orm 3160-3
August 2007)

NM OIL CONSERVATION
ARTESIA DISTRICT
DEC 22 2016
RECEIVED

Carlsbad Field Office
OCD Artesia

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

R-111-POTASH

ATS-14-870

FORM APPROVED
OMB No. 1004-013
Expires July 31, 2010

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
SHL: NMNM114354
BHL: NMNM0429170

6. If Indian, Allotee or Tribe Name

1a. Type of Work: [✓] DRILL [ ] REENTER

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

1b. Type of Well: [✓] Oil Well [ ] Gas Well [ ] Other [ ] Single Zone [ ] Multiple Zone

8. Lease Name and Well No.
Solution Federal Com #1H

2. Name of Operator
COG Operating LLC.

9. API Well No.
30-015-44008

3a. Address
2208 West Main Street
Artesia, NM 88210

3b. Phone No. *(include area code)*
575-748-6940

10. Field and Pool, or Exploratory
Parkway; Bone Spring

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

At surface 190' FNL & 2090' FEL Lot 2 NWNE SHL Sec 5-T20S-R30E

At proposed prod. Zone 2310' FNL & 380' FEL Unit Letter H SENE SHL Sec 8-T20S-R30E

11. Sec., T.R.M. or Blk and Survey or Area
Sec. 5- T20S - R30E

14. Distance in miles and direction from nearest town or post office*
About 13 miles from Carlsbad

12. County or Parish
Eddy County

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. Unit line, if any)	16. No. of acres in lease	17. Spacing Unit dedicated to this well
190'	SHL: 599.68 BHL: 320	239.69

18. Distance from location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth	20. BLM/BIA Bond No. on file
SHL: 170' (Solution 2H) BHL: 662'	TVD: 8,395' MD: 15,727'	NMB000740 & NMB000215

21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
3248.1' GL	1/1/2015	30 days

24. Attachments

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

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

25. Signature	Name *(Printed/Typed)*	Date
Mayte Reyes	Mayte Reyes	12-11-2014

Title
Regulatory Analyst

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
/s/Cody Layton		DEC 19 2016

Title	Office
FIELD MANAGER	CARLSBAD FIELD OFFICE

Application approval does not warrant or certify that the applicant holds legan or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations theron.
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)

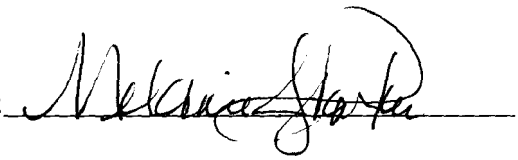
Capitan Controlled Water Basin

Approval Subject to General Requirements & Special Stipulations Attached

SEE ATTACHED FOR CONDITIONS OF APPROVAL

OPERATOR CERTIFICATION

I hereby certify that I, or persons under my direct supervision, have inspected the drill site and access road proposed herein; that I am familiar with the conditions that presently exist; that I have full knowledge of State and Federal laws applicable to this operation; that the statements made in this 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 in conformity with this APD package and the terms and conditions under which it is approved. I also certify that I, or COG Operating LLC, am responsible for the operations conducted under this application. These statements are subject to the provisions of 18 U.S.C. 1001 for the filing of false statements. Executed this 2nd day of March, 2015.

Signed: 

Printed Name: Melanie J. Parker
Position: Regulatory Coordinator
Address: 2208 W. Main Street, Artesia, NM 88210
Telephone: (575) 748-6940
Field Representative (if not above signatory): Rand French
E-mail: mparker@concho.com

NM OIL CONSERVATION
ARTESIA DISTRICT
DEC 22 2014
RECEIVED

DISTRICT I
1625 N. FRENCH DR., HOBBS, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720

DISTRICT II
811 S. FIRST ST., ARTESIA, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 RIO BRAZOS RD., AZTEC, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170

DISTRICT IV
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, New Mexico 87505

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

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-015- 44008	49622	Parkway; Bone Spring

Property Code	Property Name	Well Number
315036	SOLUTION FEDERAL COM	1H

OGRID No.	Operator Name	Elevation
229137	COG OPERATING, LLC	3248.1

Surface Location

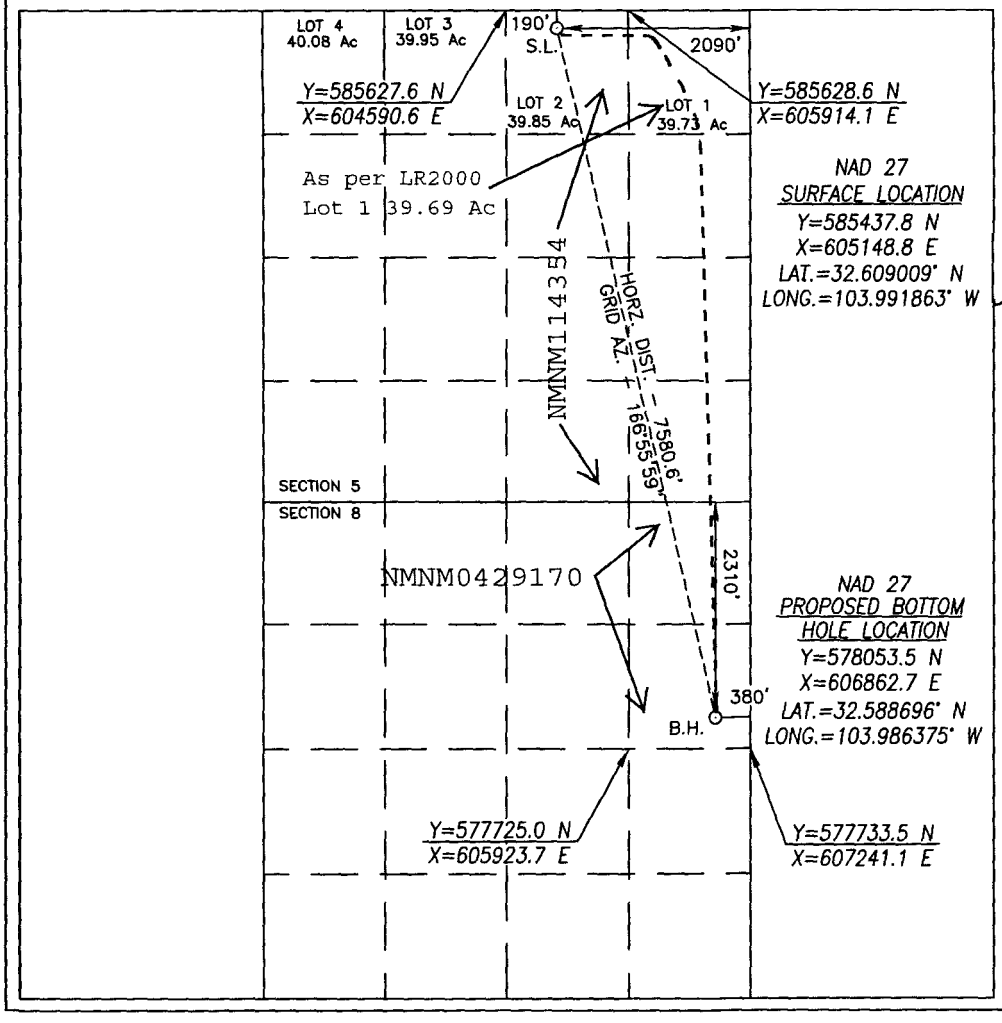
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
2	5	20-S	30-E		190	NORTH	2090	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
H	8	20-S	30-E		2310	NORTH	380	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
239.69			

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



OPERATOR CERTIFICATION

I hereby certify that the information herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Melanie Parker 12/11/14
Signature Date

Melanie J Parker
Printed Name

mparker@concho.com
E-mail Address

SURVEYOR CERTIFICATION

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.

AUGUST 8, 2014
Date of Survey

Signature & Seal of Professional Surveyor

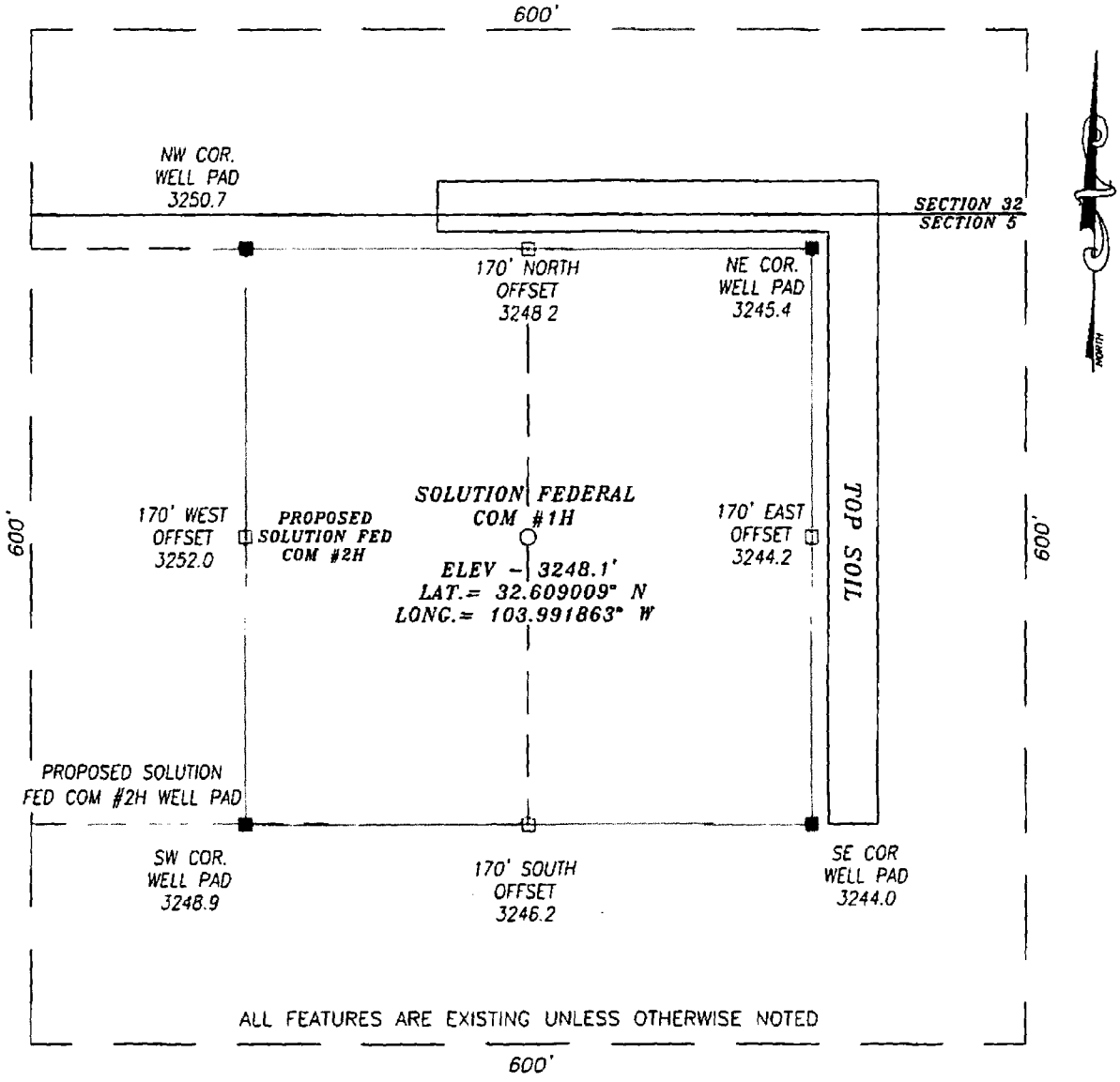
CHAD L. HARCROW
NEW MEXICO
17777
LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 08/26/14
Certificate No. CHAD HARCROW 17777

W.O. # 14-960 DRAWN BY: AM

SECTION 5, TOWNSHIP 20 SOUTH, RANGE 30 EAST, N.M.P.M.,

EDDY COUNTY NEW MEXICO



DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF HWY 360 (BLUESTEM RD.) AND CR #235 (CURRY COMB RD.) GO APPROX. 2.3 MILES NORTHWEST ALONG CR #235 (CURRY COMB RD.); THEN TURN LEFT SOUTHWEST AND GO APPROX 0.9 MILES; THEN PROPOSED WELL IS APPROX. 370 FEET SOUTHEAST.

HARCROW SURVEYING, LLC
2314 W. MAIN ST, ARTESIA, N.M 88210
PH: (575) 746-2158 FAX: (575) 746-2158
c.harcrow@harcrowsurveying.com

CERTIFICATION

I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 2/11/16

CHAD HARCROW N.M.P.S. NO. 17777 DATE

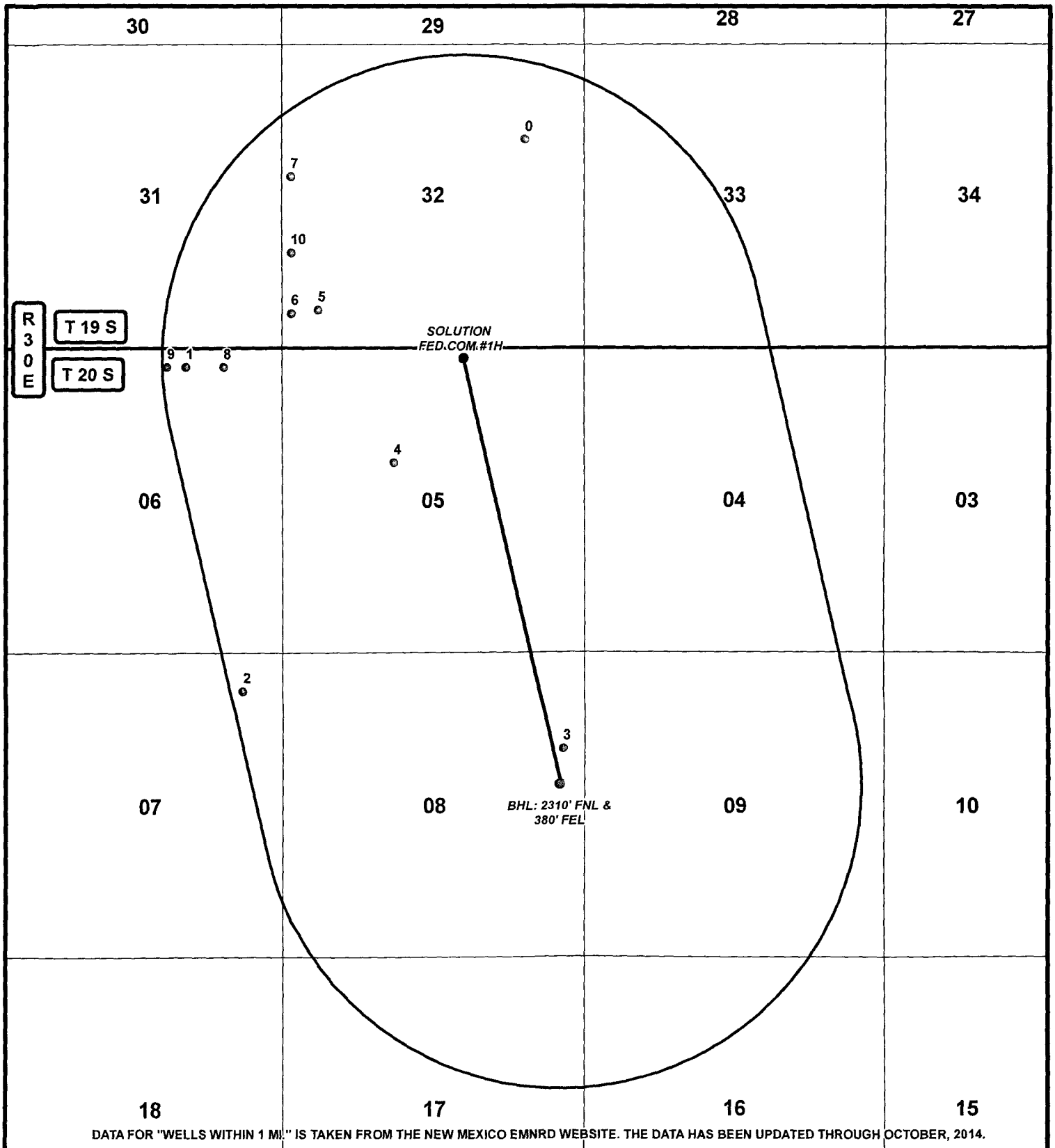
100 0 100 200 Feet

Scale: 1"=100'

COG OPERATING, LLC

SOLUTION FEDERAL COM #1H WELL
LOCATED 190 FEET FROM THE NORTH LINE
AND 2090 FEET FROM THE EAST LINE OF SECTION 5,
TOWNSHIP 20 SOUTH, RANGE 30 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO

SURVEY DATE: 8/8/2014		PAGE: 1 OF 1
DRAFTING DATE: 10/28/2014		
APPROVED BY: CH	DRAWN BY: AM	FILE: 14-1049



DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH OCTOBER, 2014.

LEGEND

- WELL
- BOTTOMHOLE
- WELLS WITHIN 1 MI.
- 1 MI. BUFFER

SOLUTION FED COM #1H

SEC: 5	TWP: 20 S.	RGE: 30 E.	ELEVATION: 3248.1'
STATE: NEW MEXICO	COUNTY: EDDY		190' FNL & 2090' FEL
W.O. # 14-1049	LEASE: SOLUTION FED		SURVEY: N.M.P.M

0 2,500 5,000 FEET

0 0.15 0.3 0.6 Miles

1 IN = 2,250 FT

1 MILE MAP 10/28/2014 S.P.

N

CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
2314 W. MAIN ST, ARTESIA, NM 88210
PH: (575) 513-2570 FAX: (575) 746-2158
chad_harcrow77@yahoo.com

Solution Federal Com #1H

FID	OPERATOR	WELL_NAME	LATITUDE	LONGITUDE	API	SECTION	TOWNSHIP	RANGE	FTG_NS	NS_CD	FTG_EW	EW_CD	TVD_DEPTH	COMPL_STAT
0	HENRY BLACK DRLG CO	STATE LOWE 002	32.619602	-103.988884	3001504653	32	19.0S	30E	1650	N	990	E	0	Plugged
1	MARK WHELAN	RIGGS 001	32.608755	-104.008212	3001504661	6	20.0S	30E	330	N	1650	E	0	Plugged
2	GROVER-MANN BRO	RIGGS 001	32.593327	-104.00499	3001504665	7	20.0S	30E	660	N	660	E	0	Plugged
3	CONTINENTAL OIL	Cunningham 001	32.590619	-103.986775	3001504666	8	20.0S	30E	1650	N	330	E	0	Plugged
4	IKE LOVELADY INC	CONTINENTAL FED 5 001	32.604201	-103.996358	3001510003	5	20.0S	30E	1980	N	1980	W	0	Plugged
5	COG OPERATING LLC	STRAIGHT JOE STATE COM 001	32.611466	-104.000673	3001534068	32	19.0S	30E	660	S	660	W	12180	Active
6	COG OPERATING LLC	SHOELESS JOE 32 STATE COM 004H	32.611304	-104.002207	3001541242	32	19.0S	30E	600	S	190	W	8378	New (Not drilled or compl)
7	COG OPERATING LLC	SHOELESS JOE 32 STATE COM 002H	32.61782	-104.002197	3001541238	32	19.0S	30E	2310	N	190	W	0	New (Not drilled or compl)
8	CIMAREX ENERGY CO.	BURTON 6 FEDERAL COM 004H	32.608753	-104.006058	3001539332	6	20.0S	30E	330	N	990	E	0	New (Not drilled or compl)
9	CIMAREX ENERGY CO.	BURTON 6 FEDERAL 003H	32.608756	-104.009288	3001539331	6	20.0S	30E	330	N	1980	E	0	New (Not drilled or compl)
10	COG OPERATING LLC	SHOELESS JOE 32 STATE COM 003H	32.61419	-104.002203	3001541028	32	19.0S	30E	1650	S	190	W	8405	New (Not drilled or compl)

COG Operating LLC, Solution Federal Com #1H

1. Geologic Formations

TVD of target @ EOC	8395'	Pilot hole depth	NA
MD at TD:	15727'	Deepest expected fresh water:	148'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Fresh Water	
Rustler	199'	Fresh Water	
Top of Salt	462'	Salt	
Tansill	1559'	Barren	
Yates	1639'	Barren	
Capitan Reef	2031'	Water	
Delaware Group	3457'	Oil/Gas	
Bone Spring	6211'	Oil/Gas	
2nd Bone Spring	8075'	Target Zone	
3rd Bone Spring	9157'	Will Not Penetrate	

*H2S, water flows, loss of circulation, abnormal pressures, etc.

2. Casing Program

See COA

per Alex Kaczmarski

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
26"	0	350'	20"	94	J55	STC	3.36	2.57	23.80
17 1/2"	0	~~1660'~~ 1680'	13.375"	54.5	J55	~~LTC~~ STC	1.31	1.74	6.06
12 1/4"	0'	3477'	9.625"	40	J55	LTC	1.63	1.01	3.74
8 3/4"	0	7849'	7.0"	26	P110	BTC	1.59	1.33	2.52
8 3/4"	7849'	~~15727~~' 15,724 per directional plan	5.5 "	17	P110	BTC	1.90	1.33	4.08
			BLM Minimum Safety Factor				1.125	1	1.6 Dry 1.8 Wet

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
- BLM standard formulas where used on all SF calculations.
- Assumed 9.0 ppg MW equivalent pore pressure thru entire wellbore.

COG Operating LLC, Solution Federal Com #1H

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	Y
If yes, does production casing cement tie back a minimum of 50' above the Reef?	Y
Is well within the designated 4 string boundary.	Y
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	Y
If yes, are the first three strings cemented to surface?	Y
Is 2nd string set 100' to 600' below the base of salt?	Y
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/ sk	500# Comp. Strength (hours)	Slurry Description
Surf.	875	13.5	1.75	9.2	10	Lead: Class C + 4.0% Gel+2% $CaCl_2$ + 0.25 pps CF
	325	14.8	1.34	6.3	6	Tail: Class C + 2% $CaCl_2$ + 0.25 pps CF
1st Inter.	1200	12.7	1.75	11.5	10	Lead: Class"C" + 4.0 % Gel+2% $CaCl_2$ + 0.25 pps CF
	375	14.8	1.32	6.3	6	Tail: Class C + 2% $CaCl_2$ +0.25 pps CF
2nd Inter.	200	11.8	2.45	14.4	72	1st stage Lead: 50:50:10 C: Poz:Gel w/5% Salt + 5 pps LCM + 0.25 pps CF
	550	14.8	1.32	6.3	6	1st stage Tail: Class"C" w/2% CaCl2 + 0.25 pps CF
	DV Tool/ ECP @ approx. 1980'					
	425	11.8	2.45	14.4	72	2nd stage lead: 50:50:10 C:Poz:Gel w/5% Salt+ 5 pps LCM + 0.25 pps CF
	200	14.8	1.32	6.3	6	2nd stage Tail: Class"C" + 2% $CaCl_2$ + 0.25 pps CF

Prod.	600	11.9	2.51	14.2	22	Lead: EconoCem-H+ 0.5% Halad-322 + 5 pps Kol-Seal + 0.25 pps D-AIR 5000 + 0.2% HR-601
See COA	2000	14.4	1.24	5.7	8	Tail: VersaCem + 0.4% GasStop+ 0.3% CFR-3 + 1% Salt + 0.1% HR-601

DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	100%
1st Intermediate	0'	100%
2nd Intermediate	0'	100%
Production	0'	35%

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
17 ½"	20"	2M	Annular	x	50% of working pressure
			Blind Ram		2000 psi WP
			Pipe Ram		
			Double Ram		
			Other*		
12 ¼"	13 5/8"	2M	Annular	x	50% testing pressure
			Blind Ram		2000 psi WP
			Pipe Ram		
			Double Ram		
			Other *		
8 ¾" & 7 7/8"	13 5/8"	3M	Annular	x	
			Blind Ram	x	3000 psi WP
			Pipe Ram	x	
			Double Ram		
			Other *		

*Specify if additional ram is utilized.

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

N	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
N	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
	NA | Are anchors required by manufacturer?
N	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. shoe	Fresh Water	8.4-8.6	29-40	N/C
Surf shoe	1st Int. shoe	Brine	10.0-10.1	29-32	N/C
1st Int. shoe	2nd Int. shoe	Fresh Water	8.4-8.7	28-32	N/C
2nd Int. shoe	TD	Cut Brine	8.4-9.0	29-36	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

Logging, Coring and Testing.	
X	Will run Cased hole GR/CNL fromTD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	No Logs are planned based on well control or offset log information.
	Drill stem test? If yes, explain
	Coring? If yes, explain

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	3693 psi
Abnormal Temperature	No

If severe losses are encountered in the Capitan Reef and hole conditions allow, dry drilling to TD while using only fresh water in mud system will be the preferred operation. If hole conditions do not allow dry drilling with fresh water – LCM sweeps, cement plugs, air or other loss circulation remedies may be introduced to operations to manage lost circulation. Cement will be circulated to surface in two stages using a stage tool and an external casing packer to isolate the weaker zones in the Capitan Reef.

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.	
N	H2S is present
Y	H2S Plan attached

8. Other facets of operation

Is this a walking operation? No
- No casings will be pre-set
- Anti-Collision practices will be used to avoid collision in vertical well bores

Attachments:
- BOP & Choke schematics
- Directional plan
- C102 and supporting maps
- Anti-collision report
- Rig plat schematic
- H2S plan schematic
- H2S contingency plan
- Interim reclamation plat

GEG: 10/20/14

COG OPERATING, LLC

Eddy County, NM
Solution Federal 1H
1H

Lateral

Plan: Plan #2

Standard Planning Report

08 December, 2014

Section Distances
Sec5,T20S,R30E
SHL - Lot 2
190'FNL, 2089'FEL
PP
542'FNL, 995'FEL
Sec8,T20S,R30E
PBHL - Unit H
2310'FNL, 380'FEL

Archer
Planning Report

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 1H
Company:	COG OPERATING, LLC	**TVD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Project:	Eddy County, NM	**MD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Site:	Solution Federal 1H	**North Reference:**	Grid
Well:	1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #2		

Project	Eddy County, NM		
Map System:	US State Plane 1927 (Exact solution)	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Solution Federal 1H				
Site Position:		**Northing:**	585,437.80 usft	**Latitude:**	32° 36' 32.43 N
From:	Map	**Easting:**	605,148.80 usft	**Longitude:**	103° 59' 30.70 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13.200 in	**Grid Convergence:**	0.18 °

Well	1H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	585,437.80 usft	**Latitude:**	32° 36' 32.43 N
	+E/-W	0.00 usft	**Easting:**	605,148.80 usft	**Longitude:**	103° 59' 30.70 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	3,248.00 usft

Wellbore	Lateral				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	10/8/2014	7.73	60.53	48,521

Design	Plan #2				
Audit Notes:					
Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.00	0.00	0.00	166.93	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,110.41	0.00	0.00	3,110.41	0.00	0.00	0.00	0.00	0.00	0.00	
3,610.41	10.00	90.00	3,607.88	0.00	43.52	2.00	2.00	0.00	90.00	
7,310.41	10.00	90.00	7,251.66	0.00	686.02	0.00	0.00	0.00	0.00	
7,810.41	0.00	0.00	7,749.13	0.00	729.54	2.00	-2.00	0.00	180.00	
7,910.41	0.00	0.00	7,849.13	0.00	729.54	0.00	0.00	0.00	0.00	
8,726.77	89.80	133.19	8,370.00	-355.25	1,107.98	11.00	11.00	0.00	133.19	
10,286.01	89.80	179.97	8,375.71	-1,746.60	1,710.68	3.00	0.00	3.00	90.08	
15,923.74	89.80	179.97	8,395.00	-7,384.30	1,713.90	0.00	0.00	0.00	0.00	Solution 1H PBHL

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 1H
Company:	COG OPERATING, LLC	**TVD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Project:	Eddy County, NM	**MD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Site:	Solution Federal 1H	**North Reference:**	Grid
Well:	1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,110.41	0.00	0.00	3,110.41	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 2.00									
3,200.00	1.79	90.00	3,199.99	0.00	1.40	0.32	2.00	2.00	0.00
3,300.00	3.79	90.00	3,299.86	0.00	6.27	1.42	2.00	2.00	0.00
3,400.00	5.79	90.00	3,399.51	0.00	14.62	3.31	2.00	2.00	0.00
3,500.00	7.79	90.00	3,498.80	0.00	26.45	5.98	2.00	2.00	0.00
3,600.00	9.79	90.00	3,597.62	0.00	41.73	9.44	2.00	2.00	0.00
3,610.41	10.00	90.00	3,607.88	0.00	43.52	9.84	2.00	2.00	0.00
Start 3700.00 hold at 3610.41 MD									
3,700.00	10.00	90.00	3,696.10	0.00	59.08	13.36	0.00	0.00	0.00
3,800.00	10.00	90.00	3,794.59	0.00	76.44	17.28	0.00	0.00	0.00
3,900.00	10.00	90.00	3,893.07	0.00	93.81	21.21	0.00	0.00	0.00
4,000.00	10.00	90.00	3,991.55	0.00	111.17	25.14	0.00	0.00	0.00
4,100.00	10.00	90.00	4,090.03	0.00	128.54	29.06	0.00	0.00	0.00
4,200.00	10.00	90.00	4,188.51	0.00	145.90	32.99	0.00	0.00	0.00
4,300.00	10.00	90.00	4,286.99	0.00	163.27	36.91	0.00	0.00	0.00
4,400.00	10.00	90.00	4,385.47	0.00	180.63	40.84	0.00	0.00	0.00
4,500.00	10.00	90.00	4,483.95	0.00	198.00	44.77	0.00	0.00	0.00
4,600.00	10.00	90.00	4,582.43	0.00	215.36	48.69	0.00	0.00	0.00
4,700.00	10.00	90.00	4,680.91	0.00	232.73	52.62	0.00	0.00	0.00
4,800.00	10.00	90.00	4,779.39	0.00	250.09	56.54	0.00	0.00	0.00
4,900.00	10.00	90.00	4,877.87	0.00	267.46	60.47	0.00	0.00	0.00

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 1H
Company:	COG OPERATING, LLC	**TVD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Project:	Eddy County, NM	**MD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Site:	Solution Federal 1H	**North Reference:**	Grid
Well:	1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,000.00	10.00	90.00	4,976.35	0.00	284.82	64.40	0.00	0.00	0.00
5,100.00	10.00	90.00	5,074.84	0.00	302.19	68.32	0.00	0.00	0.00
5,200.00	10.00	90.00	5,173.32	0.00	319.55	72.25	0.00	0.00	0.00
5,300.00	10.00	90.00	5,271.80	0.00	336.92	76.17	0.00	0.00	0.00
5,400.00	10.00	90.00	5,370.28	0.00	354.28	80.10	0.00	0.00	0.00
5,500.00	10.00	90.00	5,468.76	0.00	371.65	84.03	0.00	0.00	0.00
5,600.00	10.00	90.00	5,567.24	0.00	389.01	87.95	0.00	0.00	0.00
5,700.00	10.00	90.00	5,665.72	0.00	406.38	91.88	0.00	0.00	0.00
5,800.00	10.00	90.00	5,764.20	0.00	423.74	95.80	0.00	0.00	0.00
5,900.00	10.00	90.00	5,862.68	0.00	441.11	99.73	0.00	0.00	0.00
6,000.00	10.00	90.00	5,961.16	0.00	458.47	103.66	0.00	0.00	0.00
6,100.00	10.00	90.00	6,059.64	0.00	475.84	107.58	0.00	0.00	0.00
6,200.00	10.00	90.00	6,158.12	0.00	493.20	111.51	0.00	0.00	0.00
6,300.00	10.00	90.00	6,256.60	0.00	510.56	115.43	0.00	0.00	0.00
6,400.00	10.00	90.00	6,355.09	0.00	527.93	119.36	0.00	0.00	0.00
6,500.00	10.00	90.00	6,453.57	0.00	545.29	123.29	0.00	0.00	0.00
6,600.00	10.00	90.00	6,552.05	0.00	562.66	127.21	0.00	0.00	0.00
6,700.00	10.00	90.00	6,650.53	0.00	580.02	131.14	0.00	0.00	0.00
6,800.00	10.00	90.00	6,749.01	0.00	597.39	135.06	0.00	0.00	0.00
6,900.00	10.00	90.00	6,847.49	0.00	614.75	138.99	0.00	0.00	0.00
7,000.00	10.00	90.00	6,945.97	0.00	632.12	142.92	0.00	0.00	0.00
7,100.00	10.00	90.00	7,044.45	0.00	649.48	146.84	0.00	0.00	0.00
7,200.00	10.00	90.00	7,142.93	0.00	666.85	150.77	0.00	0.00	0.00
7,300.00	10.00	90.00	7,241.41	0.00	684.21	154.69	0.00	0.00	0.00
7,310.41	10.00	90.00	7,251.66	0.00	686.02	155.10	0.00	0.00	0.00
Start Drop -2.00									
7,400.00	8.21	90.00	7,340.12	0.00	700.20	158.31	2.00	-2.00	0.00
7,500.00	6.21	90.00	7,439.33	0.00	712.74	161.14	2.00	-2.00	0.00
7,600.00	4.21	90.00	7,538.91	0.00	721.82	163.20	2.00	-2.00	0.00
7,700.00	2.21	90.00	7,638.75	0.00	727.42	164.46	2.00	-2.00	0.00
7,800.00	0.21	90.00	7,738.72	0.00	729.52	164.94	2.00	-2.00	0.00
7,810.41	0.00	0.00	7,749.13	0.00	729.54	164.94	2.00	-2.00	0.00
Start 100.00 hold at 7810.41 MD									
7,900.00	0.00	0.00	7,838.72	0.00	729.54	164.94	0.00	0.00	0.00
7,910.41	0.00	0.00	7,849.13	0.00	729.54	164.94	0.00	0.00	0.00
Start Build 11.00									
7,950.00	4.35	133.19	7,888.68	-1.03	730.64	166.19	11.00	11.00	0.00
8,000.00	9.85	133.19	7,938.28	-5.26	735.15	171.33	11.00	11.00	0.00
8,050.00	15.35	133.19	7,987.05	-12.73	743.10	180.40	11.00	11.00	0.00
8,100.00	20.85	133.19	8,034.56	-23.36	754.42	193.32	11.00	11.00	0.00
8,150.00	26.35	133.19	8,080.36	-37.05	769.02	209.96	11.00	11.00	0.00
8,200.00	31.85	133.19	8,124.03	-53.69	786.74	230.18	11.00	11.00	0.00
8,250.00	37.35	133.19	8,165.17	-73.12	807.44	253.78	11.00	11.00	0.00
8,300.00	42.85	133.19	8,203.40	-95.16	830.91	280.55	11.00	11.00	0.00
8,350.00	48.35	133.19	8,238.36	-119.60	856.95	310.25	11.00	11.00	0.00
8,400.00	53.85	133.19	8,269.75	-146.22	885.31	342.60	11.00	11.00	0.00
8,450.00	59.35	133.19	8,297.26	-174.78	915.73	377.30	11.00	11.00	0.00
8,500.00	64.85	133.19	8,320.64	-205.02	947.94	414.03	11.00	11.00	0.00
8,550.00	70.35	133.19	8,339.68	-236.64	981.63	452.45	11.00	11.00	0.00
8,600.00	75.85	133.19	8,354.21	-269.37	1,016.50	492.22	11.00	11.00	0.00
8,650.00	81.35	133.19	8,364.08	-302.91	1,052.22	532.96	11.00	11.00	0.00
8,700.00	86.85	133.19	8,369.22	-336.94	1,088.47	574.30	11.00	11.00	0.00
8,726.77	89.80	133.19	8,370.00	-355.25	1,107.98	596.55	11.00	11.00	0.00

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 1H
Company:	COG OPERATING, LLC	**TVD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Project:	Eddy County, NM	**MD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Site:	Solution Federal 1H	**North Reference:**	Grid
Well:	1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
Start DLS 3.00 TFO 90.08									
8,800.00	89.80	135.39	8,370.25	-406.38	1,160.39	658.21	3.00	0.00	3.00
8,900.00	89.79	138.39	8,370.61	-479.37	1,228.73	744.76	3.00	0.00	3.00
9,000.00	89.79	141.39	8,370.98	-555.84	1,293.15	833.81	3.00	0.00	3.00
9,100.00	89.79	144.39	8,371.34	-635.57	1,353.48	925.13	3.00	0.00	3.00
9,200.00	89.79	147.39	8,371.71	-718.36	1,409.56	1,018.44	3.00	0.00	3.00
9,300.00	89.78	150.39	8,372.09	-803.96	1,461.23	1,113.51	3.00	0.00	3.00
9,400.00	89.78	153.39	8,372.47	-892.15	1,508.34	1,210.07	3.00	0.00	3.00
9,500.00	89.78	156.39	8,372.84	-982.69	1,550.78	1,307.86	3.00	0.00	3.00
9,600.00	89.78	159.39	8,373.22	-1,075.32	1,588.42	1,406.60	3.00	0.00	3.00
9,700.00	89.79	162.39	8,373.59	-1,169.80	1,621.15	1,506.03	3.00	0.00	3.00
9,800.00	89.79	165.39	8,373.97	-1,265.86	1,648.90	1,605.88	3.00	0.00	3.00
9,900.00	89.79	168.39	8,374.33	-1,363.24	1,671.59	1,705.87	3.00	0.00	3.00
10,000.00	89.79	171.39	8,374.70	-1,461.67	1,689.15	1,805.72	3.00	0.00	3.00
10,100.00	89.80	174.39	8,375.06	-1,560.89	1,701.53	1,905.17	3.00	0.00	3.00
10,200.00	89.80	177.39	8,375.41	-1,660.62	1,708.70	2,003.94	3.00	0.00	3.00
10,286.01	89.80	179.97	8,375.71	-1,746.60	1,710.68	2,088.14	3.00	0.00	3.00
Start 5637.74 hold at 10286.01 MD									
10,300.00	89.80	179.97	8,375.76	-1,760.59	1,710.69	2,101.77	0.00	0.00	0.00
10,400.00	89.80	179.97	8,376.10	-1,860.59	1,710.75	2,199.20	0.00	0.00	0.00
10,500.00	89.80	179.97	8,376.44	-1,960.59	1,710.81	2,296.62	0.00	0.00	0.00
10,600.00	89.80	179.97	8,376.78	-2,060.59	1,710.86	2,394.04	0.00	0.00	0.00
10,700.00	89.80	179.97	8,377.12	-2,160.59	1,710.92	2,491.47	0.00	0.00	0.00
10,800.00	89.80	179.97	8,377.47	-2,260.59	1,710.98	2,588.89	0.00	0.00	0.00
10,900.00	89.80	179.97	8,377.81	-2,360.59	1,711.03	2,686.31	0.00	0.00	0.00
11,000.00	89.80	179.97	8,378.15	-2,460.59	1,711.09	2,783.73	0.00	0.00	0.00
11,100.00	89.80	179.97	8,378.49	-2,560.59	1,711.15	2,881.16	0.00	0.00	0.00
11,200.00	89.80	179.97	8,378.84	-2,660.58	1,711.21	2,978.58	0.00	0.00	0.00
11,300.00	89.80	179.97	8,379.18	-2,760.58	1,711.26	3,076.00	0.00	0.00	0.00
11,400.00	89.80	179.97	8,379.52	-2,860.58	1,711.32	3,173.43	0.00	0.00	0.00
11,500.00	89.80	179.97	8,379.86	-2,960.58	1,711.38	3,270.85	0.00	0.00	0.00
11,600.00	89.80	179.97	8,380.20	-3,060.58	1,711.43	3,368.27	0.00	0.00	0.00
11,700.00	89.80	179.97	8,380.55	-3,160.58	1,711.49	3,465.69	0.00	0.00	0.00
11,800.00	89.80	179.97	8,380.89	-3,260.58	1,711.55	3,563.12	0.00	0.00	0.00
11,900.00	89.80	179.97	8,381.23	-3,360.58	1,711.60	3,660.54	0.00	0.00	0.00
12,000.00	89.80	179.97	8,381.57	-3,460.58	1,711.66	3,757.96	0.00	0.00	0.00
12,100.00	89.80	179.97	8,381.91	-3,560.58	1,711.72	3,855.39	0.00	0.00	0.00
12,200.00	89.80	179.97	8,382.26	-3,660.58	1,711.78	3,952.81	0.00	0.00	0.00
12,300.00	89.80	179.97	8,382.60	-3,760.58	1,711.83	4,050.23	0.00	0.00	0.00
12,400.00	89.80	179.97	8,382.94	-3,860.58	1,711.89	4,147.66	0.00	0.00	0.00
12,500.00	89.80	179.97	8,383.28	-3,960.58	1,711.95	4,245.08	0.00	0.00	0.00
12,600.00	89.80	179.97	8,383.63	-4,060.58	1,712.00	4,342.50	0.00	0.00	0.00
12,700.00	89.80	179.97	8,383.97	-4,160.58	1,712.06	4,439.92	0.00	0.00	0.00
12,800.00	89.80	179.97	8,384.31	-4,260.58	1,712.12	4,537.35	0.00	0.00	0.00
12,900.00	89.80	179.97	8,384.65	-4,360.57	1,712.18	4,634.77	0.00	0.00	0.00
13,000.00	89.80	179.97	8,384.99	-4,460.57	1,712.23	4,732.19	0.00	0.00	0.00
13,100.00	89.80	179.97	8,385.34	-4,560.57	1,712.29	4,829.62	0.00	0.00	0.00
13,200.00	89.80	179.97	8,385.68	-4,660.57	1,712.35	4,927.04	0.00	0.00	0.00
13,300.00	89.80	179.97	8,386.02	-4,760.57	1,712.40	5,024.46	0.00	0.00	0.00
13,400.00	89.80	179.97	8,386.36	-4,860.57	1,712.46	5,121.88	0.00	0.00	0.00
13,500.00	89.80	179.97	8,386.71	-4,960.57	1,712.52	5,219.31	0.00	0.00	0.00
13,600.00	89.80	179.97	8,387.05	-5,060.57	1,712.57	5,316.73	0.00	0.00	0.00
13,700.00	89.80	179.97	8,387.39	-5,160.57	1,712.63	5,414.15	0.00	0.00	0.00
13,800.00	89.80	179.97	8,387.73	-5,260.57	1,712.69	5,511.58	0.00	0.00	0.00

Database:	EDM R5000.1 MULTI	**Local Co-ordinate Reference:**	Well 1H
Company:	COG OPERATING, LLC	**TVD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Project:	Eddy County, NM	**MD Reference:**	3248'GL+19'KB @ 3267.00usft (McVay 6)
Site:	Solution Federal 1H	**North Reference:**	Grid
Well:	1H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Lateral		
Design:	Plan #2		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,900.00	89.80	179.97	8,388.07	-5,360.57	1,712.75	5,609.00	0.00	0.00	0.00
14,000.00	89.80	179.97	8,388.42	-5,460.57	1,712.80	5,706.42	0.00	0.00	0.00
14,100.00	89.80	179.97	8,388.76	-5,560.57	1,712.86	5,803.85	0.00	0.00	0.00
14,200.00	89.80	179.97	8,389.10	-5,660.57	1,712.92	5,901.27	0.00	0.00	0.00
14,300.00	89.80	179.97	8,389.44	-5,760.57	1,712.97	5,998.69	0.00	0.00	0.00
14,400.00	89.80	179.97	8,389.79	-5,860.57	1,713.03	6,096.11	0.00	0.00	0.00
14,500.00	89.80	179.97	8,390.13	-5,960.57	1,713.09	6,193.54	0.00	0.00	0.00
14,600.00	89.80	179.97	8,390.47	-6,060.56	1,713.14	6,290.96	0.00	0.00	0.00
14,700.00	89.80	179.97	8,390.81	-6,160.56	1,713.20	6,388.38	0.00	0.00	0.00
14,800.00	89.80	179.97	8,391.15	-6,260.56	1,713.26	6,485.81	0.00	0.00	0.00
14,900.00	89.80	179.97	8,391.50	-6,360.56	1,713.32	6,583.23	0.00	0.00	0.00
15,000.00	89.80	179.97	8,391.84	-6,460.56	1,713.37	6,680.65	0.00	0.00	0.00
15,100.00	89.80	179.97	8,392.18	-6,560.56	1,713.43	6,778.07	0.00	0.00	0.00
15,200.00	89.80	179.97	8,392.52	-6,660.56	1,713.49	6,875.50	0.00	0.00	0.00
15,300.00	89.80	179.97	8,392.87	-6,760.56	1,713.54	6,972.92	0.00	0.00	0.00
15,400.00	89.80	179.97	8,393.21	-6,860.56	1,713.60	7,070.34	0.00	0.00	0.00
15,500.00	89.80	179.97	8,393.55	-6,960.56	1,713.66	7,167.77	0.00	0.00	0.00
15,600.00	89.80	179.97	8,393.89	-7,060.56	1,713.72	7,265.19	0.00	0.00	0.00
15,700.00	89.80	179.97	8,394.23	-7,160.56	1,713.77	7,362.61	0.00	0.00	0.00
15,800.00	89.80	179.97	8,394.58	-7,260.56	1,713.83	7,460.04	0.00	0.00	0.00
15,900.00	89.80	179.97	8,394.92	-7,360.56	1,713.89	7,557.46	0.00	0.00	0.00
15,923.74	89.80	179.97	8,395.00	-7,384.30	1,713.90	7,580.59	0.00	0.00	0.00
TD at 15923.74									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Solution 1H Surface - plan hits target center - Point	0.00	0.00	0.00	0.00	0.00	585,437.80	605,148.80	32° 36' 32.43 N	103° 59' 30.70 W
Solution 1H PP - plan misses target center by 1150.91usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	-351.39	1,095.95	585,086.41	606,244.76	32° 36' 28.92 N	103° 59' 17.91 W
Solution 1H PBHL - plan hits target center - Point	0.00	0.00	8,395.00	-7,384.30	1,713.90	578,053.50	606,862.70	32° 35' 19.30 N	103° 59' 10.95 W

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
3,110.41	3,110.41	0.00	0.00	Start Build 2.00
3,610.41	3,607.88	0.00	43.52	Start 3700.00 hold at 3610.41 MD
7,310.41	7,251.66	0.00	686.02	Start Drop -2.00
7,810.41	7,749.13	0.00	729.54	Start 100.00 hold at 7810.41 MD
7,910.41	7,849.13	0.00	729.54	Start Build 11.00
8,726.77	8,370.00	-355.25	1,107.98	Start DLS 3.00 TFO 90.08
10,286.01	8,375.71	-1,746.60	1,710.68	Start 5637.74 hold at 10286.01 MD
15,923.74	8,395.00	-7,384.30	1,713.90	TD at 15923.74

COG OPERATING, LLC

Field: Eddy County, NM
Site: Solution Federal 1H
Well: 1H
Wellbore: Lateral
Plan: Plan #2

TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Solution 1H PP	0.00	-351.39	1095.95	585086.41	606244.75	32° 36' 28.92 N	103° 59' 17.91 W	Point
Solution 1H Surface	0.00	0.00	0.00	585437.80	605148.80	32° 36' 32.43 N	103° 59' 30.70 W	Point
Solution 1H PBHL	8395.00	-7384.30	1713.90	578053.50	606862.70	32° 35' 19.30 N	103° 59' 10.95 W	Point

CONCHO

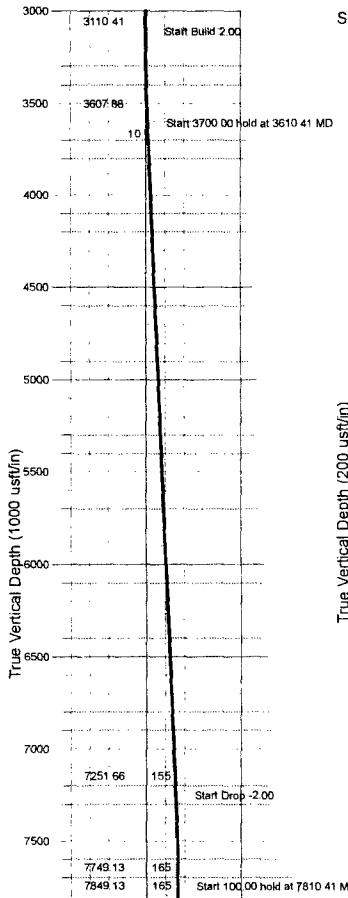
SECTION DETAILS

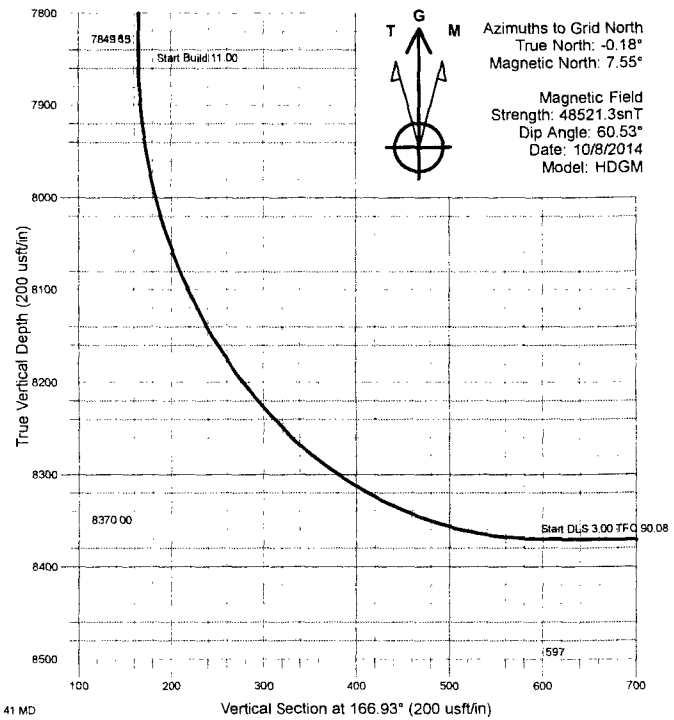
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	3110.41	0.00	0.00	3110.41	0.00	0.00	0.00	0.00	0.00	
3	3610.41	10.00	90.00	3607.88	0.00	43.52	2.00	90.00	9.84	
4	7310.41	10.00	90.00	7251.66	0.00	686.02	0.00	0.00	155.10	
5	7810.41	0.00	0.00	7749.13	0.00	729.54	2.00	180.00	164.94	
6	7910.41	0.00	0.00	7849.13	0.00	729.54	0.00	0.00	164.94	
7	8726.77	89.80	133.19	8370.00	-355.25	1107.98	11.00	133.19	596.55	
8	10286.01	89.80	179.97	8375.71	-1746.60	1710.68	3.00	90.08	2088.14	
9	15923.74	89.80	179.97	8395.00	-7384.30	1713.90	0.00	0.00	7580.59	Solution 1H PBHL

Section Distances

Sec5,T20S,R30E
SHL - Lot 2
190'FNL, 2089'FEL
PP
542'FNL, 995'FEL

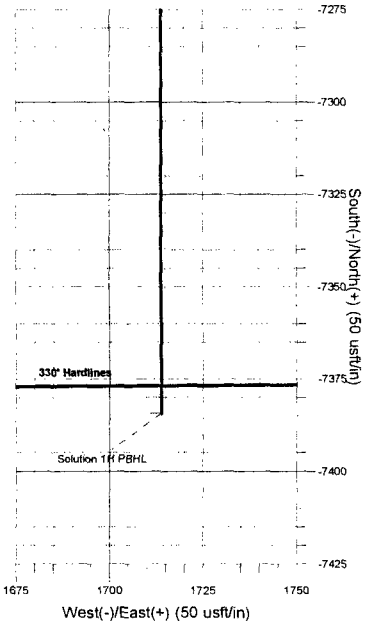
Sec8,T20S,R30E
PBHL - Unit H
2310'FNL, 380'FEL

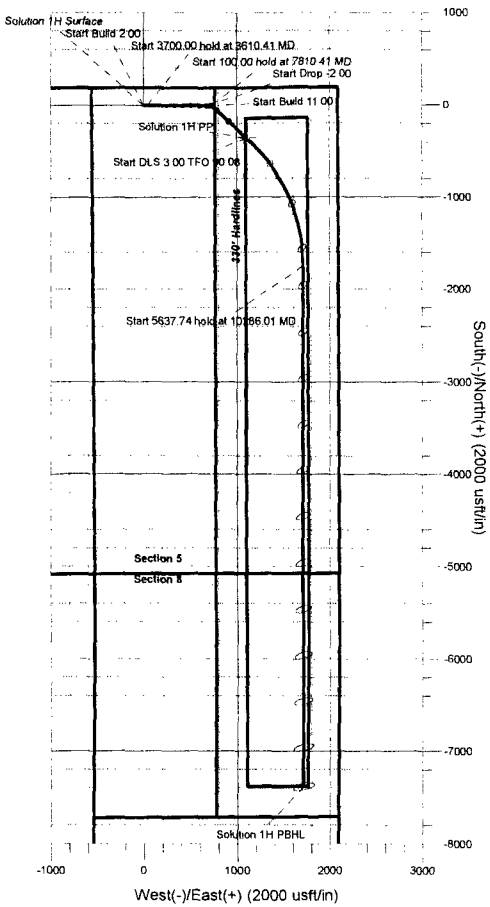




Azimuths to Grid North
True North: -0.18°
Magnetic North: 7.55°

Magnetic Field
Strength: 48521.3snT
Dip Angle: 60.53°
Date: 10/8/2014
Model: HDGM





Archer

ARCHER DIRECTIONAL DRILLING SERVICES
12101 Cutten Rd. Houston, Texas 77066
Phone: 281-301-2600 Fax: 281-301-2795

Design: Plan #2 (1H/Lateral)
Created By: Ivonne Gonzalez
Date: 11:44, December 08 2014

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

No records found.

PLSS Search:

Section(s): 8 **Township:** 20S **Range:** 30E

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

No records found.

PLSS Search:

Section(s): 5 **Township:** 20S **Range:** 30E

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

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are smallest to largest) (NAD83 UTM in meters) (In feet)

POD Number	POD Sub-Code	basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Depth Well	Depth Water	Water Column
CP 00419			ED		4	3	32	20S	30E	594250	3599003*	262	170	92
CP 00431			ED		2	3	33	20S	30E	595857	3599419*	235	195	40
CP 00532			ED	4	3	4	21	20S	30E	596328	3602138*	335	150	185
CP 00537			LE	3	1	1	36	20S	30E	600176	3600161*	3500		
CP 00551			ED	1	1	1	33	20S	30E	595343	3600320*	286	187	99
CP 00775			ED	2	1	4	11	20S	30E	599515	3605981*	350	40	310
CP 00834			LE		2	3	06	20S	30E	592566	3607436*	120		

Average Depth to Water: **148 feet**

Minimum Depth: ***40 feet***

Maximum Depth: **195 feet**

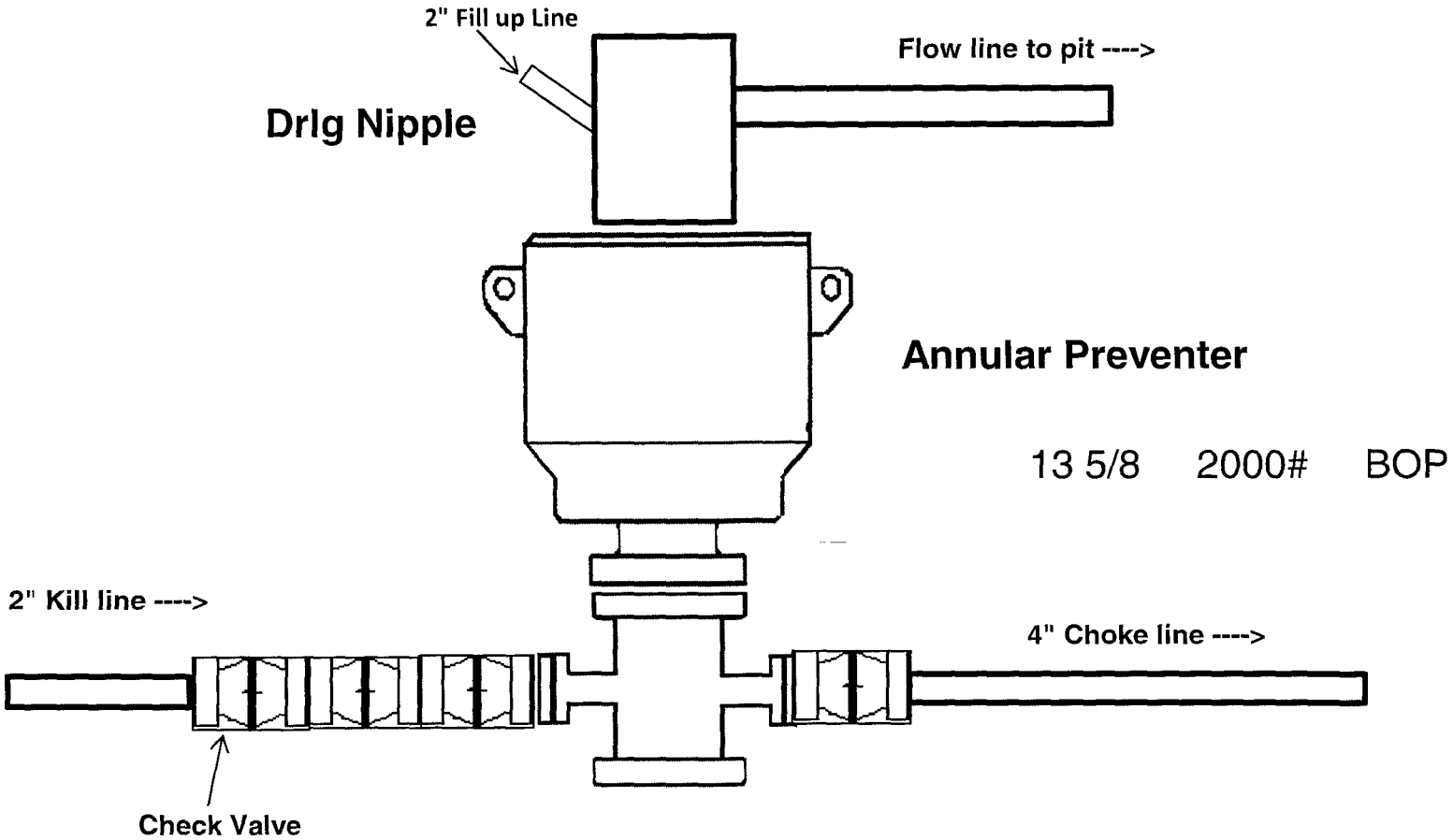
Record Count: 7

PLSS Search:

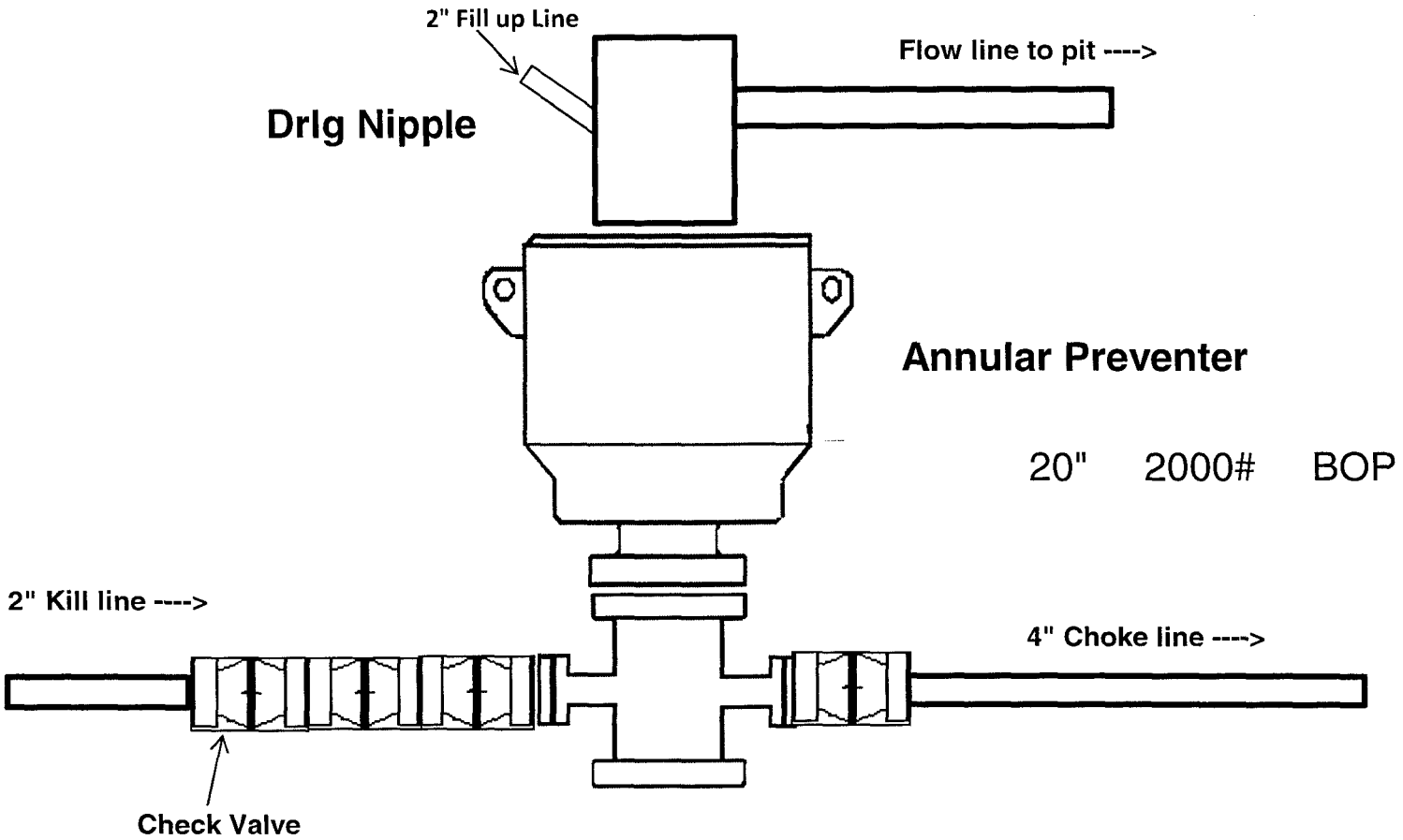
Township: 20S **Range:** 30E

***UTM location was derived from PLSS - see Help**

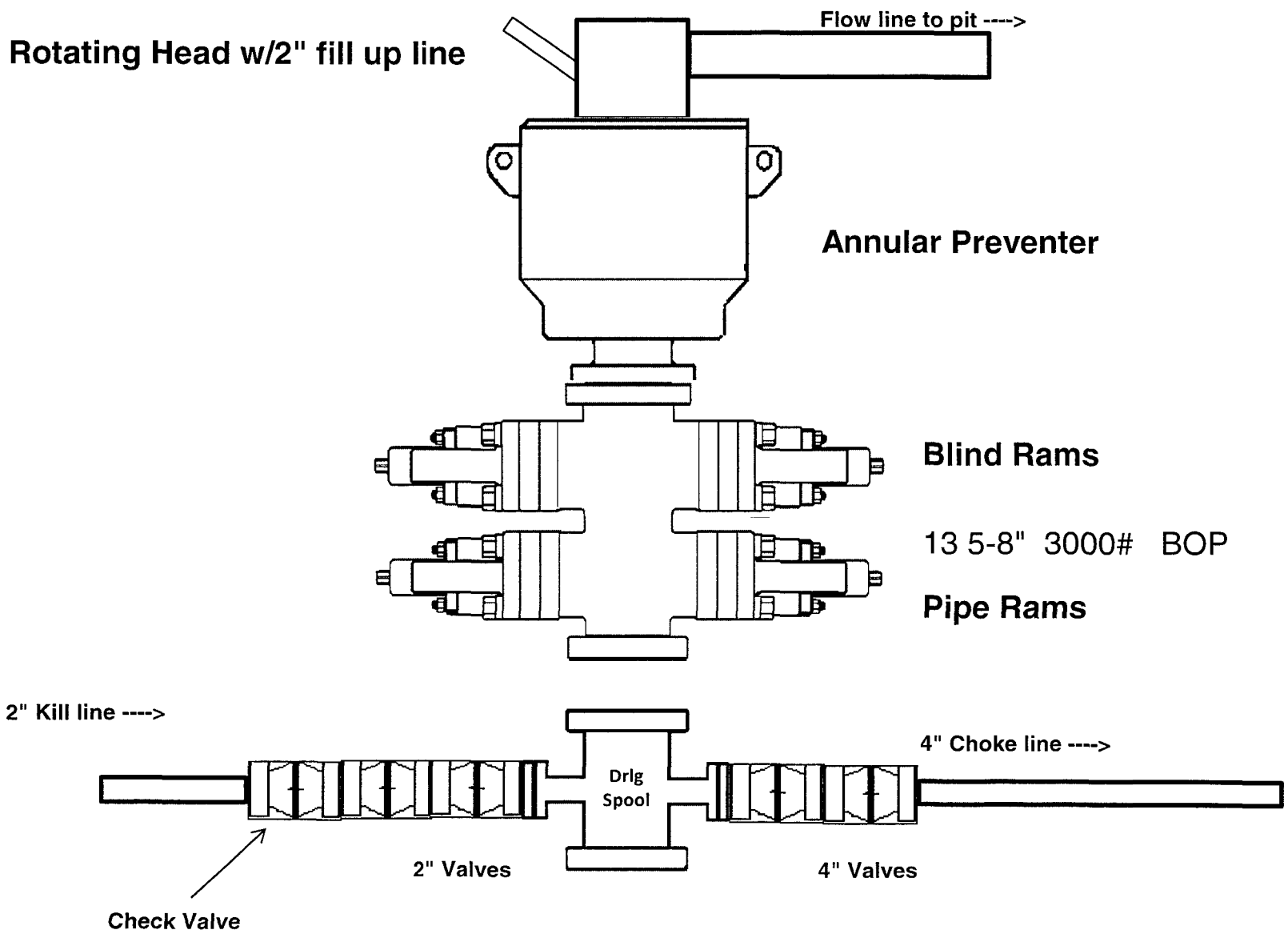
2,000 psi BOP Schematic



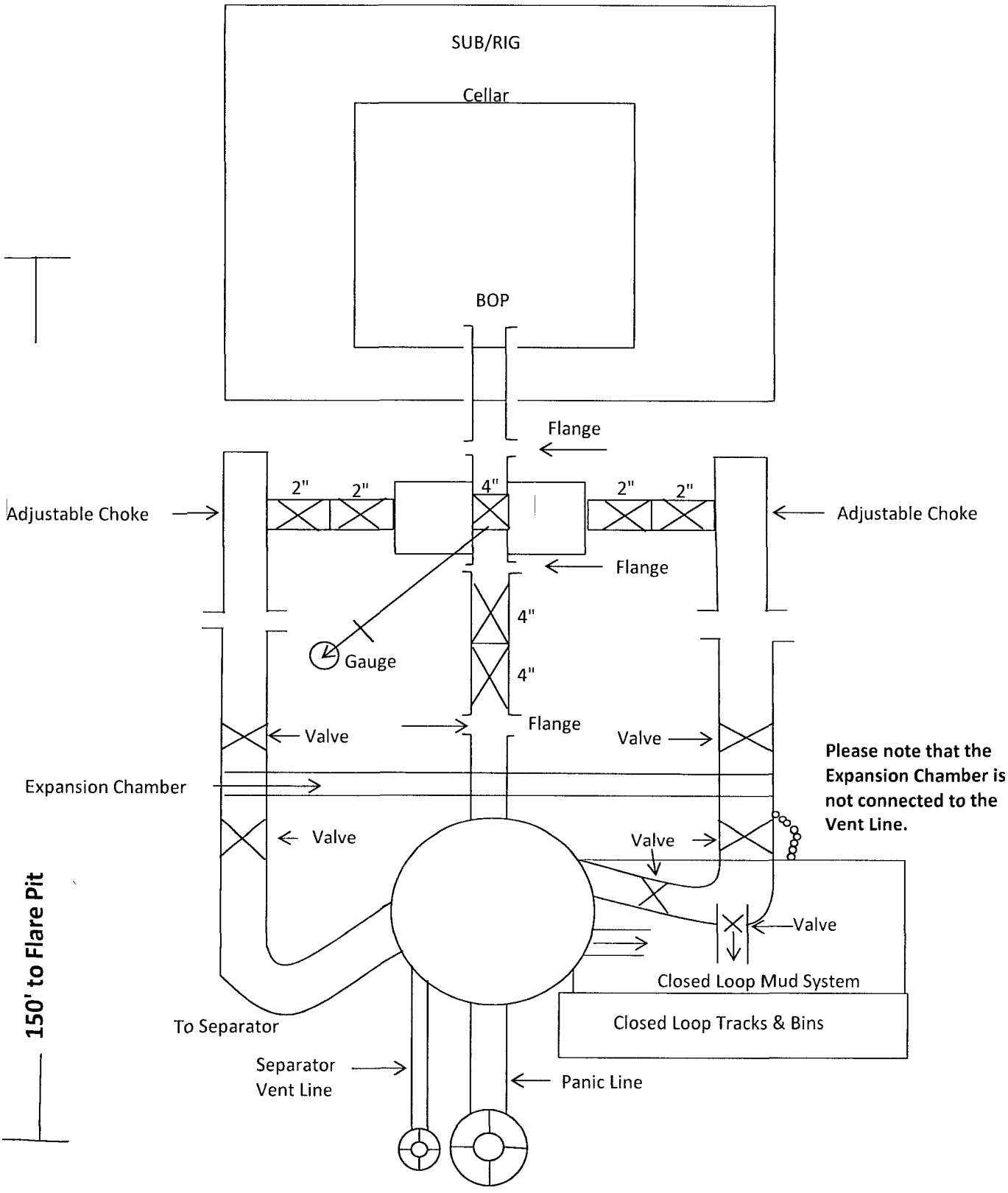
2,000 psi BOP Schematic



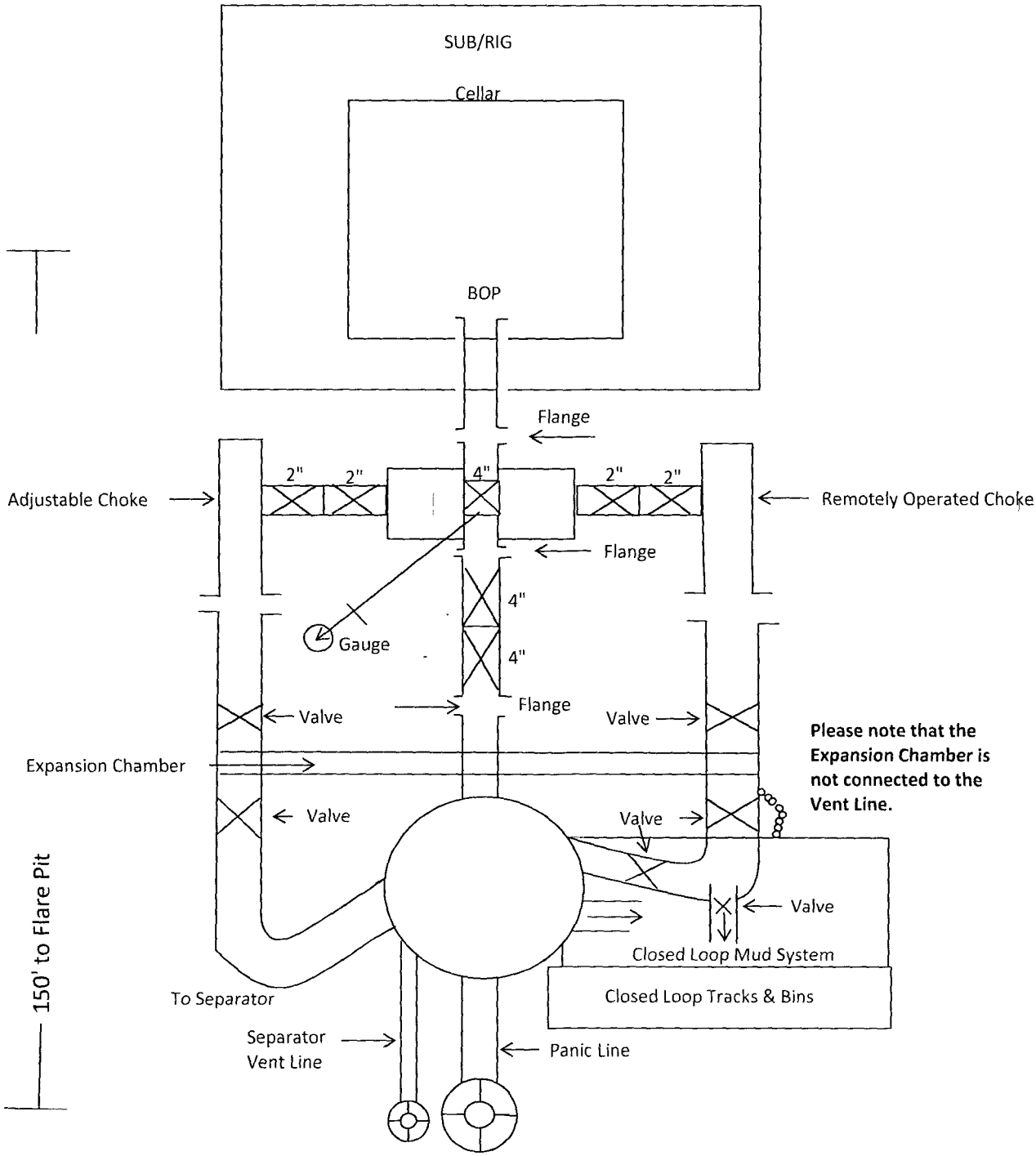
3,000 psi BOP Schematic



2M Choke Manifold Equipment



3M Choke Manifold Equipment

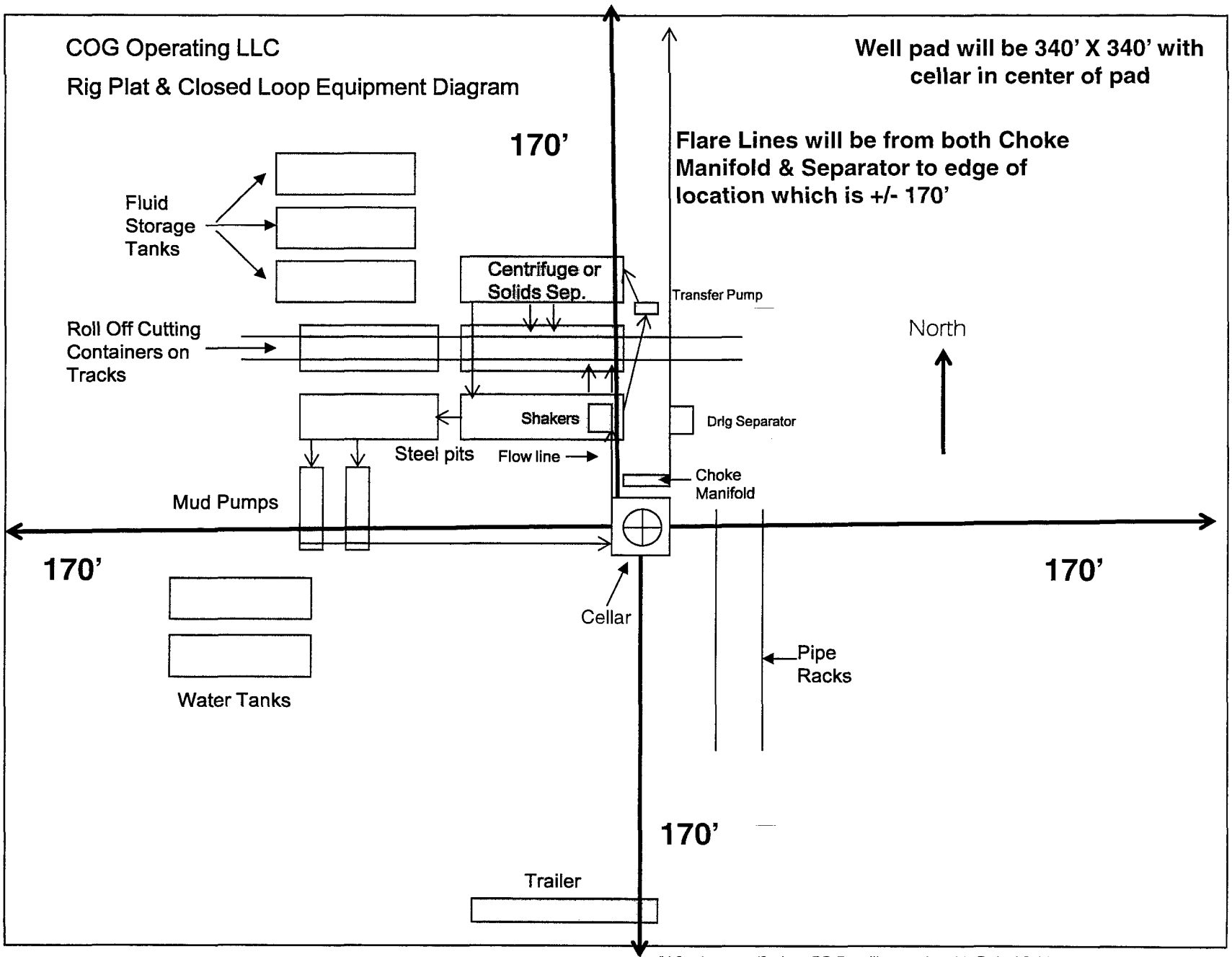


COG Operating LLC

Rig Plat & Closed Loop Equipment Diagram

Well pad will be 340' X 340' with cellar in center of pad

Flare Lines will be from both Choke Manifold & Separator to edge of location which is +/- 170'



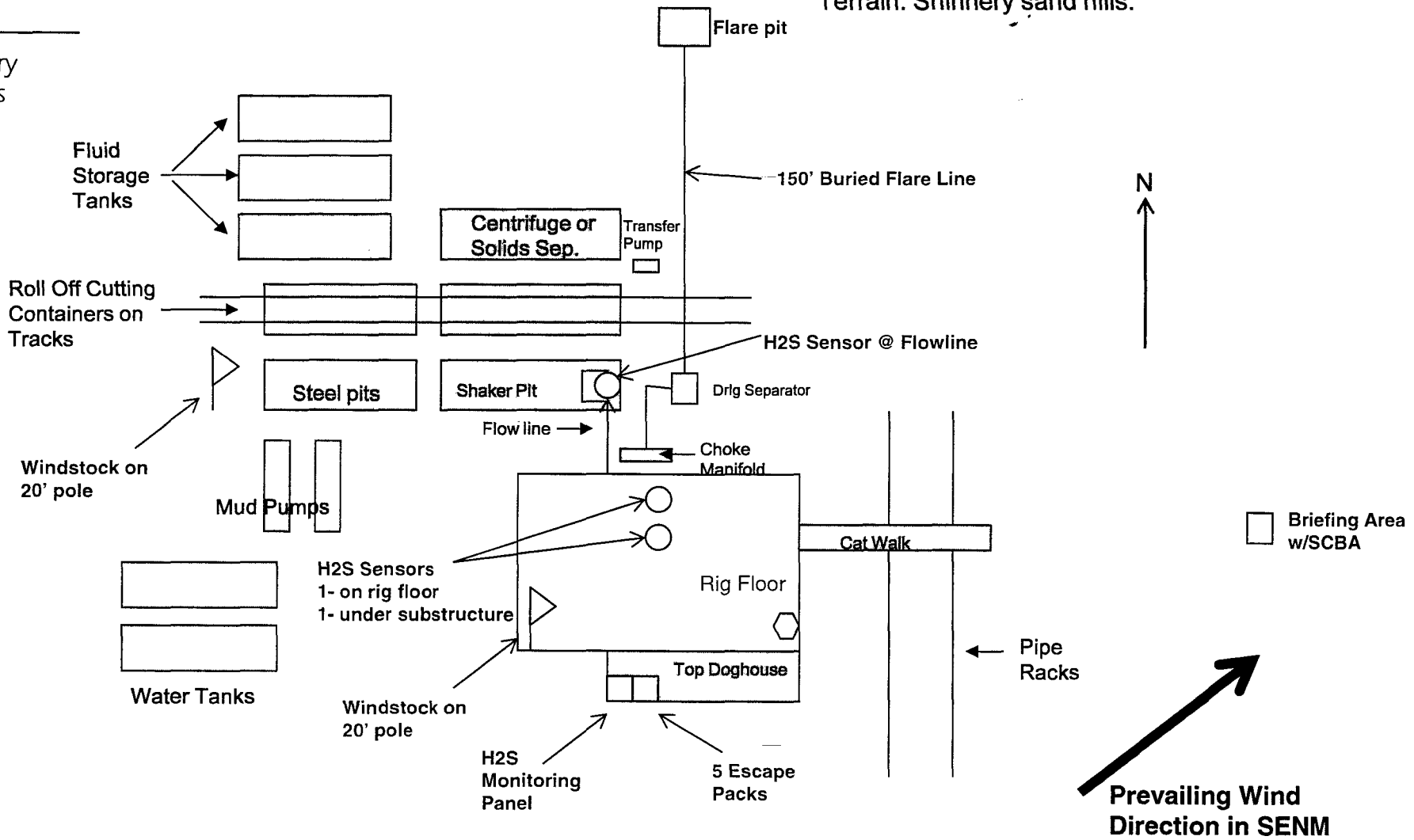
"I further certify that COG will comply with Rule 19.15.17 NMAC by using a Closed Loop System."

Location Entry Condition Sign

Well pad will be 340' X 340' with cellar in center of pad

COG Operating LLC
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Primary egress



Secondary egress.

Company Representative's Trailer

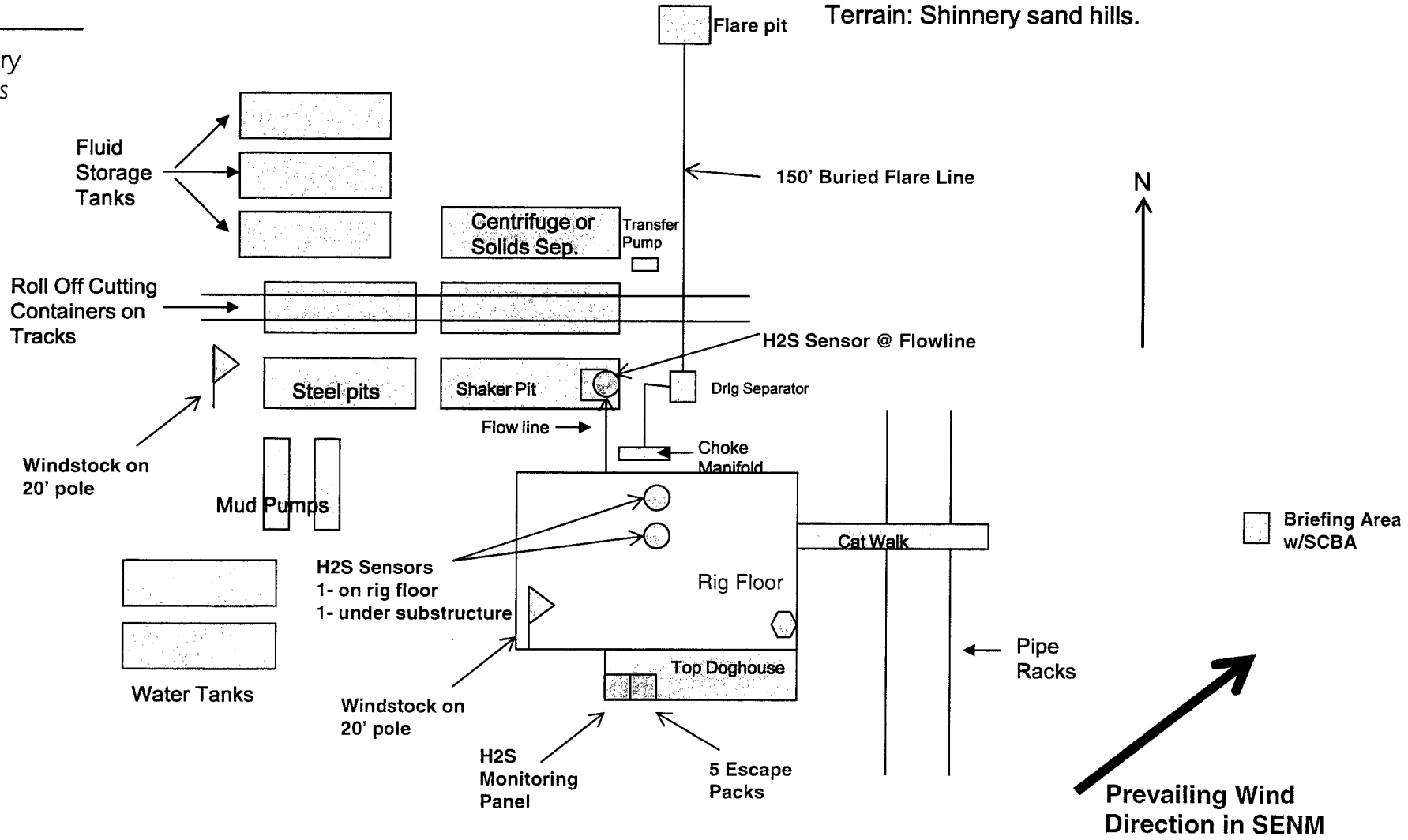
Primary Briefing Area w/SCBA

Location Entry Condition Sign

Well pad will be 510' X 340' with cellar in center of pad

COG Operating LLC
Solution Federal Com #1H & #2H
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Primary egress



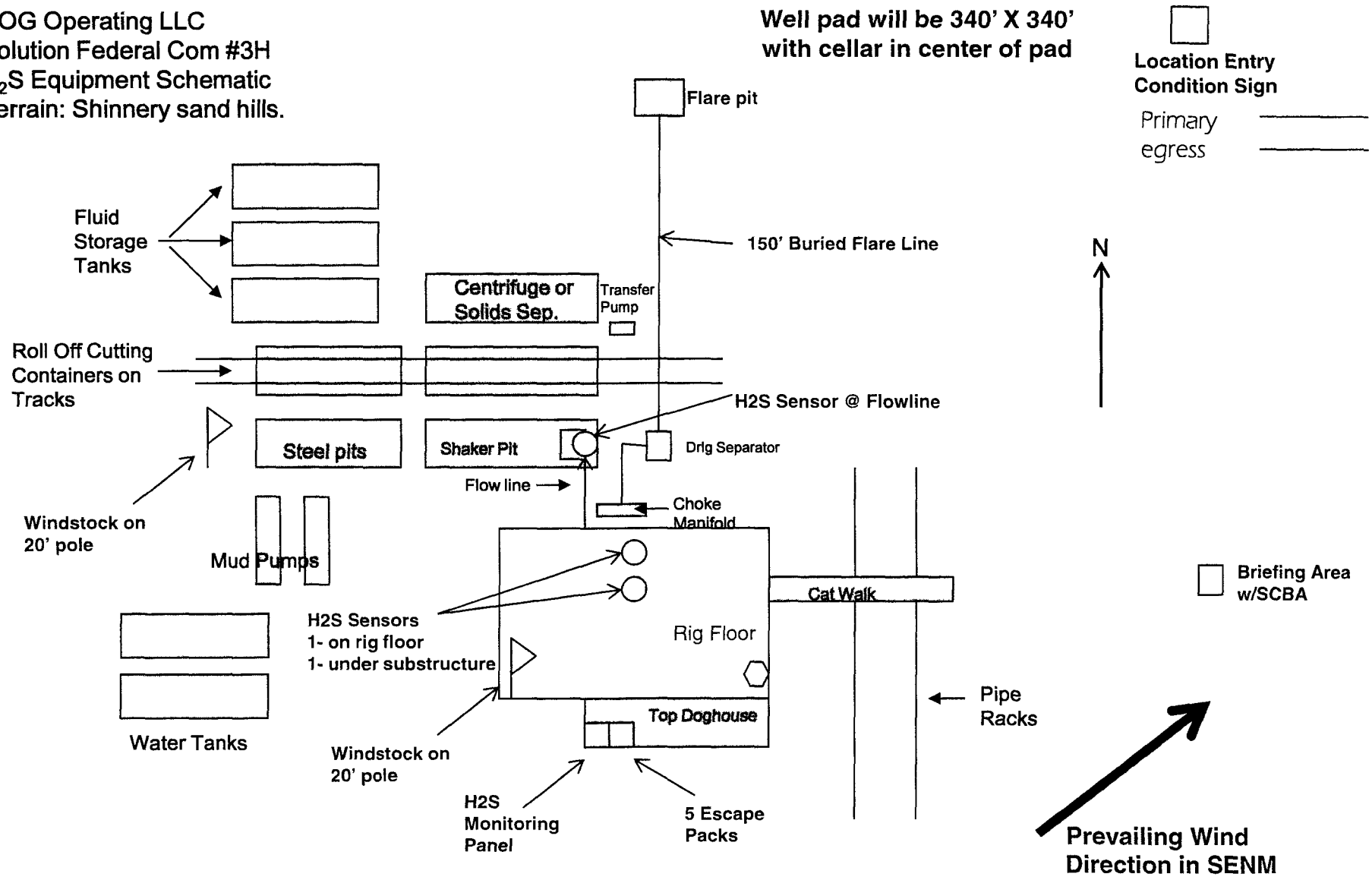
Secondary egress.

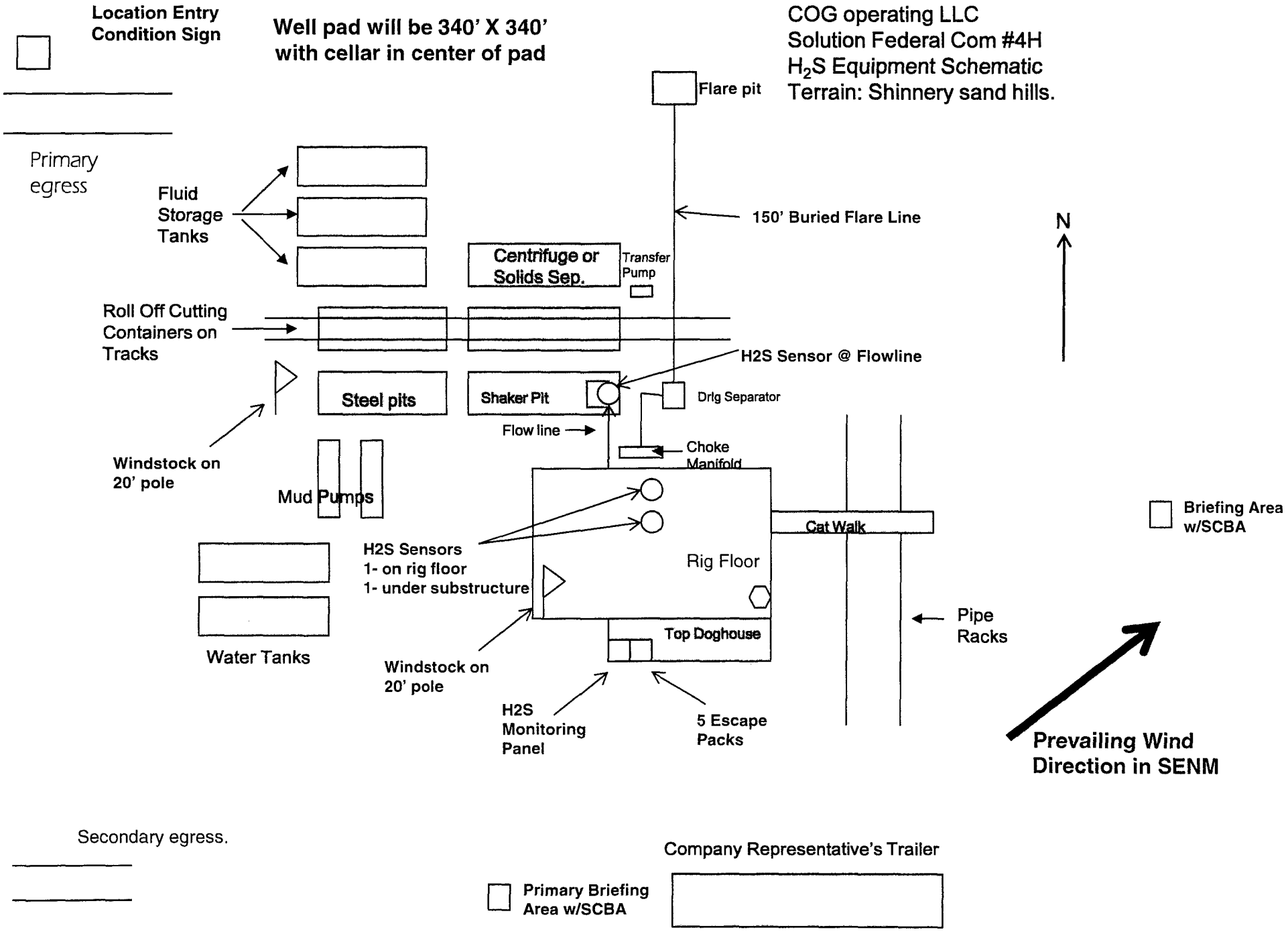
Company Representative's Trailer

Primary Briefing Area w/SCBA

COG Operating LLC
Solution Federal Com #3H
H_2S Equipment Schematic
Terrain: Shinnery sand hills.

Well pad will be 340' X 340' with cellar in center of pad




Location Entry Condition Sign
Well pad will be 340' X 340' with cellar in center of pad
COG operating LLC
Solution Federal Com #4H
H_2S Equipment Schematic
Terrain: Shinnery sand hills.
Flare pit
Primary egress
Fluid Storage Tanks
150' Buried Flare Line
N
Centrifuge or Solids Sep.
Transfer Pump
Roll Off Cutting Containers on Tracks
H2S Sensor @ Flowline
Steel pits
Shaker Pit
Drlg Separator
Flow line
Choke Manifold
Windstock on 20' pole
Mud Pumps
Briefing Area w/SCBA
Cat Walk
H2S Sensors
1- on rig floor
1- under substructure
Rig Floor
Pipe Racks
Top Doghouse
Water Tanks
Windstock on 20' pole
H2S Monitoring Panel
5 Escape Packs
Prevailing Wind Direction in SENM
Secondary egress.
Company Representative's Trailer
Primary Briefing Area w/SCBA

COG OPERATING LLC
HYDROGEN SULFIDE DRILLING OPERATIONS PLAN

1. HYDROGEN SULFIDE TRAINING

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will receive training from a qualified instructor in the following areas prior to commencing drilling operations on this well:

a. The hazards and characteristics of hydrogen sulfide (H_2S).
b. The proper use and maintenance of personal protective equipment and life support systems.
c. The proper use of H_2S detectors, alarms, warning systems, briefing areas, evacuation procedures, and prevailing winds.
d. The proper techniques for first aid and rescue procedures.

In addition, supervisory personnel will be trained in the following areas:

a. The effects of H2S on metal components. If high tensile tubulars are to be used, personnel will be trained in their special maintenance requirements.
b. Corrective action and shut-in procedures when drilling or reworking a well and blowout prevention and well control procedures.
c. The contents and requirements of the H_2S Drilling Operations Plan and the Public Protection Plan.

There will be an initial training session just prior to encountering a known or probable H2S zone (within 3 days or 500 feet) and weekly H2S and well control drills for all personnel in each crew. The initial training session shall include a review of the site specific H2S Drilling Operations Plan and the Public Protection Plan. This plan shall be available at the well site. All personnel will be required to carry documentation that they have received the proper training.

2. H_2S SAFETY EQUIPMENT AND SYSTEMS

Note: All H_2S safety equipment and systems will be installed, tested, and operational when drilling reaches a depth of 500 feet above, or three days prior to penetrating the first zone containing or reasonably expected to contain H2S. If H2S greater than 100 ppm is encountered in the gas stream we will shut in and install H2S equipment.

a. Well Control Equipment:
   Flare line.
   Choke manifold with remotely operated choke.
   Blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit.
   Auxiliary equipment to include: annular preventer, mud-gas separator, rotating head.

b. Protective equipment for essential personnel:
Mark II Surviveair 30-minute units located in the dog house and at briefing areas.

c. H2S detection and monitoring equipment:
2 - portable H2S monitor positioned on location for best coverage and response. These units have warning lights and audible sirens when H2S levels of 20 ppm are reached.

d. Visual warning systems:
Caution/Danger signs shall be posted on roads providing direct access to location. Signs will be painted a high visibility yellow with black lettering of sufficient size to be readable at a reasonable distance from the immediate location. Bilingual signs will be used, when appropriate. See example attached.

e. Mud Program:
The mud program has been designed to minimize the volume of H2S circulated to the surface.

f. Metallurgy:
All drill strings, casings, tubing, wellhead, blowout preventers, drilling spool, kill lines, choke manifold and lines, and valves shall be suitable for H2S service.

g. Communication:
Company vehicles equipped with cellular telephone.

COG OPERATING LLC has conducted a review to determine if an H2S contingency plan is required for the above referenced well. We were able to conclude that any potential hazardous volume would be minimal. H2S concentrations of wells in this area from surface to TD are low enough; therefore, we do not believe that an H2S contingency plan is necessary.

WARNING

YOU ARE ENTERING AN H_2S AREA
AUTHORIZED PERSONNEL ONLY

1. ***BEARDS OR CONTACT LENSES NOT ALLOWED***
2. ***HARD HATS REQUIRED***
3. ***SMOKING IN DESIGNATED AREAS ONLY***
4. ***BE WIND CONSCIOUS AT ALL TIMES***
5. ***CK WITH COG OPERATING LLC FOREMAN AT MAIN OFFICE***

COG OPERATING LLC

1-575-748-6940

EMERGENCY CALL LIST

	OFFICE	MOBILE
COG OPERATING LLC OFFICE	575-748-6940	
SHERYL BAKER	575-748-6940	432-934-1873
KENT GREENWAY	575-746-2010	432-557-1694
SETH WILD	432-683-7443	432-528-3633
WALTER ROYE	575-748-6940	432-934-1886

EMERGENCY RESPONSE NUMBERS

	OFFICE
STATE POLICE	575-748-9718
EDDY COUNTY SHERIFF	575-746-2701
EMERGENCY MEDICAL SERVICES (AMBULANCE)	911 or 575-746-2701
EDDY COUNTY EMERGENCY MANAGEMENT (HARRY BURGESS)	575-887-9511
STATE EMERGENCY RESPONSE CENTER (SERC)	575-476-9620
CARLSBAD POLICE DEPARTMENT	575-885-2111
CARLSBAD FIRE DEPARTMENT	575-885-3125
NEW MEXICO OIL CONSERVATION DIVISION	575-748-1283
INDIAN FIRE & SAFETY	800-530-8693
HALLIBURTON SERVICES	800-844-8451

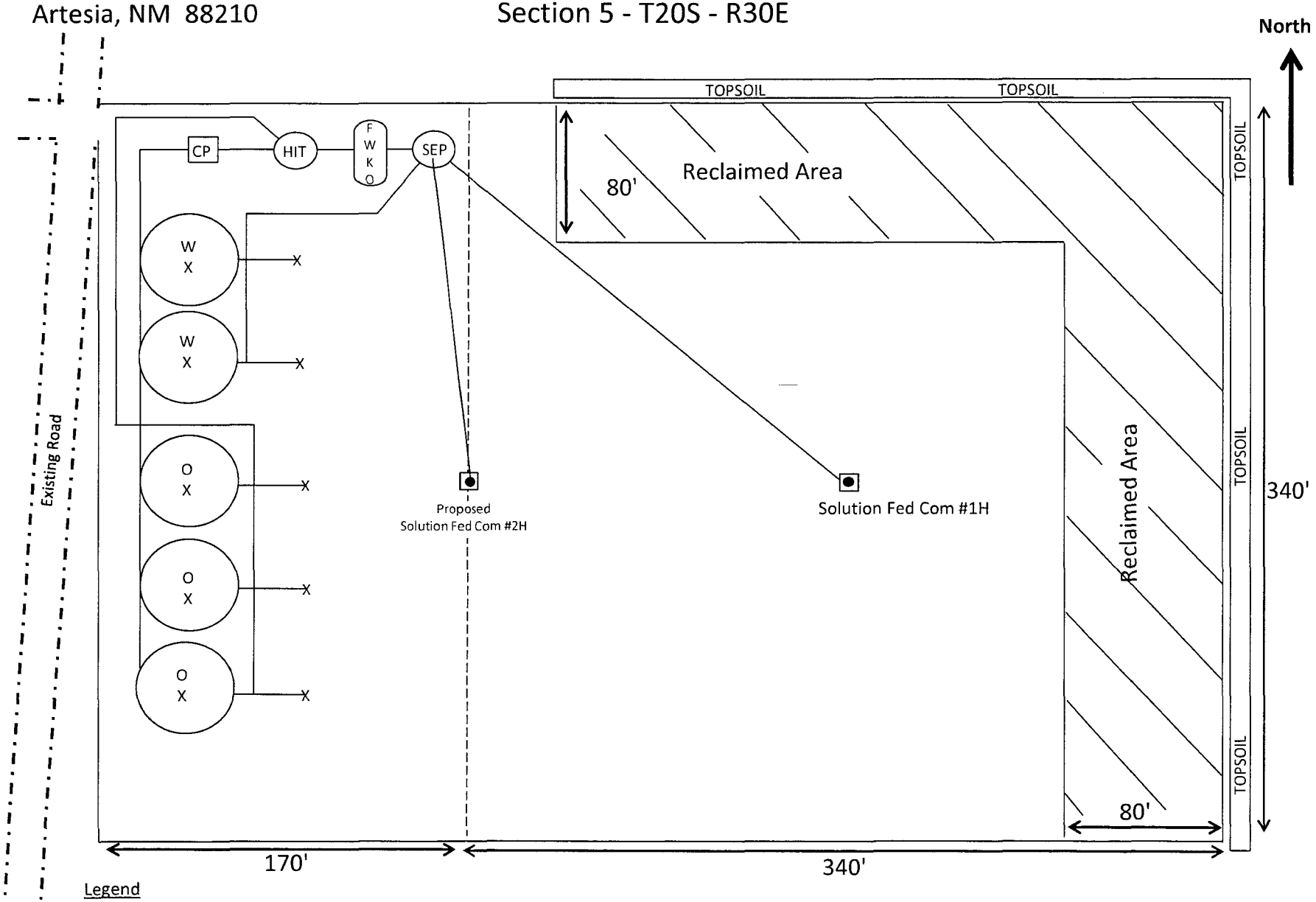
CONCHO

COG Operating LLC
2208 West Main
Artesia, NM 88210

Production Facility Layout

Solution Federal Com #1H
Section 5 - T20S - R30E

Exhibit 3



Legend

O = 500 BBL Steel Oil Tank **W** = 500 BBL Steel Water Tank **H** = 6' x 20' Heater

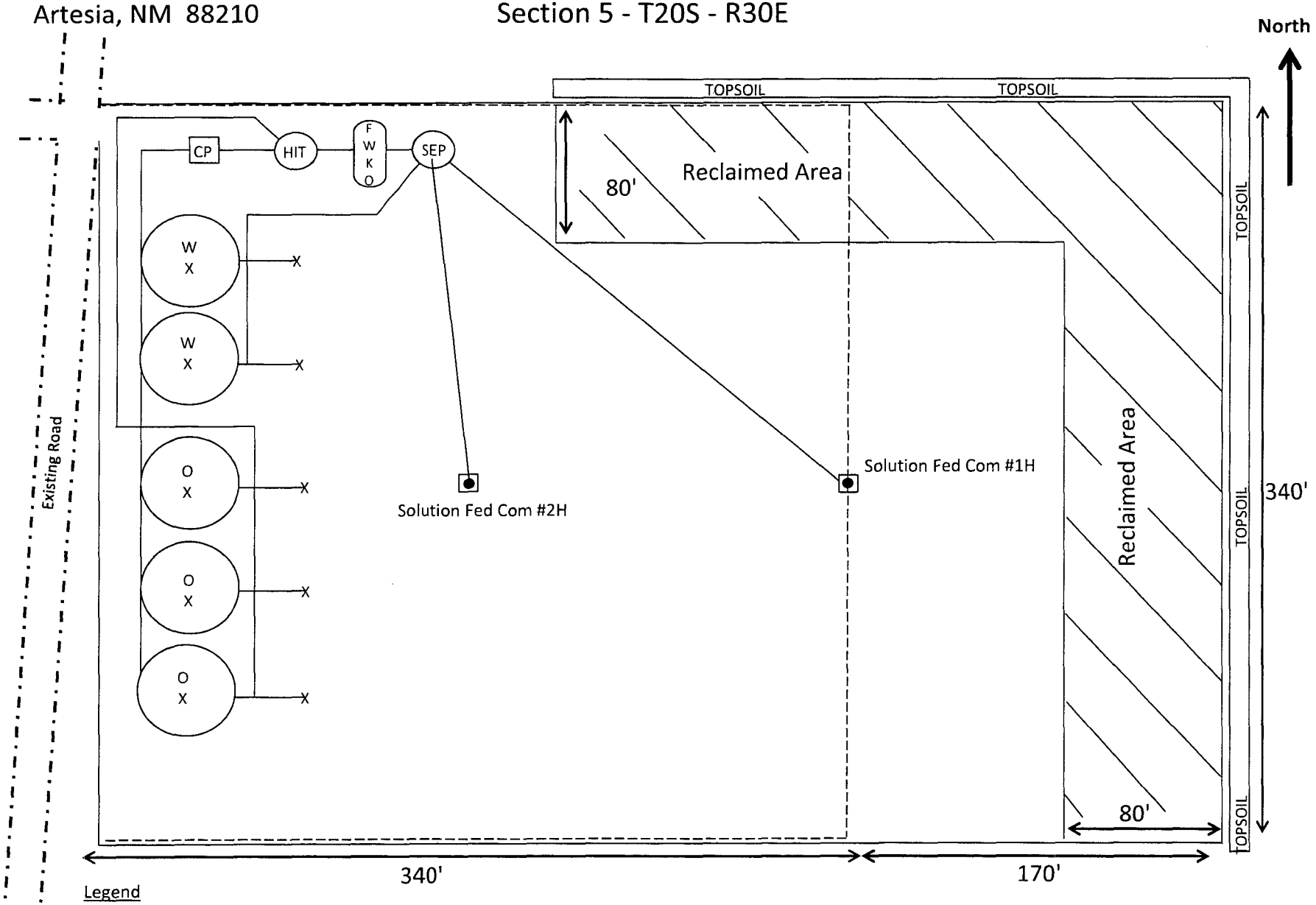
CONCHO

COG Operating LLC
2208 West Main
Artesia, NM 88210

Production Facility Layout

Solution Federal Com #1H & #2H
Section 5 - T20S - R30E

Exhibit 3



Legend

O = 500 BBL Steel Oil Tank **W** = 500 BBL Steel Water Tank **H** = 6' x 20' Heater

CONCHO

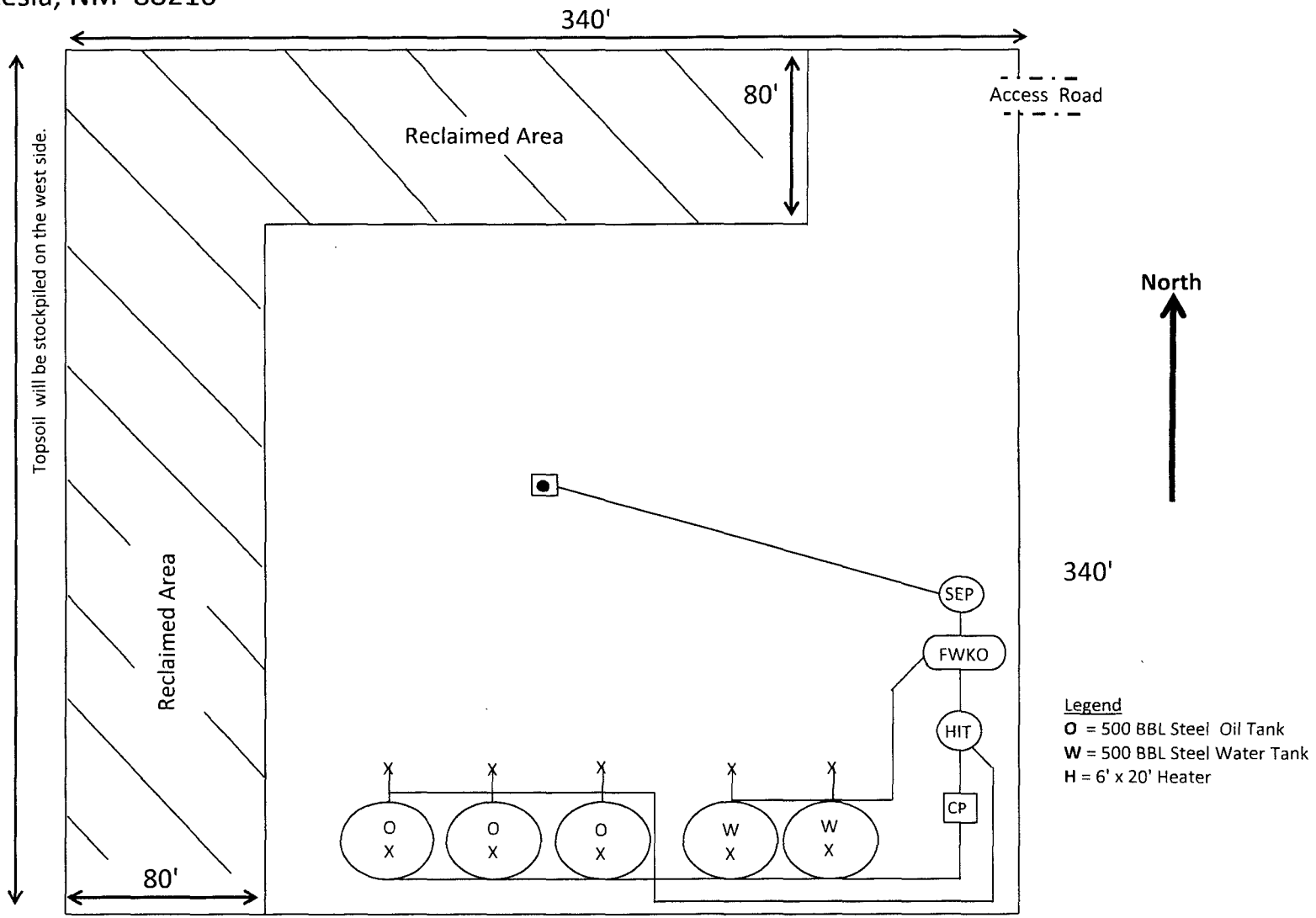
COG Operating LLC
2208 West Main
Artesia, NM 88210

Production Facility Layout

Solution Federal Com #3H

Section 5 - T20S - R30E

Exhibit 3



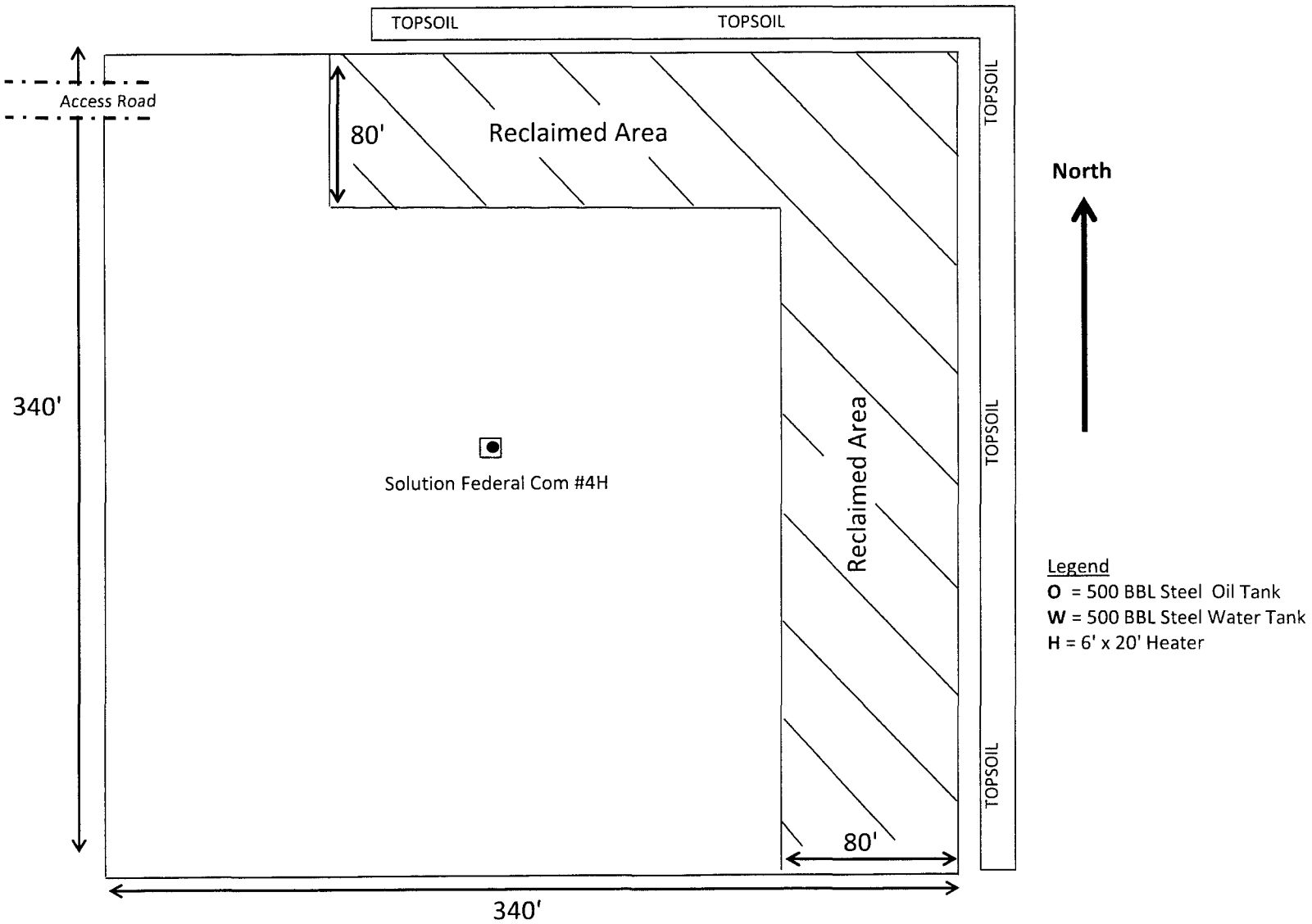
CONCHO

COG Operating LLC
2208 West Main
Artesia, NM 88210

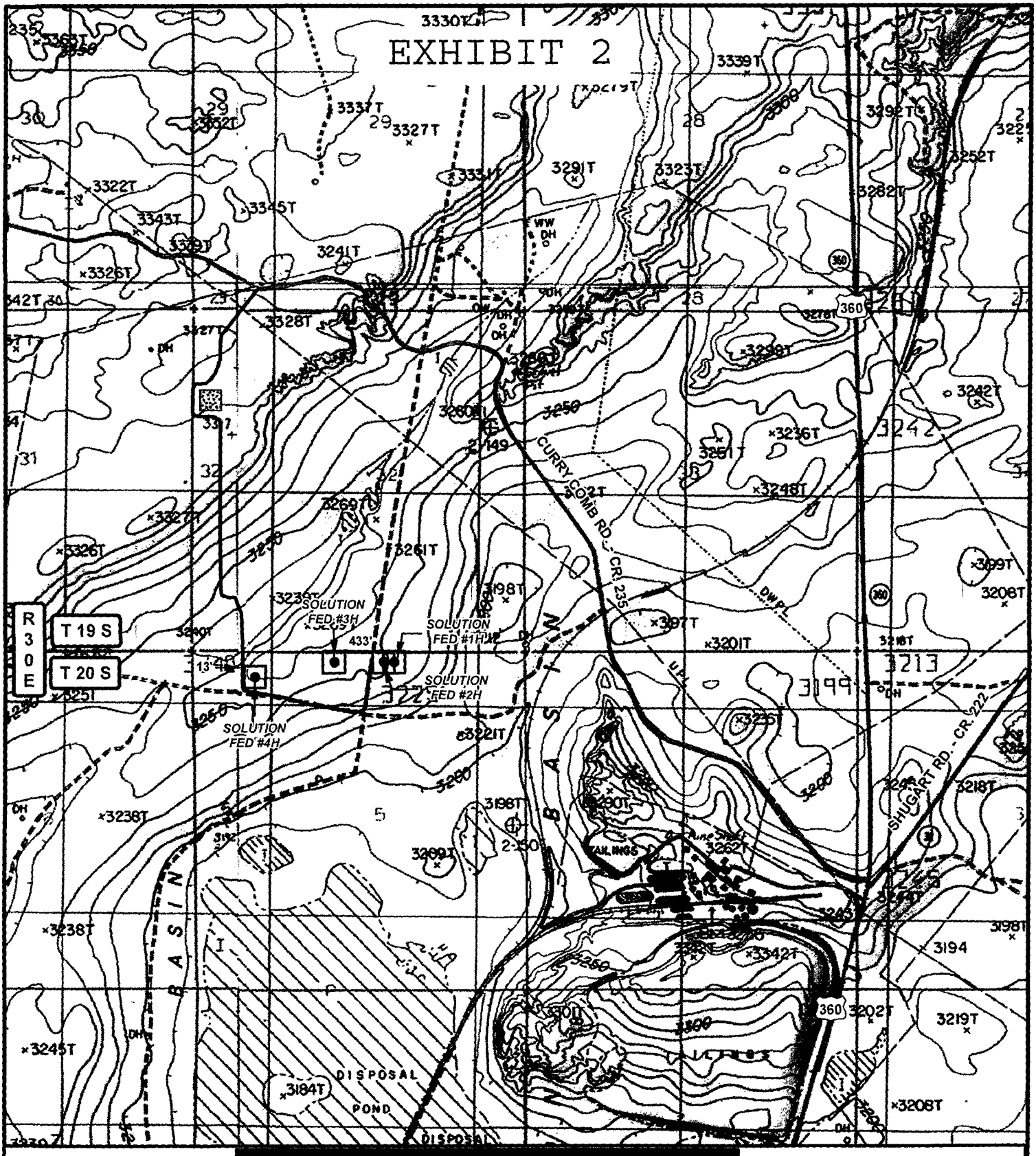
Production Facility Layout

Solution Federal Com #4
Section 5 - T20S - R30E

Exhibit 3



Legend
O = 500 BBL Steel Oil Tank
W = 500 BBL Steel Water Tank
H = 6' x 20' Heater



LEGEND

- WELL
- WELLPAD
- FRAC POND
- PLATTED EXISTING ROAD
- PROPOSED ROAD
- EXISTING ROAD

SOLUTION FED ROAD REROUTE

SECTIONS: 5, 29, 32	TOWNSHIP: 19 & 20 S.	RANGE: 30 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 14-1202		LEASE: SOLUTION FED

0 2,500 5,000 FEET

0 0.125 0.25 0.5 Miles 1 IN = 2,000 FT

CONCHO

COG OPERATING, LLC

N

HARCROW SURVEYING, LLC.
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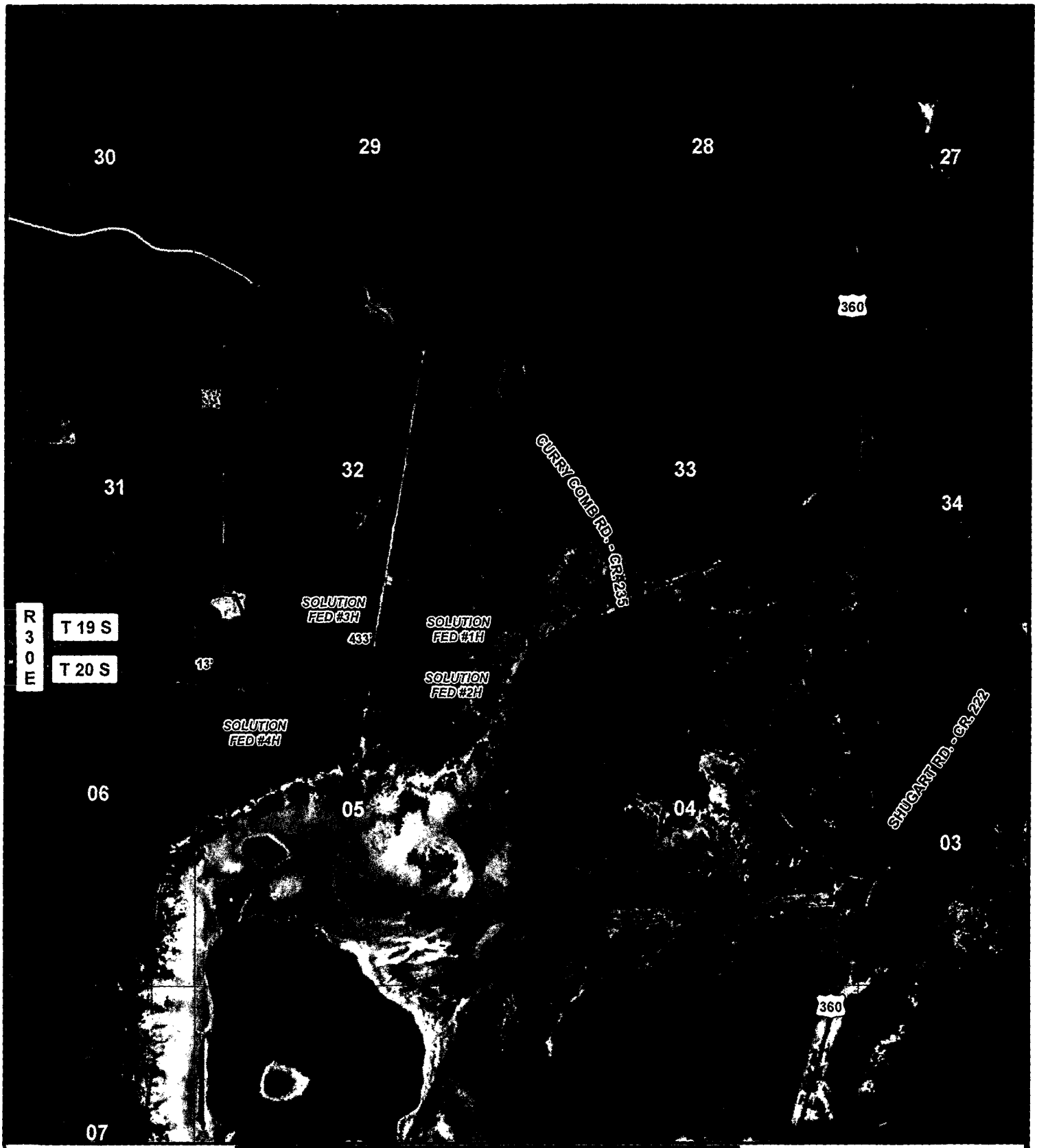

LEGEND

- WELL
- WELLPAD
- FRAC POND
- PLATTED EXISTING ROAD
- PROPOSED ROAD
- EXISTING ROAD

SOLUTION FED ROAD REROUTE

SECTIONS: 5, 29, 32	TOWNSHIP: 19 & 20 S.	RANGE: 30 E.
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0 2,500 5,000 FEET

0 0.125 0.25 0.5 Miles 1 IN = 2,000 FT

IMAGERY 12/04/2014 S.P.

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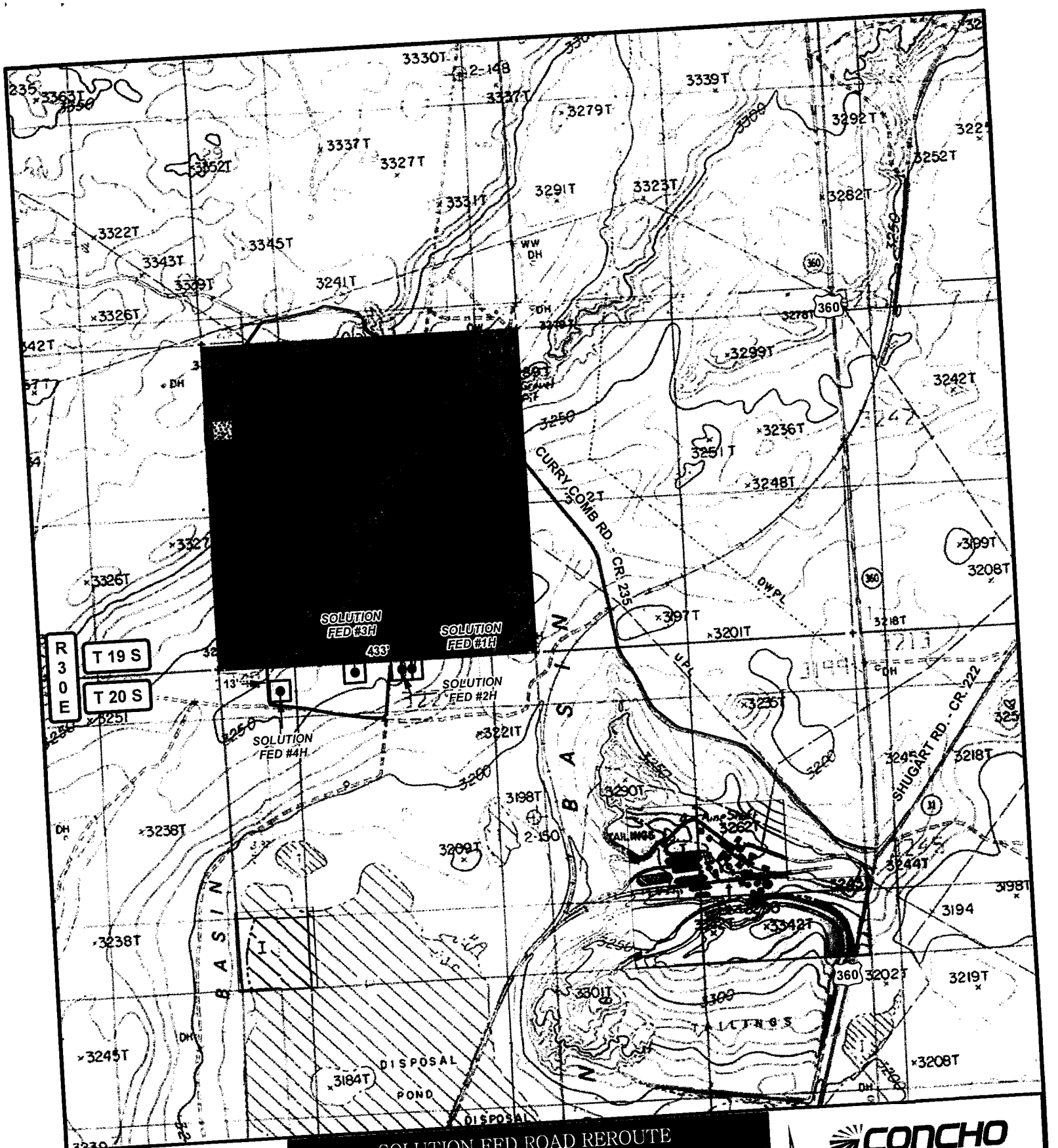

LEGEND

- WELL
- WELLPAD
- FRAC POND
- PLATTED EXISTING ROAD
- PROPOSED ROAD
- EXISTING ROAD
- PRIVATE
- STATE OF NM

SOLUTION FED ROAD REROUTE

SECTIONS: 5, 29, 32	TOWNSHIP: 19 & 20 S.	RANGE: 30 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 14-1202		LEASE: SOLUTION FED

0 2,500 5,000 FEET

0 0.125 0.25 0.5 Miles

1 IN = 2,000 FT

LAN STATUS 12/04/2014 S.P.

CONCHO

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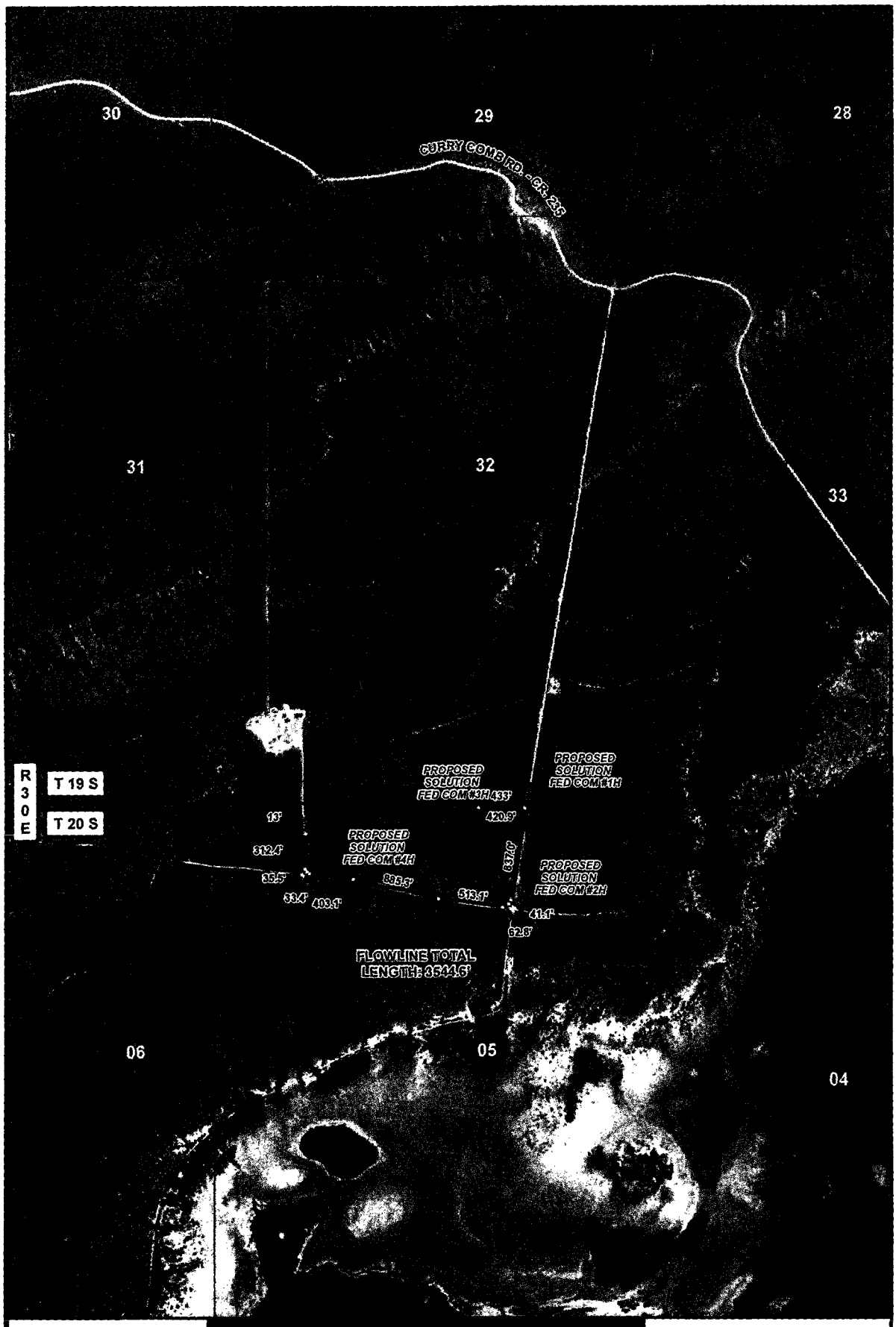

LEGEND

- FLOWLINE
- WELL
- WELLPAD
- PROPOSED RD.
- EXISTING RD.

SOLUTION FED COM FLOWLINE

SECTION: 5	TOWNSHIP: 20 S.	RANGE: 30 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 14-1215		LEASE: SOLUTION FED COM

0 2,500 FEET

0 0.05 0.1 0.2 Miles 1 IN = 1,000 FT

PIPELINE OVERVIEW IMAGERY 12/22/2014 A.F.

CONCHO

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N

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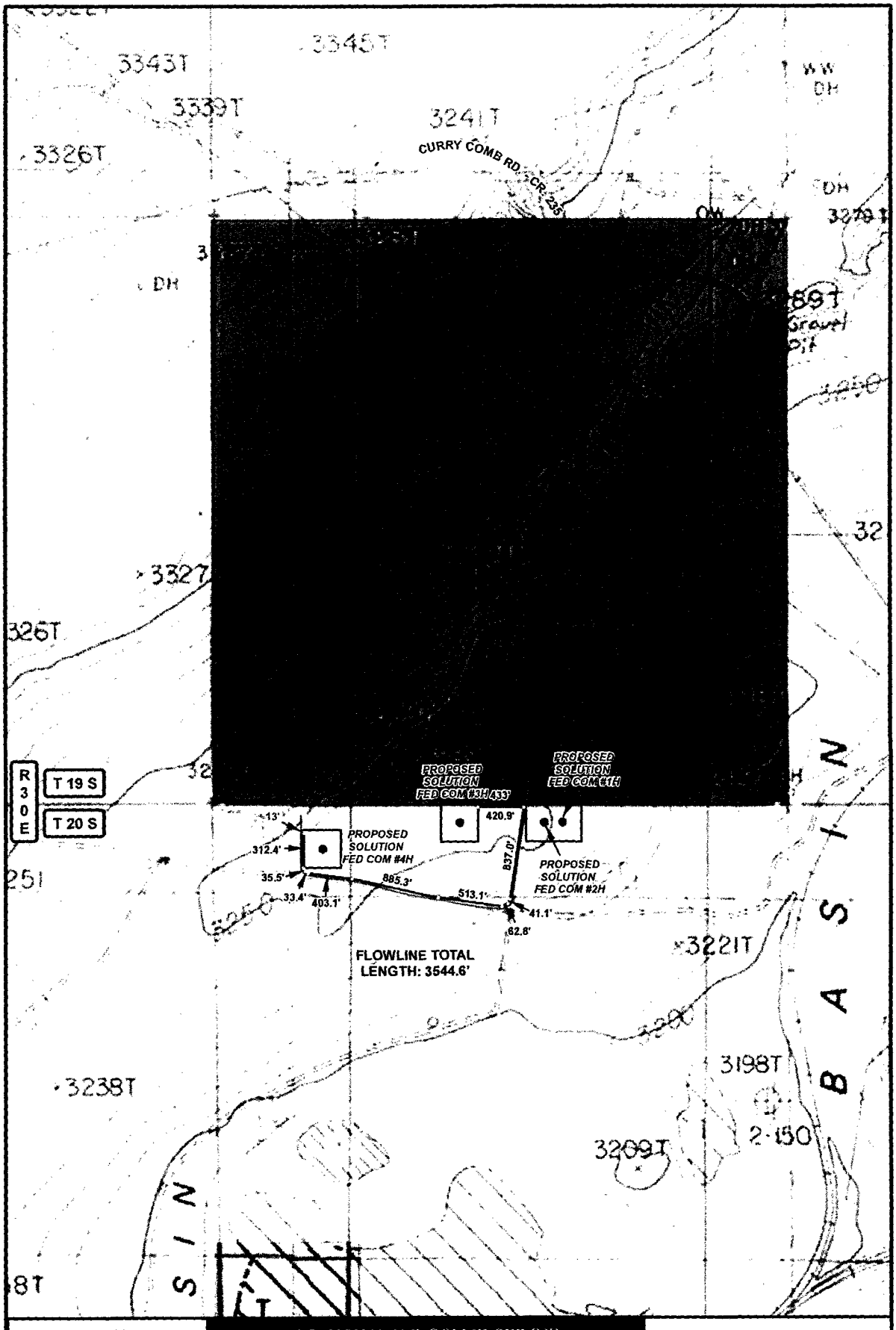
PH: (575) 513-2570 FAX: (575) 746-2158
chad_harcrow77@yahoo.com



LEGEND

- FLOWLINE
- WELL
- WELLPAD
- PROPOSED RD.
- EXISTING RD.
- PRIVATE
- STATE OF NM
- US BLM

SOLUTION FED COM FLOWLINE

SECTION: 5	TOWNSHIP: 20 S.	RANGE: 30 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 14-1215		LEASE: SOLUTION FED COM

0 2,500 FEET

0 0.05 0.1 0.2 Miles 1 IN = 1,000 FT

PIPELINE OVERVIEW | LAND STATUS | 12/2/2014 | A.F.

CONCHO

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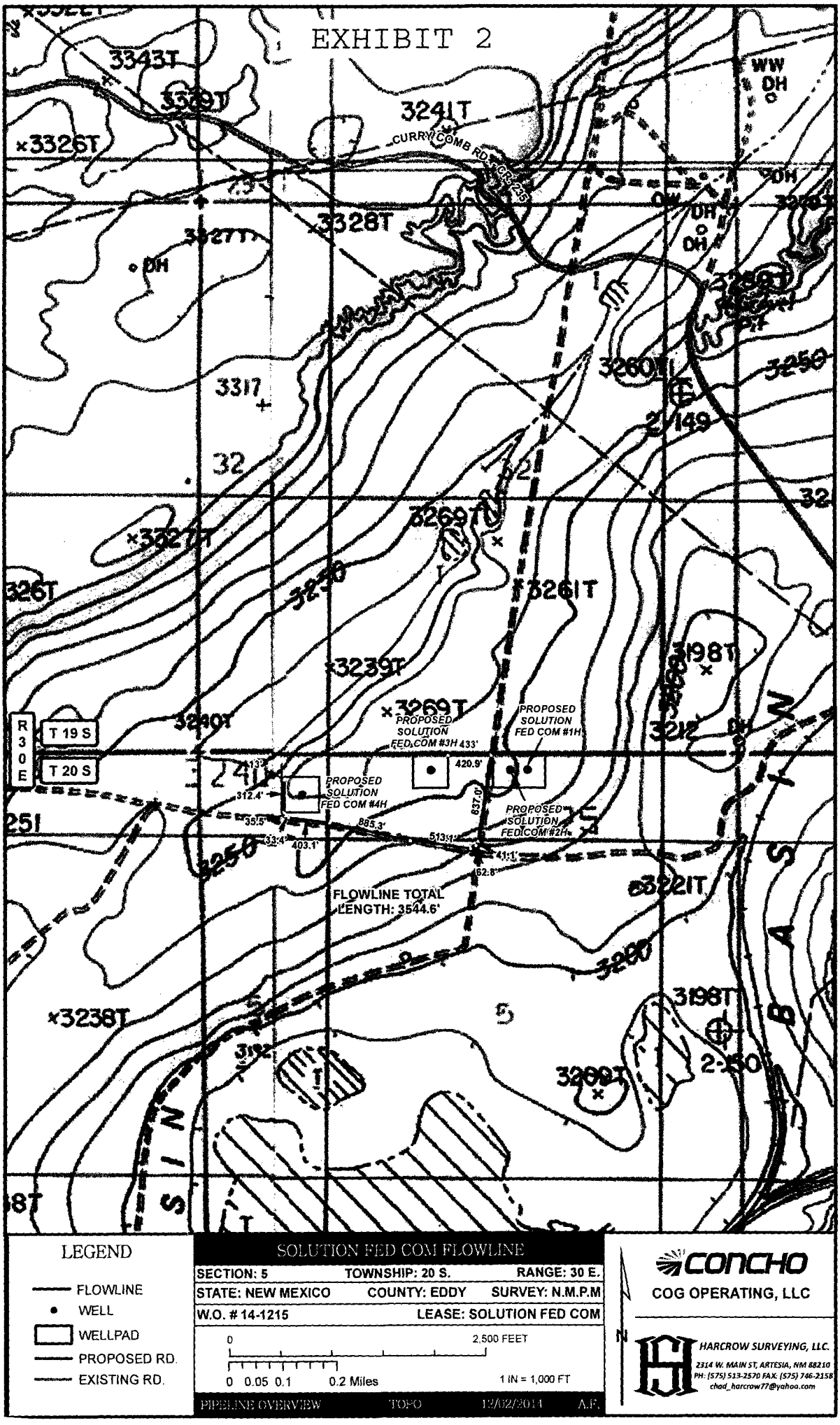
EXHIBIT 2
3343T
3241T
CURRY COMB RD
3328T
3327T
3317
3260T
3250
32
3269T
3261T
3239T
3198T
3290T
3212
PROPOSED SOLUTION FED COM #3H 433'
PROPOSED SOLUTION FED COM #1H
PROPOSED SOLUTION FED COM #4H
PROPOSED SOLUTION FED COM #2H
420.9'
312.4'
885.3'
403.1'
837.0'
513.1'
52.8'
FLOWLINE TOTAL LENGTH: 3544.6'
3222T
3200
3238T
3209T
T 19 S
T 20 S
R 30 E
SOLUTION FED COM FLOWLINE
SECTION: 5
TOWNSHIP: 20 S.
RANGE: 30 E.
STATE: NEW MEXICO
COUNTY: EDDY
SURVEY: N.M.P.M
W.O. # 14-1215
LEASE: SOLUTION FED COM
0
2,500 FEET
0 0.05 0.1
0.2 Miles
1 IN = 1,000 FT
PIPELINE OVERVIEW
TOPO
12/02/2014
A.F.
LEGEND
FLOWLINE
WELL
WELLPAD
PROPOSED RD.
EXISTING RD.
CONCHO
COG OPERATING, LLC
HARCROW SURVEYING, LLC.
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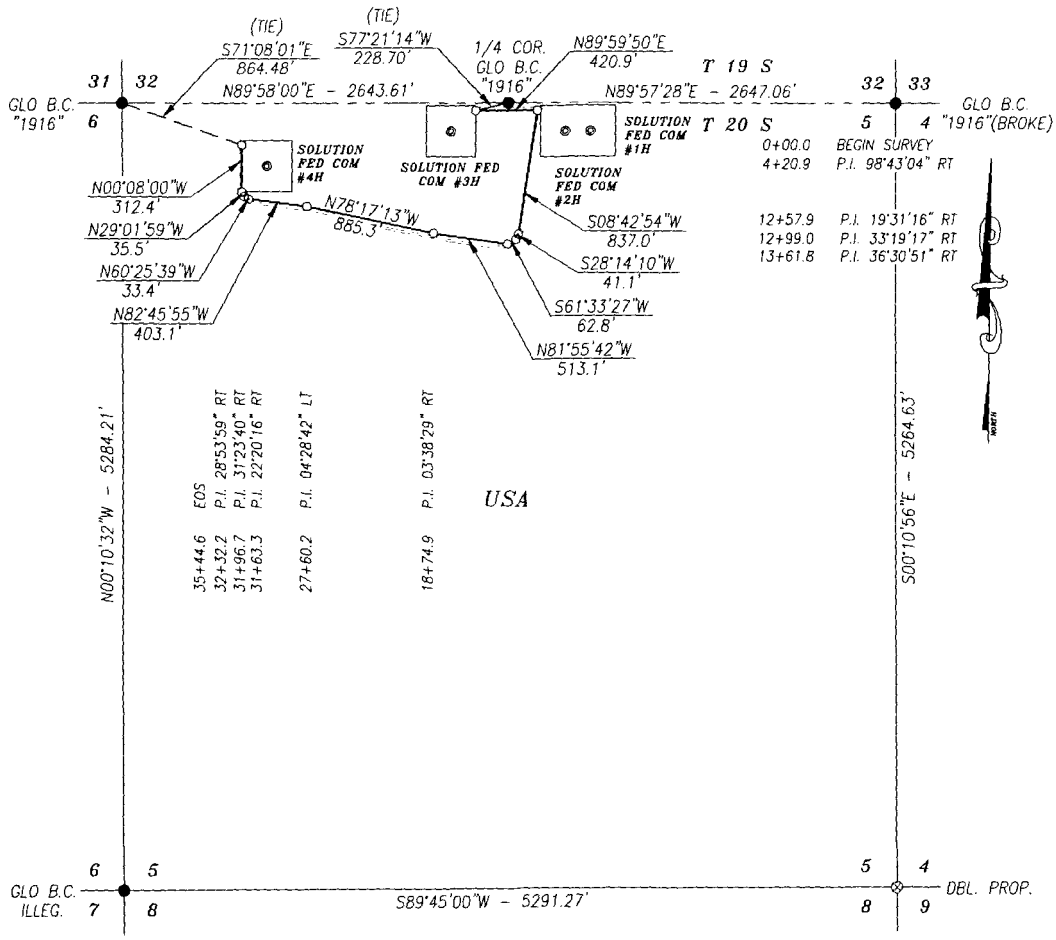
PH: (575) 513-2570 FAX: (575) 746-2158
chad_harcrow77@yahoo.com

EXHIBIT 2A

SECTION 5, TOWNSHIP 20 SOUTH, RANGE 30 EAST, N.M.P.M.,

EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 3544.6 FEET OR 214.82 RODS OR 0.671 MILES IN LENGTH CROSSING USA LAND IN SECTION 5, TOWNSHIP 20 SOUTH, RANGE 30 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:
BEARINGS SHOWN HEREON ARE MERCATOR GRID AND CONFORM TO THE NEW MEXICO COORDINATE SYSTEM "NEW MEXICO EAST ZONE" NORTH AMERICAN DATUM 1983. DISTANCES ARE SURFACE VALUES.

HARCROW SURVEYING, LLC
2314 W. MAIN ST, ARTESIA, N.M. 88210
PH: (575) 746-2158 FAX: (575) 746-2158
c.harcrow@harcrowsurveying.com

CERTIFICATION
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.

CHAD L. HARCROW NEW MEXICO 17777 LICENSED PROFESSIONAL SURVEYOR

Chad Harcrow 12/3/14
CHAD HARCROW N.M.P.S. NO. 17777 DATE

1000 0 1000 2000 FEET
SCALE: 1"=1000'

COG OPERATING, LLC

SURVEY OF A PROPOSED FLOWLINE LOCATED IN SECTION 5, TOWNSHIP 20 SOUTH, RANGE 30 EAST, EDDY COUNTY, NMPM, NEW MEXICO

SURVEY DATE: DECEMBER 2, 2014		
DRAFTING DATE: DECEMBER 2, 2014		PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: SP	FILE: 14-1215

LLD ACREAGE REPORT

Admin State: NM

Geo State: NM

MTR: 23 0200S 0300E

Section: 005

Sur Type	Sur No	Lld Suff	NE NW SW SE NNSS NNSS NNSS NNSS EWWE EWWE EWWE EWWE	Sur Note	Dup Flg	Sub Surf	Acreage
A			--XX --XX XXXX XXXX				480.000
L	1		X--- ---- ---- ----				39.690
L	2		-X-- ---- ---- ----				39.850
L	3		---- X--- ---- ----				39.990
L	4		---- -X-- ---- ----				40.150

Section 005 Total: 639.680

MTR Total Exluding Survey Notes C/D/R and Sub Surf = Y 639.680

Grand Total Excluding Survey Notes C/D/R and Sub Surf = Y: 639.680

Supplemental

Surface Use & Operating Plan

SURFACE USE AND OPERATING PLAN

1. Existing & Proposed Access Roads

A. Based on current road maintenance performed on other roads serving existing wells, we anticipate maintaining the lease roads leading to the proposed well pad at least twice a year on dry conditions and three a year in wetter conditions.

2. Proposed Access Road:

The Location Verification Map shows that no new access road will be required for this location. If any road is required it will be constructed as follows:

The maximum width of the running surface will be 14'. The road will be crowned, ditched and constructed of 6" rolled and compacted caliche. Ditches will be at 3:1 slope and 4 feet wide. Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

A. The average grade will be less than 1%.

B. No turnouts are planned.

C. No cattleguard, culvert, gates, low water crossings or fence cuts are necessary.

D. Surfacing material will consist of native caliche. Caliche will be obtained from the actual well site if available. If not available onsite, caliche will be hauled from the nearest BLM approved caliche pit. Any additional construction materials will be purchased from contractors.

3. Location of Existing and/or Proposed Facilities:

A. COG Operating LLC does not operate an oil production facility on this lease.

B. If the well is productive, contemplated facilities will be as follows:

1) A tank battery and facilities will be constructed as shown on Exhibit 3.

2) The tank battery and facilities will be installed according to API specifications. No flow lines are anticipated at this time.

3) Any additional caliche will be obtained from the actual well site. If caliche does not exist or is not plentiful from the well site, caliche will be hauled from the nearest BLM approved caliche pit. Any additional construction materials will be purchased from contractors.

4) It will be necessary to run electric power if this well is productive. Power will be provided by Xcel Energy and they will submit a separate plan and ROW for service to the well location.

5) If the well is productive, rehabilitation plans will include the following:

- The original topsoil from the well site will be returned to the location, and the site will be re-contoured as close as possible to the original site.

4. Location and Type of Water Supply:

The well will be drilled with combination brine and fresh water mud system as outlined in the drilling program. The water will be obtained from private source Rio Fast-Line and Tanks, 4602 W. Pierce Street, Carlsbad, NM 88220, (575) 887-0042. No water well will be drilled on the location.

5. Source of Construction Materials and Location "Turn-Over" Procedure:

Obtaining caliche: One primary way of obtaining caliche to build locations and roads will be by "turning over" the location. This means, caliche will be obtained from the actual well site. Amount will vary for each pad. The procedure below has been approved by BLM personnel:

A. Equipment that is needed to construct the proposed location will be as follows: Two dozers, one blade, one morograder, one backhoe, one water truck and two dump trucks.

B. The time line to complete construction will be approximately 10 days.

C. The top 6 inches of topsoil is pushed off and stockpiled along the side of the location.

D. An approximate 160' X 160' area is used within the proposed well site to remove caliche.

E. Subsoil is removed and stockpiled within the surveyed well pad.

F. When caliche is found, material will be stock piled within the pad site to build the location and road.

G. Then subsoil is pushed back in the hole and caliche is spread accordingly across entire location and road.

H. Once well is drilled, the stock piled top soil will be used for interim reclamation and spread along areas where caliche is picked up and the location size is reduced.

I. Neither caliche, nor subsoil will be stock piled outside of the well pad. Topsoil will be stockpiled along the edge of the pad as depicted in the Well Site Layout or survey plat.

In the event that no caliche is found onsite, caliche will be hauled from the nearest BLM approved caliche pit. Any additional construction materials will be purchased from contractors.

6. Methods of Handling Water Disposal:

A. The well will be drilled utilizing a closed loop mud system. Drill cuttings will be held in roll-off style mud box commerciales and taken to R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240. .

B. Drilling fluids will be contained in steel mud pits and taken to R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.

C. Water produced from the well during completion will be held temporarily in steel tanks and then taken to an NMOCD approved commercial disposal facility R360's disposal site located at 4507 West Carlsbad Highway, Hobbs, NM 88240.

D. It is anticipated that the disposal of produced water will be trucked to unspecified commercial SWD wells in the area around the leases.

E. Garbage and trash produced during drilling or completion operations will be collected in a trash bin and hauled to an approved landfill-Lea Landfill LLC located at Mile Marker 64, Highway 62-180 East, P O Box 3247, Carlsbad, NM 88221. No toxic waste or hazardous chemicals will be produced by this operation.

F. Human waste and grey water will need to be properly contained and disposed of. Proper disposal and elimination of waste and grey water may include but are not limited to portable septic systems and/or portable waste gathering systems (i.e. portable toilets).

G. After the rig is moved out and the well is either completed or abandoned, all waste materials will be cleaned up within 30 days. In the event of a dry hole only a dry hole marker will remain.

7. Plans for Restoration of the Surface:

A. Interim Reclamation will take place after the well has been completed. The pad will be downsized by reclaiming the areas not needed for production operations. The portions of the pad that are not needed for production operations will be re-contoured to its original state as much as possible. The caliche that is removed will be reused to either build another pad site or for road repairs within the lease. The stockpiled topsoil will then be spread out reclaimed area and reseeded with a BLM approved seed mixture. In the event that the well must be worked over or maintained, it may be necessary to drive, park, and/or operate machinery on reclaimed land. This area will be repaired or reclaimed after work is complete.

B. Final Reclamation: Upon plugging and abandoning the well all caliche for well pad and lease road will be removed and surface will be recountoured to reflect its surroundings as much as possible. Caliche will be recycled for road repair or reused for another well pad within the lease. If any topsoil remains, it will be spread out and the area will be re-seeded with a BLM approved mixture and re-vegetated as per BLM orders. When required by BLM, the well pad site will be restored to match pre-construction grades.

8. (Sedimentation and Erosion Control)

Immediately following pad construction approximately 340' of straw waddles will be placed on the East side and 340' across the South side of the location to reduce sediment impacts to fragile/sensitive soils. Since the tank battery will be on the South side, there is no need for straw waddles since there are berms around the tank battery, which detours water from running off location.

PECOS DISTRICT
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**COG Operating, LLC**
LEASE NO.:	**NMNM-0429170**
WELL NAME & NO.:	**Solution Federal Com 1H**
SURFACE HOLE FOOTAGE:	**0190' FNL & 2090' FEL**
BOTTOM HOLE FOOTAGE	**2310' FNL & 0380' FEL Sec. 08, T. 20 S., R 30 E.**
LOCATION:	**Section 05, T. 20 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.

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)

Communitization Agreement
A Communitization Agreement covering the acreage dedicated to this well must be filed for approval with the BLM. The effective date of the agreement shall be prior to any sales. In addition, the well sign shall include the surface and bottom hole lease numbers. If the Communitization Agreement number is known, it shall also be on the sign. If not, it shall be placed on the sign when the sign is replaced.

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 pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the pad.

Closed Mud System Using Steel Tanks with All Fluids and Cuttings Hauled Off.
A closed mud system using steel tanks for all cuttings and fluids is required. All fluids and cuttings will be hauled off site for disposal. No pits are allowed.

Tank Battery Liners and Berms:
Tank battery locations 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 values 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 values, 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.

Vegetation

Interim reclamation will be conducted on all disturbed areas not needed for active support of production operations, and if caliche is used as a surfacing material it will be removed at time of reclamation to enhance re-establishment of vegetation.

Sedimentation control structures are needed at the access road diversion ditches constructed at several locations along the road.

Potash

(1) Drilling within the Designated Potash Area. It is the intent of the Department of the Interior to administer oil and gas operations

throughout the Designated Potash Area in a manner which promotes safe, orderly co-development of oil, gas, and potash resources. It is the policy of the Department of the Interior to deny approval of most applications for permits to drill oil and gas wells from surface locations within the Designated Potash Area. Three exceptions to this policy will be permitted if the drilling will occur under the following conditions from:

(a) A Drilling Island associated with a Development Area established under this Order or a Drilling Island established under a prior Order;

(b) A Barren Area and the Authorized Officer determines that such operations will not adversely affect active or planned potash mining operations in the immediate vicinity of the proposed drill-site; or

(c) A Drilling Island, not covered by (a) above or single well site established under this Order by the approval and in the sole discretion of the Authorized Officer, provided that such site was jointly recommended to the Authorized Officer by the oil and gas lessee(s) and the nearest potash lessee(s).

(2) Development Areas

(a) When processing an application for permit to drill (APD) an oil or gas well in the Designated Potash Area that complies with regulatory requirements, the Authorized Officer will determine whether to establish a Development Area in connection with the application, and if so, will determine the boundaries of the Development Area and the location within the Development Area of one or more Drilling Islands from which drilling will be permitted. The BLM may also designate a Development Area outside of the APD process based on information in its possession, and may modify the boundaries of a Development Area. Existing wells may be included within the boundaries of a Development Area. A Development Area may include Federal oil and gas leases and other Federal and non-Federal lands.

(b) After designating or modifying a Development Area, the BLM will issue a Notice to Lessees, consistent with its authorities under 43 CFR Subpart 3105 and part 3180, information lessees that future drilling on lands under an oil and gas lease within that Development Area will:

(i) occur, under most circumstances, from a Barren Area or A Drilling Island within the Development Area; and

(ii) be managed under a unit or communitization agreement, generally by a single operator, consistent with BLM

regulations and this Order. Unit and communitization agreements will be negotiated among lessees. The BLM will consider whether a specific plan of development is necessary or advisable for a particular Drilling Island.

(c) The Authorized Officer reserves the right to approve an operator or successor operator of a Development Area and/or a Drilling Island, if applicable, to ensure that the operator has the resources to operate and extract the oil and gas resources consistent with the requirements of this Order and all applicable laws and regulations, and has provided financial assurance in the amount required by the Authorized Officer.

(d) The Authorized Officer will determine the appropriate designation of a Development Area in terms of location, shape and size. In most cases, a single Drilling Island will be established for each Development Area. In establishing the location, shape and size of a Development Area and an associated Drilling Island, the Authorized Officer will consider:

(i) the appropriate location, shape, and size of a Development Area and associated Drillings Island to allow effective extraction of oil and gas resources while managing the impact on potash resources;

(ii) the application of available oil and gas drilling and production technology in the Permian Basin;

(iii) the applicable geology of the Designated Potash Area and optimal locations to minimize loss of potash ore while considering co-development of both resources;

(iv) any long term exploration and/or mining plans provided by the potash industry;

(v) whether a Barren Area may be the most appropriate area for a Drilling Island;

(vi) the requirements of this Order; and

(vii) any other relevant factors

(e) As the Authorized Officer establishes a Development Area, the Authorized Officer will more strictly apply the factors listed in Section 6.e.(2)(d), especially the appropriate application of the available oil and gas drilling and production technology in the Permian Basin, when closer to current traditional (non-solution) potash mining operations. Greater flexibility in the application of the factors listed in Section 6.e(2)(d) will be applied further from current and near-term traditional (non-solution)potash mining operations. No Drilling Islands will be

established within one mile of any area where approved potash mining operations will be conducted within 3 years consistent with the 3-year mine plan referenced above (Section 6.d.(8)) without the consent of the affected potash lessee(s).

(f) The Authorized Officer may establish a Development Area associated with a well or wells drilled from a Barren Area as appropriate and necessary.

(g) As part of the consideration for establishing Development Areas and Drilling Islands, the BLM will consider input from the potash lessees and the oil and gas lessees or mineral right owner who would be potentially subject to a unitization agreement supporting the Development Are, provided that the input is given timely.

(3) Buffer Zones. Buffer Zones of ¼ mile for oil wells and ½ mile for gas wells are hereby established. These Buffer Zones will stay in effect until such time as revised distances are adopted by the BLM Director or other BLM official, as delegated. However, the Authorized Officer may adjust the Buffer Zones in an individual case, when the facts and circumstances demonstrate that such adjustment would enhance conservation and would not compromise safety. The Director will base revised Buffer Zones on science, engineering, and new technology and will consider comments and reports from the Joint Industry Technical Committee and other interested parties in adopting any revisions.

(4) Unitization and Communitization. To more properly conserve the potash, oil and gas resources in the Designated Potash Area and to adequately protect the rights of all parties in interest, including the United States, it is the policy of the Department of the Interior that all Federal oil and gas leases within a Development Area should be unitized or subject to an approved communitization agreement unless there is a compelling reason for another operating system. The Authorized Officer will make full use of his/her authorities wherever necessary or advisable to require unitization and/or communitization pursuant to the regulations in 43 CFR Subparts 3105 and 3180. The Authorized Officer will use his/her discretion to the fullest extent possible to assure that any communitization agreement and any unit plan of operations hereafter approved or prescribed within the Designated Potash Area will adhere to the provisions of this Order. The Authorized Officer will work with Federal lessees, and with the State Of New Mexico as provided below, to include non-Federal mineral rights owners in unit or communitization agreements to the extent possible.

(5) Coordination with the State of New Mexico.

(a) If the effective operation of any Development Area requires that the New Mexico Oil Conservation Division (NMOCD) revise the State's mandatory well spacing requirements, the BLM will participate as needed in such a process. The BLM may adopt the NMOCD spacing requirements and require lessees to enter into communitization agreements based on those requirements.

(b) The BLM will cooperate with the NMOCD in the implementation of that agency's rules and regulations.

(c) In taking any action under Section 6.e. of this Order, the Authorized Officer will take into consideration the applicable rules and regulations of the NMOCD.

To minimize impacts to potash resources, the proposed well is confined within the boundaries of the established Solution Drill Island (See Potash Memo and Map in attached file for Drill Island description).

Watershed

- **The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. Topsoil shall not be used to construct the berm. No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad. The berm shall be maintained through the life of the well and after interim reclamation has been completed.**
- **A leak detection plan will be submitted to the BLM Carlsbad Field Office for approval prior to pipeline installation. The method could incorporate gauges to detect pressure drops, situating values and lines so they can be visually inspected periodically or installing electronic sensors to alarm when a leak is present. The leak detection plan will incorporate an automatic shut off system that will be installed for proposed pipelines to minimize the effects of an undesirable event.**
- **With the topography having flat to low slope grades no sedimentation control structures are needed.**

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.

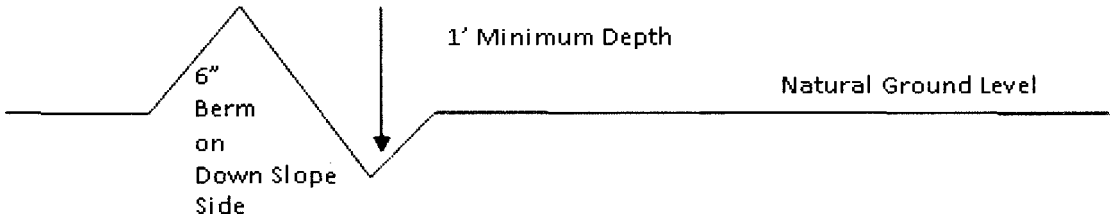
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

Drainage control systems shall be constructed on the entire length of road (e.g. ditches, sidehill outsloping 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 foot road with 4% road slope: $\frac{400'}{4\%} + 100' = 200'$ 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

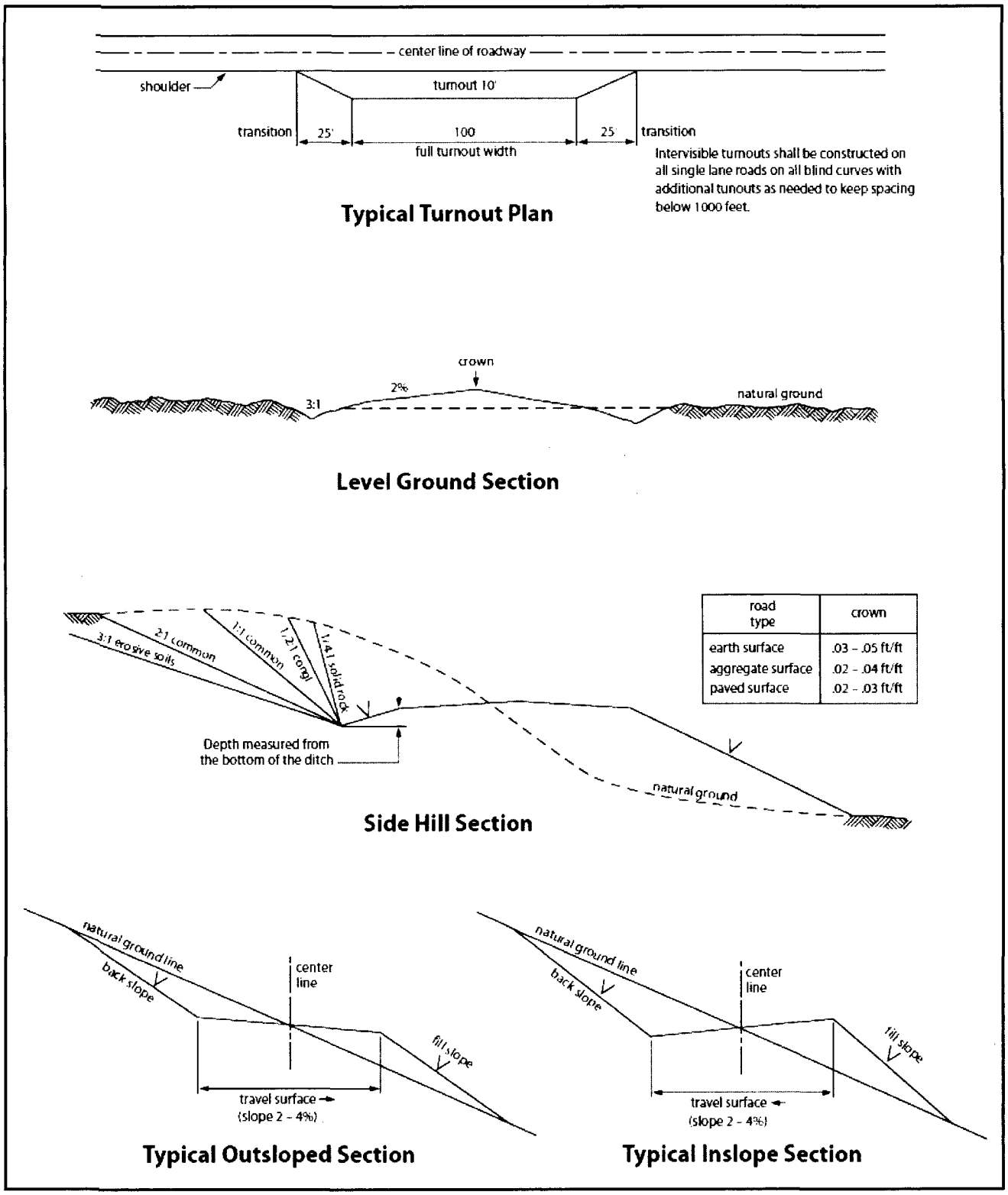


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

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 (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S 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.

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

R-111- P Potash
High Cave/Karst
Capitan Reef
Possibility of water flows in the Artesia Group and Salado.
Possibility of lost circulation in the Artesia Group, Capitan Reef, and Delaware.

A MINIMUM OF TWO CASING STRINGS CEMENTED TO SURFACE IS REQUIRED IN HIGH CAVE/KARST AREAS. THE CEMENT MUST BE IN A SOLID SHEATH. THEREFORE, ONE INCH OPERATIONS ARE NOT SUFFICIENT TO PROTECT CAVE KARST RESOURCES. A CASING DESIGN THAT HAS A ONE INCH JOB PERFORMED DOES NOT COUNT AS A SOLID SHEATH.

1. The **20** inch surface casing shall be set at approximately **350** 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 **13-3/8** inch 1st intermediate casing, which shall be set at approximately **1680** feet **(Top of Seven Rivers formation)**, 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.**

3. The minimum required fill of cement behind the **9-5/8** inch 2nd intermediate casing is:

Operator has proposed DV tool at depth of 1980', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool:

☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage.

b. Second stage above DV tool:

☒ 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 Capitan Reef and potash.**

Centralizers required on horizontal leg, must be type for horizontal service and a minimum of one every other joint.

4. The minimum required fill of cement behind the **7 X 5-1/2** inch production casing is:

☒ Cement to surface. If cement does not circulate, contact the appropriate BLM office. **Excess calculates to 23% - Additional cement may be required.**

5. 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.

6. 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 53.

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.

    a. **For surface casing only:** If the BOP/BOPE is to be tested against casing, the wait on cement (WOC) time for that casing is to be met (see WOC statement at start of casing section). Independent service company required.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** 2nd intermediate casing shoe shall be **3000 (3M)** psi.

4. 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 (8 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 (Jim Amos: 575-234-5909).

Seed Mixture 1 for Loamy Sites

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 shall 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 shall be either certified or registered seed. The seed container shall be tagged in accordance with State law(s) and available for inspection by the Authorized Officer.

Seed shall be planted using a drill equipped with a depth regulator to ensure proper depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture shall be evenly and uniformly planted over the disturbed area (small/heavier seeds have a tendency to drop the bottom of the drill and are planted first). Holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed shall be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre shall be doubled. The seeding shall be repeated until a satisfactory stand is established as determined by the Authorized Officer. Evaluation of growth may 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 lovegrass (Eragrostis intermedia)	0.5
Sand dropseed (Sporobolus cryptandrus)	1.0
Sideoats grama (Bouteloua curtipendula)	5.0
Plains bristlegrass (Setaria macrostachya)	2.0

*Pounds of pure live seed:

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

NMOCD CONDITION OF APPROVAL

The ***New!*** Gas Capture Plan (GCP) notice is posted on the NMOCD website under Announcements. The Plan became effective May 1, 2016. A copy of the GCP form is included with the NOTICE and is also in our FORMS section under Unnumbered Forms. Please review filing dates for all applicable activities currently approved or pending and submit accordingly. Failure to file a GCP may jeopardize the operator's ability to obtain C-129 approval to flare gas after the initial 60-day completion period.