Form 3160-3
(June 2015)

HOBBS OCD
APR 16 2019
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FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

F/F
(H)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
NMNM108973

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

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

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

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

8. Lease Name and Well No.
HARRIER FEDERAL COM
103H (325390)

2. Name of Operator
COG OPERATING LLC (229137)

9. API Well No.
30-025-45829 (97838)

3a. Address	3b. Phone No. *(include area code)*	10. Field and Pool, or Exploratory
600 West Illinois Ave Midland TX 79701	(432)683-7443	JENNINGS / UPPER BONE SPRING SH/

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface NWNW / 435 FNL / 232 FWL / LAT 32.093054 / LONG -103.65349
At proposed prod. zone SWSW / 50 FSL / 10 FWL / LAT 32.065143 / LONG -103.654209

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 35 / T25S / R32E / NMP

14. Distance in miles and direction from nearest town or post office*	12. County or Parish	13. State
24 miles	LEA	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
50 feet	640	320

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.	19. Proposed Depth	20. BLM/BIA Bond No. in file
920 feet	9200 feet / 19513 feet	FED: NMB000215

21. Elevations (Show whether DF, KDB, RT, GL, etc.)	22. Approximate date work will start*	23. Estimated duration
3369 feet	05/01/2019	30 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

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 must 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 requested by the BLM.

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Mayte Reyes / Ph: (575)748-6945	01/17/2019
Title: Regulatory Analyst		
Approved by *(Signature)* (Electronic Submission)	Name *(Printed/Typed)* Cody Layton / Ph: (575)234-5959	Date 04/15/2019
Title: Assistant Field Manager Lands & Minerals	Office: CARLSBAD	

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

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.

GCP Rec 04/16/19

APPROVED WITH CONDITIONS

Approval Date: 04/15/2019

KZ 04/18/19

REQUIRES NSL

(Continued on page 2)

*(Instructions on page 2)

INSTRUCTIONS

GENERAL: This form is designed for submitting proposals to perform certain well operations, as indicated on Federal and Indian lands and leases for action by appropriate Federal agencies, pursuant to applicable Federal laws and regulations. Any necessary special instructions concerning the use of this form and the number of copies to be submitted, particularly with regard to local, area, or regional procedures and practices, either are shown below or will be issued by, or may be obtained from local Federal offices.

ITEM I: If the proposal is to redrill to the same reservoir at a different subsurface location or to a new reservoir, use this form with appropriate notations. Consult applicable Federal regulations concerning subsequent work proposals or reports on the well.

ITEM 4: Locations on Federal or Indian land should be described in accordance with Federal requirements. Consult local Federal offices for specific instructions.

ITEM 14: Needed only when location of well cannot readily be found by road from the land or lease description. A plat, or plats, separate or on the reverse side, showing the roads to, and the surveyed location of, the wen, and any other required information, should be furnished when required by Federal agency offices.

ITEMS 15 AND 18: If well is to be, or has been directionany drilled, give distances for subsurface location of hole in any present or objective productive zone.

ITEM 22: Consult applicable Federal regulations, or appropriate officials, concerning approval of the proposal before operations are started.

ITEM 24: If the proposal will involve hydraulic fracturing operations, you must comply with 43 CFR 3162.3-3, including providing information about the protection of usable water. Operators should provide the best available information about all formations containing water and their depths. This information could include data and interpretation of resistivity logs run on nearby wells. Information may also be obtained from state or tribal regulatory agencies and from local BLM offices.

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.
AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160
PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service wen or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.
ROUTINE USE: Information from the record and/or the record win be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.
EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:
The BLM conects this information to anow evaluation of the technical, safety, and environmental factors involved with drilling for oil and/or gas on Federal and Indian oil and gas leases. This information will be used to analyze and approve applications. Response to this request is mandatory only if the operator elects to initiate drilling or reentry operations on an oil and gas lease. The BLM would like you to know that you do not have to respond to this or any other Federal agency-sponsored information collection unless it displays a currently valid OMB control number.

BURDEN HOURS STATEMENT: Public reporting burden for this form is estimated to average 8 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the form. Direct comments regarding the burden estimate or any other aspect of this form to U.S. Department of the Interior, Bureau of Land Management (1004-0137), Bureau Information Conection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

(Continued on page 3)

Additional Operator Remarks

Location of Well

1. SHL: NWNW / 435 FNL / 232 FWL / TWSP: 25S / RANGE: 32E / SECTION: 35 / LAT: 32.093054 / LONG: -103.65349 (TVD: 0 feet, MD: 0 feet)
   PPP: NWNW / 100 FNL / 10 FWL / TWSP: 25S / RANGE: 32E / SECTION: 35 / LAT: 32.093974 / LONG: -103.654204 (TVD: 3793 feet, MD: 3800 feet)
   PPP: NWNW / 0 FNL / 10 FWL / TWSP: 26S / RANGE: 32E / SECTION: 2 / LAT: 32.079709 / LONG: -103.654207 (TVD: 9173 feet, MD: 14550 feet)
   BHL: SWSW / 50 FSL / 10 FWL / TWSP: 25S / RANGE: 32E / SECTION: 2 / LAT: 32.065143 / LONG: -103.654209 (TVD: 9200 feet, MD: 19513 feet)

BLM Point of Contact

Name: Tanja Baca
Title: Admin Support Assistant
Phone: 5752345940
Email: tabaca@blm.gov

Review and Appeal Rights

A person contesting a decision shall request a State Director review. This request must be filed within 20 working days of receipt of the Notice with the appropriate State Director (see 43 CFR 3165.3). The State Director review decision may be appealed to the Interior Board of Land Appeals, 801 North Quincy Street, Suite 300, Arlington, VA 22203 (see 43 CFR 3165.4). Contact the above listed Bureau of Land Management office for further information.

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

APD Print Report

04/16/2019

APD ID: 10400037554 **Submission Date:** 01/17/2019

Operator Name: COG OPERATING LLC **Federal/Indian APD:** FED

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Well Type: OIL WELL **Well Work Type:** Drill

[redacted]

Show Final Text

Application

Section 1 - General

APD ID: 10400037554 **Tie to previous NOS?** **Submission Date:** 01/17/2019

BLM Office: CARLSBAD **User:** Mayte Reyes **Title:** Regulatory Analyst

Federal/Indian APD: FED **Is the first lease penetrated for production Federal or Indian?** FED

Lease number: NMNM108973 **Lease Acres:** 640

Surface access agreement in place? **Allotted?** **Reservation:**

Agreement in place? NO **Federal or Indian agreement:**

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? NO **APD Operator:** COG OPERATING LLC

Operator letter of designation:

Operator Info

Operator Organization Name: COG OPERATING LLC

Operator Address: 600 West Illinois Ave **Zip:** 79701

Operator PO Box:

Operator City: Midland **State:** TX

Operator Phone: (432)683-7443

Operator Internet Address: RODOM@CONCHO.COM

Section 2 - Well Information

Well in Master Development Plan? NO **Master Development Plan name:**

Well in Master SUPO? NO **Master SUPO name:**

Well in Master Drilling Plan? NO **Master Drilling Plan name:**

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Well Name: HARRIER FEDERAL COM **Well Number:** 103H **Well API Number:**

Field/Pool or Exploratory? Field and Pool **Field Name:** JENNINGS **Pool Name:** UPPER BONE SPRING SHALE

Is the proposed well in an area containing other mineral resources? USEABLE WATER

Describe other minerals:

Is the proposed well in a Helium production area? N **Use Existing Well Pad?** NO **New surface disturbance?**

Type of Well Pad: MULTIPLE WELL **Multiple Well Pad Name:** HARRIER FEDERAL COM **Number:** 103H AND 202H

Well Class: HORIZONTAL **Number of Legs:**

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 24 Miles **Distance to nearest well:** 920 FT **Distance to lease line:** 50 FT

Reservoir well spacing assigned acres Measurement: 320 Acres

Well plat: COH_Harrier_103H_C102_20190308100215.pdf

Well work start Date: 05/01/2019 **Duration:** 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number:

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
SHL Leg #1	435	FNL	232	FWL	25S	32E	35	Aliquot NWNW	32.093054	-103.65349	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 108973	3369	0	0
KOP Leg #1	435	FNL	232	FWL	25S	32E	35	Aliquot NWNW	32.093054	-103.65349	LEA	NEW MEXICO	NEW MEXICO	S	STATE	3369	0	0

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

	NS-Foot	NS Indicator	EW-Foot	EW Indicator	Twsp	Range	Section	Aliquot/Lot/Tract	Latitude	Longitude	County	State	Meridian	Lease Type	Lease Number	Elevation	MD	TVD
PPP Leg #1	0	FNL	10	FWL	26S	32E	2	Aliquot NWNW	32.079709	-103.654207	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-5804	14550	9173
PPP Leg #1	100	FNL	10	FWL	25S	32E	35	Aliquot NWNW	32.093974	-103.654204	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 108973	-424	3800	3793
EXIT Leg #1	100	FSL	10	FWL	25S	32E	2	Aliquot SWSW	32.06528	-103.654209	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-5781	10154	9150
BHL Leg #1	50	FSL	10	FWL	25S	32E	2	Aliquot SWSW	32.065143	-103.654209	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-5831	19513	9200

Drilling Plan

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	UNKNOWN	3369	0	0		NONE	No
2	RUSTLER	2528	841	841		NONE	No
3	TOP SALT	2165	1204	1204		NONE	No
4	BASE OF SALT	-1101	4470	4470		NONE	No
5	LAMAR	-1318	4687	4687		NONE	No
6	BELL CANYON	-1356	4725	4725		NONE	No
7	CHERRY CANYON	-2365	5734	5734		NATURAL GAS,OIL	No
8	BRUSHY CANYON	-3958	7327	7327		NATURAL GAS,OIL	No
9	UPPER AVALON SHALE	-5523	8892	8892		NATURAL GAS,OIL	Yes
10	---	-5836	9205	9205		NATURAL GAS,OIL	No

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
11	—	-6149	9518	9518		NATURAL GAS,OIL	No
12	BONE SPRING 1ST	-6472	9841	9841		NATURAL GAS,OIL	No

Section 2 - Blowout Prevention

Pressure Rating (PSI): 2M **Rating Depth:** 4700

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.
Requesting Variance? NO

Variance request: 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.
Testing Procedure: 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 of the components installed will be functional and tested.

Choke Diagram Attachment:

COG_Harrier_103H_2M_Choke_20190103131041.pdf

BOP Diagram Attachment:

COG_Harrier_103H_2M_BOP_20190103131049.pdf

COG_Harrier_103H_Flex_Hose_20190308100301.pdf

Pressure Rating (PSI): 3M **Rating Depth:** 9200

Equipment: Annular. The BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold.
Requesting Variance? YES

Variance request: 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.
Testing Procedure: 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 of the components installed will be functional and tested.

Choke Diagram Attachment:

COG_Harrier_103H_3M_Choke_20190103131135.pdf

BOP Diagram Attachment:

COG_Harrier_103H_3M_BOP_20190103131153.pdf

COG_Harrier_103H_Flex_Hose_20190308100251.pdf

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	870	0	870	-9530	-10415	870	J-55	54.5	STC	2.84	1.32	DRY	10.84	DRY	10 4
2	INTERMEDIATE	12.25	9.625	NEW	API	Y	0	4700	0	4700	-9530	-21730	4700	L-80	40	LTC	1.25	1.63	DRY	5.73	DRY	5.
3	PRODUCTION	8.75	5.5	NEW	API	N	0	19513	0	19513	-9530	-32300	19513	P-110	17	LTC	1.68	3.01	DRY	2.85	DRY	2.

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Harrier_103H_Casing_Prog_20190103131435.pdf

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Casing Attachments

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

COG_Harrier_103H_Casing_Prog_20190103131444.pdf

Casing Design Assumptions and Worksheet(s):

COG_Harrier_103H_Casing_Prog_20190103131455.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Harrier_103H_Casing_Prog_20190103131507.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	870	330	1.75	13.5	577	50	Class C	4% Gel + 1 % CaCl2
SURFACE	Tail		0	870	250	1.34	14.8	335	50	Class C	2% CaCl2
INTERMEDIATE	Lead		0	4700	890	2	12.7	1780	50	35:65:6 C Blend	No Additives
INTERMEDIATE	Tail		0	4700	250	1.34	14.8	335	50	Class C	2% CaCl

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
PRODUCTION	Lead		0	19513	630	2.5	11.9	1575	25	Lead: 50:50:10 H Blend	No additives
PRODUCTION	Tail		0	19513	2750	1.24	14.4	3410	25	Tail: 50:50:2 Class H Blend	No additives

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
870	4700	OTHER : Saturated Brine	10	10.1							Saturated Brine
4700	19513	OTHER : CUT BRINE	8.6	9.3							Cut Brine
0	870	OTHER : Fresh water gel	8.6	8.8							Fresh water gel

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

None planned

List of open and cased hole logs run in the well:

CNL,GR

Coring operation description for the well:

None planned

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 4450 **Anticipated Surface Pressure:** 2426

Anticipated Bottom Hole Temperature(F): 150

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Harrier_103H_H2S_Schem_20190104091239.pdf

COG_Harrier_103H_H2S_SUP_20190104091247.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_Harrier_103H_AC_Rprt_20190104091302.pdf

COG_Harrier_103H_Direct_Plan_20190104091311.pdf

Other proposed operations facets description:

GCP Attached.

Other proposed operations facets attachment:

COG_Harrier_103H_Drill_Prog_20190104091323.pdf

COG_Harrier_103H_GCP_20190104091330.pdf

Other Variance attachment:

SUPO

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

COG_Harrier_103H_Existing_Rd._20190104085728.pdf

Existing Road Purpose: ACCESS,FLUID TRANSPORT **Row(s) Exist?** NO

ROW ID(s)

ID:

Do the existing roads need to be improved? NO

Existing Road Improvement Description:

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG_Harrier_103H_Maps_Plats_20190104085751.pdf

New road type: RESOURCE

Length: 166.4 Feet **Width (ft.):** 30

Max slope (%): 33 **Max grade (%):** 1

Army Corp of Engineers (ACOE) permit required? NO

ACOE Permit Number(s):

New road travel width: 14

New road access erosion control: Water will be diverted where necessary to avoid ponding, prevent erosion, maintain good drainage, and to be consistent with local drainage patterns.

New road access plan or profile prepared? NO

New road access plan attachment:

Access road engineering design? NO

Access road engineering design attachment:

Access surfacing type: OTHER

Access topsoil source: ONSITE

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Access surfacing type description: Caliche

Access onsite topsoil source depth: 6

Offsite topsoil source description:

Onsite topsoil removal process: Blading

Access other construction information: No turnouts are planned. Re-routing access road around proposed well location.

Access miscellaneous information:

Number of access turnouts: **Access turnout map:**

Drainage Control

New road drainage crossing: OTHER

Drainage Control comments: None necessary

Road Drainage Control Structures (DCS) description: None needed.

Road Drainage Control Structures (DCS) attachment:

Access Additional Attachments

Additional Attachment(s):

Section 3 - Location of Existing Wells

Existing Wells Map? YES

Attach Well map:

COG_Harrier_103H_1Mile_Data_20190104085831.pdf

Existing Wells description:

Section 4 - Location of Existing and/or Proposed Production Facilities

Submit or defer a Proposed Production Facilities plan? DEFER

Estimated Production Facilities description: A Central Tank Battery and facilities will be permitted and constructed at a later date, once the well is completed. The battery and facilities will be installed according to API specifications.

Section 5 - Location and Types of Water Supply

Water Source Table

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Water source use type: ICE PAD CONSTRUCTION & MAINTENANCE, STIMULATION, SURFACE CASING **Water source type:** OTHER

Describe type: Fresh Water.

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: PRIVATE

Water source transport method: PIPELINE

Source transportation land ownership: PRIVATE

Water source volume (barrels): 450000 **Source volume (acre-feet):** 58.001892

Source volume (gal): 18900000

Water source use type: INTERMEDIATE/PRODUCTION CASING **Water source type:** OTHER

Describe type: Brine Water

Source latitude: **Source longitude:**

Source datum:

Water source permit type: PRIVATE CONTRACT

Source land ownership: COMMERCIAL

Water source transport method: TRUCKING

Source transportation land ownership: COMMERCIAL

Water source volume (barrels): 30000 **Source volume (acre-feet):** 3.866793

Source volume (gal): 1260000

Water source and transportation map:

COG_Harrier_103H_Brine_H2O_20190104085859.pdf

COG_Harrier_103H_Fresh_H2O_20190115071952.pdf

Water source comments: Fresh water will be obtained from Airacuda Frac Pond located in Section 31. T25S, R33E. Brine water will be obtained from the Malaga Brine Station II, located in Section 12. T23S. R28E.

New water well? NO

New Water Well Info

Well latitude: **Well Longitude:** **Well datum:**

Well target aquifer:

Est. depth to top of aquifer(ft): **Est thickness of aquifer:**

Aquifer comments:

Aquifer documentation:

Well depth (ft): **Well casing type:**

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Well casing outside diameter (in.): **Well casing inside diameter (in.):**

New water well casing? **Used casing source:**

Drilling method: **Drill material:**

Grout material: **Grout depth:**

Casing length (ft.): **Casing top depth (ft.):**

Well Production type: **Completion Method:**

Water well additional information:

State appropriation permit:

Additional information attachment:

Section 6 - Construction Materials

Construction Materials description: Caliche will be obtained from the actual well site if available. If not available onsite, caliche will be obtained from Oliver Kiehne Ranch and Cattle Co., caliche pit located in Section 4, T26S, R32E. P O Box 135, Orla, TX 79770. Phone (432) 448-6337.
Construction Materials source location attachment:

Section 7 - Methods for Handling Waste

Waste type: SEWAGE

Waste content description: Human waste and gray water

Amount of waste: 1000 gallons

Waste disposal frequency : One Time Only

Safe containment description: Waste will be properly contained and disposed of properly at a state approved disposal facility.
Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** PRIVATE
Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Waste type: DRILLING

Waste content description: Drilling fluids and produced oil land water while drilling and completion operations

Amount of waste: 6000 barrels

Waste disposal frequency : One Time Only

Safe containment description: All drilling waste will be stored safely and disposed of properly

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** COMMERCIAL

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Disposal type description:

Disposal location description: Trucked to an approved disposal facility

Waste type: GARBAGE

Waste content description: Garbage and trash produced during drilling and completion operations.

Amount of waste: 500 pounds

Waste disposal frequency : One Time Only

Safe containment description: Garbage and trash produced during drilling and completion operations will be collected in a trash container and disposed of properly at a state approved disposal facility

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL **Disposal location ownership:** COMMERCIAL FACILITY

Disposal type description:

Disposal location description: Trucked to an approved disposal facility.

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

Is at least 50% of the reserve pit in cut?

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? YES

Description of cuttings location Roll off cutting containers on tracks

Cuttings area length (ft.) **Cuttings area width (ft.)**

Cuttings area depth (ft.) **Cuttings area volume (cu. yd.)**

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Harrier_103H_Layout_20190104085935.pdf

Comments: A Central Tank Battery and facilities will be permitted and constructed at a later date, once the well is completed. The battery and facilities will be installed according to API specifications.

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: HARRIER FEDERAL COM

Multiple Well Pad Number: 103H AND 202H

Recontouring attachment:

Drainage/Erosion control construction: Due to the relatively flat surface No waddles will be needed to reduce sediment impacts to fragile/sensitive soils.

Drainage/Erosion control reclamation: East 50'

Well pad proposed disturbance (acres): 3.67

Well pad interim reclamation (acres): 0.15

Well pad long term disturbance (acres): 2.35

Road proposed disturbance (acres): 0.05

Road interim reclamation (acres): 0.05

Road long term disturbance (acres): 0.05

Powerline proposed disturbance (acres): 0

Powerline interim reclamation (acres): 0

Powerline long term disturbance (acres): 0

Pipeline proposed disturbance (acres): 0

Pipeline interim reclamation (acres): 0

Pipeline long term disturbance (acres): 0

Other proposed disturbance (acres): 0

Other interim reclamation (acres): 0

Other long term disturbance (acres): 0

Total proposed disturbance: 3.72

Total interim reclamation: 0.2

Total long term disturbance: 2.4

Disturbance Comments:

Reconstruction method: If needed, portions of the pad 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. The stockpiled topsoil will be spread out over reclaimed area and reseeded with BLM approved seed mixture.

Topsoil redistribution: East 50'

Soil treatment: None

Existing Vegetation at the well pad: Shinnery Oak/Mesquite grassland

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Existing Vegetation at the well pad attachment:

Existing Vegetation Community at the road: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the road attachment:

Existing Vegetation Community at the pipeline: Shinnery Oak/Mesquite grassland

Existing Vegetation Community at the pipeline attachment:

Existing Vegetation Community at other disturbances: N/A

Existing Vegetation Community at other disturbances attachment:

Non native seed used? NO

Non native seed description:

Seedling transplant description:

Will seedlings be transplanted for this project? NO

Seedling transplant description attachment:

Will seed be harvested for use in site reclamation? NO

Seed harvest description:

Seed harvest description attachment:

Seed Management

Seed Table

Seed type:

Seed source:

Seed name:

Source name:

Source address:

Source phone:

Seed cultivar:

Seed use location:

PLS pounds per acre:

Proposed seeding season:

Seed Summary

Total pounds/Acre:

Seed Type	Pounds/Acre

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Seed reclamation attachment:

Operator Contact/Responsible Official Contact Info

First Name: Gerald **Last Name:** Herrera

Phone: (432)260-7399 **Email:** gherrera@concho.com

Seedbed prep:

Seed BMP:

Seed method:

Existing invasive species? NO

Existing invasive species treatment description:

Existing invasive species treatment attachment:

Weed treatment plan description: N/A

Weed treatment plan attachment:

Monitoring plan description: N/A

Monitoring plan attachment:

Success standards: N/A

Pit closure description: N/A

Pit closure attachment:

COG_Harrier_103H_Closed_Loop_20190104090001.pdf

Section 11 - Surface Ownership

Disturbance type: WELL PAD

Describe:

Surface Owner: BUREAU OF LAND MANAGEMENT

Other surface owner description:

BIA Local Office:

BOR Local Office:

COE Local Office:

DOD Local Office:

NPS Local Office:

State Local Office:

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Military Local Office:

USFWS Local Office:

Other Local Office:

USFS Region:

USFS Forest/Grassland: **USFS Ranger District:**

Section 12 - Other Information

Right of Way needed? NO **Use APD as ROW?**

ROW Type(s):

ROW Applications

SUPO Additional Information: Surface Use & Operating Plan.

Use a previously conducted onsite? YES

Previous Onsite information: Onsite completed on 4/26/2018 by Rand French (COG); Gerald Herrera (COG) and Jeff Robertson (BLM).

Other SUPO Attachment

COG_Harrier_103H_1Mile_Data_20190104090031.pdf
COG_Harrier_103H_Brine_H2O_20190104090045.pdf
COG_Harrier_103H_C102_20190104090054.pdf
COG_Harrier_103H_Closed_Loop_20190104090102.pdf
COG_Harrier_103H_Existing_Rd._20190104090111.pdf
COG_Harrier_103H_Layout_20190104090144.pdf
COG_Harrier_103H_Maps_Plats_20190104090158.pdf
COG_Harrier_103H_Fresh_H2O_20190115072026.pdf
COG_Harrier_103H_Reclamation_20190115072036.pdf
COG_Harrier_103H_Certification_20190115072116.pdf
COG_Harrier_103H_SUP_20190117094522.pdf

PWD

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 1 - General

Would you like to address long-term produced water disposal? NO

Section 2 - Lined Pits

Would you like to utilize Lined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Lined pit PWD on or off channel:

Lined pit PWD discharge volume (bbl/day):

Lined pit specifications:

Pit liner description:

Pit liner manufacturers information:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Lined pit precipitated solids disposal schedule:

Lined pit precipitated solids disposal schedule attachment:

Lined pit reclamation description:

Lined pit reclamation attachment:

Leak detection system description:

Leak detection system attachment:

Lined pit Monitor description:

Lined pit Monitor attachment:

Lined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Lined pit bond number:

Lined pit bond amount:

Additional bond information attachment:

Section 3 - Unlined Pits

Would you like to utilize Unlined Pit PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Unlined pit PWD on or off channel:

Unlined pit PWD discharge volume (bbl/day):

Unlined pit specifications:

Precipitated solids disposal:

Decribe precipitated solids disposal:

Precipitated solids disposal permit:

Unlined pit precipitated solids disposal schedule:

Unlined pit precipitated solids disposal schedule attachment:

Unlined pit reclamation description:

Unlined pit reclamation attachment:

Unlined pit Monitor description:

Unlined pit Monitor attachment:

Do you propose to put the produced water to beneficial use?

Beneficial use user confirmation:

Estimated depth of the shallowest aquifer (feet):

Does the produced water have an annual average Total Dissolved Solids (TDS) concentration equal to or less than that of the existing water to be protected?

TDS lab results:

Geologic and hydrologic evidence:

State authorization:

Unlined Produced Water Pit Estimated percolation:

Unlined pit: do you have a reclamation bond for the pit?

Is the reclamation bond a rider under the BLM bond?

Unlined pit bond number:

Unlined pit bond amount:

Additional bond information attachment:

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Section 4 - Injection

Would you like to utilize Injection PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Injection PWD discharge volume (bbl/day):

Injection well mineral owner:

Injection well type:

Injection well number: **Injection well name:**

Assigned injection well API number? **Injection well API number:**

Injection well new surface disturbance (acres):

Minerals protection information:

Mineral protection attachment:

Underground Injection Control (UIC) Permit?

UIC Permit attachment:

Section 5 - Surface Discharge

Would you like to utilize Surface Discharge PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Surface discharge PWD discharge volume (bbl/day):

Surface Discharge NPDES Permit?

Surface Discharge NPDES Permit attachment:

Surface Discharge site facilities information:

Surface discharge site facilities map:

Section 6 - Other

Would you like to utilize Other PWD options? NO

Produced Water Disposal (PWD) Location:

PWD surface owner: **PWD disturbance (acres):**

Other PWD discharge volume (bbl/day):

Other PWD type description:

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Other PWD type attachment:

Have other regulatory requirements been met?

Other regulatory requirements attachment:

Bond Info

Bond Information

Federal/Indian APD: FED

BLM Bond number: NMB000215

BIA Bond number:

Do you have a reclamation bond? NO

Is the reclamation bond a rider under the BLM bond?

Is the reclamation bond BLM or Forest Service?

BLM reclamation bond number:

Forest Service reclamation bond number:

Forest Service reclamation bond attachment:

Reclamation bond number:

Reclamation bond amount:

Reclamation bond rider amount:

Additional reclamation bond information attachment:

Operator Certification

Operator Certification

I hereby certify that I, or someone under my direct supervision, have inspected the drill site and access route proposed herein; that I am familiar with the conditions which currently 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 the company I represent, 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.

NAME: Mayte Reyes **Signed on:** 12/27/2018

Title: Regulatory Analyst

Street Address: 2208 W Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6945

Email address: Mreyes1@concho.com

Operator Name: COG OPERATING LLC

Well Name: HARRIER FEDERAL COM **Well Number:** 103H

Field Representative

Representative Name: Gerald Herrera

Street Address: 2208 West Main Street

City: Artesia **State:** NM **Zip:** 88210

Phone: (575)748-6940

Email address: gherrera@concho.com

Payment Info

Payment

APD Fee Payment Method: PAY.GOV

pay.gov Tracking ID: 26ENS5UK

COG Production, LLC - Harrier Federal Com #103H

1. Geologic Formations

TVD of target	9,200' EOL	Pilot hole depth	NA
MD at TD:	19,513'	Deepest expected fresh water:	405'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	841	Water	
Top of Salt	1204	Salt	
Base of Salt	4470	Salt	
Lamar	4687	Salt Water	
Bell Canyon	4725	Salt Water	
Cherry Canyon	5734	Oil/Gas	
Brushy Canyon	7327	Oil/Gas	
U. Avalon Shale	8892	Target Oil/Gas	
M. Avalon Shale	9205	Not Penetrated	
L. Avalon Shale	9518	Not Penetrated	
Basal Avalon	X	Not Penetrated	
1st Bone Spring Sand	9841	Not Penetrated	
2nd Bone Spring Sand	X	Not Penetrated	
3rd Bone Spring Sand	X	Not Penetrated	

2. Casing Program

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
17.5"	0	870	13.375"	54.5	J55	STC	2.84	1.32	10.84
12.25"	0	4000	9.625"	40	J55	LTC	1.22	1.12	3.25
12.25"	4000	4700	9.625"	40	L80	LTC	1.25	1.63	5.73
8.75"	0	19,513	5.5"	17	P110	LTC	1.68	3.01	2.85
			BLM Minimum Safety Factor				1.125	1	1.6 Dry 1.8 Wet

Intermediate casing will be kept at least 1/3 full while running casing.to mitigate collapse. Intermediate burst based on 0.7 frac gradient at the shoe with Gas Gradient 0.1 psi/ft to surface.
All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

COG Production, LLC - Harrier Federal Com #103H

	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?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary?	
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?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(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?	

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft3/ sack	H_20 gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	330	13.5	1.75	9	12	Lead: Class C + 4% Gel + 1% CaCl2
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl2
Inter.	890	12.7	2.0	9.6	16	Lead: 35:65:6 C Blend
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl
5.5 Prod	630	11.9	2.5	19	72	Lead: 50:50:10 H Blend
	2750	14.4	1.24	5.7	19	Tail: 50:50:2 Class H Blend

Volumes Subject to Observed Hole Conditions and/or Fluid Caliper Results
Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
Surface	0'	50%
1st Intermediate	0'	50%
Production	4,200'	25% OH in Lateral (KOP to EOL) – 40% OH in Vertical

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.6 - 8.8	28-34	N/C
Surf csg	9-5/8" Int shoe	Saturated Brine	10 - 10.1	28-34	N/C
9-5/8" Int shoe	Lateral TD	Cut Brine	8.6 - 9.3	28-34	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.	
Y	Will run GR/CNL from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
Y	No Logs are planned based on well control or offset log information.
N	Drill stem test? If yes, explain.
N	Coring? If yes, explain.

Additional logs planned		Interval
N	Resistivity	Pilot Hole TD to ICP
N	Density	Pilot Hole TD to ICP
Y	CBL	Production casing (If cement not circulated to surface)
Y	Mud log	Intermediate shoe to TD
N	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	4450 psi at 9200' TVD
Abnormal Temperature	NO 150 Deg. F.

No abnormal pressure or temperature conditions are anticipated. Sufficient mud materials to maintain mud properties and weight increase requirements will be kept on location at all times.

Sufficient supplies of Paper/LCM for periodic sweeps to control seepage and losses will be maintained on location.

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

Y	Is it a walking operation?
N	Is casing pre-set?

x	H2S Plan.
x	BOP & Choke Schematics.
x	Directional Plan

PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Harrier Fed Com
103H

OH

Plan: Plan 1 12-27-18

Standard Planning Report

27 December, 2018

CONCHO

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 103H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site:	Harrier Fed Com	**North Reference:**	Grid
Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 12-27-18		

Project	Lea County, NM (NAD27 NME)		
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	Harrier Fed Com				
Site Position:		**Northing:**	398,195.60 usft	**Latitude:**	32° 5' 34.54352 N
From:	Map	**Easting:**	710,683.50 usft	**Longitude:**	103° 39' 10.86286 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.36 °

Well	103H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	398,195.60 usft	**Latitude:**	32° 5' 34.54352 N
	+E/-W	0.00 usft	**Easting:**	710,683.50 usft	**Longitude:**	103° 39' 10.86286 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**		**Ground Level:**	3,369.50 usft

Wellbore	OH				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	MVHD	1/31/2019	6.70	59.74	47,800.79721303

Design	Plan 1 12-27-18				
Audit Notes:					
Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**	
	0.00	0.00	0.00	180.90	

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	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,799.83	6.00	329.71	2,799.28	13.54	-7.91	2.00	2.00	0.00	329.71	
6,752.90	6.00	329.71	6,730.72	370.14	-216.17	0.00	0.00	0.00	0.00	
7,052.72	0.00	0.00	7,030.00	383.68	-224.08	2.00	-2.00	0.00	180.00	
8,646.72	0.00	0.00	8,624.00	383.68	-224.08	0.00	0.00	0.00	0.00	
9,549.42	90.27	179.65	9,196.95	-191.97	-220.53	10.00	10.00	19.90	179.65	
19,512.46	90.27	179.65	9,150.00	-10,154.70	-159.10	0.00	0.00	0.00	0.00	BHL - Harrier Fed C

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 103H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site:	Harrier Fed Com	**North Reference:**	Grid
Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 12-27-18		

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
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, Begin 2.00°/100' Build									
2,600.00	2.00	329.71	2,599.98	1.51	-0.88	-1.49	2.00	2.00	0.00
2,700.00	4.00	329.71	2,699.84	6.03	-3.52	-5.97	2.00	2.00	0.00
2,799.83	6.00	329.71	2,799.28	13.54	-7.91	-13.41	2.00	2.00	0.00
Hold 6.00° Inc at 329.71° Azm									
2,800.00	6.00	329.71	2,799.45	13.55	-7.91	-13.43	0.00	0.00	0.00
2,900.00	6.00	329.71	2,898.90	22.57	-13.18	-22.36	0.00	0.00	0.00
3,000.00	6.00	329.71	2,998.36	31.59	-18.45	-31.30	0.00	0.00	0.00
3,100.00	6.00	329.71	3,097.81	40.61	-23.72	-40.24	0.00	0.00	0.00
3,200.00	6.00	329.71	3,197.26	49.64	-28.99	-49.18	0.00	0.00	0.00
3,300.00	6.00	329.71	3,296.72	58.66	-34.26	-58.11	0.00	0.00	0.00
3,400.00	6.00	329.71	3,396.17	67.68	-39.53	-67.05	0.00	0.00	0.00
3,500.00	6.00	329.71	3,495.62	76.70	-44.79	-75.99	0.00	0.00	0.00
3,600.00	6.00	329.71	3,595.07	85.72	-50.06	-84.93	0.00	0.00	0.00
3,700.00	6.00	329.71	3,694.53	94.74	-55.33	-93.86	0.00	0.00	0.00
3,800.00	6.00	329.71	3,793.98	103.76	-60.60	-102.80	0.00	0.00	0.00
3,900.00	6.00	329.71	3,893.43	112.78	-65.87	-111.74	0.00	0.00	0.00
4,000.00	6.00	329.71	3,992.89	121.80	-71.14	-120.67	0.00	0.00	0.00
4,100.00	6.00	329.71	4,092.34	130.83	-76.41	-129.61	0.00	0.00	0.00
4,200.00	6.00	329.71	4,191.79	139.85	-81.67	-138.55	0.00	0.00	0.00
4,300.00	6.00	329.71	4,291.24	148.87	-86.94	-147.49	0.00	0.00	0.00
4,400.00	6.00	329.71	4,390.70	157.89	-92.21	-156.42	0.00	0.00	0.00
4,500.00	6.00	329.71	4,490.15	166.91	-97.48	-165.36	0.00	0.00	0.00
4,600.00	6.00	329.71	4,589.60	175.93	-102.75	-174.30	0.00	0.00	0.00
4,700.00	6.00	329.71	4,689.06	184.95	-108.02	-183.24	0.00	0.00	0.00
4,800.00	6.00	329.71	4,788.51	193.97	-113.29	-192.17	0.00	0.00	0.00
4,900.00	6.00	329.71	4,887.96	202.99	-118.55	-201.11	0.00	0.00	0.00
5,000.00	6.00	329.71	4,987.41	212.01	-123.82	-210.05	0.00	0.00	0.00
5,100.00	6.00	329.71	5,086.87	221.04	-129.09	-218.99	0.00	0.00	0.00
5,200.00	6.00	329.71	5,186.32	230.06	-134.36	-227.92	0.00	0.00	0.00
5,300.00	6.00	329.71	5,285.77	239.08	-139.63	-236.86	0.00	0.00	0.00
5,400.00	6.00	329.71	5,385.23	248.10	-144.90	-245.80	0.00	0.00	0.00
5,500.00	6.00	329.71	5,484.68	257.12	-150.17	-254.74	0.00	0.00	0.00
5,600.00	6.00	329.71	5,584.13	266.14	-155.43	-263.67	0.00	0.00	0.00
5,700.00	6.00	329.71	5,683.58	275.16	-160.70	-272.61	0.00	0.00	0.00
5,800.00	6.00	329.71	5,783.04	284.18	-165.97	-281.55	0.00	0.00	0.00
5,900.00	6.00	329.71	5,882.49	293.20	-171.24	-290.49	0.00	0.00	0.00
6,000.00	6.00	329.71	5,981.94	302.22	-176.51	-299.42	0.00	0.00	0.00
6,100.00	6.00	329.71	6,081.40	311.25	-181.78	-308.36	0.00	0.00	0.00
6,200.00	6.00	329.71	6,180.85	320.27	-187.04	-317.30	0.00	0.00	0.00
6,300.00	6.00	329.71	6,280.30	329.29	-192.31	-326.23	0.00	0.00	0.00
6,400.00	6.00	329.71	6,379.75	338.31	-197.58	-335.17	0.00	0.00	0.00
6,500.00	6.00	329.71	6,479.21	347.33	-202.85	-344.11	0.00	0.00	0.00
6,600.00	6.00	329.71	6,578.66	356.35	-208.12	-353.05	0.00	0.00	0.00
6,700.00	6.00	329.71	6,678.11	365.37	-213.39	-361.98	0.00	0.00	0.00
6,752.90	6.00	329.71	6,730.72	370.14	-216.17	-366.71	0.00	0.00	0.00
Begin 2.00°/100' Drop									
6,800.00	5.05	329.71	6,777.60	374.06	-218.46	-370.59	2.00	-2.00	0.00
6,900.00	3.05	329.71	6,877.35	380.17	-222.03	-376.64	2.00	-2.00	0.00
7,000.00	1.05	329.71	6,977.28	383.26	-223.84	-379.71	2.00	-2.00	0.00
7,052.72	0.00	0.00	7,030.00	383.68	-224.08	-380.12	2.00	-2.00	57.44
Begin Vertical Hold									

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 103H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site:	Harrier Fed Com	**North Reference:**	Grid
Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 12-27-18		

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)
8,646.72	0.00	0.00	8,624.00	383.68	-224.08	-380.12	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
8,700.00	5.33	179.65	8,677.20	381.20	-224.06	-377.65	10.00	10.00	0.00
8,800.00	15.33	179.65	8,775.45	363.30	-223.95	-359.75	10.00	10.00	0.00
8,900.00	25.33	179.65	8,869.11	328.61	-223.74	-325.06	10.00	10.00	0.00
9,000.00	35.33	179.65	8,955.31	278.18	-223.43	-274.64	10.00	10.00	0.00
9,100.00	45.33	179.65	9,031.45	213.55	-223.03	-210.02	10.00	10.00	0.00
9,200.00	55.33	179.65	9,095.21	136.67	-222.56	-133.17	10.00	10.00	0.00
9,300.00	65.33	179.65	9,144.65	49.90	-222.02	-46.41	10.00	10.00	0.00
9,400.00	75.33	179.65	9,178.27	-44.14	-221.44	47.61	10.00	10.00	0.00
9,500.00	85.33	179.65	9,195.05	-142.60	-220.83	146.04	10.00	10.00	0.00
9,549.42	90.27	179.65	9,196.95	-191.97	-220.53	195.40	10.00	10.00	0.00
LP, Hold 90.27° Inc at 179.65° Azm									
9,600.00	90.27	179.65	9,196.71	-242.54	-220.22	245.96	0.00	0.00	0.00
9,700.00	90.27	179.65	9,196.24	-342.54	-219.60	345.94	0.00	0.00	0.00
9,800.00	90.27	179.65	9,195.77	-442.53	-218.99	445.91	0.00	0.00	0.00
9,900.00	90.27	179.65	9,195.30	-542.53	-218.37	545.89	0.00	0.00	0.00
10,000.00	90.27	179.65	9,194.83	-642.53	-217.75	645.86	0.00	0.00	0.00
10,100.00	90.27	179.65	9,194.36	-742.53	-217.14	745.84	0.00	0.00	0.00
10,200.00	90.27	179.65	9,193.89	-842.52	-216.52	845.81	0.00	0.00	0.00
10,300.00	90.27	179.65	9,193.41	-942.52	-215.90	945.79	0.00	0.00	0.00
10,400.00	90.27	179.65	9,192.94	-1,042.52	-215.29	1,045.76	0.00	0.00	0.00
10,500.00	90.27	179.65	9,192.47	-1,142.51	-214.67	1,145.74	0.00	0.00	0.00
10,600.00	90.27	179.65	9,192.00	-1,242.51	-214.05	1,245.71	0.00	0.00	0.00
10,700.00	90.27	179.65	9,191.53	-1,342.51	-213.44	1,345.69	0.00	0.00	0.00
10,800.00	90.27	179.65	9,191.06	-1,442.50	-212.82	1,445.66	0.00	0.00	0.00
10,900.00	90.27	179.65	9,190.59	-1,542.50	-212.20	1,545.64	0.00	0.00	0.00
11,000.00	90.27	179.65	9,190.12	-1,642.50	-211.59	1,645.61	0.00	0.00	0.00
11,100.00	90.27	179.65	9,189.64	-1,742.50	-210.97	1,745.59	0.00	0.00	0.00
11,200.00	90.27	179.65	9,189.17	-1,842.49	-210.35	1,845.56	0.00	0.00	0.00
11,300.00	90.27	179.65	9,188.70	-1,942.49	-209.74	1,945.54	0.00	0.00	0.00
11,400.00	90.27	179.65	9,188.23	-2,042.49	-209.12	2,045.51	0.00	0.00	0.00
11,500.00	90.27	179.65	9,187.76	-2,142.48	-208.50	2,145.49	0.00	0.00	0.00
11,600.00	90.27	179.65	9,187.29	-2,242.48	-207.89	2,245.46	0.00	0.00	0.00
11,700.00	90.27	179.65	9,186.82	-2,342.48	-207.27	2,345.44	0.00	0.00	0.00
11,800.00	90.27	179.65	9,186.35	-2,442.47	-206.65	2,445.41	0.00	0.00	0.00
11,900.00	90.27	179.65	9,185.87	-2,542.47	-206.04	2,545.39	0.00	0.00	0.00
12,000.00	90.27	179.65	9,185.40	-2,642.47	-205.42	2,645.36	0.00	0.00	0.00
12,100.00	90.27	179.65	9,184.93	-2,742.47	-204.80	2,745.34	0.00	0.00	0.00
12,200.00	90.27	179.65	9,184.46	-2,842.46	-204.19	2,845.31	0.00	0.00	0.00
12,300.00	90.27	179.65	9,183.99	-2,942.46	-203.57	2,945.29	0.00	0.00	0.00
12,400.00	90.27	179.65	9,183.52	-3,042.46	-202.95	3,045.26	0.00	0.00	0.00
12,500.00	90.27	179.65	9,183.05	-3,142.45	-202.34	3,145.24	0.00	0.00	0.00
12,600.00	90.27	179.65	9,182.58	-3,242.45	-201.72	3,245.21	0.00	0.00	0.00
12,700.00	90.27	179.65	9,182.10	-3,342.45	-201.10	3,345.19	0.00	0.00	0.00
12,800.00	90.27	179.65	9,181.63	-3,442.44	-200.49	3,445.16	0.00	0.00	0.00
12,900.00	90.27	179.65	9,181.16	-3,542.44	-199.87	3,545.14	0.00	0.00	0.00
13,000.00	90.27	179.65	9,180.69	-3,642.44	-199.25	3,645.11	0.00	0.00	0.00
13,100.00	90.27	179.65	9,180.22	-3,742.44	-198.64	3,745.09	0.00	0.00	0.00
13,200.00	90.27	179.65	9,179.75	-3,842.43	-198.02	3,845.06	0.00	0.00	0.00
13,300.00	90.27	179.65	9,179.28	-3,942.43	-197.41	3,945.04	0.00	0.00	0.00
13,400.00	90.27	179.65	9,178.81	-4,042.43	-196.79	4,045.01	0.00	0.00	0.00
13,500.00	90.27	179.65	9,178.33	-4,142.42	-196.17	4,144.99	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 103H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site:	Harrier Fed Com	**North Reference:**	Grid
Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 12-27-18		

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)
13,600.00	90.27	179.65	9,177.86	-4,242.42	-195.56	4,244.96	0.00	0.00	0.00
13,700.00	90.27	179.65	9,177.39	-4,342.42	-194.94	4,344.94	0.00	0.00	0.00
13,800.00	90.27	179.65	9,176.92	-4,442.41	-194.32	4,444.91	0.00	0.00	0.00
13,900.00	90.27	179.65	9,176.45	-4,542.41	-193.71	4,544.89	0.00	0.00	0.00
14,000.00	90.27	179.65	9,175.98	-4,642.41	-193.09	4,644.86	0.00	0.00	0.00
14,100.00	90.27	179.65	9,175.51	-4,742.41	-192.47	4,744.84	0.00	0.00	0.00
14,200.00	90.27	179.65	9,175.04	-4,842.40	-191.86	4,844.81	0.00	0.00	0.00
14,300.00	90.27	179.65	9,174.56	-4,942.40	-191.24	4,944.79	0.00	0.00	0.00
14,400.00	90.27	179.65	9,174.09	-5,042.40	-190.62	5,044.76	0.00	0.00	0.00
14,500.00	90.27	179.65	9,173.62	-5,142.39	-190.01	5,144.74	0.00	0.00	0.00
14,600.00	90.27	179.65	9,173.15	-5,242.39	-189.39	5,244.71	0.00	0.00	0.00
14,700.00	90.27	179.65	9,172.68	-5,342.39	-188.77	5,344.69	0.00	0.00	0.00
14,800.00	90.27	179.65	9,172.21	-5,442.38	-188.16	5,444.66	0.00	0.00	0.00
14,900.00	90.27	179.65	9,171.74	-5,542.38	-187.54	5,544.64	0.00	0.00	0.00
15,000.00	90.27	179.65	9,171.27	-5,642.38	-186.92	5,644.61	0.00	0.00	0.00
15,100.00	90.27	179.65	9,170.79	-5,742.38	-186.31	5,744.59	0.00	0.00	0.00
15,200.00	90.27	179.65	9,170.32	-5,842.37	-185.69	5,844.56	0.00	0.00	0.00
15,300.00	90.27	179.65	9,169.85	-5,942.37	-185.07	5,944.54	0.00	0.00	0.00
15,400.00	90.27	179.65	9,169.38	-6,042.37	-184.46	6,044.51	0.00	0.00	0.00
15,500.00	90.27	179.65	9,168.91	-6,142.36	-183.84	6,144.49	0.00	0.00	0.00
15,600.00	90.27	179.65	9,168.44	-6,242.36	-183.22	6,244.46	0.00	0.00	0.00
15,700.00	90.27	179.65	9,167.97	-6,342.36	-182.61	6,344.44	0.00	0.00	0.00
15,800.00	90.27	179.65	9,167.50	-6,442.35	-181.99	6,444.41	0.00	0.00	0.00
15,900.00	90.27	179.65	9,167.02	-6,542.35	-181.37	6,544.39	0.00	0.00	0.00
16,000.00	90.27	179.65	9,166.55	-6,642.35	-180.76	6,644.36	0.00	0.00	0.00
16,100.00	90.27	179.65	9,166.08	-6,742.35	-180.14	6,744.34	0.00	0.00	0.00
16,200.00	90.27	179.65	9,165.61	-6,842.34	-179.52	6,844.31	0.00	0.00	0.00
16,300.00	90.27	179.65	9,165.14	-6,942.34	-178.91	6,944.29	0.00	0.00	0.00
16,400.00	90.27	179.65	9,164.67	-7,042.34	-178.29	7,044.26	0.00	0.00	0.00
16,500.00	90.27	179.65	9,164.20	-7,142.33	-177.67	7,144.24	0.00	0.00	0.00
16,600.00	90.27	179.65	9,163.73	-7,242.33	-177.06	7,244.22	0.00	0.00	0.00
16,700.00	90.27	179.65	9,163.25	-7,342.33	-176.44	7,344.19	0.00	0.00	0.00
16,800.00	90.27	179.65	9,162.78	-7,442.32	-175.82	7,444.17	0.00	0.00	0.00
16,900.00	90.27	179.65	9,162.31	-7,542.32	-175.21	7,544.14	0.00	0.00	0.00
17,000.00	90.27	179.65	9,161.84	-7,642.32	-174.59	7,644.12	0.00	0.00	0.00
17,100.00	90.27	179.65	9,161.37	-7,742.32	-173.97	7,744.09	0.00	0.00	0.00
17,200.00	90.27	179.65	9,160.90	-7,842.31	-173.36	7,844.07	0.00	0.00	0.00
17,300.00	90.27	179.65	9,160.43	-7,942.31	-172.74	7,944.04	0.00	0.00	0.00
17,400.00	90.27	179.65	9,159.96	-8,042.31	-172.13	8,044.02	0.00	0.00	0.00
17,500.00	90.27	179.65	9,159.48	-8,142.30	-171.51	8,143.99	0.00	0.00	0.00
17,600.00	90.27	179.65	9,159.01	-8,242.30	-170.89	8,243.97	0.00	0.00	0.00
17,700.00	90.27	179.65	9,158.54	-8,342.30	-170.28	8,343.94	0.00	0.00	0.00
17,800.00	90.27	179.65	9,158.07	-8,442.29	-169.66	8,443.92	0.00	0.00	0.00
17,900.00	90.27	179.65	9,157.60	-8,542.29	-169.04	8,543.89	0.00	0.00	0.00
18,000.00	90.27	179.65	9,157.13	-8,642.29	-168.43	8,643.87	0.00	0.00	0.00
18,100.00	90.27	179.65	9,156.66	-8,742.28	-167.81	8,743.84	0.00	0.00	0.00
18,200.00	90.27	179.65	9,156.19	-8,842.28	-167.19	8,843.82	0.00	0.00	0.00
18,300.00	90.27	179.65	9,155.71	-8,942.28	-166.58	8,943.79	0.00	0.00	0.00
18,400.00	90.27	179.65	9,155.24	-9,042.28	-165.96	9,043.77	0.00	0.00	0.00
18,500.00	90.27	179.65	9,154.77	-9,142.27	-165.34	9,143.74	0.00	0.00	0.00
18,600.00	90.27	179.65	9,154.30	-9,242.27	-164.73	9,243.72	0.00	0.00	0.00
18,700.00	90.27	179.65	9,153.83	-9,342.27	-164.11	9,343.69	0.00	0.00	0.00
18,800.00	90.27	179.65	9,153.36	-9,442.26	-163.49	9,443.67	0.00	0.00	0.00
18,900.00	90.27	179.65	9,152.89	-9,542.26	-162.88	9,543.64	0.00	0.00	0.00

Database:	USA Compass	**Local Co-ordinate Reference:**	Well 103H
Company:	COG Operating LLC	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Project:	Lea County, NM (NAD27 NME)	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site:	Harrier Fed Com	**North Reference:**	Grid
Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 12-27-18		

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)
19,000.00	90.27	179.65	9,152.42	-9,642.26	-162.26	9,643.62	0.00	0.00	0.00
19,100.00	90.27	179.65	9,151.94	-9,742.25	-161.64	9,743.59	0.00	0.00	0.00
19,200.00	90.27	179.65	9,151.47	-9,842.25	-161.03	9,843.57	0.00	0.00	0.00
19,300.00	90.27	179.65	9,151.00	-9,942.25	-160.41	9,943.54	0.00	0.00	0.00
19,400.00	90.27	179.65	9,150.53	-10,042.25	-159.79	10,043.52	0.00	0.00	0.00
19,500.00	90.27	179.65	9,150.06	-10,142.24	-159.18	10,143.49	0.00	0.00	0.00
19,512.46	90.27	179.65	9,150.00	-10,154.70	-159.10	10,155.95	0.00	0.00	0.00
TD at 19512.46									

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
BHL - Harrier Fed Cor - plan hits target center - Point	0.00	0.00	9,150.00	-10,154.70	-159.10	388,040.90	710,524.40	32° 3' 54.06341 N	03° 39' 13.45584 W
LTP - Harrier Fed Con - plan misses target center by 0.01usft at 19462.46usft MD (9150.24 TVD, -10104.70 N, -159.41 E) - Point	0.00	0.00	9,150.23	-10,104.70	-159.40	388,090.90	710,524.10	32° 3' 54.55822 N	03° 39' 13.45567 W
FTP - Harrier Fed Cor - plan misses target center by 205.25usft at 9115.21usft MD (9042.00 TVD, 202.59 N, -222.96 E) - Point	0.00	0.00	9,200.00	333.60	-223.20	398,529.20	710,460.30	32° 5' 37.85872 N	03° 39' 13.43290 W

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
840.50	840.50	Rustler		-0.27	180.90
1,203.50	1,203.50	TOS		-0.27	180.90
4,480.01	4,470.27	BOS (Fletcher)		-0.27	180.90
4,698.30	4,687.36	LMAR (Top Delaware)		-0.27	180.90
4,736.52	4,725.38	BCLN		-0.27	180.90
5,751.50	5,734.81	CYCN		-0.27	180.90
7,351.02	7,328.29	BYCN		-0.27	180.90
8,926.71	8,892.98	Bone Sprg (BSGK)		-0.27	180.90

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
2,500.00	2,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2,799.83	2,799.28	13.54	-7.91	Hold 6.00° Inc at 329.71° Azm
6,752.90	6,730.72	370.14	-216.17	Begin 2.00°/100' Drop
7,052.72	7,030.00	383.68	-224.08	Begin Vertical Hold
8,646.72	8,624.00	383.68	-224.08	KOP2, Begin 10.00°/100' Build
9,549.42	9,196.95	-191.97	-220.53	LP, Hold 90.27° Inc at 179.65° Azm
19,512.46	9,150.00	-10,154.70	-159.10	TD at 19512.46

CONCHO

Project: Lea County, NM (NAD27 NME)
Site: Harrier Fed Com
Well: 103H
Wellbore: OH
Design: Plan 1 12-27-18
Rig: Precision 595

PHOENIX TECHNOLOGY SERVICES

Azimuths to Grid North
True North: -0.36°
Magnetic North: 6.34°

Magnetic Field
Strength: 47800.8snT
Dip Angle: 59.74°
Date: 1/31/2019
Model: MVHD

RKB @ 3394.50usft (Precision 595)

3369.50

WELL DETAILS

3389.50

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	398195.60	710683.50	32° 5' 34.54352 N	103° 39' 10.86286 W

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
BHL - Harrier Fed Com 103H	9150.00	-10154.70	-159.10	388040.90	710524.40	32° 3' 54.06341 N	103° 39' 13.45584 W
LTP - Harrier Fed Com 103H	9150.23	-10104.70	-159.40	388090.90	710524.10	32° 3' 54.55822 N	103° 39' 13.45567 W
FTP - Harrier Fed Com 103H	9200.00	333.60	-223.20	398529.20	710460.30	32° 5' 37.85871 N	103° 39' 13.43290 W

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	0.00		KOP, Begin 2.00°/100' Build
3	2799.83	6.00	329.71	2799.28	13.54	-7.91	2.00	329.71	-13.41		Hold 6.00° Inc at 329.71° Azm
4	6752.90	6.00	329.71	6730.72	370.14	-216.17	0.00	0.00	-366.71		Begin 2.00°/100' Drop
5	7052.72	0.00	0.00	7030.00	383.68	-224.08	2.00	180.00	-380.12		Begin Vertical Hold
6	8846.72	0.00	0.00	8824.00	383.68	-224.08	0.00	0.00	-380.12		KOP2, Begin 10.00°/100' Build
7	9549.42	90.27	179.65	9198.95	-191.97	-220.53	10.00	179.65	195.40		LP, Hold 90.27° Inc at 179.65° Azm
8	19512.46	90.27	179.65	9150.00-10154.70	-159.10	0.00	0.00	0.00	10155.95	BHL - Harrier Fed Com 103H	TD at 19512.46

Map System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone Name: New Mexico East 3001

Local Origin: Well 103H, Grid North

Latitude: 32° 5' 34.54352 N
Longitude: 103° 39' 10.86286 W

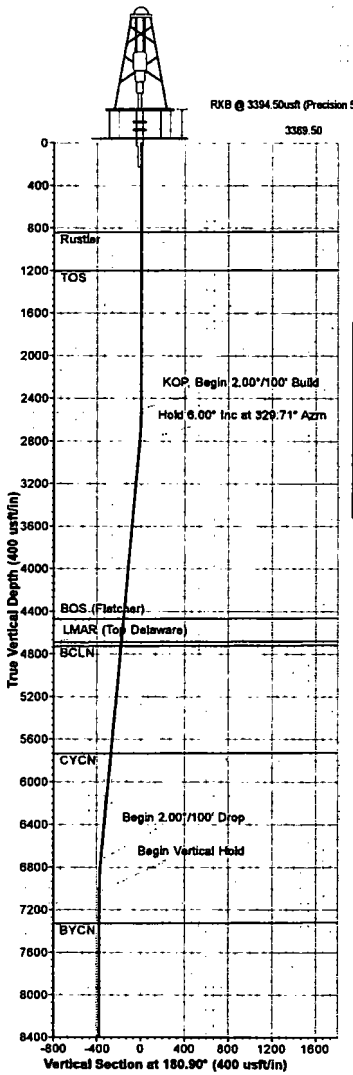
Grid East: 710683.50
Grid North: 398195.60
Scale Factor: 1.000

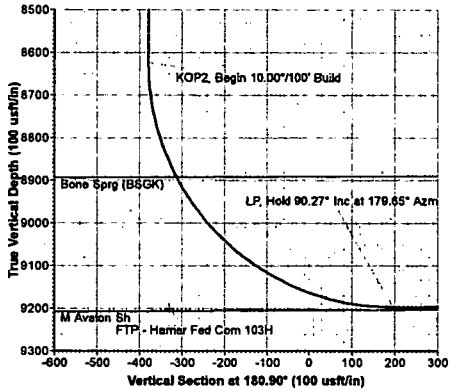
Geomagnetic Model: MVHD
Sample Date: 31-Jan-19
Magnetic Declination: 6.70°
Dip Angle from Horizontal: 59.74°
Magnetic Field Strength: 47800.79721303nT

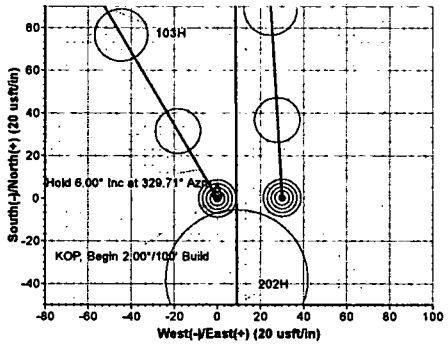
To convert a Magnetic Direction to a Grid Direction, Add 6.34°
To convert a Magnetic Direction to a True Direction, Add 6.70° East
To convert a True Direction to a Grid Direction, Subtract 0.36°

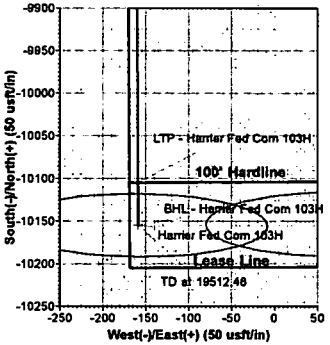
LEGEND

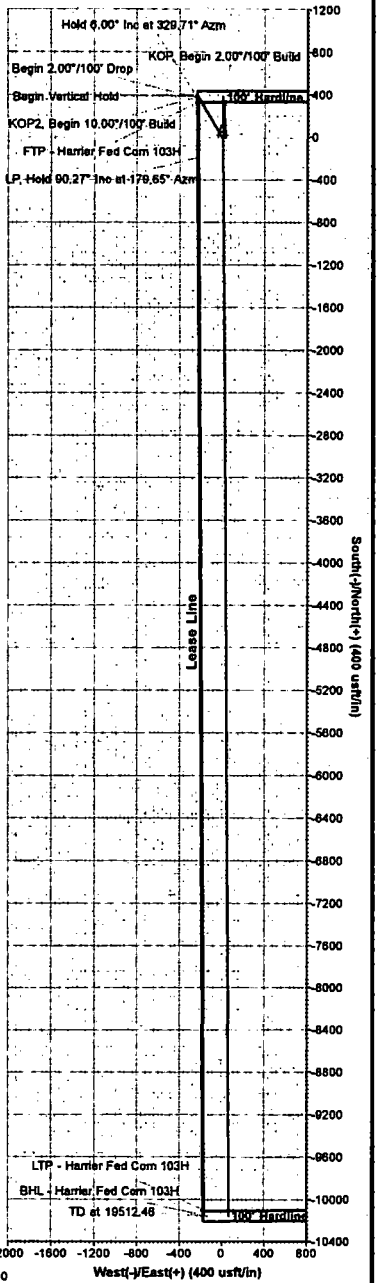
202H, OH, Plan 1 12-27-18 V0
Plan 1 12-27-18

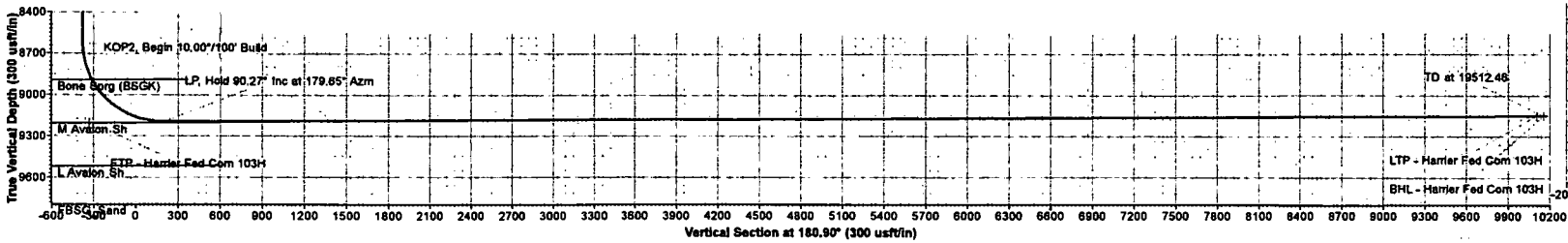












Created By: Sherman Stokes Date: 11:22, December 27 2018

PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Lea County, NM (NAD27 NME)
Harrier Fed Com
103H

OH
Plan 1 12-27-18

Anticollision Report

27 December, 2018

CONCHO

PHOENIX TECHNOLOGY SERVICES

Anticollision Report

CONCHO

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

Reference	Plan 1 12-27-18		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD Interval 100.00usft	**Error Model:**	ISCWSA
Depth Range:	Unlimited	**Scan Method:**	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 50,000.00 u	**Error Surface:**	Pedal Curve
Warning Levels Evaluated at:	2.00 **Sigma**	**Casing Method:**	Not applied

Survey Tool Program **Date** 12/27/2018

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	19,512.25	Plan 1 12-27-18 (OH)	MWD+HDGM	OWSG Rev.2 MWD + HDGM

Summary

Site Name Offset Well - Wellbore - Design	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Harrier Fed Com						
202H - OH - Plan 1 12-27-18	2,500.00	2,500.00	30.00	12.53	1.717	CC, ES

Offset Design Harrier Fed Com - 202H - OH - Plan 1 12-27-18 — Offset Site Error: 0.00 usft

Survey Program: 0-MWD+HDGM — Offset Well Error: 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
0.00	0.00	0.00	0.00	0.00	0.00	89.43	0.30	30.00	30.00				
100.00	100.00	100.00	100.00	0.13	0.13	89.43	0.30	30.00	30.00	29.73	0.27	111.590	
200.00	200.00	200.00	200.00	0.49	0.49	89.43	0.30	30.00	30.00	29.02	0.99	30.434	
300.00	300.00	300.00	300.00	0.85	0.85	89.43	0.30	30.00	30.00	28.30	1.70	17.620	
400.00	400.00	400.00	400.00	1.21	1.21	89.43	0.30	30.00	30.00	27.58	2.42	12.399	
500.00	500.00	500.00	500.00	1.57	1.57	89.43	0.30	30.00	30.00	26.86	3.14	9.565	
524.13	524.13	524.13	524.13	1.65	1.65	89.43	0.30	30.00	30.00	26.69	3.31	9.065	
600.00	600.00	600.00	600.00	1.93	1.93	89.43	0.30	30.00	30.00	26.15	3.85	7.785	
633.33	633.33	633.33	633.33	2.05	2.05	89.43	0.30	30.00	30.00	25.91	4.09	7.331	
700.00	700.00	700.00	700.00	2.29	2.29	89.43	0.30	30.00	30.00	25.43	4.57	6.564	
800.00	800.00	800.00	800.00	2.64	2.64	89.43	0.30	30.00	30.00	24.71	5.29	5.674	
900.00	900.00	900.00	900.00	3.00	3.00	89.43	0.30	30.00	30.00	24.00	6.00	4.997	
1,000.00	1,000.00	1,000.00	1,000.00	3.36	3.36	89.43	0.30	30.00	30.00	23.28	6.72	4.464	
1,100.00	1,100.00	1,100.00	1,100.00	3.72	3.72	89.43	0.30	30.00	30.00	22.56	7.44	4.033	
1,200.00	1,200.00	1,200.00	1,200.00	4.08	4.08	89.43	0.30	30.00	30.00	21.85	8.16	3.679	
1,300.00	1,300.00	1,300.00	1,300.00	4.44	4.44	89.43	0.30	30.00	30.00	21.13	8.87	3.382	
1,400.00	1,400.00	1,400.00	1,400.00	4.79	4.79	89.43	0.30	30.00	30.00	20.41	9.59	3.129	
1,500.00	1,500.00	1,500.00	1,500.00	5.15	5.15	89.43	0.30	30.00	30.00	19.70	10.31	2.911	
1,600.00	1,600.00	1,600.00	1,600.00	5.51	5.51	89.43	0.30	30.00	30.00	18.98	11.02	2.722	
1,700.00	1,700.00	1,700.00	1,700.00	5.87	5.87	89.43	0.30	30.00	30.00	18.26	11.74	2.556	
1,800.00	1,800.00	1,800.00	1,800.00	6.23	6.23	89.43	0.30	30.00	30.00	17.54	12.46	2.408	
1,900.00	1,900.00	1,900.00	1,900.00	6.59	6.59	89.43	0.30	30.00	30.00	16.83	13.17	2.277	
2,000.00	2,000.00	2,000.00	2,000.00	6.95	6.95	89.43	0.30	30.00	30.00	16.11	13.89	2.160	
2,100.00	2,100.00	2,100.00	2,100.00	7.30	7.30	89.43	0.30	30.00	30.00	15.39	14.61	2.054	
2,200.00	2,200.00	2,200.00	2,200.00	7.66	7.66	89.43	0.30	30.00	30.00	14.68	15.32	1.958	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

Offset Design Harrier Fed Com - 202H - OH - Plan 1 12-27-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
2,300.00	2,300.00	2,300.00	2,300.00	8.02	8.02	89.43	0.30	30.00	30.00	13.96	16.04	1.870	
2,400.00	2,400.00	2,400.00	2,400.00	8.38	8.38	89.43	0.30	30.00	30.00	13.24	16.76	1.790	
2,500.00	2,500.00	2,500.00	2,500.00	8.74	8.74	89.43	0.30	30.00	30.00	12.53	17.48	1.717	CC, ES
2,600.00	2,599.98	2,600.05	2,600.03	9.10	9.10	119.28	2.04	29.89	30.78	12.59	18.19	1.692	
2,700.00	2,699.84	2,700.06	2,699.89	9.45	9.45	118.08	7.27	29.57	33.12	14.21	18.90	1.752	
2,800.00	2,799.45	2,799.98	2,799.44	9.81	9.81	116.43	15.96	29.04	37.03	17.42	19.61	1.888	
2,900.00	2,898.90	2,899.87	2,898.77	10.17	10.17	114.92	26.38	28.40	41.76	21.43	20.33	2.054	
3,000.00	2,998.36	2,999.75	2,998.11	10.52	10.53	113.72	36.79	27.76	46.51	25.46	21.04	2.210	
3,100.00	3,097.81	3,099.63	3,097.45	10.89	10.89	112.75	47.20	27.12	51.27	29.51	21.76	2.356	
3,200.00	3,197.26	3,199.52	3,196.78	11.25	11.25	111.94	57.62	26.48	56.05	33.56	22.48	2.493	
3,300.00	3,296.72	3,299.40	3,296.12	11.61	11.61	111.26	68.03	25.85	60.83	37.62	23.21	2.621	
3,400.00	3,396.17	3,399.28	3,395.46	11.98	11.97	110.68	78.45	25.21	65.63	41.69	23.93	2.742	
3,500.00	3,495.62	3,499.17	3,494.79	12.34	12.34	110.17	88.86	24.57	70.43	45.76	24.66	2.855	
3,600.00	3,595.07	3,599.05	3,594.13	12.71	12.71	109.73	99.27	23.93	75.23	49.83	25.40	2.962	
3,700.00	3,694.53	3,698.93	3,693.47	13.08	13.07	109.35	109.69	23.29	80.04	53.91	26.13	3.063	
3,800.00	3,793.98	3,798.81	3,792.80	13.45	13.44	109.01	120.10	22.65	84.85	57.99	26.86	3.159	
3,900.00	3,893.43	3,898.70	3,892.14	13.81	13.81	108.70	130.52	22.01	89.66	62.06	27.60	3.249	
4,000.00	3,992.89	3,998.58	3,991.48	14.19	14.18	108.43	140.93	21.37	94.48	66.14	28.34	3.334	
4,100.00	4,092.34	4,098.46	4,090.81	14.56	14.55	108.18	151.35	20.74	99.30	70.22	29.08	3.415	
4,200.00	4,191.79	4,198.35	4,190.15	14.93	14.92	107.95	161.76	20.10	104.12	74.30	29.82	3.492	
4,300.00	4,291.24	4,298.23	4,289.49	15.30	15.29	107.75	172.17	19.46	108.94	78.38	30.56	3.565	
4,400.00	4,390.70	4,398.11	4,388.82	15.67	15.66	107.56	182.59	18.82	113.76	82.46	31.30	3.635	
4,500.00	4,490.15	4,498.00	4,488.16	16.04	16.03	107.39	193.00	18.18	118.58	86.54	32.04	3.701	
4,600.00	4,589.60	4,597.88	4,587.49	16.42	16.41	107.23	203.42	17.54	123.41	90.62	32.79	3.764	
4,700.00	4,689.06	4,697.76	4,686.83	16.79	16.78	107.08	213.83	16.90	128.23	94.70	33.53	3.824	
4,800.00	4,788.51	4,797.64	4,786.17	17.17	17.15	106.95	224.24	16.26	133.06	98.78	34.28	3.882	
4,900.00	4,887.96	4,897.53	4,885.50	17.54	17.53	106.82	234.66	15.63	137.89	102.86	35.02	3.937	
5,000.00	4,987.41	4,997.41	4,984.84	17.92	17.90	106.70	245.07	14.99	142.72	106.94	35.77	3.990	
5,100.00	5,086.87	5,097.29	5,084.18	18.29	18.28	106.59	255.49	14.35	147.54	111.03	36.52	4.040	
5,200.00	5,186.32	5,197.18	5,183.51	18.67	18.65	106.49	265.90	13.71	152.37	115.11	37.27	4.089	
5,300.00	5,285.77	5,297.06	5,282.85	19.04	19.03	106.39	276.31	13.07	157.20	119.19	38.01	4.135	
5,400.00	5,385.23	5,396.94	5,382.19	19.42	19.40	106.30	286.73	12.43	162.03	123.27	38.76	4.180	
5,500.00	5,484.68	5,496.83	5,481.52	19.80	19.78	106.21	297.14	11.79	166.86	127.35	39.51	4.223	
5,600.00	5,584.13	5,596.71	5,580.86	20.17	20.15	106.13	307.56	11.16	171.69	131.43	40.26	4.264	
5,700.00	5,683.58	5,696.59	5,680.20	20.55	20.53	106.05	317.97	10.52	176.52	135.51	41.02	4.304	
5,800.00	5,783.04	5,796.47	5,779.53	20.93	20.90	105.98	328.38	9.88	181.35	139.59	41.77	4.342	
5,900.00	5,882.49	5,896.36	5,878.87	21.30	21.28	105.91	338.80	9.24	186.18	143.67	42.52	4.379	
6,000.00	5,981.94	5,996.24	5,978.21	21.68	21.66	105.85	349.21	8.60	191.02	147.74	43.27	4.414	
6,100.00	6,081.40	6,096.12	6,077.54	22.06	22.03	105.79	359.63	7.96	195.85	151.82	44.02	4.449	
6,200.00	6,180.85	6,196.06	6,176.94	22.44	22.41	105.73	370.04	7.32	200.68	155.90	44.78	4.482	
6,300.00	6,280.30	6,297.28	6,277.78	22.82	22.79	106.20	378.67	6.79	205.16	159.62	45.53	4.506	
6,400.00	6,379.75	6,398.32	6,378.68	23.19	23.15	107.62	383.73	6.48	209.06	162.79	46.27	4.518	
6,500.00	6,479.21	6,498.86	6,479.21	23.57	23.51	109.91	385.25	6.39	212.65	165.65	46.99	4.525	
6,600.00	6,578.66	6,598.31	6,578.66	23.95	23.86	112.50	385.25	6.39	216.45	168.74	47.70	4.537	
6,700.00	6,678.11	6,697.76	6,678.11	24.33	24.20	115.00	385.25	6.39	220.67	172.27	48.41	4.559	
6,800.00	6,777.60	6,797.25	6,777.60	24.71	24.55	117.35	385.25	6.39	225.13	176.02	49.11	4.584	
6,900.00	6,877.35	6,897.00	6,877.35	25.08	24.90	118.98	385.25	6.39	228.47	178.66	49.81	4.587	
7,000.00	6,977.28	6,996.93	6,977.28	25.44	25.25	119.79	385.25	6.39	230.23	179.72	50.51	4.558	
7,100.00	7,077.28	7,096.93	7,077.28	25.78	25.60	89.61	385.25	6.39	230.48	179.26	51.21	4.500	
7,200.00	7,177.28	7,196.93	7,177.28	26.13	25.95	89.61	385.25	6.39	230.48	178.56	51.91	4.440	
7,300.00	7,277.28	7,296.93	7,277.28	26.48	26.30	89.61	385.25	6.39	230.48	177.86	52.61	4.381	
7,400.00	7,377.28	7,396.93	7,377.28	26.83	26.65	89.61	385.25	6.39	230.48	177.16	53.31	4.323	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

Offset Design Harrier Fed Com - 202H - OH - Plan 1 12-27-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
7,500.00	7,477.28	7,496.93	7,477.28	27.18	27.00	89.61	385.25	6.39	230.48	176.46	54.01	4.267	
7,600.00	7,577.28	7,596.93	7,577.28	27.52	27.36	89.61	385.25	6.39	230.48	175.76	54.71	4.212	
7,700.00	7,677.28	7,696.93	7,677.28	27.87	27.71	89.61	385.25	6.39	230.48	175.06	55.42	4.159	
7,800.00	7,777.28	7,796.93	7,777.28	28.22	28.06	89.61	385.25	6.39	230.48	174.36	56.12	4.107	
7,900.00	7,877.28	7,896.93	7,877.28	28.57	28.41	89.61	385.25	6.39	230.48	173.66	56.82	4.056	
8,000.00	7,977.28	7,996.93	7,977.28	28.92	28.76	89.61	385.25	6.39	230.48	172.95	57.52	4.007	
8,100.00	8,077.28	8,096.93	8,077.28	29.27	29.12	89.61	385.25	6.39	230.48	172.25	58.23	3.958	
8,200.00	8,177.28	8,196.93	8,177.28	29.62	29.47	89.61	385.25	6.39	230.48	171.55	58.93	3.911	
8,300.00	8,277.28	8,296.93	8,277.28	29.97	29.82	89.61	385.25	6.39	230.48	170.84	59.63	3.865	
8,400.00	8,377.28	8,396.93	8,377.28	30.32	30.17	89.61	385.25	6.39	230.48	170.14	60.34	3.820	
8,500.00	8,477.28	8,496.93	8,477.28	30.67	30.53	89.61	385.25	6.39	230.48	169.43	61.04	3.776	
8,600.00	8,577.28	8,596.93	8,577.28	31.02	30.88	89.61	385.25	6.39	230.48	168.73	61.75	3.733	
8,600.04	8,577.31	8,596.96	8,577.31	31.02	30.88	89.61	385.25	6.39	230.48	168.73	61.75	3.733	
8,700.00	8,677.20	8,696.85	8,677.20	31.35	31.23	-90.65	385.25	6.39	230.49	168.06	62.43	3.692	
8,800.00	8,775.45	8,796.63	8,776.93	31.64	31.57	-94.59	383.49	6.40	231.24	168.15	63.09	3.665	
8,900.00	8,869.11	8,899.98	8,878.68	31.88	31.87	-99.06	366.16	6.51	233.49	169.86	63.63	3.670	
9,000.00	8,955.31	9,007.08	8,979.05	32.09	32.13	-103.24	329.25	6.73	236.95	173.03	63.92	3.707	
9,100.00	9,031.45	9,118.03	9,073.91	32.25	32.37	-106.97	272.05	7.08	241.20	177.36	63.85	3.778	
9,200.00	9,095.21	9,232.74	9,158.52	32.38	32.58	-110.11	194.87	7.56	245.65	182.28	63.37	3.876	
9,300.00	9,144.65	9,350.85	9,227.80	32.51	32.78	-112.54	99.47	8.14	249.69	187.03	62.66	3.985	
9,400.00	9,178.27	9,471.69	9,276.93	32.66	32.98	-114.20	-10.69	8.81	252.72	190.69	62.03	4.074	
9,500.00	9,195.05	9,594.29	9,302.09	32.83	33.20	-115.02	-130.43	9.55	254.32	192.46	61.86	4.111	
9,600.00	9,196.71	9,704.21	9,305.40	33.02	33.41	-115.25	-240.26	10.22	254.79	192.61	62.18	4.098	
9,700.00	9,196.24	9,804.21	9,306.20	33.28	33.66	-115.51	-340.24	10.83	255.33	192.74	62.59	4.079	
9,800.00	9,195.77	9,904.20	9,307.00	33.59	33.97	-115.77	-440.23	11.44	255.88	192.77	63.11	4.055	
9,900.00	9,195.30	10,004.19	9,307.81	33.97	34.33	-116.02	-540.22	12.06	256.43	192.70	63.73	4.024	
10,000.00	9,194.83	10,104.18	9,308.61	34.40	34.75	-116.28	-640.20	12.67	256.99	192.54	64.45	3.987	
10,100.00	9,194.36	10,204.17	9,309.41	34.88	35.23	-116.53	-740.19	13.28	257.55	192.28	65.27	3.946	
10,200.00	9,193.89	10,304.17	9,310.22	35.41	35.75	-116.79	-840.18	13.89	258.12	191.94	66.19	3.900	
10,300.00	9,193.41	10,404.16	9,311.02	36.00	36.33	-117.04	-940.16	14.50	258.70	191.51	67.19	3.850	
10,400.00	9,192.94	10,504.15	9,311.82	36.63	36.95	-117.29	-1,040.15	15.12	259.27	191.01	68.27	3.798	
10,500.00	9,192.47	10,604.14	9,312.62	37.30	37.62	-117.54	-1,140.14	15.73	259.86	190.43	69.43	3.743	
10,600.00	9,192.00	10,704.13	9,313.43	38.02	38.33	-117.79	-1,240.13	16.34	260.44	189.78	70.66	3.686	
10,700.00	9,191.53	10,804.12	9,314.23	38.77	39.08	-118.04	-1,340.11	16.95	261.04	189.07	71.96	3.627	
10,800.00	9,191.06	10,904.12	9,315.03	39.56	39.86	-118.28	-1,440.10	17.56	261.63	188.30	73.33	3.568	
10,900.00	9,190.59	11,004.11	9,315.84	40.39	40.68	-118.53	-1,540.09	18.18	262.24	187.48	74.76	3.508	
11,000.00	9,190.12	11,104.10	9,316.64	41.25	41.54	-118.77	-1,640.07	18.78	262.84	186.61	76.24	3.448	
11,100.00	9,189.64	11,204.09	9,317.44	42.15	42.43	-119.02	-1,740.06	19.40	263.45	185.69	77.77	3.388	
11,200.00	9,189.17	11,304.08	9,318.25	43.07	43.34	-119.26	-1,840.05	20.01	264.07	184.72	79.35	3.328	
11,300.00	9,188.70	11,404.08	9,319.05	44.02	44.29	-119.50	-1,940.03	20.62	264.69	183.72	80.98	3.269	
11,400.00	9,188.23	11,504.07	9,319.85	44.99	45.26	-119.74	-2,040.02	21.24	265.32	182.68	82.64	3.210	
11,500.00	9,187.76	11,604.06	9,320.65	45.99	46.25	-119.98	-2,140.01	21.85	265.95	181.60	84.35	3.153	
11,600.00	9,187.29	11,704.05	9,321.46	47.01	47.27	-120.22	-2,239.99	22.46	266.58	180.50	86.08	3.097	
11,700.00	9,186.82	11,804.04	9,322.26	48.06	48.30	-120.45	-2,339.98	23.07	267.22	179.37	87.85	3.042	
11,800.00	9,186.35	11,904.04	9,323.06	49.12	49.36	-120.69	-2,439.97	23.68	267.87	178.21	89.65	2.988	
11,900.00	9,185.87	12,004.03	9,323.87	50.20	50.44	-120.92	-2,539.95	24.30	268.52	177.04	91.48	2.935	
12,000.00	9,185.40	12,104.02	9,324.67	51.30	51.53	-121.16	-2,639.94	24.91	269.17	175.84	93.33	2.884	
12,100.00	9,184.93	12,204.01	9,325.47	52.41	52.64	-121.39	-2,739.93	25.52	269.83	174.62	95.21	2.834	
12,200.00	9,184.46	12,304.00	9,326.27	53.54	53.77	-121.62	-2,839.91	26.13	270.49	173.39	97.10	2.786	
12,300.00	9,183.99	12,404.00	9,327.08	54.69	54.91	-121.85	-2,939.90	26.74	271.16	172.14	99.02	2.738	
12,400.00	9,183.52	12,503.99	9,327.88	55.85	56.06	-122.08	-3,039.89	27.36	271.83	170.88	100.95	2.693	
12,500.00	9,183.05	12,603.98	9,328.68	57.02	57.23	-122.30	-3,139.87	27.97	272.50	169.61	102.90	2.648	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

Offset Design Harrier Fed Com - 202H - OH - Plan 1 12-27-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
12,600.00	9,182.58	12,703.97	9,329.49	58.20	58.41	-122.53	-3,239.86	28.58	273.18	168.32	104.86	2.605	
12,700.00	9,182.10	12,803.96	9,330.29	59.39	59.60	-122.76	-3,339.85	29.19	273.87	167.03	106.83	2.563	
12,800.00	9,181.63	12,903.95	9,331.09	60.60	60.80	-122.98	-3,439.83	29.81	274.55	165.73	108.82	2.523	
12,900.00	9,181.16	13,003.95	9,331.89	61.81	62.01	-123.20	-3,539.82	30.42	275.25	164.43	110.82	2.484	
13,000.00	9,180.69	13,103.94	9,332.70	63.03	63.23	-123.43	-3,639.81	31.03	275.94	163.12	112.82	2.446	
13,100.00	9,180.22	13,203.93	9,333.50	64.26	64.46	-123.65	-3,739.79	31.64	276.64	161.80	114.84	2.409	
13,200.00	9,179.75	13,303.92	9,334.30	65.51	65.70	-123.87	-3,839.78	32.25	277.35	160.48	116.86	2.373	
13,300.00	9,179.28	13,403.91	9,335.11	66.75	66.94	-124.08	-3,939.77	32.87	278.05	159.16	118.89	2.339	
13,400.00	9,178.81	13,503.91	9,335.91	68.01	68.19	-124.30	-4,039.76	33.48	278.77	157.84	120.93	2.305	
13,500.00	9,178.33	13,603.90	9,336.71	69.27	69.45	-124.52	-4,139.74	34.09	279.48	156.51	122.97	2.273	
13,600.00	9,177.86	13,703.89	9,337.51	70.54	70.72	-124.73	-4,239.73	34.70	280.20	155.19	125.01	2.241	
13,700.00	9,177.39	13,803.88	9,338.32	71.82	71.99	-124.95	-4,339.72	35.31	280.93	153.86	127.06	2.211	
13,800.00	9,176.92	13,903.87	9,339.12	73.10	73.27	-125.16	-4,439.70	35.93	281.66	152.54	129.12	2.181	
13,900.00	9,176.45	14,003.87	9,339.92	74.38	74.56	-125.37	-4,539.69	36.54	282.39	151.22	131.17	2.153	
14,000.00	9,175.98	14,103.86	9,340.73	75.68	75.85	-125.58	-4,639.68	37.15	283.12	149.89	133.23	2.125	
14,100.00	9,175.51	14,203.85	9,341.53	76.97	77.14	-125.79	-4,739.66	37.76	283.86	148.57	135.29	2.098	
14,200.00	9,175.04	14,303.84	9,342.33	78.27	78.44	-126.00	-4,839.65	38.37	284.61	147.26	137.35	2.072	
14,300.00	9,174.56	14,403.83	9,343.14	79.58	79.75	-126.21	-4,939.64	38.99	285.36	145.94	139.41	2.047	
14,400.00	9,174.09	14,503.82	9,343.94	80.89	81.06	-126.42	-5,039.62	39.60	286.11	144.63	141.48	2.022	
14,500.00	9,173.62	14,603.82	9,344.74	82.21	82.37	-126.62	-5,139.61	40.21	286.86	143.32	143.54	1.998	
14,600.00	9,173.15	14,703.81	9,345.54	83.53	83.69	-126.82	-5,239.60	40.82	287.62	142.02	145.60	1.975	
14,700.00	9,172.68	14,803.80	9,346.35	84.85	85.01	-127.03	-5,339.58	41.43	288.38	140.72	147.66	1.953	
14,800.00	9,172.21	14,903.79	9,347.15	86.18	86.33	-127.23	-5,439.57	42.05	289.15	139.42	149.73	1.931	
14,900.00	9,171.74	15,003.78	9,347.95	87.51	87.66	-127.43	-5,539.56	42.66	289.92	138.13	151.79	1.910	
15,000.00	9,171.27	15,103.78	9,348.76	88.84	88.99	-127.63	-5,639.54	43.27	290.69	136.84	153.85	1.889	
15,100.00	9,170.79	15,203.77	9,349.56	90.18	90.33	-127.83	-5,739.53	43.88	291.46	135.56	155.90	1.870	
15,200.00	9,170.32	15,303.76	9,350.36	91.51	91.67	-128.03	-5,839.52	44.49	292.24	134.29	157.96	1.850	
15,300.00	9,169.85	15,403.75	9,351.16	92.86	93.01	-128.22	-5,939.50	45.11	293.03	133.01	160.01	1.831	
15,400.00	9,169.38	15,503.74	9,351.97	94.20	94.35	-128.42	-6,039.49	45.72	293.81	131.75	162.07	1.813	
15,500.00	9,168.91	15,603.74	9,352.77	95.55	95.70	-128.61	-6,139.48	46.33	294.60	130.49	164.11	1.795	
15,600.00	9,168.44	15,703.73	9,353.57	96.90	97.04	-128.81	-6,239.46	46.94	295.40	129.24	166.16	1.778	
15,700.00	9,167.97	15,803.72	9,354.38	98.25	98.40	-129.00	-6,339.45	47.55	296.19	127.99	168.21	1.761	
15,800.00	9,167.50	15,903.71	9,355.18	99.61	99.75	-129.19	-6,439.44	48.17	297.00	126.75	170.25	1.744	
15,900.00	9,167.02	16,003.70	9,355.98	100.96	101.11	-129.38	-6,539.42	48.78	297.80	125.51	172.29	1.729	
16,000.00	9,166.55	16,103.69	9,356.78	102.32	102.46	-129.57	-6,639.41	49.39	298.61	124.28	174.32	1.713	
16,100.00	9,166.08	16,203.69	9,357.59	103.68	103.82	-129.76	-6,739.40	50.00	299.42	123.06	176.35	1.698	
16,200.00	9,165.61	16,303.68	9,358.39	105.05	105.19	-129.95	-6,839.39	50.62	300.23	121.85	178.38	1.683	
16,300.00	9,165.14	16,403.67	9,359.19	106.41	106.55	-130.14	-6,939.37	51.23	301.04	120.64	180.41	1.669	
16,400.00	9,164.67	16,503.66	9,360.00	107.78	107.92	-130.32	-7,039.36	51.84	301.86	119.43	182.43	1.655	
16,500.00	9,164.20	16,603.65	9,360.80	109.15	109.28	-130.51	-7,139.35	52.45	302.69	118.24	184.45	1.641	
16,600.00	9,163.73	16,703.65	9,361.60	110.52	110.65	-130.69	-7,239.33	53.06	303.51	117.05	186.46	1.628	
16,700.00	9,163.25	16,803.64	9,362.41	111.89	112.03	-130.87	-7,339.32	53.68	304.34	115.87	188.48	1.615	
16,800.00	9,162.78	16,903.63	9,363.21	113.27	113.40	-131.05	-7,439.31	54.29	305.17	114.69	190.48	1.602	
16,900.00	9,162.31	17,003.62	9,364.01	114.64	114.77	-131.23	-7,539.29	54.90	306.01	113.52	192.49	1.590	
17,000.00	9,161.84	17,103.61	9,364.81	116.02	116.15	-131.41	-7,639.28	55.51	306.85	112.36	194.49	1.578	
17,100.00	9,161.37	17,203.61	9,365.62	117.40	117.53	-131.59	-7,739.27	56.12	307.69	111.21	196.48	1.566	
17,200.00	9,160.90	17,303.60	9,366.42	118.77	118.90	-131.77	-7,839.25	56.74	308.53	110.06	198.47	1.555	
17,300.00	9,160.43	17,403.59	9,367.22	120.16	120.28	-131.94	-7,939.24	57.35	309.38	108.92	200.46	1.543	
17,400.00	9,159.96	17,503.58	9,368.03	121.54	121.67	-132.12	-8,039.23	57.96	310.23	107.78	202.45	1.532	
17,500.00	9,159.48	17,603.57	9,368.83	122.92	123.05	-132.30	-8,139.21	58.57	311.08	106.66	204.43	1.522	
17,600.00	9,159.01	17,703.56	9,369.63	124.30	124.43	-132.47	-8,239.20	59.18	311.94	105.54	206.40	1.511	
17,700.00	9,158.54	17,803.56	9,370.43	125.69	125.82	-132.64	-8,339.19	59.80	312.80	104.42	208.37	1.501	

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

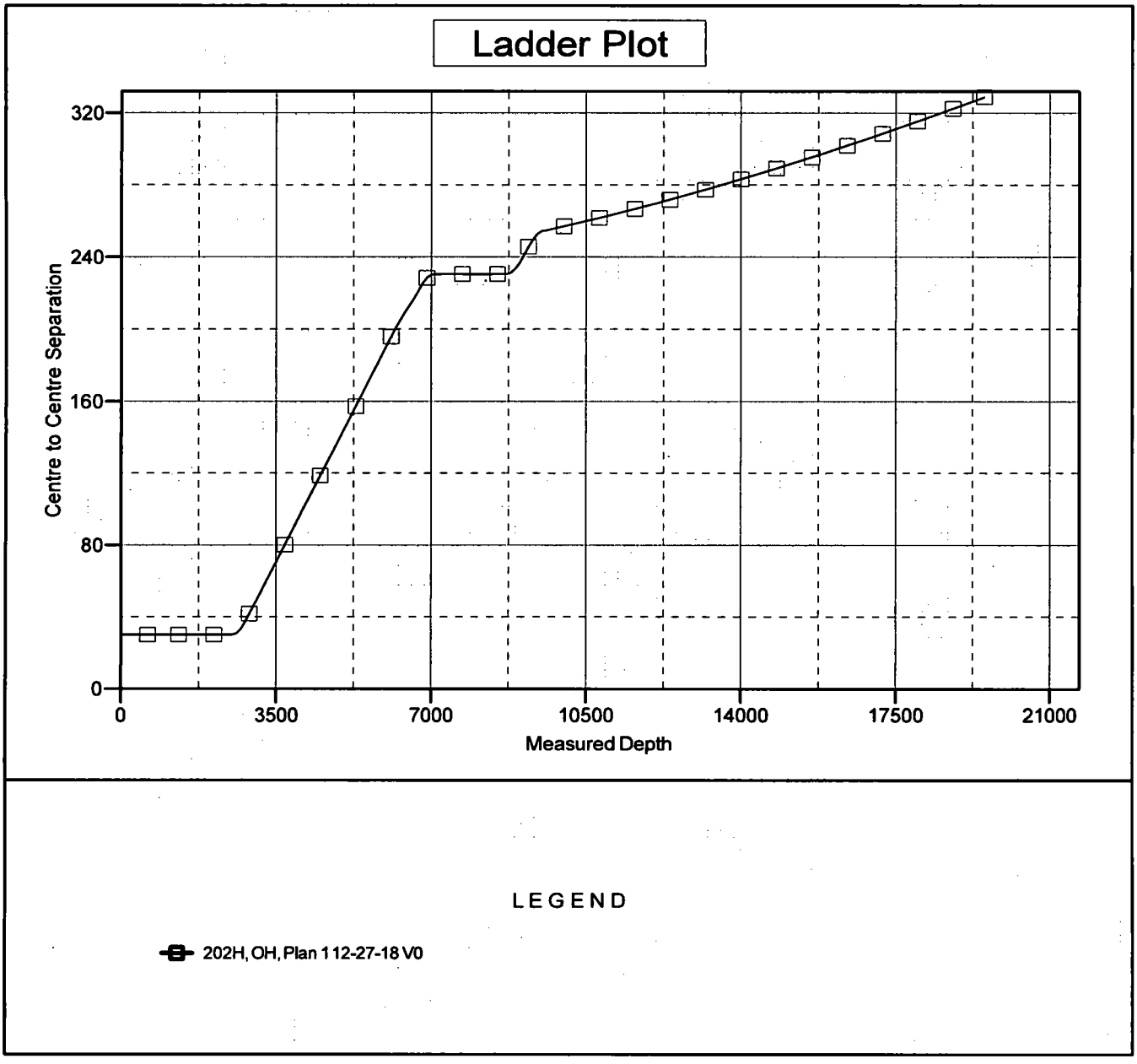
Offset Design Harrier Fed Com - 202H - OH - Plan 1 12-27-18 — **Offset Site Error:** 0.00 usft

Survey Program: 0-MWD+HDGM — **Offset Well Error:** 0.00 usft

Reference Measured Depth (usft)	Reference Vertical Depth (usft)	Offset Measured Depth (usft)	Offset Vertical Depth (usft)	Semi Major Axis Reference (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
17,800.00	9,158.07	17,903.55	9,371.24	127.08	127.20	-132.81	-8,439.17	60.41	313.66	103.32	210.34	1.491	Level 3
17,900.00	9,157.60	18,003.54	9,372.04	128.46	128.59	-132.98	-8,539.16	61.02	314.52	102.22	212.30	1.481	Level 3
18,000.00	9,157.13	18,103.53	9,372.84	129.85	129.98	-133.15	-8,639.15	61.63	315.39	101.13	214.26	1.472	Level 3
18,100.00	9,156.66	18,203.52	9,373.65	131.24	131.37	-133.32	-8,739.13	62.24	316.26	100.04	216.22	1.463	Level 3
18,200.00	9,156.19	18,303.52	9,374.45	132.63	132.76	-133.49	-8,839.12	62.86	317.13	98.96	218.17	1.454	Level 3
18,300.00	9,155.71	18,403.51	9,375.25	134.03	134.15	-133.66	-8,939.11	63.47	318.01	97.89	220.11	1.445	Level 3
18,400.00	9,155.24	18,503.50	9,376.05	135.42	135.54	-133.82	-9,039.09	64.08	318.88	96.83	222.06	1.436	Level 3
18,500.00	9,154.77	18,603.49	9,376.86	136.81	136.93	-133.99	-9,139.08	64.69	319.76	95.77	223.99	1.428	Level 3
18,600.00	9,154.30	18,703.48	9,377.66	138.21	138.33	-134.15	-9,239.07	65.30	320.65	94.72	225.93	1.419	Level 3
18,700.00	9,153.83	18,803.48	9,378.46	139.60	139.72	-134.32	-9,339.05	65.92	321.53	93.68	227.86	1.411	Level 3
18,800.00	9,153.36	18,903.47	9,379.27	141.00	141.12	-134.48	-9,439.04	66.53	322.42	92.64	229.78	1.403	Level 3
18,900.00	9,152.89	19,003.46	9,380.07	142.39	142.51	-134.64	-9,539.03	67.14	323.31	91.61	231.70	1.395	Level 3
19,000.00	9,152.42	19,103.45	9,380.87	143.79	143.91	-134.80	-9,639.02	67.75	324.21	90.59	233.62	1.388	Level 3
19,100.00	9,151.94	19,203.44	9,381.67	145.19	145.31	-134.96	-9,739.00	68.37	325.10	89.57	235.53	1.380	Level 3
19,200.00	9,151.47	19,303.44	9,382.48	146.59	146.71	-135.12	-9,838.99	68.98	326.00	88.56	237.44	1.373	Level 3
19,300.00	9,151.00	19,403.43	9,383.28	147.99	148.11	-135.28	-9,938.98	69.59	326.90	87.56	239.34	1.366	Level 3
19,400.00	9,150.53	19,503.42	9,384.08	149.39	149.51	-135.44	-10,038.96	70.20	327.80	86.56	241.24	1.359	Level 3
19,500.00	9,150.06	19,603.41	9,384.89	150.79	150.91	-135.59	-10,138.95	70.81	328.71	85.57	243.14	1.352	Level 3
19,512.46	9,150.00	19,615.87	9,384.99	150.96	151.08	-135.61	-10,151.41	70.89	328.82	85.45	243.37	1.351	Level 3, SF

Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

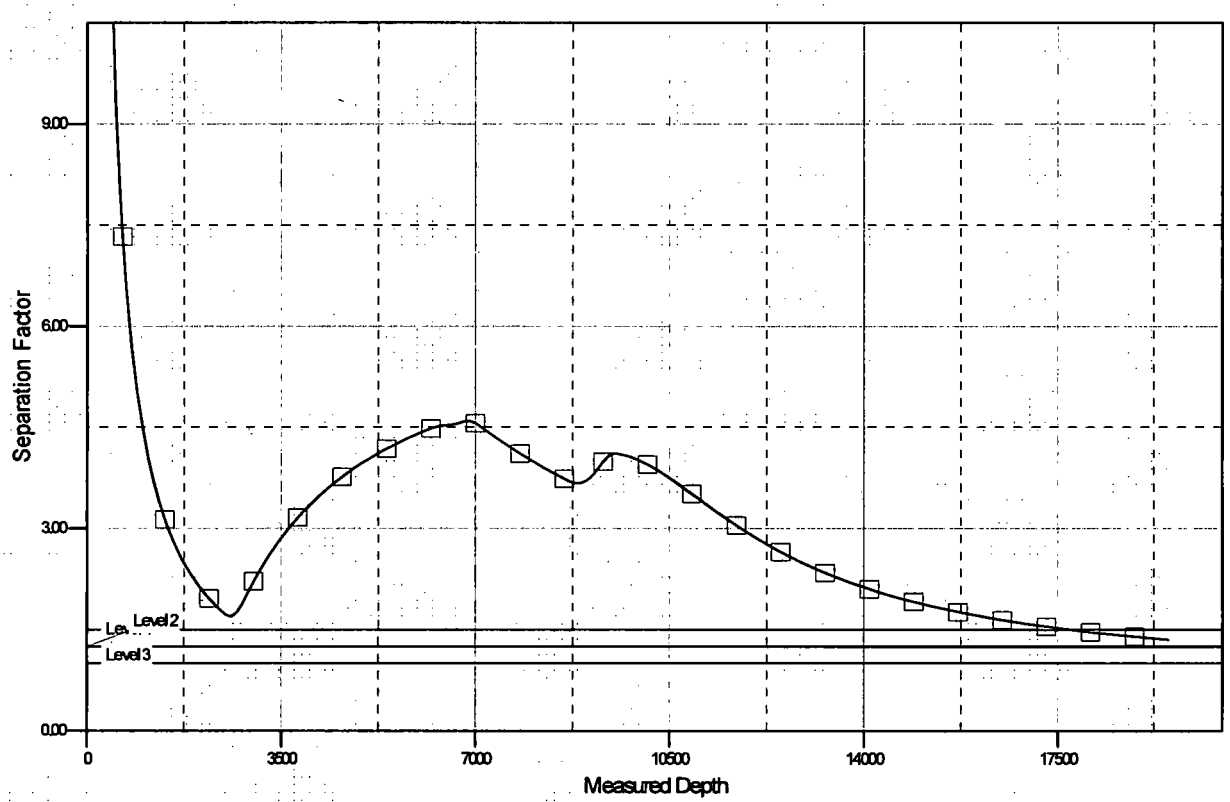
Reference Depths are relative to RKB @ 3394.50usft (Precision 595)	Coordinates are relative to: 103H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.00000 W	Grid Convergence at Surface is: 0.36°



Company:	COG Operating LLC	**Local Co-ordinate Reference:**	Well 103H
Project:	Lea County, NM (NAD27 NME)	**TVD Reference:**	RKB @ 3394.50usft (Precision 595)
Reference Site:	Harrier Fed Com	**MD Reference:**	RKB @ 3394.50usft (Precision 595)
Site Error:	0.00 usft	**North Reference:**	Grid
Reference Well:	103H	**Survey Calculation Method:**	Minimum Curvature
Well Error:	0.00 usft	**Output errors are at**	2.00 sigma
Reference Wellbore	OH	**Database:**	USA Compass
Reference Design:	Plan 1 12-27-18	**Offset TVD Reference:**	Offset Datum

Reference Depths are relative to RKB @ 3394.50usft (Precision 595)	Coordinates are relative to: 103H
Offset Depths are relative to Offset Datum	Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Central Meridian is 104° 19' 60.00000 W	Grid Convergence at Surface is: 0.36°

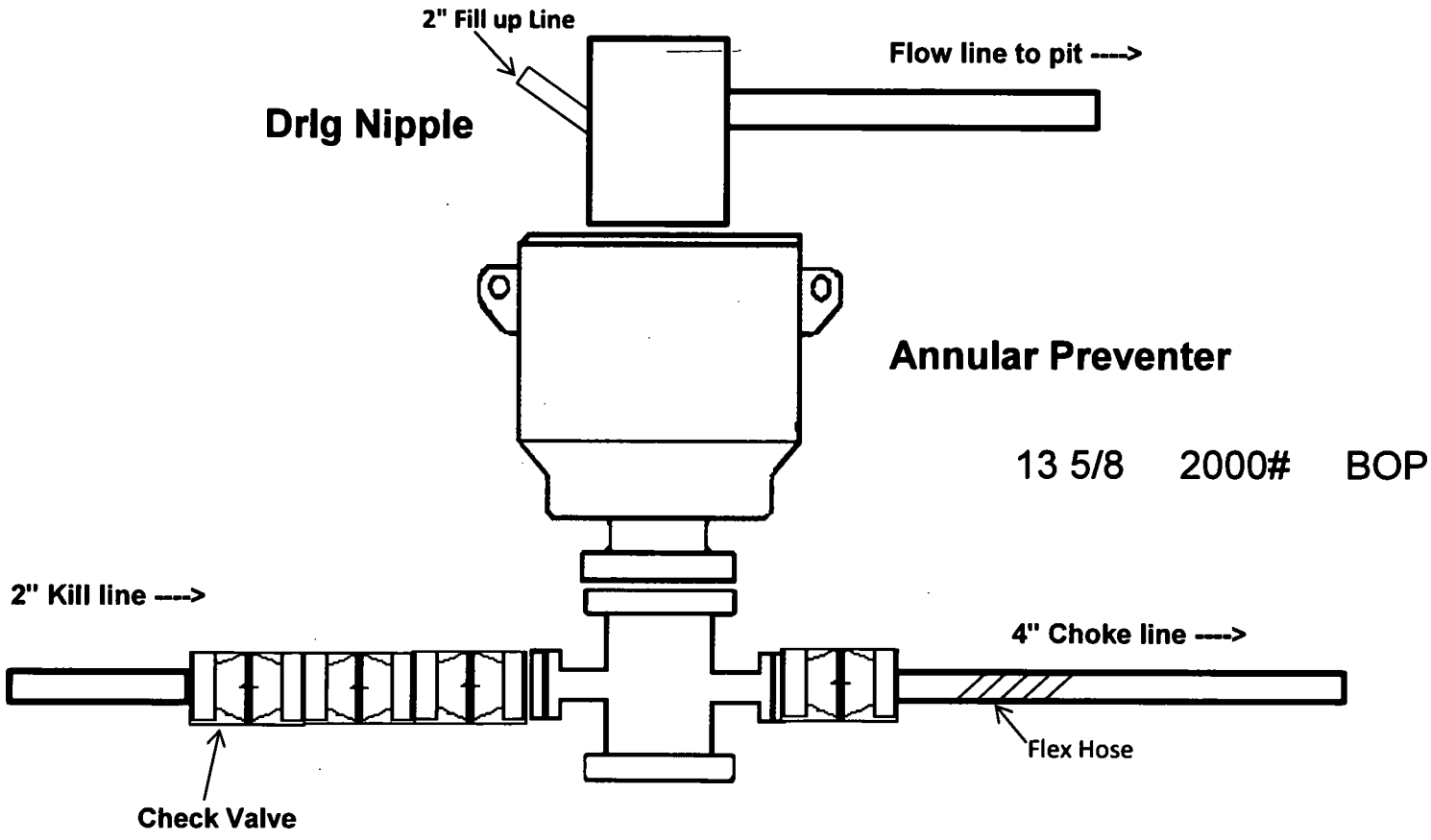
Separation Factor Plot



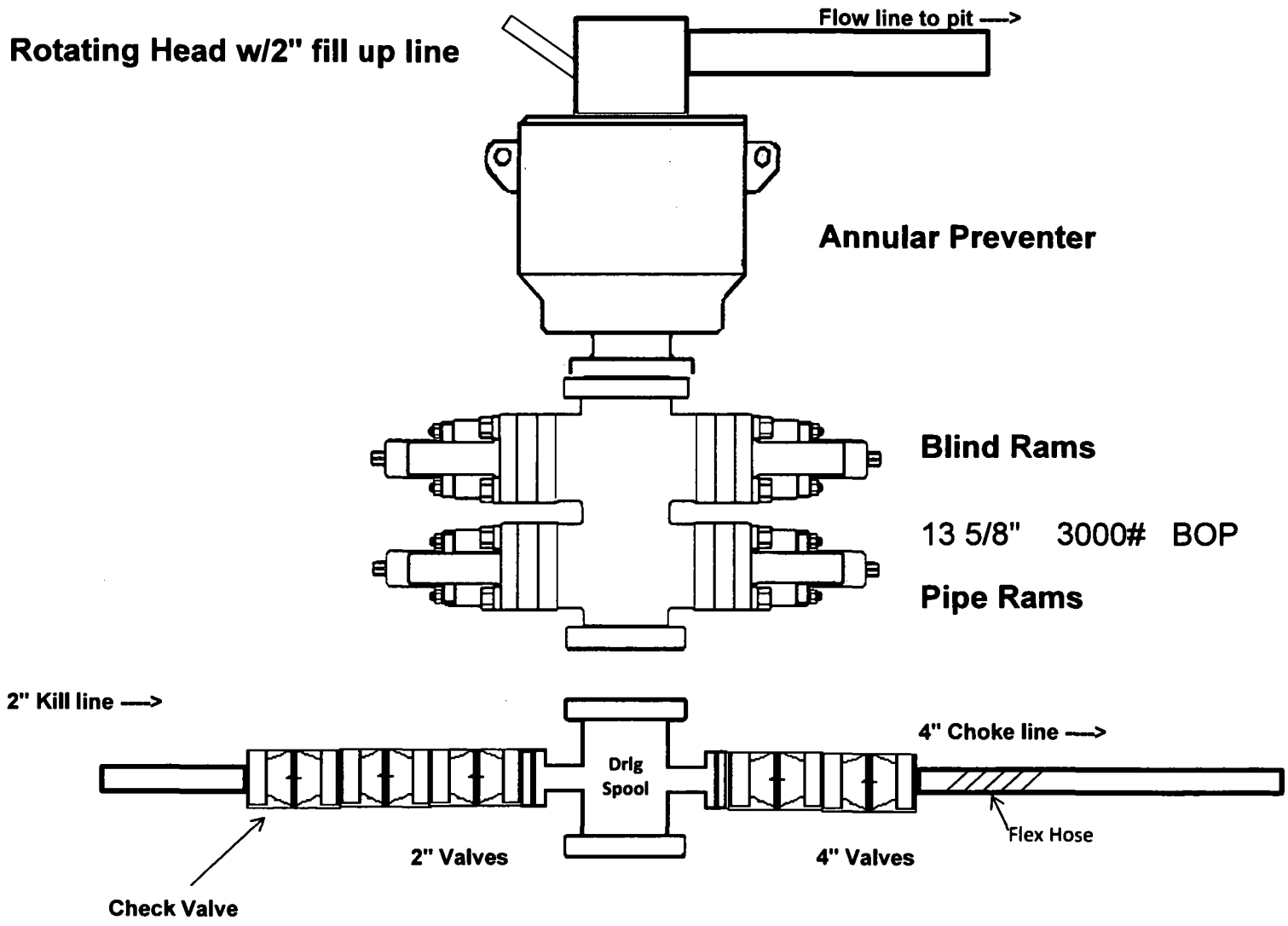
LEGEND

202H, OH, Plan 1 12-27-18 V0

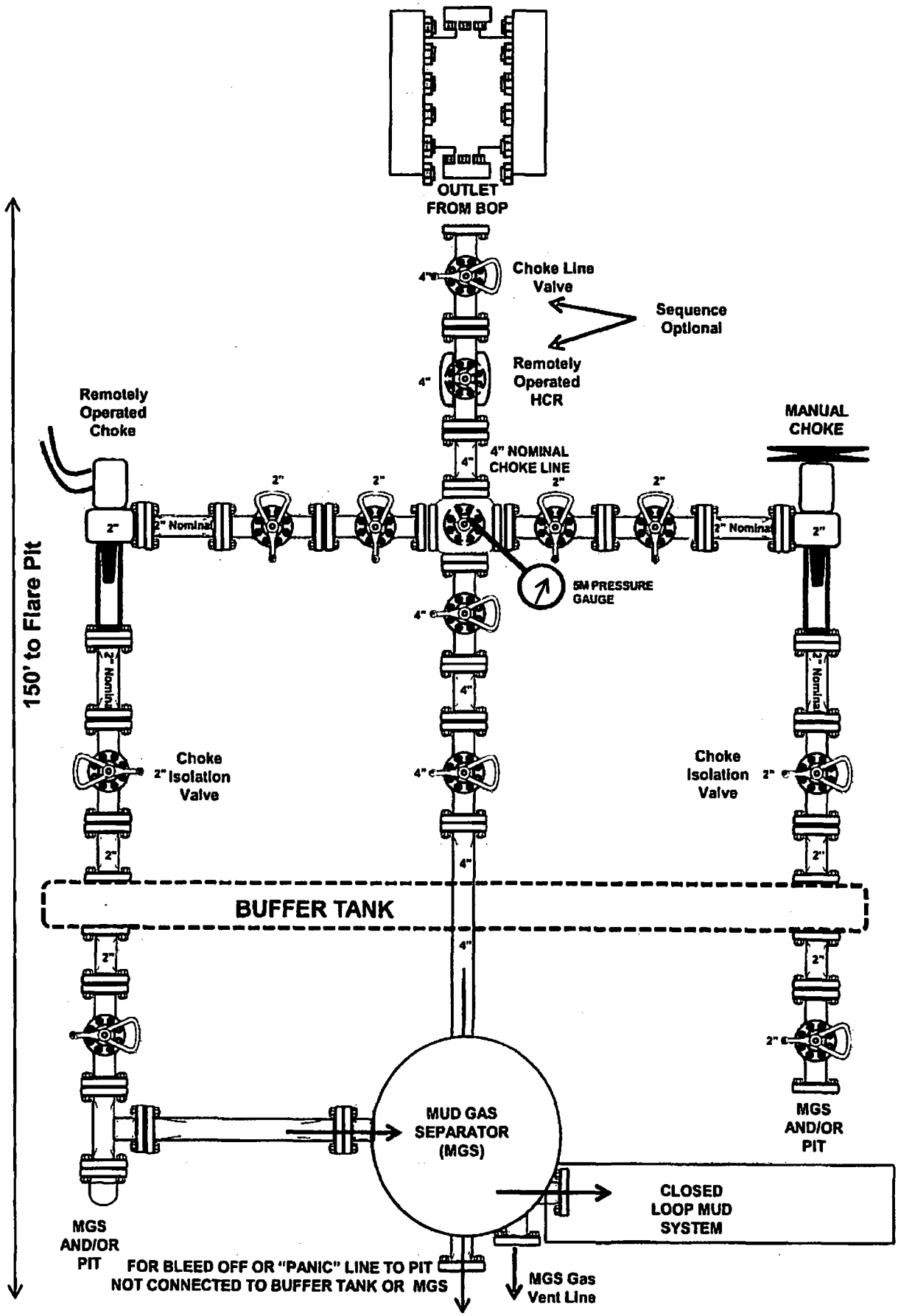
2,000 psi BOP Schematic



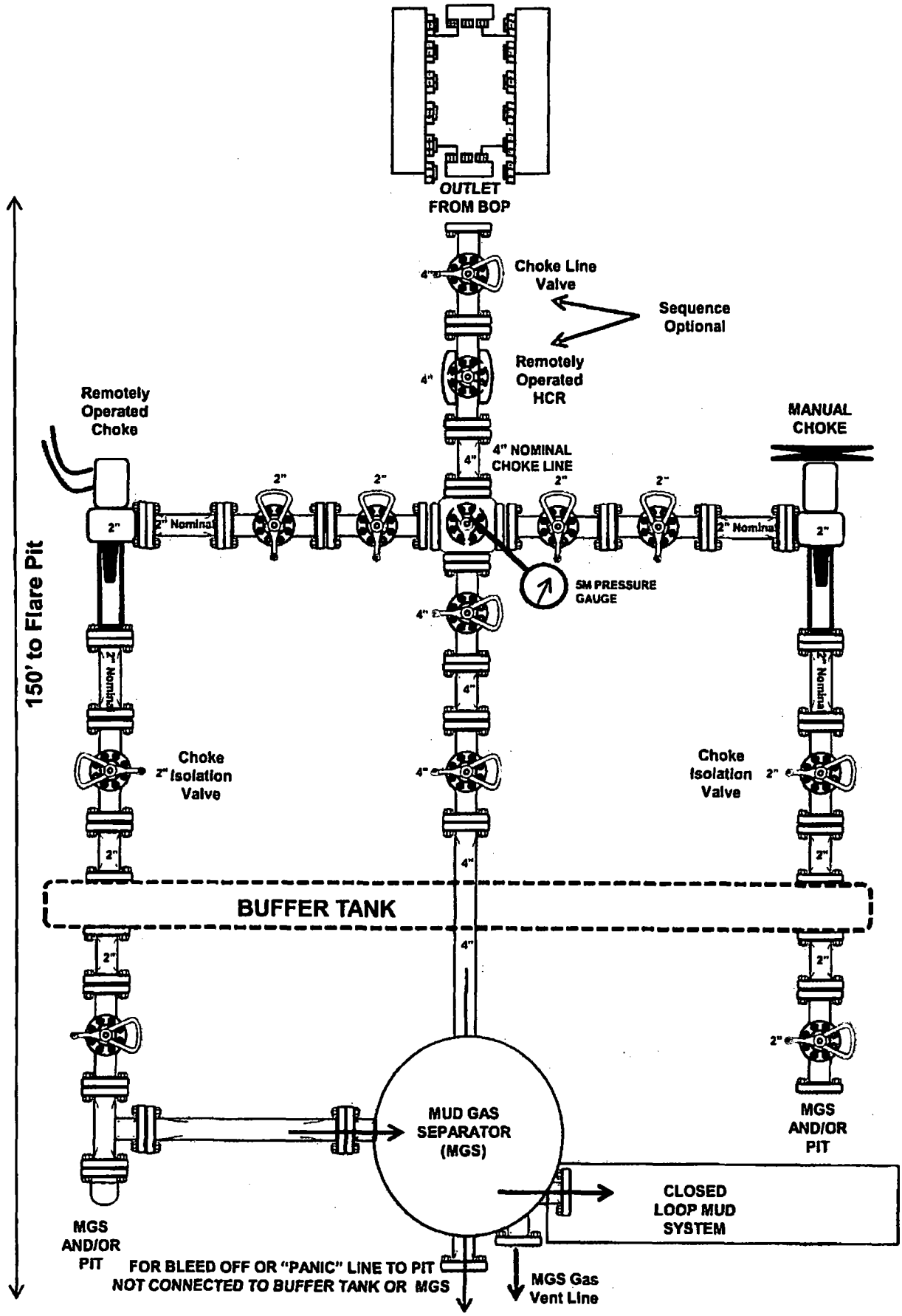
3,000 psi BOP Schematic



2M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



3M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)



Certificate of Conformance	
Equipment Name	STUDS & NUTS KIT, FLG, 4-10M
Part Number	20022221
Serial Number	N/A
Customer	NOV GALENA PARK – CO 514
Rig	RIG 129
Customer Purchase Order	GPK1000357
NOV Sales Order	830047
Date of Manufacturing	MAY 2012
Quantity	10 (TEN)

NOV certifies that the above equipment:

1) Was manufactured and inspected in accordance with NOV specifications and customer purchase order requirements.

PREPARED BY: _____
Lucy Garcia
Documentation Specialist

REVIEWED BY: _____
Ashleigh Woodhouse
Documentation Specialist

CERTIFIED BY: _____
Quality Department

Certificate of Conformance	
Equipment Name	KILL HOSE, 02.0"ID X 40' LG, 10K PSI
Part Number	20095185
Serial Number	20095185-61453
Customer	NOV GALENA PARK – CO 514
Rig	RIG 129
Customer Purchase Order	GPK1000357
NOV Sales Order	830047
Date of Manufacturing	OCTOBER 2011
Quantity	1 (ONE)

NOV certifies that the above equipment:

1) Was manufactured and inspected in accordance with NOV specifications and customer purchase order requirements.

2) Manufactured to:
   - API SPECIFICATION 16C

3) Meets the applicable portions of NACE MR 0175/ISO 15156-1, for internal H_2S service.

PREPARED BY: _____
Lucy Garcia
Documentation Specialist

REVIEWED BY: _____
Ashleigh Woodhouse
Documentation Specialist

CERTIFIED BY: _____
Quality Department

PN 20080216P
LN RJ 503
EAR BLK 21-5M
LXT 3.26 X 5.00

Printed: 04/18/20
Page

Certifi

Order Number
74692

REPUBLIC HEAT TREAT

8902 N. MAIN
HOUSTON, TX 770220
Ph: 713-692-3410 Fax: 713-692-3910

Customer: 00000068
SFI-GRAY STEEL INC.
3511 W.12TH STREET
HOUSTON, TX 77008

Shipped To:
SFI-GRAY STEEL INC.
3511 W. 12TH STREET
HOUSTON, TX 77008

Customer Purchase Order No.	Customer Shipper No.	Material Type	Mat'l Heat Code	Lot Number
18354		4130	SEE BELOW	

Process: NQT

PROCESSING SPECIFICATIONS

Requirement	Specified	Qty Tested	Test Results
SFC HDNS:	212-235 BHN	4	228-235

Line#	Quantity	Weight	Part Number/Description	Revision
1	60	208.0	P/DWG#20080216PD	
2			3/4" PL 3.26" X 5"	
3	1		3/4" PL 4" X 6" COUPON TO LAB	
4			HT#E50984L-66872A	

Operation	Spec Temp Range	Specified Soak Time	Furnace# Load#	Atmos/Dpt CarbPot	Q-Media Q-Temp	Start Date	Time In	Time Out	Date Complete
NORMALIZE	1675	1:00	1			04/12/2011	2:30	4:30	04/12/2011
QUENCH	1600	1:00	5		WATER 72-80	04/13/2011	9:30	12:00	04/13/2011
TEMPER	1275	1:00	3			04/15/2011	6:30	8:00	04/15/2011

COMMENTS

JAMES MUGGROVE — Date Signed 4-18-11

REVIEW OF REPUBLIC
WORK ORDER ☐ CERTS ☑
TO CUSTOMER REQUIREMENTS
DATE 4.18.11 BY

Continental CONTITECH

Fluid Technology

Quality Document

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE				CERT. N°:	1272	
PURCHASER:	ContiTech Beattie Co.			P.O. N°:	005427	
CONTITECH ORDER N°:	515783	HOSE TYPE:	4" ID	Choke and Kill Hose		
HOSE SERIAL N°:	61451	NOMINAL / ACTUAL LENGTH:		15,24 m / 15,22 m		
W.P. 68,9 MPa	10000 psi	T.P. 103,4 MPa	15000 psi	Duration:	60	min.

Pressure test with water at ambient temperature

See attachment. (1 page)

↑ 10 mm = 10 Min.

→ 10 mm = 20 MPa

COUPLINGS Type	Serial N°	Quality	Heat N°
4" coupling with	1476 1482	AISI 4130	B2297A
4 1/16" 10K API Flange end		AISI 4130	32498

NOT DESIGNED FOR WELL TESTING

TAG NO.: PN 20095183

All metal parts are flawless

WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.

STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements.

COUNTRY OF ORIGIN HUNGARY/EU

Date:	Inspector	Quality Control
25. October 2011.		ContiTech Rubber Industrial Kft. Quality Control Dept.

ContiTech Rubber Industrial Kft.
Budapesti út 10., Szeged H 6728
P.O.Box 152 Szeged H-6701

Phone: +36 62 566 737
Fax: +36 62 566 738
e-mail: info@ti.contitech.hu
Internet: www.contitech-rubber.hu

Trib Court of Csongrád County as Registry Court
Registry Court No: HU 06-09-002502
EU VAT No: HU11087200

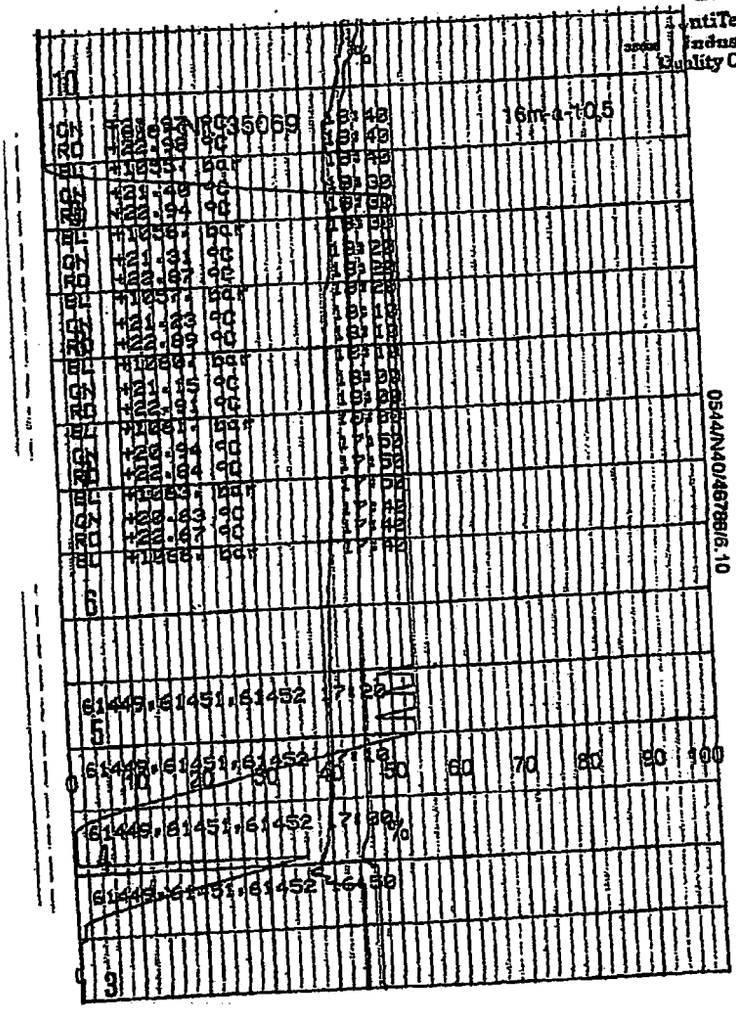
Bank data
Commerzbank Zrt.
Budapest
14220108-26830000-00000000

ATTACHMENT OF QUALITY CONTROL INSPECTION AND TEST CERTIFICATE

No: 1269, 1271, 1272

Page: 1 / 1

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



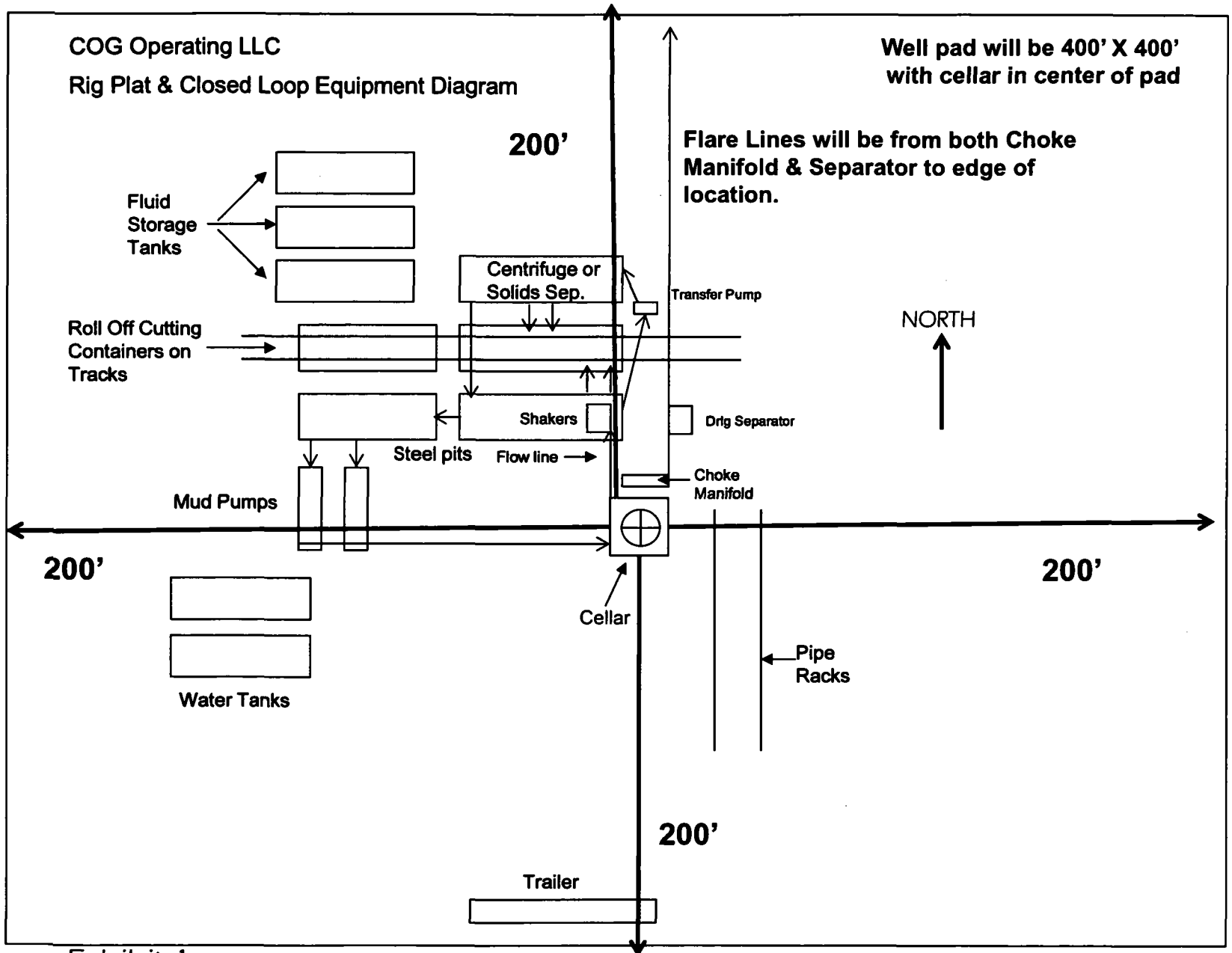
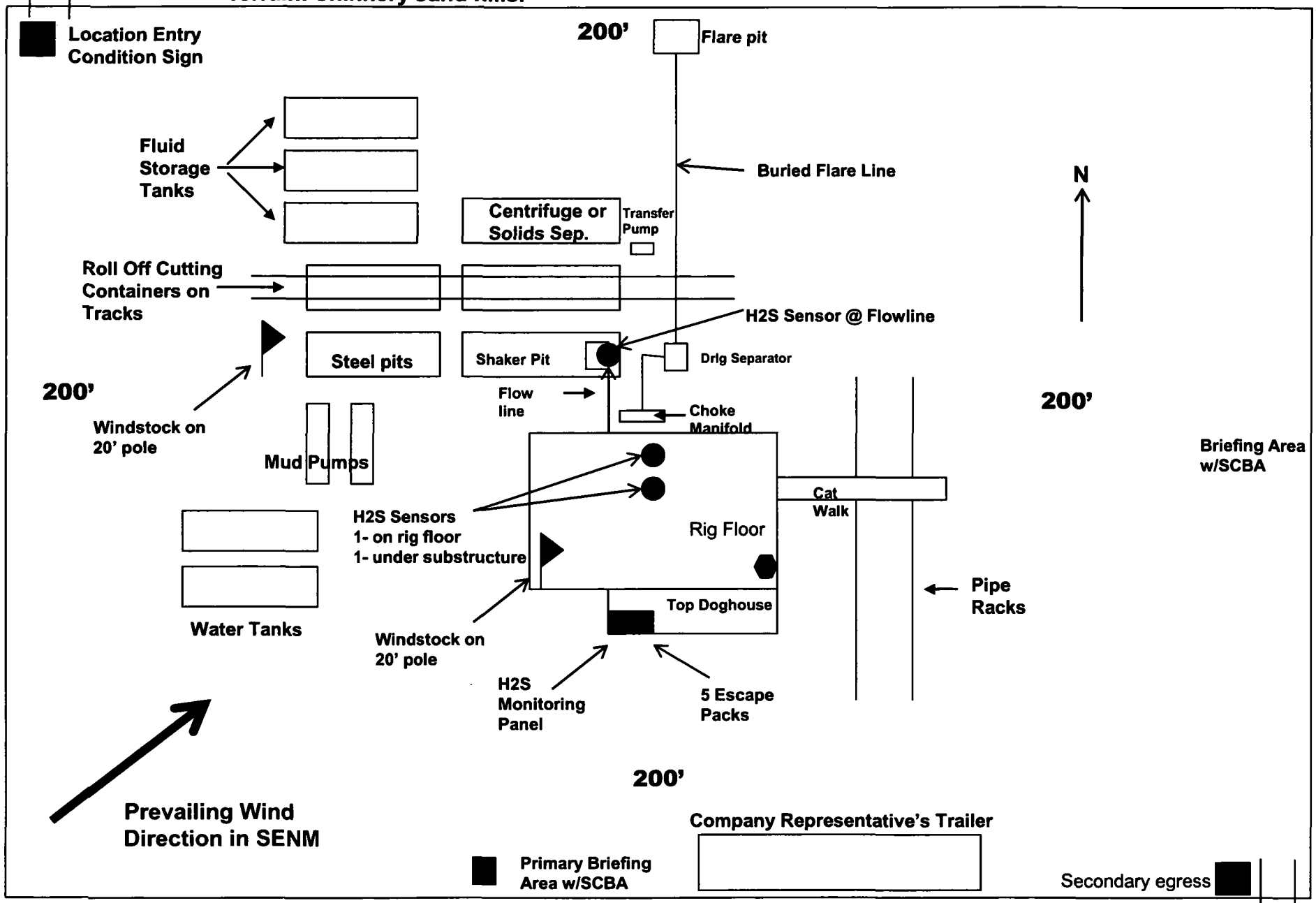


Exhibit 1

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

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

Well pad will be 400' x 400'
with cellar in center of pad



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	
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

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
WELL NAME & NO.:	Harrier Federal Com 103H
SURFACE HOLE FOOTAGE:	435'/N & 232'/W
BOTTOM HOLE FOOTAGE	50'/S & 10'/W
LOCATION:	Section 35, T.25 S., R.32 E., NMPM
COUNTY:	Lea County, New Mexico

Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	◉ Low	○ Medium	○ High
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	◉ Conventional	○ Multibowl	
Other	☐4 String Area	☐Capitan Reef	☐WIPP

A. HYDROGEN SULFIDE

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.

B. CASING

1. The **13 3/8** inch surface casing shall be set at approximately **870** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

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

    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)

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

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

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

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

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

   - Cement should tie-back at least **200** feet into previous casing string. Operator shall provide method of verification.

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).

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 **Annular**. **In the case where the only BOP installed is an annular preventer, it shall be tested to a minimum of 2000 psi (which may require upgrading to 3M or 5M annular)**

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

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.

- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

MHH 03202019

GENERAL 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)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

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

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. 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.

   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig
      - Notify the BLM when moving in and removing the Spudder Rig.
      - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. 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 are located, this does not include the dog house or stairway area.

3. 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.

A. CASING

1. 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.

2. 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.

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

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

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

6. 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. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. 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.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

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

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
    e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

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

    a. In a water-basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the

plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

b. 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.

c. 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).

d. 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.

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

f. 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.

g. 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.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. 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.

PECOS DISTRICT
SURFACE USE
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	COG Operating LLC
WELL NAME & NO.:	Harrier Federal Com 103H
SURFACE HOLE FOOTAGE:	435'/N & 232'/W
BOTTOM HOLE FOOTAGE	50'/S & 10'/W
LOCATION:	Section 35, T.25 S., R.32 E., NMPM
COUNTY:	Lea County, New Mexico

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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.

Approval Date: 04/15/2019

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)

Timing Limitation Stipulation / Condition of Approval for lesser prairie-chicken: Oil and gas activities including 3-D geophysical exploration, and drilling will not be allowed in lesser prairie-chicken habitat during the period from March 1st through June 15th annually. During that period, other activities that produce noise or involve human activity, such as the maintenance of oil and gas facilities, pipeline, road, and well pad construction, will be allowed except between 3:00 am and 9:00 am. The 3:00 am to 9:00 am restriction will not apply to normal, around-the-clock operations, such as venting, flaring, or pumping, which do not require a human presence during this period. Additionally, no new drilling will be allowed within up to 200 meters of leks known at the time of permitting. Normal vehicle use on existing roads will not be restricted. Exhaust noise from pump jack engines must be muffled or otherwise controlled so as not to exceed 75 db measured at 30 feet from the source of the noise.

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well. For more installation details, contact the Carlsbad Field Office at 575-234-5972.

Timing Limitation Exceptions:
The Carlsbad Field Office will publish an annual map of where the LPC timing and noise stipulations and conditions of approval (Limitations) will apply for the identified year (between March 1 and June 15) based on the latest survey information. The LPC Timing Area map will identify areas which are Habitat Areas (HA), Isolated Population Area (IPA), and Primary Population Area (PPA). The LPC Timing Area map will also have an area in red crosshatch. The red crosshatch area is the only area where an operator is required to submit a request for exception to the LPC Limitations. If an operator is operating outside the red crosshatch area, the LPC Limitations do not apply for that year and an exception to LPC Limitations is not required.

Hydrology:
The entire well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad. The compacted berm shall be constructed at a minimum of 12 inches with impermeable mineral material (e.g. caliche). 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 integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed. Any water erosion that may occur due to the construction of the well pad during the life of the well will be quickly corrected and proper measures will be taken to prevent future erosion. Stockpiling of topsoil is required. The top soil shall be stockpiled in an appropriate location to prevent loss of soil due to water or wind erosion and not used for berming or erosion control. If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.

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 or 24 hour production, whichever is greater. Automatic shut off, check valves, or similar systems will be installed for tanks to minimize the effects of catastrophic line failures used in production or drilling.

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 valves 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.

Electric Lines: Any water erosion that may occur due to the construction of overhead electric line and during the life of the power line will be quickly corrected and proper measures will be taken to prevent future erosion.

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.

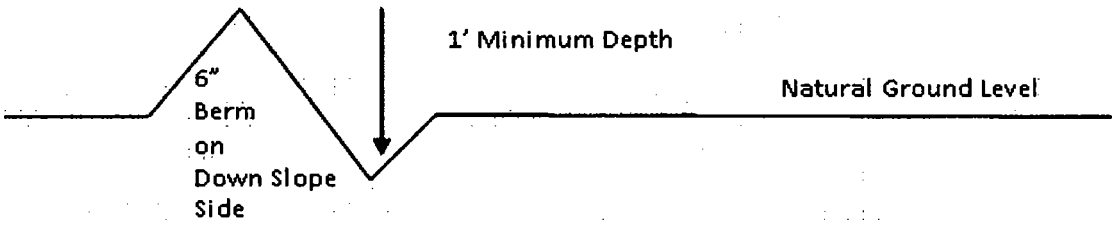
Turnouts
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

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

Cattle guards

An appropriately sized cattle guard sufficient to carry out the project shall be installed and maintained at fence/road crossings. Any existing cattle guards 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 cattle guards 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

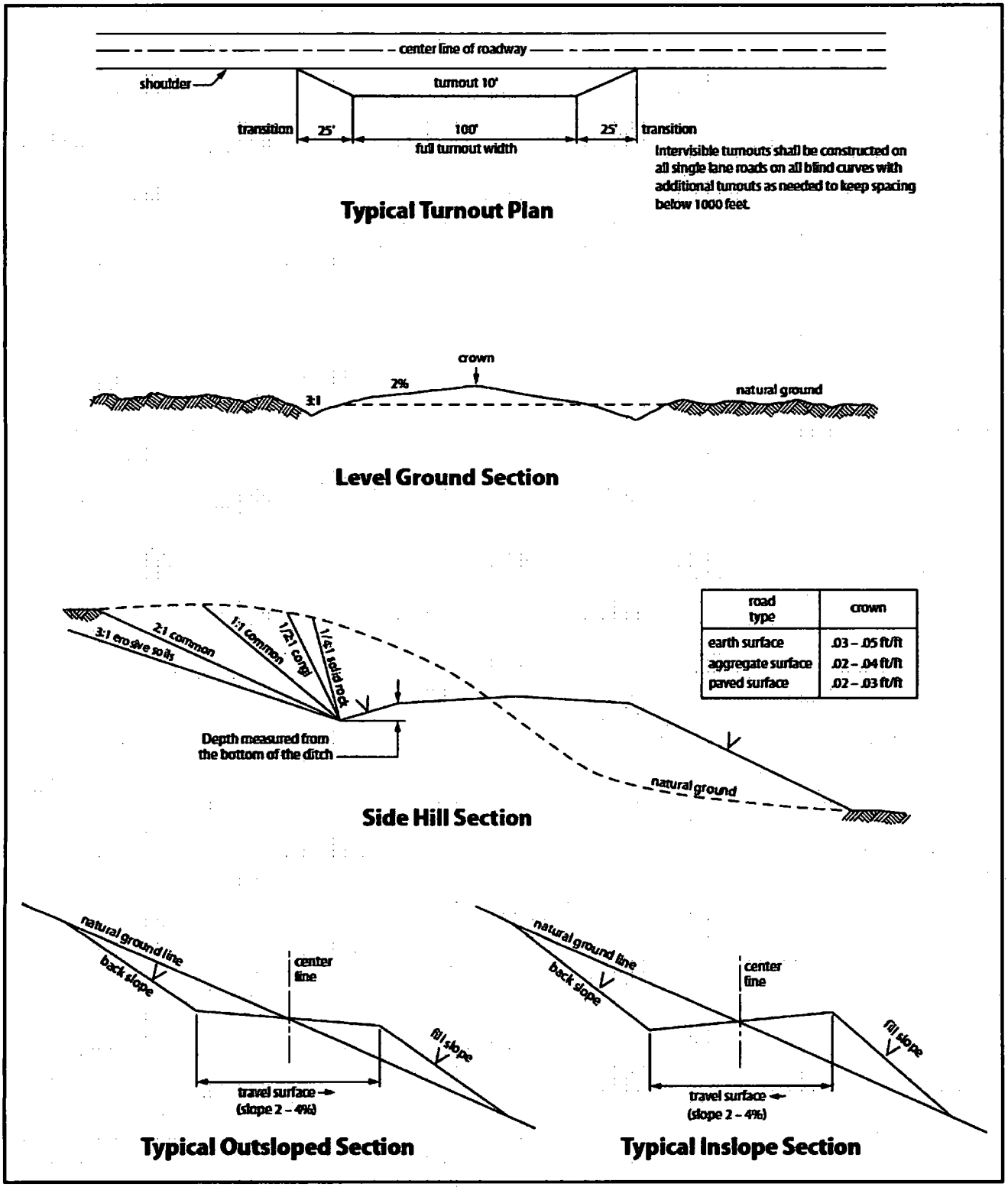


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

VII. 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).

VIII. 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).

IX. 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).

Ground-level Abandoned Well Marker to avoid raptor perching: Upon the plugging and subsequent abandonment of the well, the well marker will be installed at ground level on a plate containing the pertinent information for the plugged well.

Seed Mixture for LPC Sand/Shinnery 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 will be tested and the viability testing of seed shall 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 will be planted using a drill equipped with a depth regulator to ensure proper depth of planting where drilling is possible. The seed mixture will be evenly and uniformly planted over the disturbed area (smaller/heavier seeds have a tendency to drop the bottom of the drill and are planted first). Holder shall take appropriate measures to ensure this does not occur. Where drilling is not possible, seed will be broadcast and the area shall be raked or chained to cover the seed. When broadcasting the seed, the pounds per acre are to be doubled. 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 Bristlegrass	5lbs/A
Sand Bluestem	5lbs/A
Little Bluestem	3lbs/A
Big Bluestem	6lbs/A
Plains Coreopsis	2lbs/A
Sand Dropseed	1lbs/A

*Pounds of pure live seed:

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