well: Nash Unit Fed Com #106H  
 Wellbore: Nash Unit Fed Com #106H  
 Design: Nash Fed Com 106H



Azimuths to Grid North  
 True North: -0.22°  
 Magnetic North: 7.18°

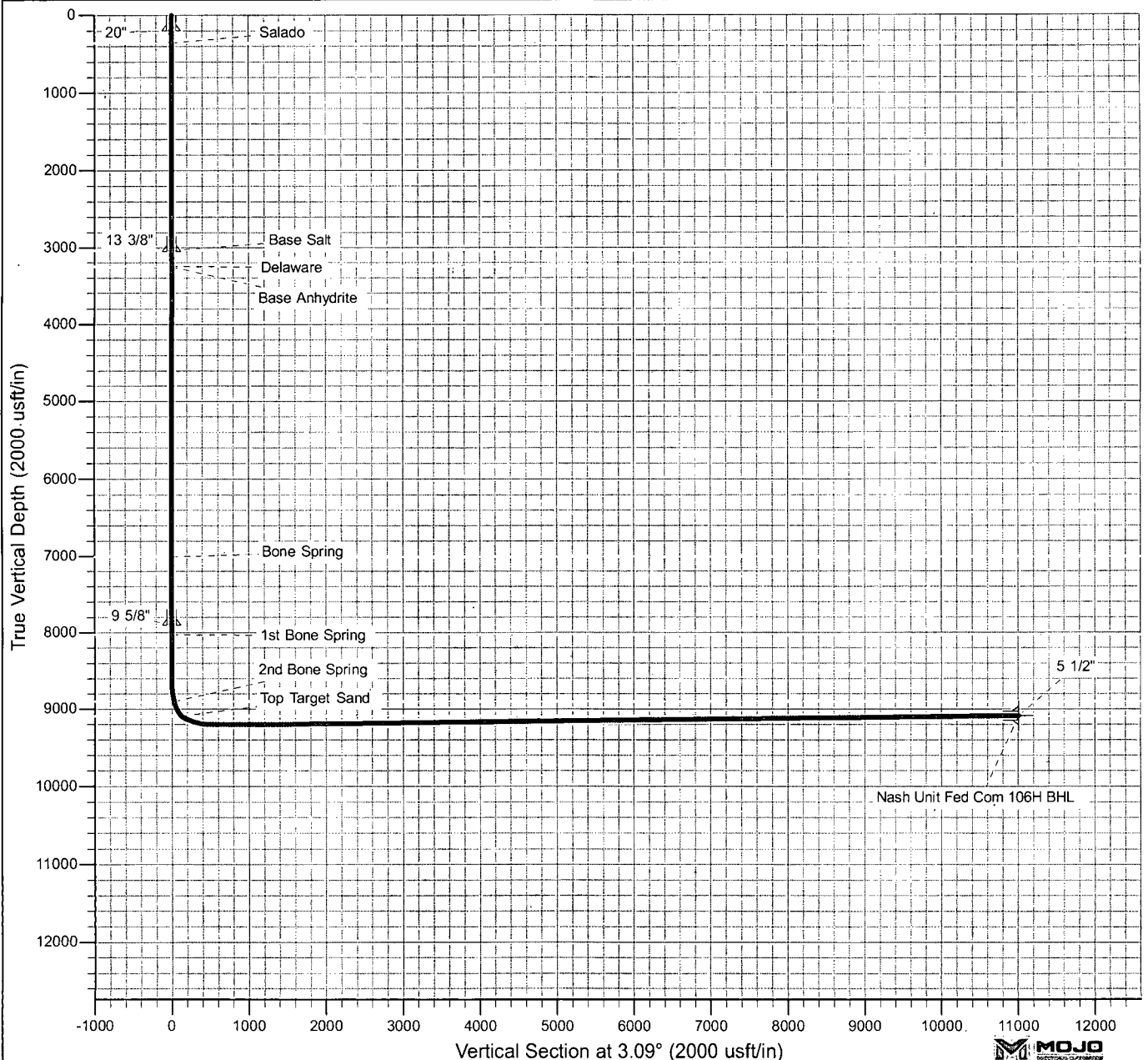
Magnetic Field  
 Strength: 48343.4 nT  
 Dip Angle: 60.14°  
 Date: 08/05/2014  
 Model: IGRF2010

### CASING DETAILS


TVD	MD	Name	Size
200.0	200.0	20"	20
3050.0	3050.0	13 3/8"	13-3/8
7900.0	7900.0	9 5/8"	9-5/8
9086.0	20246.0	5 1/2"	5-1/2

### FORMATION TOP DETAILS

TVDPPath	MDPath	Formation
357.5	357.5	Salado
3039.5	3039.5	Base Salt
3247.5	3247.5	Delaware
3253.5	3253.5	Base Anhydrite
7002.5	7002.5	Bone Spring
8028.5	8028.5	1st Bone Spring
8903.5	8919.5	2nd Bone Spring
9093.5	9241.5	Top Target Sand



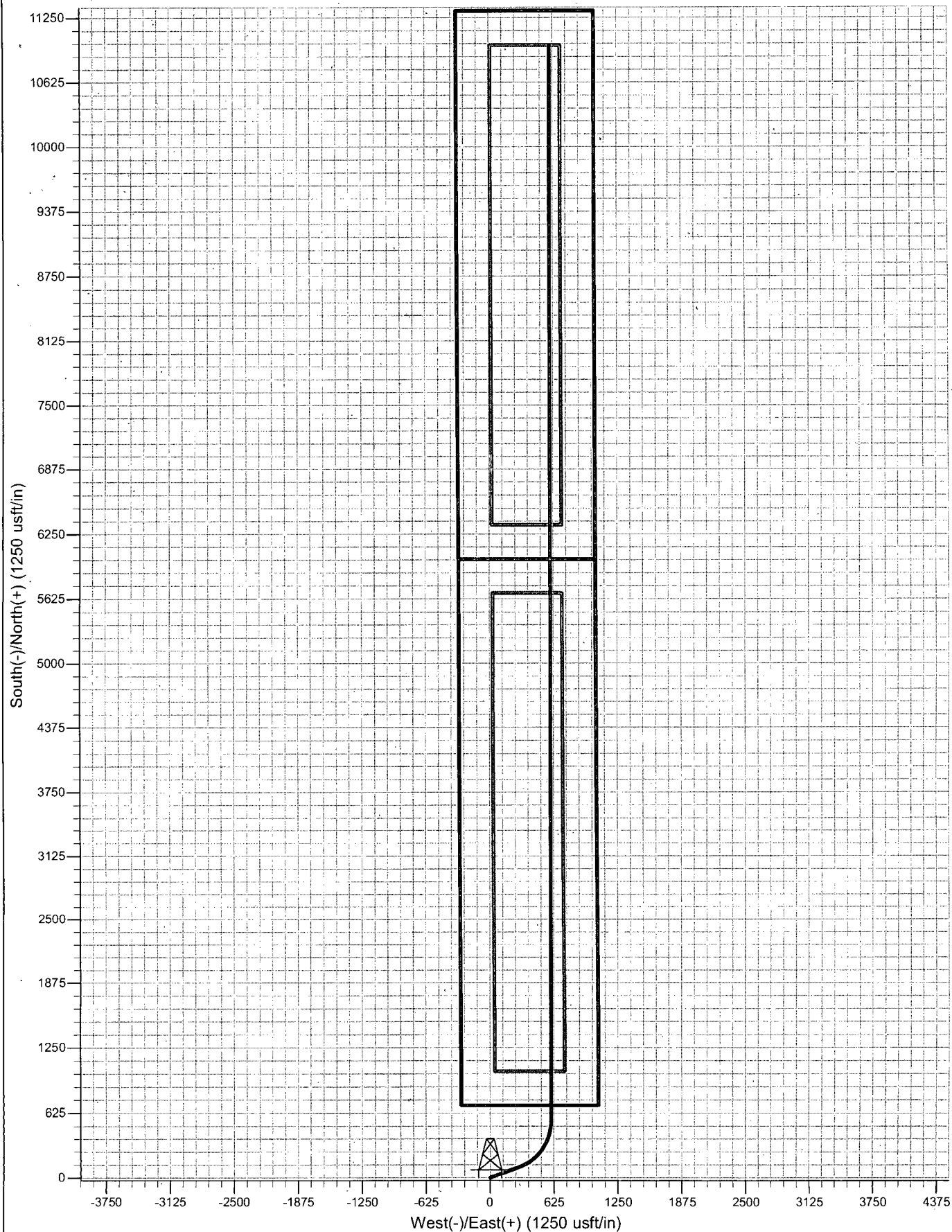
Project: Nash Unit  
Site: Nash Unit Fed Com 106H  
Well: Nash Unit Fed Com #106H  
Wellbore: Nash Unit Fed Com #106H  
Design: Nash Fed Com 106H

 MURCHISON OIL & GAS, INC.



Azimuths to Grid North  
True North:  $-0.22^\circ$   
Magnetic North:  $7.18^\circ$

Magnetic Field  
Strength: 48343.4snT  
Dip Angle:  $60.14^\circ$   
Date: 08/05/2014  
Model: IGRF2010





## **Murchison Oil and Gas**

Nash Unit

Nash Unit Fed Com 106H

Plan: Nash Fed Com 106H

## **MOJO Standard Plan**

26 June, 2014



Company: Murchison Oil and Gas			Local Co-ordinate Reference:					Site Nash Unit Fed Com 106H		
Project: Nash Unit			TVD Reference:					WELL @ 3038.5usft (Original Well Elev)		
Site: Nash Unit Fed Com 106H			MD Reference:					WELL @ 3038.5usft (Original Well Elev)		
Well: Nash Unit Fed Com #106H			North Reference:					Grid		
Wellbore: Nash Unit Fed Com #106H			Survey Calculation Method:					Minimum Curvature		
Design: 140508 Nash Fed Com 106H			Database:					EDM 5000.1 Single User.Db		

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
0.0	0.00	0.00	0.0	-3,038.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
100.0	0.00	0.00	100.0	-2,938.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
200.0	0.00	0.00	200.0	-2,838.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
20"											
300.0	0.00	0.00	300.0	-2,738.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
357.5	0.00	0.00	357.5	-2,681.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
Salado											
400.0	0.00	0.00	400.0	-2,638.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
500.0	0.00	0.00	500.0	-2,538.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
600.0	0.00	0.00	600.0	-2,438.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
700.0	0.00	0.00	700.0	-2,338.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
800.0	0.00	0.00	800.0	-2,238.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
900.0	0.00	0.00	900.0	-2,138.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,000.0	0.00	0.00	1,000.0	-2,038.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,100.0	0.00	0.00	1,100.0	-1,938.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,200.0	0.00	0.00	1,200.0	-1,838.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,300.0	0.00	0.00	1,300.0	-1,738.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,400.0	0.00	0.00	1,400.0	-1,638.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,500.0	0.00	0.00	1,500.0	-1,538.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,600.0	0.00	0.00	1,600.0	-1,438.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,700.0	0.00	0.00	1,700.0	-1,338.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,800.0	0.00	0.00	1,800.0	-1,238.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
1,900.0	0.00	0.00	1,900.0	-1,138.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
2,000.0	0.00	0.00	2,000.0	-1,038.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
2,100.0	0.00	0.00	2,100.0	-938.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
2,200.0	0.00	0.00	2,200.0	-838.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
2,300.0	0.00	0.00	2,300.0	-738.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000.1 Single User.Db

Project:	Nash Unit
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Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site:	Nash Unit Fed Com 106H
-------	------------------------

Site Position:	From:	Lat/Long	Northing:	476,896.05 usft	Latitude:	32° 18' 37.432 N
			Easting:	667,664.58 usft	Longitude:	103° 55' 27.944 W
Position Uncertainty:	0.0 usft		Slot Radius:	13-3/16 "	Grid Convergence:	0.22 °

Well:	Nash Unit Fed Com #106H
-------	-------------------------

Well Position	+N/-S	0.0 usft	Northing:	476,896.05 usft	Latitude:	32° 18' 37.432 N
	+E/-W	0.0 usft	Easting:	667,664.58 usft	Longitude:	103° 55' 27.944 W
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft	Ground Level:	3,016.5 usft

Wellbore:	Nash Unit Fed Com #106H
-----------	-------------------------

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	08/05/2014	7.40	60.14	48,343

Design:	140508 Nash Fed Com 106H
---------	--------------------------

Audit Notes:	
Version:	Phase: PLAN Tie On Depth: 0.0

Vertical Section	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	3.09

Survey Tool Program	Date: 26/06/2014
---------------------	------------------

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.0	20,246.6	140508 Nash Fed Com 106H (Nash Unit F	MWD	MWD - Standard

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM:5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)		TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,400.0	0.00	0.00	0.00	2,400.0	-638.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
2,500.0	0.00	0.00	0.00	2,500.0	-538.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
2,600.0	0.00	0.00	0.00	2,600.0	-438.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
2,700.0	0.00	0.00	0.00	2,700.0	-338.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
2,800.0	0.00	0.00	0.00	2,800.0	-238.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
2,900.0	0.00	0.00	0.00	2,900.0	-138.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,000.0	0.00	0.00	0.00	3,000.0	-38.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,039.5	0.00	0.00	0.00	3,039.5	1.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58
Base Salt											
3,050.0	0.00	0.00	0.00	3,050.0	11.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
13 3/8"											
3,100.0	0.00	0.00	0.00	3,100.0	61.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,200.0	0.00	0.00	0.00	3,200.0	161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,247.5	0.00	0.00	0.00	3,247.5	209.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58
Delaware											
3,253.5	0.00	0.00	0.00	3,253.5	215.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58
Base Anhydrite											
3,300.0	0.00	0.00	0.00	3,300.0	261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,400.0	0.00	0.00	0.00	3,400.0	361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,500.0	0.00	0.00	0.00	3,500.0	461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,600.0	0.00	0.00	0.00	3,600.0	561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,700.0	0.00	0.00	0.00	3,700.0	661.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,800.0	0.00	0.00	0.00	3,800.0	761.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
3,900.0	0.00	0.00	0.00	3,900.0	861.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
4,000.0	0.00	0.00	0.00	4,000.0	961.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
4,100.0	0.00	0.00	0.00	4,100.0	1,061.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
4,200.0	0.00	0.00	0.00	4,200.0	1,161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58
4,300.0	0.00	0.00	0.00	4,300.0	1,261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58

<b>Company:</b>	Murchison Oil and Gas	<b>Local Co-ordinate Reference:</b>	Site Nash Unit Fed Com 106H
<b>Project:</b>	Nash Unit	<b>TVD Reference:</b>	WELL @ 3038.5usft (Original Well Elev)
<b>Site:</b>	Nash Unit Fed Com 106H	<b>MD Reference:</b>	WELL @ 3038.5usft (Original Well Elev)
<b>Well:</b>	Nash Unit Fed Com #106H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Nash Unit Fed Com #106H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	140508 Nash Fed Com 106H	<b>Database:</b>	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
4,400.0	0.00	0.00	4,400.0	1,361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
4,500.0	0.00	0.00	4,500.0	1,461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
4,600.0	0.00	0.00	4,600.0	1,561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
4,700.0	0.00	0.00	4,700.0	1,661.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
4,800.0	0.00	0.00	4,800.0	1,761.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
4,900.0	0.00	0.00	4,900.0	1,861.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,000.0	0.00	0.00	5,000.0	1,961.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,100.0	0.00	0.00	5,100.0	2,061.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,200.0	0.00	0.00	5,200.0	2,161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,300.0	0.00	0.00	5,300.0	2,261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,400.0	0.00	0.00	5,400.0	2,361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,500.0	0.00	0.00	5,500.0	2,461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,600.0	0.00	0.00	5,600.0	2,561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,700.0	0.00	0.00	5,700.0	2,661.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,800.0	0.00	0.00	5,800.0	2,761.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
5,900.0	0.00	0.00	5,900.0	2,861.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,000.0	0.00	0.00	6,000.0	2,961.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,100.0	0.00	0.00	6,100.0	3,061.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,200.0	0.00	0.00	6,200.0	3,161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,300.0	0.00	0.00	6,300.0	3,261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,400.0	0.00	0.00	6,400.0	3,361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,500.0	0.00	0.00	6,500.0	3,461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,600.0	0.00	0.00	6,600.0	3,561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,700.0	0.00	0.00	6,700.0	3,661.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,800.0	0.00	0.00	6,800.0	3,761.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
6,900.0	0.00	0.00	6,900.0	3,861.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,000.0	0.00	0.00	7,000.0	3,961.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (%/100usft)	Northing (usft)	Easting (usft)	
7,002.5	0.00	0.00	7,002.5	3,964.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
<b>Bone Spring</b>											
7,100.0	0.00	0.00	7,100.0	4,061.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,200.0	0.00	0.00	7,200.0	4,161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,300.0	0.00	0.00	7,300.0	4,261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,400.0	0.00	0.00	7,400.0	4,361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,500.0	0.00	0.00	7,500.0	4,461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,600.0	0.00	0.00	7,600.0	4,561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,700.0	0.00	0.00	7,700.0	4,661.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,800.0	0.00	0.00	7,800.0	4,761.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
7,900.0	0.00	0.00	7,900.0	4,861.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
<b>9 5/8"</b>											
8,000.0	0.00	0.00	8,000.0	4,961.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,028.5	0.00	0.00	8,028.5	4,990.0	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
<b>1st Bone Spring</b>											
8,100.0	0.00	0.00	8,100.0	5,061.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,200.0	0.00	0.00	8,200.0	5,161.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,300.0	0.00	0.00	8,300.0	5,261.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,400.0	0.00	0.00	8,400.0	5,361.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,500.0	0.00	0.00	8,500.0	5,461.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,600.0	0.00	0.00	8,600.0	5,561.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,638.0	0.00	0.00	8,638.0	5,599.5	0.0	0.0	0.0	0.00	476,896.05	667,664.58	
8,650.0	1.44	70.00	8,650.0	5,611.5	0.1	0.1	0.1	12.00	476,896.10	667,664.72	
8,675.0	4.44	70.00	8,675.0	5,636.5	0.5	1.3	0.6	12.00	476,896.54	667,665.92	
8,700.0	7.44	70.00	8,699.8	5,661.3	1.4	3.8	1.6	12.00	476,897.42	667,668.36	
8,725.0	10.44	70.00	8,724.5	5,686.0	2.7	7.4	3.1	12.00	476,898.75	667,672.01	
8,750.0	13.44	70.00	8,749.0	5,710.5	4.5	12.3	5.1	12.00	476,900.52	667,676.87	

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
8,775.0	16.44	70.00	8,773.1	5,734.6	6.7	18.3	7.7	12.00	476,902.73	667,682.92	
8,800.0	19.44	70.00	8,796.9	5,758.4	9.3	25.6	10.7	12.00	476,905.36	667,690.16	
8,825.0	22.44	70.00	8,820.3	5,781.8	12.4	34.0	14.2	12.00	476,908.41	667,698.55	
8,850.0	25.44	70.00	8,843.1	5,804.6	15.8	43.5	18.2	12.00	476,911.88	667,708.08	
8,875.0	28.44	70.00	8,865.4	5,826.9	19.7	54.1	22.6	12.00	476,915.76	667,718.73	
8,900.0	31.44	70.00	8,887.0	5,848.5	24.0	65.9	27.5	12.00	476,920.02	667,730.45	
8,919.5	33.78	70.00	8,903.5	5,865.0	27.6	75.8	31.6	12.00	476,923.62	667,740.34	
<b>2nd Bone Spring</b>											
8,925.0	34.44	70.00	8,908.0	5,869.5	28.6	78.6	32.8	12.00	476,924.67	667,743.22	
8,950.0	37.44	70.00	8,928.3	5,889.8	33.6	92.4	38.6	12.00	476,929.69	667,757.01	
8,975.0	40.44	70.00	8,947.7	5,909.2	39.0	107.2	44.7	12.00	476,935.06	667,771.77	
9,000.0	43.44	70.00	8,966.3	5,927.8	44.7	122.9	51.3	12.00	476,940.78	667,787.47	
9,025.0	46.44	70.00	8,984.0	5,945.5	50.8	139.5	58.2	12.00	476,946.82	667,804.06	
9,050.0	49.44	70.00	9,000.7	5,962.2	57.1	156.9	65.5	12.00	476,953.17	667,821.50	
9,075.0	52.44	70.00	9,016.5	5,978.0	63.8	175.2	73.1	12.00	476,959.80	667,839.74	
9,100.0	55.44	70.00	9,031.2	5,992.7	70.7	194.2	81.0	12.00	476,966.72	667,858.73	
9,125.0	58.44	70.00	9,044.8	6,006.3	77.8	213.8	89.2	12.00	476,973.88	667,878.42	
9,150.0	61.44	70.00	9,057.4	6,018.9	85.2	234.2	97.7	12.00	476,981.28	667,898.75	
9,175.0	64.44	70.00	9,068.7	6,030.2	92.8	255.1	106.4	12.00	476,988.89	667,919.67	
9,200.0	67.44	70.00	9,078.9	6,040.4	100.7	276.5	115.4	12.00	476,996.70	667,941.12	
9,221.3	70.00	70.00	9,086.7	6,048.2	107.4	295.2	123.2	12.00	477,003.50	667,959.79	
9,225.0	70.05	69.54	9,087.9	6,049.4	108.6	298.4	124.5	12.00	477,004.69	667,963.03	
9,241.5	70.32	67.46	9,093.5	6,055.0	114.3	312.8	131.0	12.00	477,010.36	667,977.43	
<b>Top Target Sand</b>											
9,250.0	70.46	66.38	9,096.4	6,057.9	117.5	320.3	134.5	12.00	477,013.52	667,984.83	
9,275.0	70.92	63.24	9,104.6	6,066.1	127.5	341.6	145.7	12.00	477,023.56	668,006.18	
9,300.0	71.44	60.11	9,112.7	6,074.2	138.7	362.4	158.0	12.00	477,034.79	668,027.01	

<b>Company:</b>	Murchison Oil and Gas	<b>Local Co-ordinate Reference:</b>	Site Nash Unit Fed Com 106H
<b>Project:</b>	Nash Unit	<b>TVD Reference:</b>	WELL @ 3038.5usft (Original Well Elev)
<b>Site:</b>	Nash Unit Fed Com 106H	<b>MD Reference:</b>	WELL @ 3038.5usft (Original Well Elev)
<b>Well:</b>	Nash Unit Fed Com #106H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Nash Unit Fed Com #106H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	140508 Nash Fed Com 106H	<b>Database:</b>	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
9,325.0	72.00	57.01	9,120.5	6,082.0	151.1	382.7	171.5	12.00	477,047.17	668,047.26	
9,350.0	72.62	53.93	9,128.1	6,089.6	164.6	402.3	186.0	12.00	477,060.67	668,066.87	
9,375.0	73.28	50.87	9,135.5	6,097.0	179.2	421.2	201.6	12.00	477,075.25	668,085.81	
9,400.0	73.98	47.83	9,142.5	6,104.0	194.8	439.4	218.2	12.00	477,090.88	668,104.00	
9,425.0	74.73	44.81	9,149.3	6,110.8	211.5	456.8	235.7	12.00	477,107.50	668,121.41	
9,450.0	75.52	41.82	9,155.7	6,117.2	229.0	473.4	254.2	12.00	477,125.08	668,137.98	
9,475.0	76.35	38.84	9,161.8	6,123.3	247.5	489.1	273.5	12.00	477,143.57	668,153.67	
9,500.0	77.21	35.89	9,167.5	6,129.0	266.9	503.9	293.6	12.00	477,162.91	668,168.44	
9,525.0	78.10	32.96	9,172.8	6,134.3	287.0	517.7	314.4	12.00	477,183.05	668,182.25	
9,550.0	79.02	30.05	9,177.8	6,139.3	307.9	530.5	336.0	12.00	477,203.94	668,195.05	
9,575.0	79.98	27.15	9,182.3	6,143.8	329.5	542.2	358.2	12.00	477,225.52	668,206.81	
9,600.0	80.95	24.28	9,186.5	6,148.0	351.7	552.9	380.9	12.00	477,247.73	668,217.51	
9,625.0	81.95	21.42	9,190.2	6,151.7	374.5	562.5	404.2	12.00	477,270.51	668,227.10	
9,650.0	82.97	18.57	9,193.5	6,155.0	397.7	571.0	427.9	12.00	477,293.80	668,235.58	
9,675.0	84.00	15.74	9,196.3	6,157.8	421.5	578.3	452.0	12.00	477,317.53	668,242.90	
9,700.0	85.05	12.91	9,198.7	6,160.2	445.6	584.5	476.4	12.00	477,341.64	668,249.06	
9,725.0	86.11	10.10	9,200.6	6,162.1	470.0	589.4	501.1	12.00	477,366.06	668,254.03	
9,750.0	87.19	7.29	9,202.1	6,163.6	494.7	593.2	525.9	12.00	477,390.73	668,257.80	
9,775.0	88.26	4.49	9,203.1	6,164.6	519.5	595.8	550.8	12.00	477,415.57	668,260.36	
9,800.0	89.35	1.69	9,203.6	6,165.1	544.5	597.1	575.8	12.00	477,440.53	668,261.71	
9,815.1	90.00	0.00	9,203.7	6,165.2	559.6	597.4	590.9	12.00	477,455.63	668,261.93	
9,900.0	90.09	360.00	9,203.6	6,165.1	644.5	597.4	675.7	0.11	477,540.53	668,261.93	
10,000.0	90.21	359.99	9,203.4	6,164.9	744.5	597.3	775.5	0.11	477,640.53	668,261.92	
10,100.0	90.32	359.99	9,202.9	6,164.4	844.5	597.3	875.4	0.11	477,740.52	668,261.90	
10,200.0	90.43	359.98	9,202.3	6,163.8	944.5	597.3	975.3	0.11	477,840.52	668,261.87	
10,300.0	90.54	359.98	9,201.4	6,162.9	1,044.5	597.3	1,075.1	0.11	477,940.52	668,261.84	
10,400.0	90.65	359.97	9,200.4	6,161.9	1,144.5	597.2	1,174.9	0.11	478,040.51	668,261.79	



<b>Company:</b>	Murchison Oil and Gas	<b>Local Co-ordinate Reference:</b>	Site Nash Unit Fed Com #106H
<b>Project:</b>	Nash Unit	<b>TVD Reference:</b>	WELL @ 3038.5usft. (Original Well Elev)
<b>Site:</b>	Nash Unit Fed Com #106H	<b>MD Reference:</b>	WELL @ 3038.5usft. (Original Well Elev)
<b>Well:</b>	Nash Unit Fed Com #106H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Nash Unit Fed Com #106H	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	140508 Nash Fed Com 106H	<b>Database:</b>	EDM 5000.1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
10,413.7	90.67	359.97	9,200.2	6,161.7	1,158.2	597.2	1,188.7	0.11	478,054.24	668,261.79	
10,500.0	90.67	359.97	9,199.2	6,160.7	1,244.5	597.2	1,274.8	0.00	478,140.51	668,261.74	
10,600.0	90.67	359.97	9,198.1	6,159.6	1,344.5	597.1	1,374.6	0.00	478,240.50	668,261.69	
10,700.0	90.67	359.97	9,196.9	6,158.4	1,444.4	597.1	1,474.5	0.00	478,340.49	668,261.65	
10,800.0	90.67	359.97	9,195.7	6,157.2	1,544.4	597.0	1,574.3	0.00	478,440.49	668,261.60	
10,900.0	90.67	359.97	9,194.6	6,156.1	1,644.4	597.0	1,674.2	0.00	478,540.48	668,261.55	
11,000.0	90.67	359.97	9,193.4	6,154.9	1,744.4	596.9	1,774.0	0.00	478,640.47	668,261.50	
11,100.0	90.67	359.97	9,192.2	6,153.7	1,844.4	596.9	1,873.9	0.00	478,740.47	668,261.45	
11,200.0	90.67	359.97	9,191.1	6,152.6	1,944.4	596.8	1,973.7	0.00	478,840.46	668,261.40	
11,300.0	90.67	359.97	9,189.9	6,151.4	2,044.4	596.8	2,073.6	0.00	478,940.45	668,261.35	
11,400.0	90.67	359.97	9,188.8	6,150.3	2,144.4	596.7	2,173.4	0.00	479,040.45	668,261.30	
11,500.0	90.67	359.97	9,187.6	6,149.1	2,244.4	596.7	2,273.3	0.00	479,140.44	668,261.25	
11,600.0	90.67	359.97	9,186.4	6,147.9	2,344.4	596.6	2,373.1	0.00	479,240.43	668,261.20	
11,700.0	90.67	359.97	9,185.3	6,146.8	2,444.4	596.6	2,472.9	0.00	479,340.43	668,261.16	
11,800.0	90.67	359.97	9,184.1	6,145.6	2,544.4	596.5	2,572.8	0.00	479,440.42	668,261.11	
11,900.0	90.67	359.97	9,183.0	6,144.5	2,644.4	596.5	2,672.6	0.00	479,540.41	668,261.06	
12,000.0	90.67	359.97	9,181.8	6,143.3	2,744.4	596.4	2,772.5	0.00	479,640.41	668,261.01	
12,100.0	90.67	359.97	9,180.6	6,142.1	2,844.3	596.4	2,872.3	0.00	479,740.40	668,260.96	
12,200.0	90.67	359.97	9,179.5	6,141.0	2,944.3	596.3	2,972.2	0.00	479,840.39	668,260.91	
12,300.0	90.67	359.97	9,178.3	6,139.8	3,044.3	596.3	3,072.0	0.00	479,940.39	668,260.86	
12,400.0	90.67	359.97	9,177.1	6,138.6	3,144.3	596.2	3,171.9	0.00	480,040.38	668,260.81	
12,500.0	90.67	359.97	9,176.0	6,137.5	3,244.3	596.2	3,271.7	0.00	480,140.37	668,260.76	
12,600.0	90.67	359.97	9,174.8	6,136.3	3,344.3	596.1	3,371.6	0.00	480,240.36	668,260.71	
12,700.0	90.67	359.97	9,173.7	6,135.2	3,444.3	596.1	3,471.4	0.00	480,340.36	668,260.67	
12,800.0	90.67	359.97	9,172.5	6,134.0	3,544.3	596.0	3,571.2	0.00	480,440.35	668,260.62	
12,900.0	90.67	359.97	9,171.3	6,132.8	3,644.3	596.0	3,671.1	0.00	480,540.34	668,260.57	
13,000.0	90.67	359.97	9,170.2	6,131.7	3,744.3	595.9	3,770.9	0.00	480,640.34	668,260.52	

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey/Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000:1 Single User Db

Planned Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (°/100usft)	Northing (usft)	Easting (usft)	
13,100.0	90.67	359.97	9,169.0	6,130.5	3,844.3	595.9	3,870.8	0.00	480,740.33	668,260.47	
13,200.0	90.67	359.97	9,167.9	6,129.4	3,944.3	595.8	3,970.6	0.00	480,840.32	668,260.42	
13,300.0	90.67	359.97	9,166.7	6,128.2	4,044.3	595.8	4,070.5	0.00	480,940.32	668,260.37	
13,400.0	90.67	359.97	9,165.5	6,127.0	4,144.3	595.7	4,170.3	0.00	481,040.31	668,260.32	
13,500.0	90.67	359.97	9,164.4	6,125.9	4,244.3	595.7	4,270.2	0.00	481,140.30	668,260.27	
13,600.0	90.67	359.97	9,163.2	6,124.7	4,344.2	595.6	4,370.0	0.00	481,240.30	668,260.22	
13,700.0	90.67	359.97	9,162.0	6,123.5	4,444.2	595.6	4,469.9	0.00	481,340.29	668,260.18	
13,800.0	90.67	359.97	9,160.9	6,122.4	4,544.2	595.5	4,569.7	0.00	481,440.28	668,260.13	
13,900.0	90.67	359.97	9,159.7	6,121.2	4,644.2	595.5	4,669.5	0.00	481,540.28	668,260.08	
14,000.0	90.67	359.97	9,158.6	6,120.1	4,744.2	595.5	4,769.4	0.00	481,640.27	668,260.03	
14,100.0	90.67	359.97	9,157.4	6,118.9	4,844.2	595.4	4,869.2	0.00	481,740.26	668,259.98	
14,200.0	90.67	359.97	9,156.2	6,117.7	4,944.2	595.4	4,969.1	0.00	481,840.26	668,259.93	
14,300.0	90.67	359.97	9,155.1	6,116.6	5,044.2	595.3	5,068.9	0.00	481,940.25	668,259.88	
14,400.0	90.67	359.97	9,153.9	6,115.4	5,144.2	595.3	5,168.8	0.00	482,040.24	668,259.83	
14,500.0	90.67	359.97	9,152.8	6,114.3	5,244.2	595.2	5,268.6	0.00	482,140.24	668,259.78	
14,600.0	90.67	359.97	9,151.6	6,113.1	5,344.2	595.2	5,368.5	0.00	482,240.23	668,259.73	
14,700.0	90.67	359.97	9,150.4	6,111.9	5,444.2	595.1	5,468.3	0.00	482,340.22	668,259.69	
14,800.0	90.67	359.97	9,149.3	6,110.8	5,544.2	595.1	5,568.2	0.00	482,440.22	668,259.64	
14,900.0	90.67	359.97	9,148.1	6,109.6	5,644.2	595.0	5,668.0	0.00	482,540.21	668,259.59	
15,000.0	90.67	359.97	9,146.9	6,108.4	5,744.2	595.0	5,767.8	0.00	482,640.20	668,259.54	
15,100.0	90.67	359.97	9,145.8	6,107.3	5,844.1	594.9	5,867.7	0.00	482,740.20	668,259.49	
15,200.0	90.67	359.97	9,144.6	6,106.1	5,944.1	594.9	5,967.5	0.00	482,840.19	668,259.44	
15,300.0	90.67	359.97	9,143.5	6,105.0	6,044.1	594.8	6,067.4	0.00	482,940.18	668,259.39	
15,400.0	90.67	359.97	9,142.3	6,103.8	6,144.1	594.8	6,167.2	0.00	483,040.18	668,259.34	
15,500.0	90.67	359.97	9,141.1	6,102.6	6,244.1	594.7	6,267.1	0.00	483,140.17	668,259.29	
15,600.0	90.67	359.97	9,140.0	6,101.5	6,344.1	594.7	6,366.9	0.00	483,240.16	668,259.24	
15,700.0	90.67	359.97	9,138.8	6,100.3	6,444.1	594.6	6,466.8	0.00	483,340.16	668,259.20	

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000.1 Single User Db

Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
15,800.0	90.67	359.97	9,137.7	6,099.2	6,544.1	594.6	6,566.6	0.00	483,440.15	668,259.15
15,900.0	90.67	359.97	9,136.5	6,098.0	6,644.1	594.5	6,666.5	0.00	483,540.14	668,259.10
16,000.0	90.67	359.97	9,135.3	6,096.8	6,744.1	594.5	6,766.3	0.00	483,640.14	668,259.05
16,100.0	90.67	359.97	9,134.2	6,095.7	6,844.1	594.4	6,866.2	0.00	483,740.13	668,259.00
16,200.0	90.67	359.97	9,133.0	6,094.5	6,944.1	594.4	6,966.0	0.00	483,840.12	668,258.95
16,300.0	90.67	359.97	9,131.8	6,093.3	7,044.1	594.3	7,065.8	0.00	483,940.11	668,258.90
16,400.0	90.67	359.97	9,130.7	6,092.2	7,144.1	594.3	7,165.7	0.00	484,040.11	668,258.85
16,500.0	90.67	359.97	9,129.5	6,091.0	7,244.1	594.2	7,265.5	0.00	484,140.10	668,258.80
16,600.0	90.67	359.97	9,128.4	6,089.9	7,344.0	594.2	7,365.4	0.00	484,240.09	668,258.75
16,700.0	90.67	359.97	9,127.2	6,088.7	7,444.0	594.1	7,465.2	0.00	484,340.09	668,258.71
16,800.0	90.67	359.97	9,126.0	6,087.5	7,544.0	594.1	7,565.1	0.00	484,440.08	668,258.66
16,900.0	90.67	359.97	9,124.9	6,086.4	7,644.0	594.0	7,664.9	0.00	484,540.07	668,258.61
17,000.0	90.67	359.97	9,123.7	6,085.2	7,744.0	594.0	7,764.8	0.00	484,640.07	668,258.56
17,100.0	90.67	359.97	9,122.6	6,084.1	7,844.0	593.9	7,864.6	0.00	484,740.06	668,258.51
17,200.0	90.67	359.97	9,121.4	6,082.9	7,944.0	593.9	7,964.5	0.00	484,840.05	668,258.46
17,300.0	90.67	359.97	9,120.2	6,081.7	8,044.0	593.8	8,064.3	0.00	484,940.05	668,258.41
17,400.0	90.67	359.97	9,119.1	6,080.6	8,144.0	593.8	8,164.1	0.00	485,040.04	668,258.36
17,500.0	90.67	359.97	9,117.9	6,079.4	8,244.0	593.7	8,264.0	0.00	485,140.03	668,258.31
17,600.0	90.67	359.97	9,116.7	6,078.2	8,344.0	593.7	8,363.8	0.00	485,240.03	668,258.26
17,700.0	90.67	359.97	9,115.6	6,077.1	8,444.0	593.6	8,463.7	0.00	485,340.02	668,258.22
17,800.0	90.67	359.97	9,114.4	6,075.9	8,544.0	593.6	8,563.5	0.00	485,440.01	668,258.17
17,900.0	90.67	359.97	9,113.3	6,074.8	8,644.0	593.5	8,663.4	0.00	485,540.01	668,258.12
18,000.0	90.67	359.97	9,112.1	6,073.6	8,744.0	593.5	8,763.2	0.00	485,640.00	668,258.07
18,100.0	90.67	359.97	9,110.9	6,072.4	8,843.9	593.4	8,863.1	0.00	485,739.99	668,258.02
18,200.0	90.67	359.97	9,109.8	6,071.3	8,943.9	593.4	8,962.9	0.00	485,839.99	668,257.97
18,300.0	90.67	359.97	9,108.6	6,070.1	9,043.9	593.3	9,062.8	0.00	485,939.98	668,257.92
18,400.0	90.67	359.97	9,107.5	6,069.0	9,143.9	593.3	9,162.6	0.00	486,039.97	668,257.87

Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com 106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com 106H	MD Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com 106H	Database:	EDM 5000.1 Single User Db

Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	D Leg (%/100usft)	Northing (usft)	Easting (usft)
18,500.0	90.67	359.97	9,106.3	6,067.8	9,243.9	593.2	9,262.4	0.00	486,139.97	668,257.82
18,600.0	90.67	359.97	9,105.1	6,066.6	9,343.9	593.2	9,362.3	0.00	486,239.96	668,257.77
18,700.0	90.67	359.97	9,104.0	6,065.5	9,443.9	593.1	9,462.1	0.00	486,339.95	668,257.73
18,800.0	90.67	359.97	9,102.8	6,064.3	9,543.9	593.1	9,562.0	0.00	486,439.95	668,257.68
18,900.0	90.67	359.97	9,101.6	6,063.1	9,643.9	593.0	9,661.8	0.00	486,539.94	668,257.63
19,000.0	90.67	359.97	9,100.5	6,062.0	9,743.9	593.0	9,761.7	0.00	486,639.93	668,257.58
19,100.0	90.67	359.97	9,099.3	6,060.8	9,843.9	593.0	9,861.5	0.00	486,739.93	668,257.53
19,200.0	90.67	359.97	9,098.2	6,059.7	9,943.9	592.9	9,961.4	0.00	486,839.92	668,257.48
19,300.0	90.67	359.97	9,097.0	6,058.5	10,043.9	592.9	10,061.2	0.00	486,939.91	668,257.43
19,400.0	90.67	359.97	9,095.8	6,057.3	10,143.9	592.8	10,161.1	0.00	487,039.91	668,257.38
19,500.0	90.67	359.97	9,094.7	6,056.2	10,243.8	592.8	10,260.9	0.00	487,139.90	668,257.33
19,600.0	90.67	359.97	9,093.5	6,055.0	10,343.8	592.7	10,360.8	0.00	487,239.89	668,257.28
19,700.0	90.67	359.97	9,092.3	6,053.8	10,443.8	592.7	10,460.6	0.00	487,339.88	668,257.24
19,800.0	90.67	359.97	9,091.2	6,052.7	10,543.8	592.6	10,560.4	0.00	487,439.88	668,257.19
19,900.0	90.67	359.97	9,090.0	6,051.5	10,643.8	592.6	10,660.3	0.00	487,539.87	668,257.14
20,000.0	90.67	359.97	9,088.9	6,050.4	10,743.8	592.5	10,760.1	0.00	487,639.86	668,257.09
20,100.0	90.67	359.97	9,087.7	6,049.2	10,843.8	592.5	10,860.0	0.00	487,739.86	668,257.04
20,200.0	90.67	359.97	9,086.5	6,048.0	10,943.8	592.4	10,959.8	0.00	487,839.85	668,256.99
20,242.3	90.67	359.97	9,086.1	6,047.6	10,986.1	592.4	11,002.0	0.00	487,882.13	668,256.97
20,246.0	90.67	359.97	9,086.0	6,047.5	10,989.8	592.4	11,005.8	0.11	487,885.85	668,256.97
5 1/2"										
20,246.6	90.67	359.97	9,086.0	6,047.5	10,990.4	592.4	11,006.4	0.11	487,886.48	668,256.97

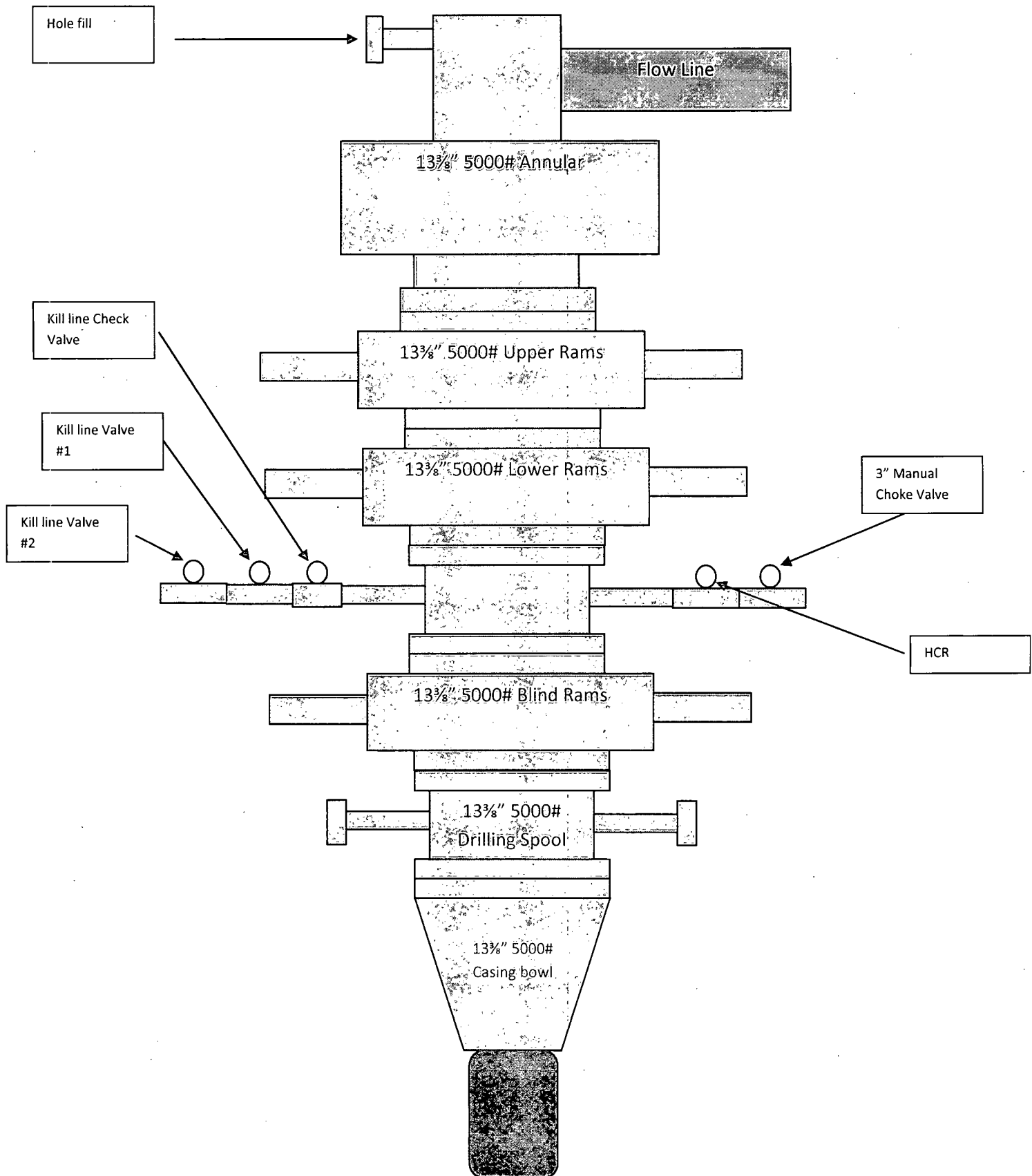
Company:	Murchison Oil and Gas	Local Co-ordinate Reference:	Site: Nash Unit Fed Com #106H
Project:	Nash Unit	TVD Reference:	WELL @ 3038.5usft (Original Well Elev)
Site:	Nash Unit Fed Com #106H	MDI Reference:	WELL @ 3038.5usft (Original Well Elev)
Well:	Nash Unit Fed Com #106H	North Reference:	Grid
Wellbore:	Nash Unit Fed Com #106H	Survey Calculation Method:	Minimum Curvature
Design:	140508 Nash Fed Com #106H	Database:	EDM-5000.1 Single User Db

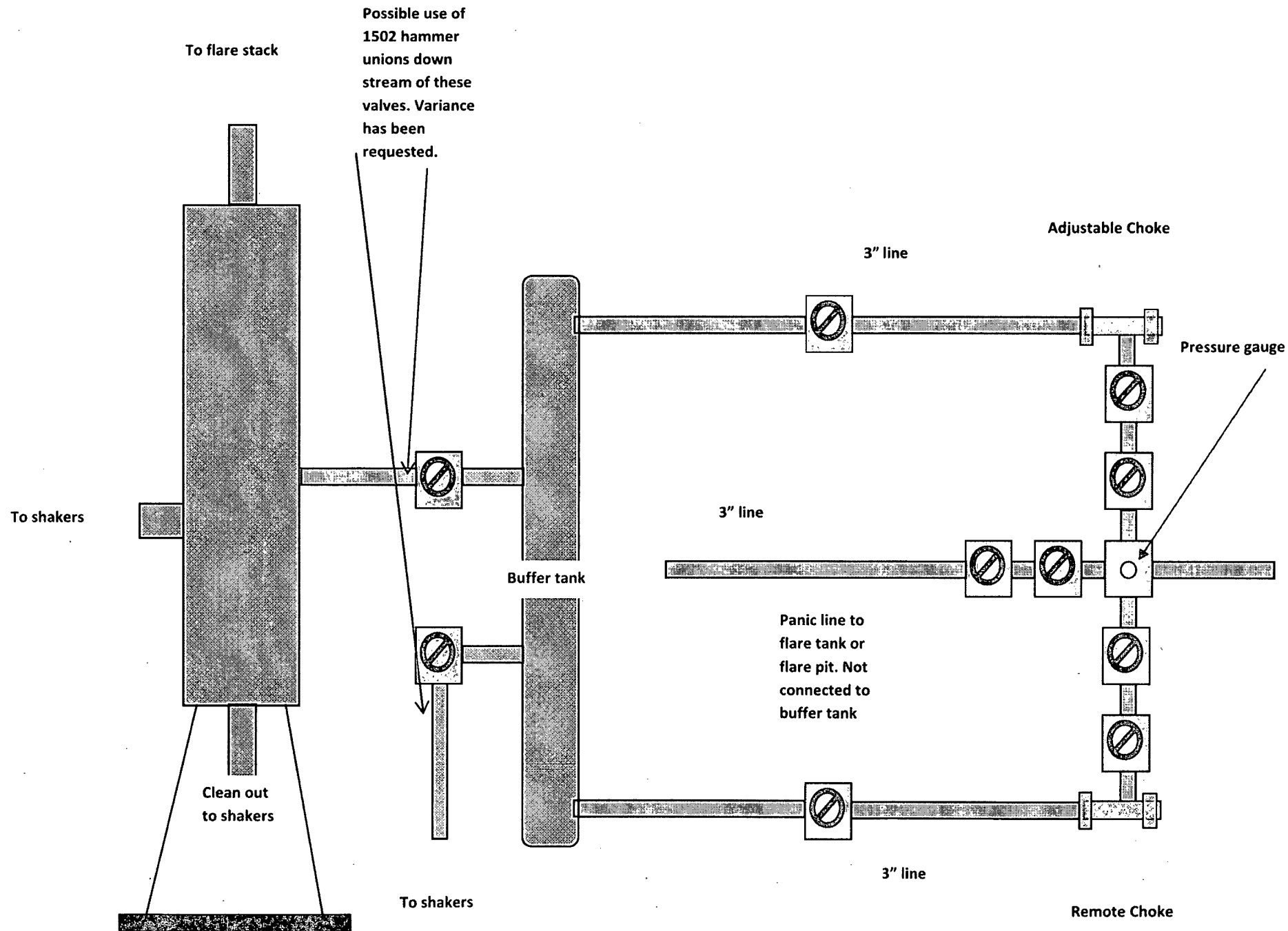
Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (in)	Hole Diameter (in)	
200.0	200.0	20"	20	20	
3,050.0	3,050.0	13 3/8"	13-3/8	16	
7,900.0	7,900.0	9 5/8"	9-5/8	12-1/4	
20,246.0	9,086.0	5 1/2"	5-1/2	8-1/2	

Formations				
Measured Depth (usft)	Vertical Depth (usft)	Name	Dip (°)	
3,253.5	3,253.5	Base Anhydrite	0.00	
9,241.5	9,093.5	Top Target Sand	0.00	
3,039.5	3,039.5	Base Salt	0.00	
357.5	357.5	Salado	0.00	
8,028.5	8,028.5	1st Bone Spring	0.00	
3,247.5	3,247.5	Delaware	0.00	
8,919.5	8,903.5	2nd Bone Spring	0.00	
7,002.5	7,002.5	Bone Spring	0.00	

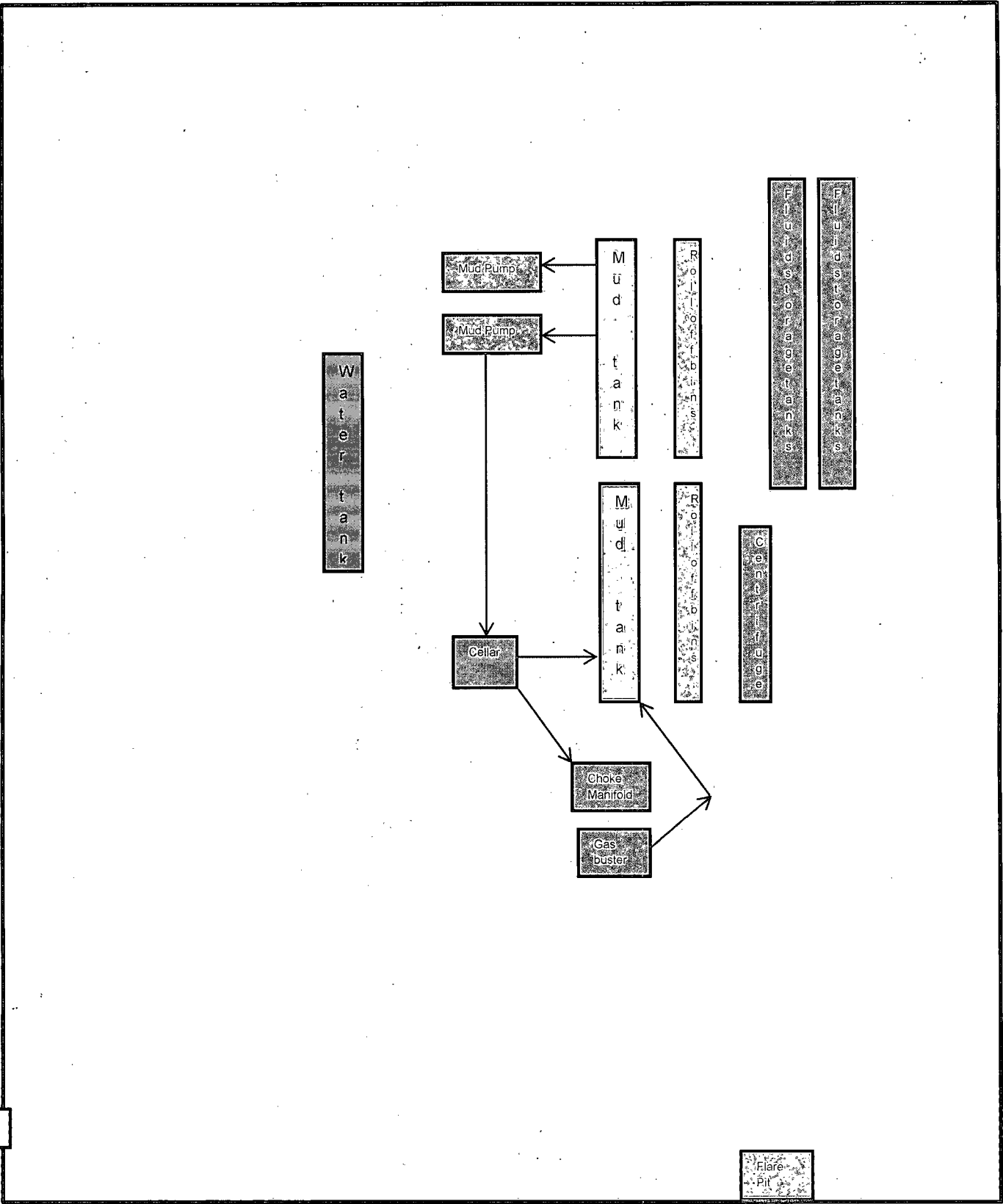
Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_

# BOP Schematic





*Closed Loop Diagram*





## **Design Plan, Operating Plan and Maintenance Plan, and Closure Plan for the OCD form C-144**

### **Design Plan:**

Fluid and cuttings coming from drilling operations will pass over the shale shaker with the cuttings going to the haul off bin and the cleaned fluid returning to the working steel pits.

### **Equipment Includes:**

- 1-670bbl steel working pit
- 2-100bbl steel working suction pits
- 2-500bbl steel tanks
- 2-20yd<sup>3</sup> steel haul off bins
- 2-pumps (HHF-1600)
- 2-Shale shakers
- 1-Centrifuge
- 1-Desilter/Desander

### **Operating and Maintenance Plan:**

Inspections are to take place every tour for proper operation of system and individual components. If any problems are found they will be repaired and/or corrected immediately.

All drilling fluid circulated over shakers with cuttings discharged into roll off bins

Fluid and fines below shakers are circulated with transfer pump through centrifuge

Roll off bins are lined and de watered with fluids recirculated into system

Additional tank is used to capture unused drilling fluid or cement returns from casing jobs.

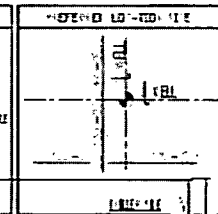
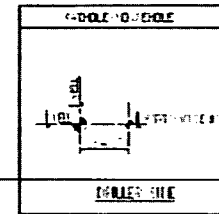
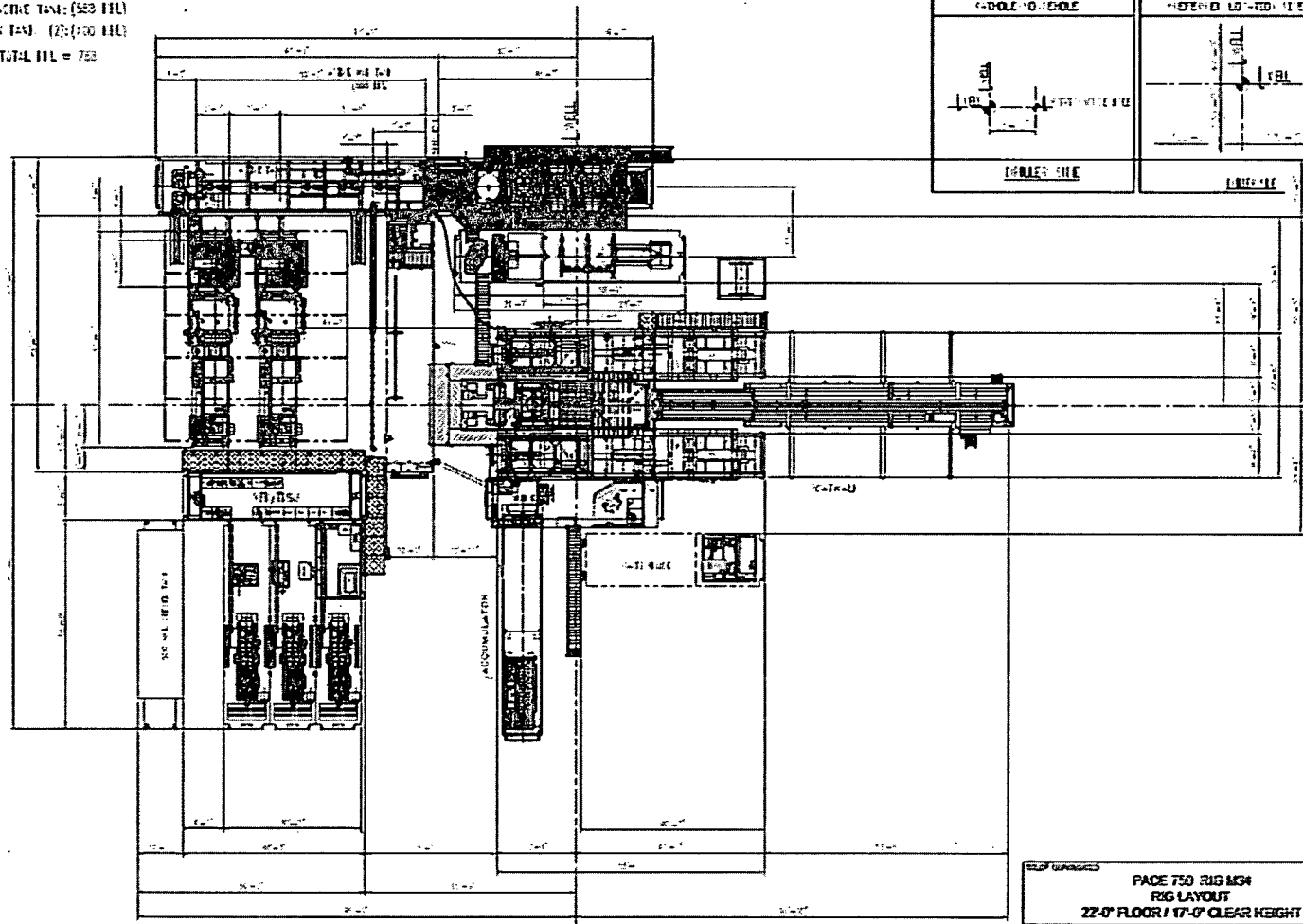
### **Closure Plan:**

All haul off bins containing cuttings will be removed from location and hauled to:

R360 Permit number R9166/NM-01-0006

GMI Permit number 711-019-001/NM-01-0019

4000 TANK (500 HLU)  
 SECTION TANK (2500 HLU)  
 TOTAL HLU = 750



PACE 750 RIG M34  
 RIG LAYOUT  
 22-01 FLOOR / 17-01 CLEAR HEIGHT

NABORS				B			
NO.	DESCRIPTION	QTY	UNIT	NO.	DESCRIPTION	QTY	UNIT
1				2			
3				4			

# Murchison Oil and Gas

1100 Mira Vista Blvd, Plano, TX 75093

Murchison Oil and Gas

H2S Drilling Operations Plan

Nash Unit Fed Com #106H

Eddy County, New Mexico

Prepared by: Steve Morris

Date: 07/23/2014

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## **H2S Contingency Plan Section**

### **Scope:**

This contingency plan provides an organized plan of action for alerting and protecting the public within an area of exposure prior to an intentional release, or following the accidental release of a potentially hazardous volume of hydrogen sulfide. The plan establishes guidelines for all personnel whose work activity may involve exposure to Hydrogen Sulfide Gas (H<sub>2</sub>S).

### **Objective:**

Prevent any and all accidents, and prevent the uncontrolled release of H<sub>2</sub>S into the atmosphere.

Provide proper evacuation procedures to cope with emergencies.

Provide immediate and adequate medical attention should an injury occur.

**Implementation:** This plan, with all details, is to be fully implemented 1000' before drilling into the first sour zone.

**Emergency Response Procedure:** This section outlines the conditions and denotes steps to be taken in the event of an emergency.

**Emergency Equipment and Procedure:** This section outlines the safety and emergency equipment that will be required for the drilling of this well.

**Training Provisions:** This section outlines the training provisions that must be adhered to 1000' before drilling into the first sour zone.

**Emergency Call Lists:** Included are the telephone numbers of all persons that would need to be contacted, should an H<sub>2</sub>S emergency occur.

**Briefing:** This section deals with the briefing of all persons involved with the drilling of this well.

**Public Safety:** Public safety personnel will be made aware of the drilling of this well.

**Check Lists:** Status check lists and procedural check lists have been included to ensure adherence to the plan.

**General Information:** A general information section has been included to supply support information.

## **Emergency Procedures Section**

### **Emergency Procedures**

- I. In the event of any evidence of H<sub>2</sub>S level above 10 ppm, take the following steps immediately:**
  - A. Secure breathing apparatus.
  - B. Order non-essential personnel out of the danger zone.
  - C. Take steps to determine if the H<sub>2</sub>S level can be corrected or suppressed, and if so, proceed with normal operations.
- II. If uncontrollable conditions occur, proceed with the following:**
  - A. Take steps to protect and/or remove any public downwind of the rig, including partial evacuation or isolation. Notify necessary public safety personnel and the New Mexico Oil & Gas of the situation.
  - B. Remove all personnel to the safe briefing area.
  - C. Notify public safety personnel for help with maintaining roadblocks and implementing evacuation.
  - D. Determine and proceed with the best possible plan to regain control of the well. Maintain tight security and safety measures.
- III. Responsibility:**
  - A. The company approved supervisor shall be responsible for the total implementation of the plan.
  - B. The company approved supervisor shall be in complete command during any emergency.
  - C. The company approved supervisor shall designate a backup supervisor in the event that he/she is not available.

### **Emergency Procedure Implementation**

- I. Drilling or Tripping:**
  - A. All Personnel**
    1. When alarm sounds, don escape unit and report to upwind safe briefing area.
    2. Check status of other personnel (buddy system).
    3. Secure breathing apparatus.
    4. Wait for orders from supervisor.
  - B. Drilling Foreman**
    1. Report to the upwind safe briefing area.
    2. Don breathing apparatus and return to the point of release with the Tool pusher of Driller (buddy system).
    3. Determine the concentration of H<sub>2</sub>S.
    4. Address the situation and take appropriate control measures.
  - C. Tool Pusher**
    1. Report to the upwind safe briefing area.
    2. Don breathing apparatus and return to the point of release with the Drilling Foreman or the Driller (buddy system).

3. Determine the concentration.
  4. Address the situation and take appropriate control measures.
- D. Driller
1. Check the status of other personnel (in a rescue attempt, always use the buddy system).
  2. Assign the least essential person to notify the Drilling Foreman and Tool Pusher, in the event of their absence.
  3. Assume the responsibility of the Drilling Foreman and the Tool Pusher until they arrive, in the event of their absence.
- E. Derrick Man and Floor Hands
1. Remain in the upwind safe briefing area until otherwise instructed by a supervisor.
- F. Mud Engineer
1. Report to the upwind safe briefing area.
  2. When instructed, begin check of mud for PH level and H2S level.
- G. Safety Personnel
1. Don breathing apparatus.
  2. Check the status of all personnel.
  3. Wait for instructions from Drilling Foreman or Tool Pusher.
- II. **Taking a Kick:**
- A. All personnel report to the upwind safe briefing area.
  - B. Follow standard BOP procedures.
- III. **Open Hole Logging:**
- A. All unnecessary personnel should leave the rig floor.
  - B. Drilling Foreman and Safety personnel should monitor the conditions and make necessary safety equipment recommendations.
- IV. **Running Casing or Plugging:**
- A. Follow "Drilling or Tripping" procedures.
  - B. Assure that all personnel have access to protective equipment.

### **Simulated Blowout Control Drills**

All drills will be initiated by activating alarm devices (air horn). One long blast on the air horn for ACTUAL and SIMULATED blowout control drills. This operation will be performed by the Drilling Foreman or Tool Pusher at least one time per week for each of the following conditions, with each crew:

- |          |                     |
|----------|---------------------|
| Drill #1 | On-bottom Drilling  |
| Drill #2 | Tripping Drill Pipe |

In each of these drills, the initial reaction time to shutting in the well shall be timed as well as the total time for the crew to complete its entire put drill assignment. The times must be recorded on the IADC Driller's log as "Blowout Control Drill".

Drill No.:

Reaction Time to Shut-in:

minutes,

seconds.

Total Time to Complete Assignment:

minutes,

seconds.

I. Drill Overviews:

A. Drill No. 1 – On-bottom Drilling

1. Sound the alarm immediately.
2. Stop the rotary and hoist the Kelly joint above the rotary table.
3. Stop the circulatory pump.
4. Close the drill pipe rams.
5. Record casing and drill pipe shut-in pressures and pit volume increases.

B. Drill No. 2 – Tripping Drill Pipe:

1. Sound the alarm immediately.
2. Position the upper tool joint just above the rotary table and set the slips.
3. Install a full opening valve inside blowout preventer tool in order to close the drill pipe.
4. Close the drill pipe rams.
5. Record the shut-in annular pressure.

II. Crew Assignments

A. Drill No. 1 – On-bottom Drilling:

1. Driller
  - a) Stop the rotary and hoist the Kelly joint above the rotary table.
  - b) Stop the circulatory pump.
  - c) Check flow.
  - d) If flowing, sound the alarm immediately.
  - e) Record the shut-in drill pipe pressure.
  - f) Determine the mud weight increase needed or other courses of action.
2. Derrick Man
  - a) Open choke line valve at BOP.
  - b) Signal Floor Man #1 at accumulator that choke line is open.
  - c) Close choke upstream valve after pipe rams have been closed.
  - d) Read the shut-in annular pressure and report readings to Driller.
3. Floor Man #1
  - a) Close the pipe rams after receiving the signal from the Derrick Man.
  - b) Report to Driller for further instructions.
4. Floor Man #2
  - a) Notify the Tool Pusher and Operator Representative of the H2S alarms.
  - b) Check for open fires and, if safe to do so, extinguish them.
  - c) Stop all welding operations.
  - d) Turn-off all non-explosive proof lights and instruments.



- e) Report to Driller for further instructions.
- 5. Tool Pusher
  - a) Report to the rig floor.
  - b) Have a meeting with all crews.
  - c) Compile and summarize all information.
  - d) Calculate the proper kill weight.
  - e) Ensure that proper well procedures are put into action.
- 6. Operator Representative
  - a) Notify the Drilling Superintendent.
  - b) Determine if an emergency exists and if so, activate the contingency plan.
- B. Drill No. 2 – Tripping Pipe:
  - 1. Driller
    - a) Sound the alarm immediately when mud volume increase has been detected.
    - b) Position the upper tool joint just above the rotary table and set slips.
    - c) Install a full opening valve or inside blowout preventer tool to close the drill pipe.
    - d) Check flow.
    - e) Record all data reported by the crew.
    - f) Determine the course of action.
  - 2. Derrick Man
    - a) Come down out of derrick.
    - b) Notify Tool Pusher and Operator Representative.
    - c) Check for open fires and, if safe to do so, extinguish them.
    - d) Stop all welding operations.
    - e) Report to Driller for further instructions.
  - 3. Floor Man #1
    - a) Pick up full opening valve or inside blowout preventer tool and slab into tool joint above rotary table (with Floor Man #2)
    - b) Tighten valve with back-up tongs.
    - c) Close pipe rams after signal from Floor Man #2.
    - d) Read accumulator pressure and check for possible high pressure fluid leaks in valves or piping.
    - e) Report to Driller for further instructions.
  - 4. Floor Man #2
    - a) Pick-up full opening valve or inside blowout preventer tool and tab into tool joint above rotary table (with Floor Man #1)
    - b) Position back-up tongs on drill pipe.
    - c) Open choke line valve at BOP.
    - d) Signal Floor Man #1 at accumulator that choke line is open.
    - e) Close choke and upstream valve after pipe rams have been closed.
    - f) Check for leaks on BOP stack and choke manifold.

- g) Read annular pressure.
- h) Report readings to the Driller.
- 5. Tool Pusher
  - a) Report to the rig floor.
  - b) Have a meeting with all of the crews.
  - c) Compile and summarize all information.
  - d) See that proper well kill procedures are put into action.
- 6. Operator Representative
  - a) Notify Drilling Superintendent.
  - b) Determine if an emergency exists, and if so, activate the contingency plan

## **Ignition Procedures**

### **Responsibility:**

The decision to ignite the well is responsibility of the DRILLING FOREMAN in concurrence with the STATE POLICE. In the event of the Drilling Foreman is incapacitated, it becomes the responsibility of the RIG TOOL PUSHER. This decision should be made only as a last resort and in a situation where it is clear that:

1. Human life and property are endangered.
2. There is no hope of controlling the blowout under the prevailing conditions.

If time permits, notify the main office, but do not delay if human life is in danger. Initiate the first phase of the evacuation plan.

### **Instructions for Igniting the Well:**

1. Two people are required for the actual igniting operation. Both men must wear self-contained breathing apparatus and must use a full body harness and attach a retrievable safety line to the D-Ring in the back. One man must monitor the atmosphere for explosive gases with the LEL monitor, while the Drilling Foreman is responsible for igniting the well.
2. The primary method to ignite is a 25mm flare gun with a range of approximately 500 feet.
3. Ignite from upwind and do not approach any closer than is warranted.
4. Select the ignition site best suited for protection and which offers an easy escape route.
5. Before igniting, check for the presence of combustible gases.
6. After igniting, continue emergency actions and procedures as before.
7. All unassigned personnel will limit their actions to those directed by the Drilling Foreman.

NOTE: After the well is ignited, burning Hydrogen Sulfide will convert to Sulfur Dioxide, which is also highly toxic. Do not assume the area is safe after the well is ignited.

## **Training Program**

When working in an area where Hydrogen Sulfide (H<sub>2</sub>S) might be encountered, definite training requirements for all personnel must be carried out. The Company Supervisor will ensure that all personnel at the well site have had adequate training in the following:

1. Hazards and Characteristics of Hydrogen Sulfide.
2. Physicals effects of Hydrogen Sulfide on the human body.
3. Toxicity of Hydrogen Sulfide and Sulfur Dioxide.
4. H<sub>2</sub>S detection, emergency alarm and sensor location.
5. Emergency rescue.
6. Resuscitators.
7. First aid and artificial resuscitation.
8. The effects of Hydrogen Sulfide on metals.
9. Location safety.

Service company personnel and visiting personnel must be notified if the zone contains H<sub>2</sub>S, and each service company must provide adequate training and equipment for their employees before they arrive at the well site.

## **Emergency Equipment Requirements**

### **Lease Entrance Sign:**

Should be located at the lease entrance with the following information:

CAUTION- POTENTIAL POISON GAS HYDROGEN SULFIDE

### **Well Control Equipment:**

- A flare line will be located a minimum of 150' from the wellhead to be ignited by a flare gun.
- The choke manifold will include a remotely operated choke.
- A mud/gas separator will be installed to separate gas from the drilling mud.

### **Mud Program:**

The drilling mud program has been designed to minimize the volume of hydrogen sulfide (H<sub>2</sub>S) circulated to surface. The operator will have the necessary mud products on location to minimize the hazards while drilling in H<sub>2</sub>S-bearing zones.

**Metallurgy:**

- All drill strings , casings, tubing, wellhead equipment , the blowout preventer , the drilling spool, kill lines, choke manifold and lines, and all valves shall be suitable for H2S service.
- All elastomers used for packing and seals shall be H2S trim.

**Respiratory Equipment:**

- Fresh air breathing equipment should be placed at the safe briefing areas and should include the following: Two SCBA's will be placed at each briefing area. A moveable breathing air trailer with 2 SCBA's, 5 work/escape units, ample breathing air hose and manifolds will be on location. The breathing air hose will be installed on the rig floor and derrick along with breathing air manifolds so that it will not restrict work activity. All employees that may wear respiratory will complete a MEQ and be quantitative fit tested 1000' prior to the 1st zone that may contain H2S.

**Windssocks or Wind Streamers:**

- A minimum of two 10" windssocks located at strategic locations so that they may be seen from any point on location. More will be used if necessary for wind consciousness.
- Wind streamers (if preferred) should be placed at various locations on the well site to ensure wind consciousness at all times. (Corners of location).

**Hydrogen Sulfide Detector and Alarms:**

- 1 - Four channel H2S monitor with audible and visual alarms, strategically located to be seen and heard by all employees working on the well site. All sensors will be bump tested or calibrated if necessary on a weekly basis. The alarms will be set to visually alarm at 10 PPM and audible at 14 PPM.
- Four (4) sensors located as follows: #1 -Rig Floor, #2 & #3- Bell Nipple, #4- End of flow line where wellbore fluid is discharged.
- Portable color metric tube detector with tubes will be stored in the Tool Pusher trailer.

**Well Condition Sign and Flags:**

The Well Condition Sign with flags should be placed a minimum of 150' before entry to the location. It should have three (3) color coded flags (green, yellow and red) that will be used to denote the following location conditions:

GREEN - Normal Operating Conditions

YELLOW - Potential Danger

RED - Danger, H<sub>2</sub>S Gas Present

**Auxiliary Rescue Equipment:**

- Stretcher (drilling contractor)
- 2- 100' OSHA approved Rescue lines (drilling contractor)
- First Aid Kit properly stocked (drilling contractor)

**Mud Inspection Equipment:**

Garret Gas Train or Hach Tester for inspection of Hydrogen Sulfide in the drilling mud system.

**Fire Extinguishers:**

Adequate fire extinguishers shall be located at strategic locations (provided by drilling contractor)

**Blowout Preventer:**

- The well shall have hydraulic BOP equipment for the anticipated BHP.
- The BOP should be tested upon installation.
- BOP, Choke Line and Kill Line will be tested as specified by Operator in the drilling plan. The frequency is per Onshore regulations.

**Confined Space Monitor:**

There should be a portable multi-gas monitor with at least 3 sensors (O<sub>2</sub>, LEL & H<sub>2</sub>S). This instrument should be used to test the atmosphere of any confined space before entering. It should also be used for atmospheric testing for LEL gas before beginning any type of Hot Work. Proper calibration documentation will need to be provided. (Supplied by Drilling Contractor)

**Communication Equipment:**

- Proper communication equipment such as cell phones or 2 -way radios should be available at the rig.
- Radio communication shall be available for communication between the company man's trailer, rig floor and the tool pusher's trailer.
- Communication equipment shall be available on the vehicles.

**Special Control Equipment:**

- Hydraulic BOP equipment with remote control on the ground.
- Rotating head at the surface casing point.
- BOP, Choke Manifold and Process Flow Diagrams (see the attached - previously submitted)
- Choke Manifold Equipment (see the attached - previously submitted)

**Evacuation Plan:**

- Evacuation routes should be established prior to spudding the well.
- Should be discussed with all rig personnel.

**Designated Areas:*****Parking and Visitor area:***

- All vehicles are to be parked at a pre-determined safe distance from the wellhead.
- Designated smoking area.

***Safe Briefing Areas:***

- Two safe briefing Areas shall be designated on either side of the location at the maximum allowable distance from the well bore so they offset prevailing winds or they are at a 180 degree angle if wind directions tend to shift in the area.
- Personal protective equipment should be stored at both briefing areas or if a moveable cascade trailer is used, it should be kept upwind of existing winds. When wind is from the prevailing direction, both briefing areas should be accessible.

**NOTES:**

- Additional equipment will be available at the Read and Stevens, Inc. Rowsell, New Mexico office.
- Additional personal H2S monitors are available for all employees on location.
- Automatic Flare Igniters are recommended for installation on the rig.

## **CHECK LISTS**

### **Status Check List**

Note: Date each item as they are implemented.

1. Sign at location entrance.
2. Two (2) wind socks (in required locations).
3. Wind Streamers (if required).
4. SCBA's on location for all rig personnel and mud loggers.
5. Air packs, inspected and ready for use.
6. Spare bottles for each air pack (if required).
7. Cascade system for refilling air bottles.
8. Cascade system and hose line hook up.
9. Choke manifold hooked-up and tested. (Before drilling out surface casing.)
10. Remote Hydraulic BOP control (hooked-up and tested before drilling out surface casing).
11. BOP tested (before drilling out surface casing).
12. Mud engineer on location with equipment to test mud for H<sub>2</sub>S.
13. Safe Briefing Areas set-up.
14. Well Condition sign and flags on location and ready.
15. Hydrogen Sulfide detection system hooked-up & tested.
16. Hydrogen Sulfide alarm system hooked-up & tested.
17. Stretcher on location at Safe Briefing Area.
18. 2-100' OSHA Approved Life Lines on location.
19. 1-20# Fire Extinguisher in safety trailer.
20. Confined Space Monitor on location and tested.
21. All rig crews and supervisor trained (as required).
22. Access restricted for unauthorized personnel.
23. Drills on H<sub>2</sub>S and well control procedures.
24. All outside service contractors advised of potential H<sub>2</sub>S on the well.
25. NO SMOKING sign posted.
26. H<sub>2</sub>S Detector Pump w/tubes on location.
27. 25mm Flare Gun on location w/flares.
28. Automatic Flare Igniter installed on rig.

### **Procedural Check List**

Perform the following on each tour:

1. Check fire extinguishers to see that they have the proper charge.
2. Check breathing equipment to insure that they have not been tampered with.
3. Check pressure on the supply air bottles to make sure they are capable of recharging.
4. Make sure all of the Hydrogen Sulfide detection systems are operative.

Perform the following each week:

1. Check each piece of breathing equipment to make sure that they are fully charged and operational. This requires that the air cylinder be opened and the mask assembly be put on and tested to make sure that the regulators and masks are properly working. Negative and positive pressure should be conducted on all masks.
2. BOP skills.
3. Check supply pressure on BOP accumulator stand-by source.
4. Check all breathing air mask assemblies to see that straps are loosened and turned back, ready to use.
5. Check pressure on cascade air cylinders to make sure they are fully charged and ready to use for refill purposes if necessary.
6. Check all cascade system regulators to make sure they work properly.
7. Perform breathing drills with on-site personnel.
8. Check the following supplies for availability:
  - Stretcher
  - Safety Belts and ropes.
  - Spare air bottles.
  - Spare oxygen bottles (if resuscitator required).
  - Gas Detector Pump and tubes.
  - Emergency telephone lists.
9. Test the Confined Space Monitor to verify the batteries are good and that the unit is in good working condition and has been properly calibrated according to manufacturer's recommendations.

## **Briefing Procedures**

The following scheduled briefings will be held to ensure the effective drilling and operation of this project:

### **Pre-Spud Meeting**

Date: Prior to spudding the well.

Attendance: Drilling Supervisor  
Drilling Engineer  
Drilling Foreman  
Rig Tool Pushers  
Mud Engineer  
All Safety Personnel  
Key Service Company Personnel

Purpose: Review and discuss the well program, step-by-step, to ensure complete understanding of assignments and responsibilities.



## Evacuation Plan

### General Plan

The direct lines of action prepared by MOGI SAFETY, to protect the public from hazardous gas situations are as follows:

1. When the company approved supervisor (Drilling Foremen, Tool Pusher or Driller) determine that Hydrogen Sulfide gas cannot be limited to the well location, and the public will be involved, he will activate the evacuation plan. Escape routes are noted on the Area Map.
2. Company safety personnel or designee will notify the appropriate local government agency that a hazardous condition exists and evacuation needs to be implemented.
3. Company approved safety personnel that have been trained in the use of the proper emergency equipment will be utilized.
4. Law enforcement personnel (State Police, Local Police Department, Fire Department, and the Sheriff's Department) will be called to aid in setting up and maintaining road blocks. Also, they will aid in evacuation of the public if necessary.

NOTE: Law enforcement personnel will not be asked to come into a contaminated area. Their assistance will be limited to uncontaminated areas. Constant radio contact will be maintained with them.

5. After the discharge of gas has been controlled, "Company" safety personnel will determine when the area is safe for re-entry.

### Emergency Assistance Telephone List

#### **PUBLIC SAFETY:** 911 or

Eddy County Sheriff or Police .....	(575) 746-9888
Eddy County Emergency Management .....	(575) 887-7551
Hospital .....	(575) 492-5000
Ambulance .....	911
Department of Public Safety .....	(392) 392-5588
Oil Conservation Division .....	(575) 748-1823
New Mexico Energy, Minerals & Natural Resources Department .....	(575) 748-1283

### **MOGI Emergnecy Call List:**

Jack Rankin ..... (713) 582-3859  
Greg Boans ..... (575) 706-0667  
Joel Stockford ..... (972) 835-3349  
Steve Morris ..... (972) 835-3315

The geologic zones that will be encountered during drilling may contain hazardous quantities of H<sub>2</sub>S. The accompanying map illustrates the affected areas of the community. The residents within this radius will be notified via a hand delivered written notice describing the activities, potential hazards, and conditions of evacuation, evacuation drill siren alarms and other precautionary measures.

#### **Evacuee Description:**

Residents: THERE ARE NO RESIDENTS WITHIN 3000' ROE.

#### **Notification Process:**

A continuous siren audible to all residence will be activated, signaling evacuation of previously notified and informed residents.

#### **Evacuation Plan:**

All evacuees will migrate laterally toward the wind direction.

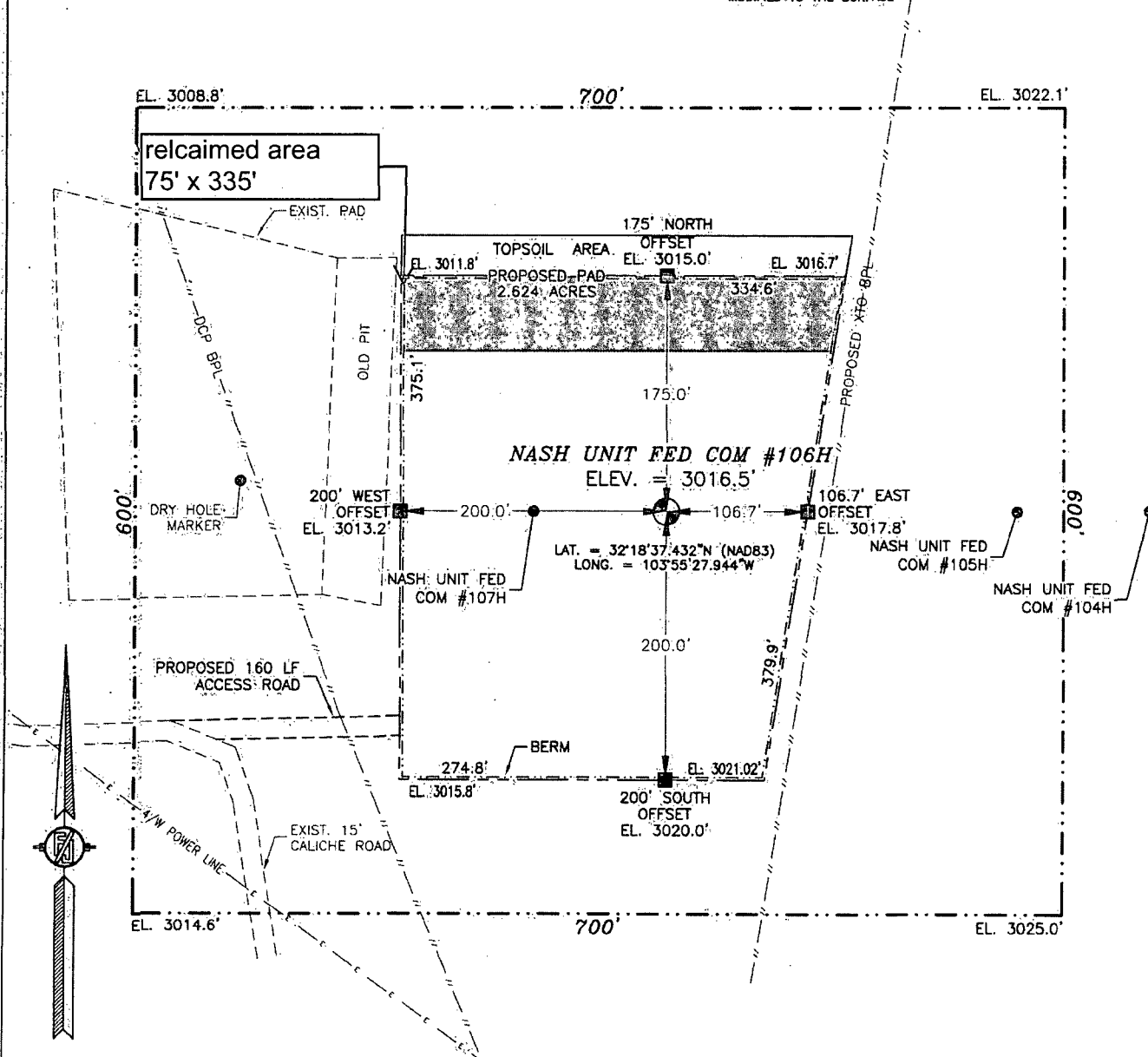
Murchison Oil and Gas will identify all home bound or highly susceptible individuals and make special evacuation preparations, interfacing with the local and emergency medical service as necessary.

### **MAPS AND PLATS**

See the attached map showing the 3000' ROE clarification.

SECTION 18, TOWNSHIP 23 SOUTH, RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO  
**SITE MAP**

NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83). LISTED NEW MEXICO STATE PLANE EAST COORDINATES ARE GRID (NAD83) BASIS OF BEARING AND DISTANCES USED ARE NEW MEXICO STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE



0 12 60 120 240

SCALE 1" = 120'

**DIRECTIONS TO LOCATION**

FROM STATE HIGHWAY 128 AND PAVED CR 793 (RAWHIDE), GO SOUTH ON CR 793 2.6 MILES; TURN LEFT ON CALICHE ROAD AND GO EAST 0.25 MILES TO A PROPOSED ROAD SURVEY AND FOLLOW FLAGS EAST 160' TO THE SOUTHWEST CORNER OF PAD FOR THIS LOCATION.

MURGHISON OIL & GAS, INC.  
**NASH UNIT FED COM #106H**  
LOCATED 700 FT. FROM THE NORTH LINE  
AND 1615 FT. FROM THE WEST LINE OF  
SECTION 18, TOWNSHIP 23 SOUTH,  
RANGE 30 EAST, N.M.P.M.  
EDDY COUNTY, STATE OF NEW MEXICO

MARCH 11, 2014

SURVEY NO. 2244

MADRON SURVEYING, INC. 301-SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

- e. No ATV's are to be used.

## **20. Maps and Diagrams**

- a. Land Survey Plat
- b. Wells Within One Mile Radius of the PSHL and PBHL
- c. Well Site Diagram
- d. Interim Reclamation Plat
- e. Rig Layout Diagram
- f. Closed Loop Diagram

# Surface Use Plan of Operations

## Introduction

The following surface use plan of operations will be followed and carried out once the APD is approved. No other disturbance will be created other than what was submitted in this surface use plan. If any other surface disturbances is needed after the APD is approved, a BLM approved sundry notice or right of way application will be acquired prior to any new surface disturbances.

Before any surface disturbance is created, stakes or flagging will be installed to mark boundaries of permitted areas of disturbance, including soils storage areas. As necessary, slope, grade, and other construction control stakes will be placed to ensure construction in accordance with the surface use plan. All boundary markers will be maintained in place until final construction cleanup is completed. If disturbance boundary markers are disturbed or knocked down, they will be replaced before construction proceeds.

If terms and conditions are attached to the approved APD and amend any of the proposed actions in this surface use plan, we will adhere to the terms and conditions.

## 1. Construction

### a. Notification

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

### b. Topsoil

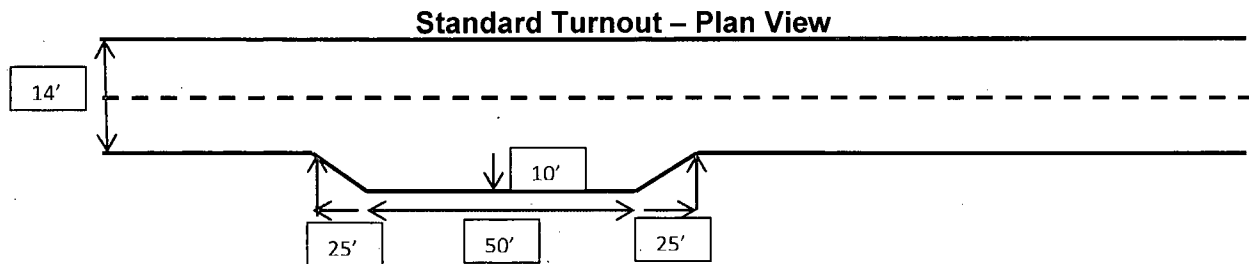
The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation,

## 2. Existing Roads

- a. The existing access road route to the proposed project is depicted on Land Survey Plat. A new road will be routed to the Nash Unit Fed Com 107H as per the attached plat. Improvements to the driving surface will be done where necessary. No new surface disturbance will be done, unless otherwise noted in the New or Reconstructed Access Roads sections of this surface plan.

- b. The Existing access road route to the proposed project does not cross lease or unit boundaries, so a BLM right-of-way grant will not be acquired for this proposed road route.
- c. Existing oil and gas roads utilized to access the proposed project will be maintained by crowning, clearing ditches, and fixing potholes. All existing structures on the entire access route such as cattleguards, other range improvement projects, culverts etc. will be properly repaired or replaced if they are damaged or have deteriorated beyond practical use.
- d. The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.
- e. Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the Surfacing material may be required to be removed at the time of reclamation.
- f. Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issue, or to fill low areas that may sustain standing water.
- g. The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.
- h. Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 14' wide road). The road shall conform to figure 1; cross section and plans for typical road construction.
- i. Ditching shall be required on both sides of the road.
- j. Vehicle turnouts shall be constructed on the road. Turnouts shall be constructed on all blind curves. Turnouts shall conform to the following diagram:

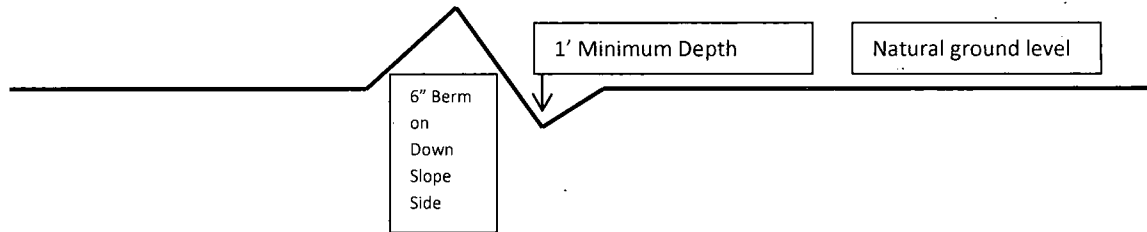


- k. Drainage control systems shall be constructed on the entire length of road (e.g. ditches, side hill, out-sloping, and in-sloping, lead-off ditches, culvert installation, and low water crossing). A typical lead-off ditch has a minimum depth of 1 foot below and berm of 6 inches above natural ground level. The berm shall be on the down-slop side of the lead-off ditch.

All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be

determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

### Cross Section of a Typical Lead off Ditch



### Formula for Spacing Interval of Lead-off Ditches

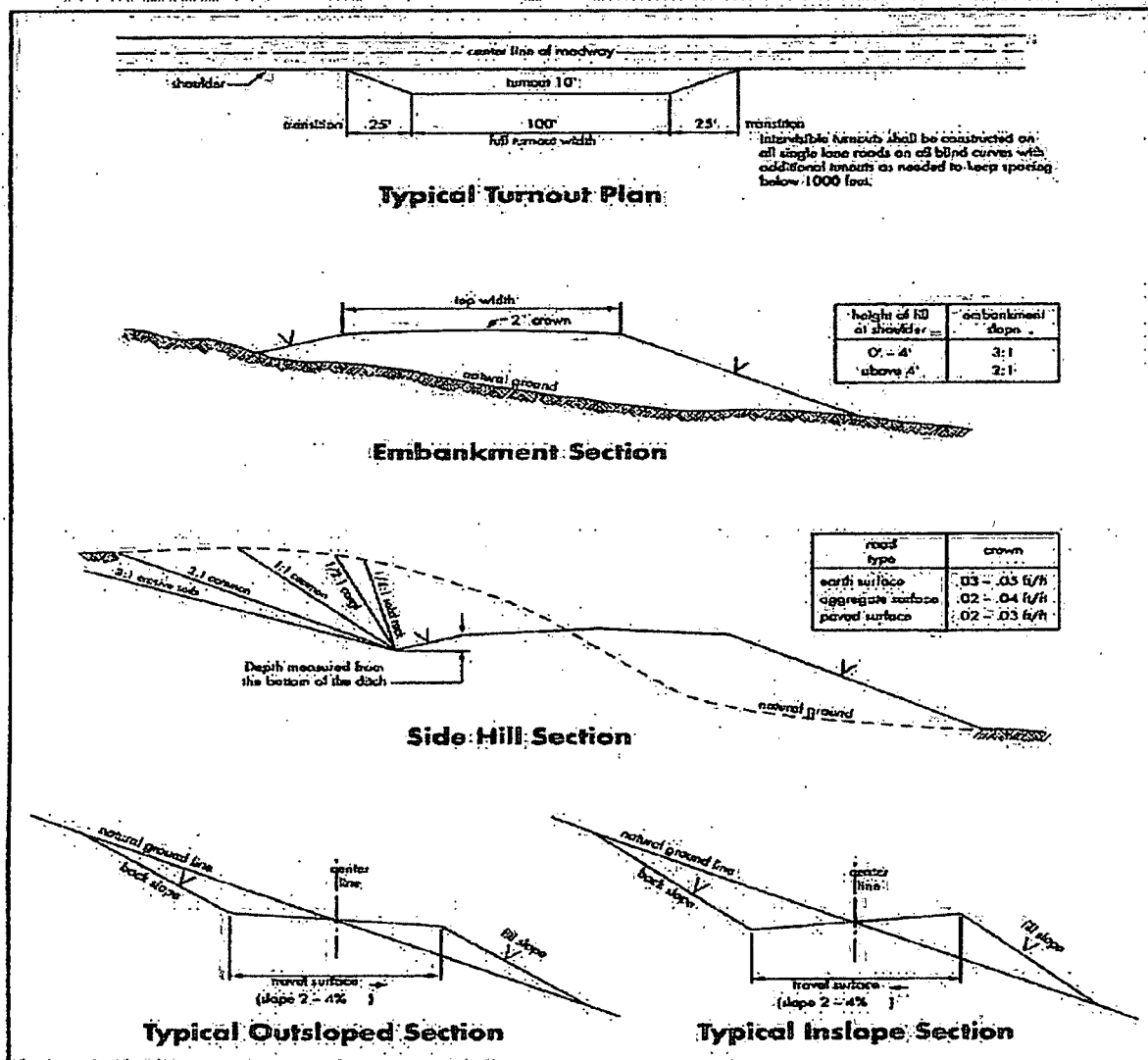
Example – on a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing intervals shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

### 3. New or Reconstructed Access Roads

- a. The existing road will be used and a new road will be constructed from that pad and routed to the south west side of the drill pad to the existing road. BLM rep has approved the routing.

## Cross Sections and Plans for Typical Road Sections



#### 4. Location of Existing Wells

- a. A 1 mile radius map has been attached with the APD.

#### 5. Location of Existing and/or Proposed Production Facilities

- a. All permanent, lasting more than 6 months, above ground structures including but not limited to pumpjacks, storage tanks, barrels, pipeline risers, meter housing, etc. That are not subject to safety requirements will be painted a non-reflective paint floor that blends in with the surrounding landscape. The paint color will be one of the colors from the BLM Standard Environmental Colors chart selected by the BLM authorized officer.



- b. All proposed production facilities that are located on the well pad will be strategically placed to allow for maximum interim reclamation, recontouring, and revegetation of the well location.
- c. Production from the proposed well will be contained on an onsite battery. See attached drawing included with APD.
- d. A pipeline to transport production will be installed from the proposed well to the battery
  - i. We plan to install a 2.875 inch Steel (tubing) pipeline below surface from the proposed well to the production facility. The maximum working pressure of the pipeline will be 7,260 psi; however we will not operate this pipeline at an internal pressure in excess of 250 psi.
  - ii. Attached drawing depicts the proposed production pipeline route from the well to the production facility.
  - iii. The proposed pipeline will be below surface.
- e. If any plans change regarding the production facility or other infrastructure (pipeline, electric line, etc.), we will submit a sundry notice or right of way (if applicable) prior to installation of construction.
- f. An electric line will be applied for through a sundry notice or BLM right-of-way at a later date.

## **6. Location and Types of Water**

- a. The source and location of the water supply are as follows: The well will be drilled with a combination of fresh water and brine water based mud systems. The water will be obtained from commercial suppliers in the area and/or piped or hauled to the location by transport trucks over an existing road. Any temporary pipelines for transfer of water will be installed along existing roads and removed within one week following the final use of such pipelines.

## **7. Construction Materials**

- a. Construction material that will be used to build the well pad and road will be caliche.
- b. All material required for construction of the drill pad and access roads will be obtained from private, state, or federal pits. If the well pad is flipped to acquire caliche underneath the well pad, Operator shall stay within the approved well pad area when performing these operations. A federal mineral material permit will be acquired prior to flipping the location for caliche or acquiring caliche from a federal pit.

## **8. Methods of Handling Waste**

- a. Drilling fluids and produced oil and water from the well during completion operations will be stored safely and disposed of properly in an NMOCD-approved disposal facility.

- b. Garbage and trash produced during drilling and completion operations will be collected in a trash bin and disposed of properly at a state approved site. All trash on and around the well site will be collected for disposal.
- c. Human waste and grey water will be properly contained and disposed of properly at a disposal facility.
- d. After drilling and completion operations, trash, chemicals, salts, frac sand and other waste material will be removed and disposed of properly at a disposal site.
- e. The well will be drilled utilizing a closed loop system. Drill cuttings will be properly disposed of into steel tanks and taken to an NMCOD-approved disposal facility.

## **9. Ancillary facilities**

- a. No ancillary facilities will be needed for this proposed project.

## **10. Well Site Layout**

- a. The proposed drilling pad was staked and surveyed by a professional surveyor. The attached survey plat of the well site depicts the drilling pad layout as staked.
- b. Attached are rig layout and a site layout diagrams.
- c. Topsoil Salvaging:  
Grass, forbs, and small woody vegetation, such as sagebrush will be excavated as the topsoil is removed. Large woody vegetation will be stripped and stored separately and respread evenly on the site following topsoil respreading. Topsoil depth is defined as the top layer of soil that contains 80% of the roots. In areas to be heavily disturbed, the top 6 inches of soil material will be stripped and stockpiled on the perimeter of the well location and along the perimeter of the access road to control run-on and run-off, to keep topsoil viable, and to make redistribution of topsoil more efficient during interim reclamation. Stockpiled topsoil should include vegetative material. Topsoil will be clearly segregated and stored separately from subsoils. Contaminated soil will not be stockpiled, but properly treated and handled prior to topsoil salvaging.

## **11. Plans for Surface Reclamation**

- a. Reclamation Objectives:
  - i. The objective of interim reclamation is to restore vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat and forage loss, visual impact, and weed infestation, during the life of the well or facilities.
  - ii. The long-term objective of final reclamation is to return the land to a condition approximating that which existed prior to disturbance. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity

- iii. The BLM will be notified at least 3 days prior to commencement of any reclamation procedures.
- iv. If circumstances allow, interim reclamation and/or final reclamation actions will be completed no later than 6 months from when the final well on the location has been completed or plugged. We will request written permission from the BLM if more time is needed.
- b. Interim Reclamation
  - i. Interim reclamation will be performed on the well site after the last well planned on this location, has been drilled and completed. An interim reclamation plan is attached.
  - ii. Within 30 days of well completion, the well location and surrounding areas will be cleared of, and maintained free of, all materials, trash, and equipment not required for production.
  - iii. In areas planned for interim reclamation, all the surfacing material will be removed and returned to the original mineral pit or recycled to repair or build roads and well pads.
  - iv. The areas planned for interim reclamation will then be recontoured to the original contour if feasible, or if not feasible, to an interim contour that blends with the surrounding topography as much as possible. Where applicable, the fill material of the well pad will be backfilled into the cut to bring the area back to the original contour. The interim cut and fill slopes prior to re-seeding will not be steeper than a 3:1 ratio, unless the adjacent native topography is steeper. Note: Constructed slopes may be much steeper during drilling, but will be recontoured to above ratios during interim reclamation.
  - v. Topsoil will be evenly respread and aggressively revegetated over the entire disturbed area not needed for all-weather operations including cuts & fills. To seed the area, the proper BLM seed mixture, free of noxious weeds, will be used. Final seedbed preparation will consist of contour cultivating to a depth of 4 to 6 inches within 24 hours prior to seeding, dozer tracking, or other imprinting in order to break the soil crust and create seed germination micro-sites.
  - vi. Proper erosion control methods will be used on the area to control erosion, runoff and siltation of the surrounding area.
  - vii. The interim reclamation will be monitored periodically to ensure that vegetation has reestablished and that erosion is controlled.
- c. Final Reclamation (well pad, buried pipelines, etc.)
  - i. Prior to final reclamation procedures, the well pad, road, and surrounding area will be cleared of material, trash, and equipment.
  - ii. All surfacing material will be removed and returned to the original mineral pit or recycled to repair or build roads and well pads.
  - iii. All disturbed areas, including roads, pipelines, pads, production facilities, and interim reclaimed areas will be recontoured to the contour existing prior to initial construction or a contour that blends indistinguishably with the surrounding landscape. Topsoil that was spread over the interim reclamation

areas will be stockpiled prior to recontouring. The topsoil will be redistributed evenly over the entire disturbed site to ensure successful revegetation.

- iv. After all the disturbed areas have been properly prepared, the areas will be seeded with the proper BLM seed mixture, free of noxious weeds. Final seedbed preparation will consist of contour cultivating to a depth of 4 to 6 inches within 24 hours prior to seeding, dozer tracking, or other imprinting in order to break the soil crust and create seed germination micro-sites.
- v. Proper erosion control methods will be used on the entire area to control erosion, runoff and siltation of the surrounding area.
- vi. All unused equipment and structures including pipelines, electric line poles, tanks, etc. that serviced the well will be removed.
- vii. All reclaimed areas will be monitored periodically to ensure that revegetation occurs, that the area is not redisturbed, and that erosion is controlled.

## **12. Federal Mineral Materials Pit**

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972

## **13. Well Pad Surfacing**

Surfacing of the well pad is required.

If the Operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation.

The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

## **14. Enclosure Fencing (Cellars & Pits)**

### **Enclosure Fencing**

The operator will install and maintain enclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of enclosure fencing design, refer to BLM's Oil and Gas Gold Book, Enclosure Fence Illustrations, Figure 1, Page 18.)

## **15. On Lease Access Roads**

### **Cattle guards**

An appropriately sized cattle guard(s) sufficient to carry out the project shall be installed and maintained at fence crossing(s)

Any existing cattle guard(s) on the access road shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattle guard(s) that are in place and are utilized during lease operations.

A gate shall be constructed and fastened securely to H-braces.

### **Fence Requirement**

Where entry is required across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting.

The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fence(s).

### **16. Surface Ownership**

- a. The surface ownership of the proposed project is federal.  
Surface Owner: J. Mobley 3515 Standpipe road, Carlsbad NM 88220
- b. A surface use agreement was obtained from the surface tenant regarding the proposed project.
- c. A good faith effort will be made to provide a copy of the APD Surface Use Plan of Operations to the private surface owner.

### **17. Archaeological, Paleontology & Historical Sites**

Any cultural and/or paleontological resource discovered by operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

### **18. Noxious Weeds**

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weed due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.

### **19. Special Requirements**

- a. Locations and facilities will be 600' from the shorelines.
- b. From May 1 – August 31 there will be no drilling or completion operations unless the recorded sound levels at 30' from the location are less than 49db.
- c. No power poles will be used, all power lines will be buried.
- d. No pits are to be used.

- e. No ATV's are to be used.

## **20. Maps and Diagrams**

- a. Land Survey Plat
- b. Wells Within One Mile Radius of the PSHL and PBHL
- c. Well Site Diagram
- d. Interim Reclamation Plat
- e. Rig Layout Diagram
- f. Closed Loop Diagram

# PECOS DISTRICT CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Murchison Oil & Gas
LEASE NO.:	NM19246
WELL NAME & NO.:	106H-Nash Unit Fed Com
SURFACE HOLE FOOTAGE:	700'/N & 1615'/W
BOTTOM HOLE FOOTAGE:	330'/N & 2260'/W, sec. 6
LOCATION:	Section 18, T. 23 S., R. 30 E., NMPM
COUNTY:	Eddy County, New Mexico

## TABLE OF CONTENTS

Standard Conditions of Approval (COA) apply to this APD. If any deviations to these standards exist or special COAs are required, the section with the deviation or requirement will be checked below.

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
  - Cave/Karst
  - Well name change
  - Unit well Signs
  - Commercial Well determination
- ☐ **Construction**
  - Notification
  - Topsoil
  - Closed Loop System
  - Federal Mineral Material Pits
  - Well Pads
  - Roads
- ☐ **Road Section Diagram**
- ☒ **Drilling**
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  - H2S Requirements
  - R-111-P-Potash
  - High Cave/Karst
  - Logging Requirements
  - Waste Material and Fluids
- ☒ **Production (Post Drilling)**
  - Well Structures & Facilities
- ☐ **Interim Reclamation**
- ☐ **Final Abandonment & Reclamation**

## **I. GENERAL PROVISIONS**

The approval of the Application For Permit To Drill (APD) is in compliance with all applicable laws and regulations: 43 Code of Federal Regulations 3160, the lease terms, Onshore Oil and Gas Orders, Notices To Lessees, New Mexico Oil Conservation Division (NMOCD) Rules, National Historical Preservation Act As Amended, and instructions and orders of the Authorized Officer. Any request for a variance shall be submitted to the Authorized Officer on Form 3160-5, Sundry Notices and Report on Wells.

## **II. PERMIT EXPIRATION**

If the permit terminates prior to drilling and drilling cannot be commenced within 60 days after expiration, an operator is required to submit Form 3160-5, Sundry Notices and Reports on Wells, requesting surface reclamation requirements for any surface disturbance. However, if the operator will be able to initiate drilling within 60 days after the expiration of the permit, the operator must have set the conductor pipe in order to allow for an extension of 60 days beyond the expiration date of the APD. (Filing of a Sundry Notice is required for this 60 day extension.)

## **III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES**

Any cultural and/or paleontological resource discovered by the operator or by any person working on the operator's behalf shall immediately report such findings to the Authorized Officer. The operator is fully accountable for the actions of their contractors and subcontractors. The operator shall suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the Authorized Officer. An evaluation of the discovery shall be made by the Authorized Officer to determine the appropriate actions that shall be required to prevent the loss of significant cultural or scientific values of the discovery. The operator shall be held responsible for the cost of the proper mitigation measures that the Authorized Officer assesses after consultation with the operator on the evaluation and decisions of the discovery. Any unauthorized collection or disturbance of cultural or paleontological resources may result in a shutdown order by the Authorized Officer.

## **IV. NOXIOUS WEEDS**

The operator shall be held responsible if noxious weeds become established within the areas of operations. Weed control shall be required on the disturbed land where noxious weeds exist, which includes the roads, pads, associated pipeline corridor, and adjacent land affected by the establishment of weeds due to this action. The operator shall consult with the Authorized Officer for acceptable weed control methods, which include following EPA and BLM requirements and policies.



## **V. SPECIAL REQUIREMENT(S)**

### **Cave and Karst**

**\*\*** Depending on location, additional Drilling, Casing, and Cementing procedures may be required by engineering to protect critical karst groundwater recharge areas.

#### **Cave/Karst Surface Mitigation**

The following stipulations will be applied to minimize impacts during construction, drilling and production.

##### **Construction:**

In the advent that any underground voids are opened up during construction activities, construction activities will be halted and the BLM will be notified immediately.

##### **No Blasting:**

No blasting will be utilized for pad construction. The pad will be constructed and leveled by adding the necessary fill and caliche.

##### **Pad Berming:**

The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.

- The compacted berm shall be constructed at a minimum of 12 inches high with impermeable mineral material (e.g. caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised. (Any access road crossing the berm cannot be lower than the berm height.)

##### **Tank Battery Liners and Berms:**

Tank battery locations and all facilities will be lined and bermed. A 20 mil permanent liner will be installed with a 4 oz. felt backing to prevent tears or punctures. Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank.

##### **Leak Detection System:**

A method of detecting leaks is required. The method could incorporate gauges to measure loss, situating valves and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present. Leak detection plan will be submitted to BLM for approval.

**Automatic Shut-off Systems:**

Automatic shut off, check valves, or similar systems will be installed for pipelines and tanks to minimize the effects of catastrophic line failures used in production or drilling.

**Cave/Karst Subsurface Mitigation**

The following stipulations will be applied to protect cave/karst and ground water concerns:

**Rotary Drilling with Fresh Water:**

Fresh water will be used as a circulating medium in zones where caves or karst features are expected. SEE ALSO: Drilling COAs for this well.

**Directional Drilling:**

Kick off for directional drilling will occur at least 100 feet below the bottom of the cave occurrence zone. SEE ALSO: Drilling COAs for this well.

**Lost Circulation:**

ALL lost circulation zones from the surface to the base of the cave occurrence zone will be logged and reported in the drilling report.

Regardless of the type of drilling machinery used, if a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

**Abandonment Cementing:**

Upon well abandonment in high cave karst areas additional plugging conditions of approval may be required. The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

**Pressure Testing:**

Annual pressure monitoring will be performed by the operator on all casing annuli and reported in a sundry notice. If the test results indicated a casing failure has occurred, remedial action will be undertaken to correct the problem to the BLM's approval.

**Well Name Change**

**NOTE: this is a Unit well, a Communitization Agreement will not be required. The operator will attempt to establish a Participating Area via a Commercial Well**

**Determination. Operator to submit a sundry after the well is completed to remove "Fed Com" from the well name.**

**Commercial Well Determination**

After 6 months of continuous production a commercial well determination will need to be submitted.

**Unit Wells**

The well sign for a unit well shall include the unit number in addition to the surface and bottom hole lease numbers. This also applies to participating area numbers. If a participating area has not been established, the operator can use the general unit designation, but will replace the unit number with the participating area number when the sign is replaced.

## **VI. CONSTRUCTION**

### **A. NOTIFICATION**

The BLM shall administer compliance and monitor construction of the access road and well pad. Notify the Carlsbad Field Office at (575) 234-5909 at least 3 working days prior to commencing construction of the access road and/or well pad.

When construction operations are being conducted on this well, the operator shall have the approved APD and Conditions of Approval (COA) on the well site and they shall be made available upon request by the Authorized Officer.

### **B. TOPSOIL**

The operator shall strip the top portion of the soil (root zone) from the entire well pad area and stockpile the topsoil along the edge of the well pad as depicted in the APD. The root zone is typically six (6) inches in depth. All the stockpiled topsoil will be redistributed over the interim reclamation areas. Topsoil shall not be used for berming the pad or facilities. For final reclamation, the topsoil shall be spread over the entire pad area for seeding preparation.

Other subsoil (below six inches) stockpiles must be completely segregated from the topsoil stockpile. Large rocks or subsoil clods (not evident in the surrounding terrain) must be buried within the approved area for interim and final reclamation.

### **C. CLOSED LOOP SYSTEM**

Tanks are required for drilling operations: No Pits.

The operator shall properly dispose of drilling contents at an authorized disposal site.

### **D. FEDERAL MINERAL MATERIALS PIT**

Payment shall be made to the BLM prior to removal of any federal mineral materials. Call the Carlsbad Field Office at (575) 234-5972.

### **E. WELL PAD SURFACING**

Surfacing of the well pad is not required.

If the operator elects to surface the well pad, the surfacing material may be required to be removed at the time of reclamation. The well pad shall be constructed in a manner which creates the smallest possible surface disturbance, consistent with safety and operational needs.

## **F. EXCLOSURE FENCING (CELLARS & PITS)**

### **Exclosure Fencing**

The operator will install and maintain exclosure fencing for all open well cellars to prevent access to public, livestock, and large forms of wildlife before and after drilling operations until the pit is free of fluids and the operator initiates backfilling. (For examples of exclosure fencing design, refer to BLM's Oil and Gas Gold Book, Exclosure Fence Illustrations, Figure 1, Page 18.)

## **G. ON LEASE ACCESS ROADS**

### **Road Width**

The access road shall have a driving surface that creates the smallest possible surface disturbance and does not exceed fourteen (14) feet in width. The maximum width of surface disturbance, when constructing the access road, shall not exceed twenty-five (25) feet.

### **Surfacing**

Surfacing material is not required on the new access road driving surface. If the operator elects to surface the new access road or pad, the surfacing material may be required to be removed at the time of reclamation.

Where possible, no improvements should be made on the unsurfaced access road other than to remove vegetation as necessary, road irregularities, safety issues, or to fill low areas that may sustain standing water.

The Authorized Officer reserves the right to require surfacing of any portion of the access road at any time deemed necessary. Surfacing may be required in the event the road deteriorates, erodes, road traffic increases, or it is determined to be beneficial for future field development. The surfacing depth and type of material will be determined at the time of notification.

### **Crowning**

Crowning shall be done on the access road driving surface. The road crown shall have a grade of approximately 2% (i.e., a 1" crown on a 14' wide road). The road shall conform to Figure 1; cross section and plans for typical road construction.

### **Ditching**

Ditching shall be required on both sides of the road.

### **Turnouts**

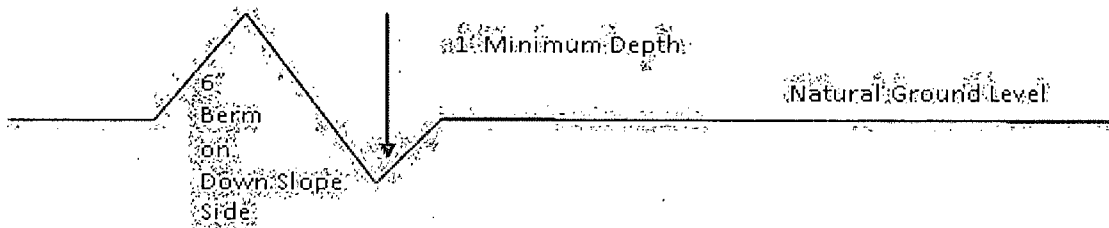
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

### **Drainage**

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outslowing and insloping, lead-off ditches, culvert installation, and low water crossings).

A typical lead-off ditch has a minimum depth of 1 foot below and a berm of 6 inches above natural ground level. The berm shall be on the down-slope side of the lead-off ditch.

#### **Cross Section of a Typical Lead-off Ditch**



All lead-off ditches shall be graded to drain water with a 1 percent minimum to 3 percent maximum ditch slope. The spacing interval are variable for lead-off ditches and shall be determined according to the formula for spacing intervals of lead-off ditches, but may be amended depending upon existing soil types and centerline road slope (in %);

#### **Formula for Spacing Interval of Lead-off Ditches**

Example - On a 4% road slope that is 400 feet long, the water flow shall drain water into a lead-off ditch. Spacing interval shall be determined by the following formula:

$$400 \text{ foot road with } 4\% \text{ road slope: } \frac{400'}{4\%} + 100' = 200' \text{ lead-off ditch interval}$$

### **Cattleguards**

An appropriately sized cattleguard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattleguards on the access road route shall be repaired or replaced if they are damaged or have deteriorated beyond practical use. The operator shall be responsible for the condition of the existing cattleguards that are in place and are utilized during lease operations.

### **Fence Requirement**

Where entry is granted across a fence line, the fence shall be braced and tied off on both sides of the passageway prior to cutting. The operator shall notify the private surface landowner or the grazing allotment holder prior to crossing any fences.

## Public Access

Public access on this road shall not be restricted by the operator without specific written approval granted by the Authorized Officer.

### Construction Steps

1. Salvage topsoil
2. Construct road
3. Redistribute topsoil
4. Revegetate slopes

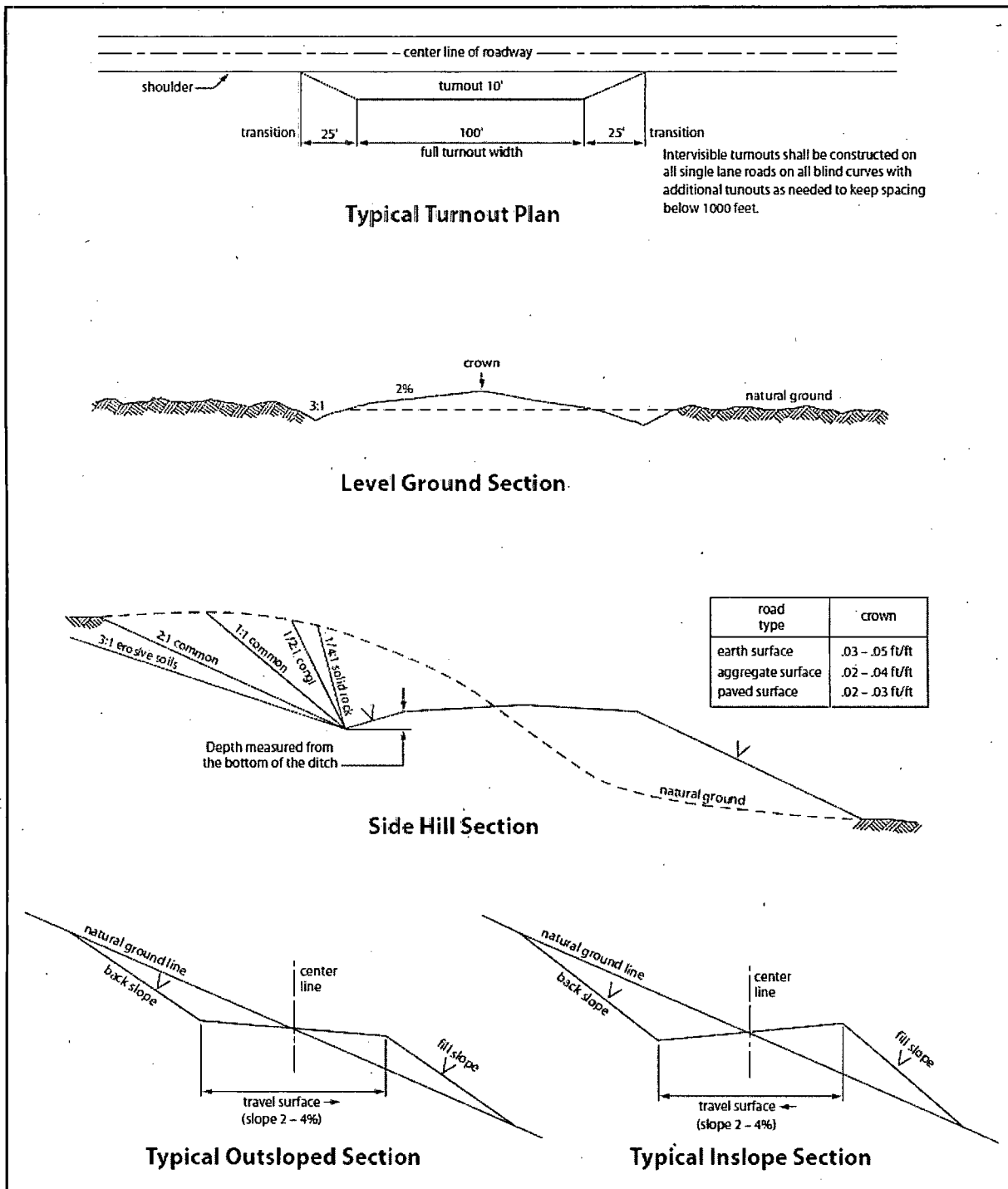


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

## VII. DRILLING

### 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 (H<sub>2</sub>S) monitors shall be installed prior to drilling out the surface shoe. If H<sub>2</sub>S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values 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) shall 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 Potash Areas:**

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 for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log.

**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.**

**R-111-P-Potash**

**High Cave/Karst**

**Possibility of water flows in the Salado and Castile.**

**Possibility of lost circulation in the Rustler, Delaware and Bone Spring.**

1. The 13-3/8 inch surface casing shall be set at approximately 200 feet and cemented to the surface. **If salt is encountered, set casing at least 25 feet above the salt.**
  - 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.
2. The minimum required fill of cement behind the 9-5/8 inch intermediate casing, which shall be set at approximately 3150 feet, is:
- ☒ Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst and potash.**

**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 for the bottom of the hole. Report results to BLM office.**

**Centralizers required through the curve and a minimum of one every other joint.**

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. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to potash.**
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.
5. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

#### **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. **Variance approved for operator to use 1502 (15,000 psi) hammer unions downstream of the choke manifold buffer Tank to connect to the mud/gas separator. These hammer unions must be no higher than 3-4 feet above ground level and the stamped 1502 must be visible for the inspector to check. No substitutions for the 1502 will be approved. Operator may be required to show manufacturer data for the 1502**

3. Variance approved to use flex line from BOP to choke manifold. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. **Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.** If the BLM inspector questions the straightness of the hose, a BLM engineer will be contacted and will review in the field or via picture supplied by inspector to determine if changes are required (operator shall expect delays if this occurs).
4. 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.**
5. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** intermediate 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.**
6. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.
  - a. In potash areas, 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. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time.
  - b. The tests shall be done by an independent service company utilizing a test plug **not a cup or J-packer**. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).
  - 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.

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## **VIII. PRODUCTION (POST DRILLING)**

### **A. WELL STRUCTURES & FACILITIES**

#### **Placement of Production Facilities**

Production facilities should be placed on the well pad to allow for maximum interim recontouring and revegetation of the well location.

#### **Exclosure Netting (Open-top Tanks)**

Immediately following active drilling or completion operations, the operator will take actions necessary to prevent wildlife and livestock access, including avian wildlife, to all open-topped tanks that contain or have the potential to contain salinity sufficient to cause harm to wildlife or livestock, hydrocarbons, or Resource Conservation and Recovery Act of 1976-exempt hazardous substances. At a minimum, the operator will net, screen, or cover open-topped tanks to exclude wildlife and livestock and prevent mortality. If the operator uses netting, the operator will cover and secure the open portion of the tank to prevent wildlife entry. The operator will net, screen, or cover the tanks until the operator removes the tanks from the location or the tanks no longer contain substances that could be harmful to wildlife or livestock. Use a maximum netting mesh size of 1 ½ inches. The netting must not be in contact with fluids and must not have holes or gaps.

#### **Chemical and Fuel Secondary Containment and Exclosure Screening**

The operator will prevent all hazardous, poisonous, flammable, and toxic substances from coming into contact with soil and water. At a minimum, the operator will install and maintain an impervious secondary containment system for any tank or barrel containing hazardous, poisonous, flammable, or toxic substances sufficient to contain the contents of the tank or barrel and any drips, leaks, and anticipated precipitation. The operator will dispose of fluids within the containment system that do not meet applicable state or U. S. Environmental Protection Agency livestock water standards in accordance with state law; the operator must not drain the fluids to the soil or ground. The operator will design, construct, and maintain all secondary containment systems to prevent wildlife and livestock exposure to harmful substances. At a minimum, the operator will install effective wildlife and livestock exclosure systems such as fencing, netting, expanded metal mesh, lids, and grate covers. Use a maximum netting mesh size of 1 ½ inches.

#### **Open-Vent Exhaust Stack Exclosures**

The operator will construct, modify, equip, and maintain all open-vent exhaust stacks on production equipment to prevent birds and bats from entering, and to discourage perching, roosting, and nesting. (*Recommended exclosure structures on open-vent exhaust stacks are in the shape of a cone.*) Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, in-line units, and compressor mufflers.

#### **Containment Structures**

Proposed production facilities such as storage tanks and other vessels will have a secondary containment structure that is constructed to hold the capacity of 1.5 times the

largest tank, plus freeboard to account for precipitation, unless more stringent protective requirements are deemed necessary.

#### **Painting Requirement**

All above-ground structures including meter housing that are not subject to safety requirements shall be painted a flat non-reflective paint color, **Shale Green** from the BLM Standard Environmental Color Chart (CC-001: June 2008).

### **IX. INTERIM RECLAMATION**

During the life of the development, all disturbed areas not needed for active support of production operations should undergo interim reclamation in order to minimize the environmental impacts of development on other resources and uses.

Within six (6) months of well completion, operators should work with BLM surface management specialists (Jim Amos: 575-234-5909) to devise the best strategies to reduce the size of the location. Interim reclamation should allow for remedial well operations, as well as safe and efficient removal of oil and gas.

During reclamation, the removal of caliche is important to increasing the success of revegetating the site. Removed caliche that is free of contaminants may be used for road repairs, fire walls or for building other roads and locations. In order to operate the well or complete workover operations, it may be necessary to drive, park and operate on restored interim vegetation within the previously disturbed area. Disturbing revegetated areas for production or workover operations will be allowed. If there is significant disturbance and loss of vegetation, the area will need to be revegetated. Communicate with the appropriate BLM office for any exceptions/exemptions if needed.

All disturbed areas after they have been satisfactorily prepared need to be reseeded with the seed mixture provided below.

Upon completion of interim reclamation, the operator shall submit a Sundry Notices and Reports on Wells, Subsequent Report of Reclamation (Form 3160-5).

### **X. FINAL ABANDONMENT & RECLAMATION**

At final abandonment, well locations, production facilities, and access roads must undergo "final" reclamation so that the character and productivity of the land are restored.

Earthwork for final reclamation must be completed within six (6) months of well plugging. All pads, pits, facility locations and roads must be reclaimed to a satisfactory

revegetated, safe, and stable condition, unless an agreement is made with the landowner or BLM to keep the road and/or pad intact.

After all disturbed areas have been satisfactorily prepared, these areas need to be revegetated with the seed mixture provided below. Seeding should be accomplished by drilling on the contour whenever practical or by other approved methods. Seeding may need to be repeated until revegetation is successful, as determined by the BLM.

Operators shall contact a BLM surface protection specialist prior to surface abandonment operations for site specific objectives (Jimi Amos: 575-234-5909).

#### Seed Mixture 3, for Shallow Sites

The holder shall seed all disturbed areas with the seed mixture listed below. The seed mixture shall be planted in the amounts specified in pounds of pure live seed (PLS)\* per acre. There shall be no primary or secondary noxious weeds in the seed mixture. Seed will be tested and the viability testing of seed will be done in accordance with State law(s) and within nine (9) months prior to purchase. Commercial seed will be either certified or registered seed. The seed container will be tagged in accordance with State law(s) and available for inspection by the authorized officer.

Seed will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). The holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. The seeding will be repeated until a satisfactory stand is established as determined by the authorized officer. Evaluation of growth will not be made before completion of at least one full growing season after seeding.

Species to be planted in pounds of pure live seed\* per acre:

Species	lb/acre
Plains Bristlegrass ( <i>Setaria magrostachya</i> )	1.0
Green Spangletop ( <i>Leptochloa dubia</i> )	2.0
Side oats Grama ( <i>Bouteloua curtipendula</i> )	5.0

\*Pounds of pure live seed:

Pounds of seed x percent purity x percent germination = pounds pure live seed