

RECEIVED

JUN 21 2019

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

DISTRICT II-ARTESIA, C.D.

APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM018613A
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☒ Single Zone ☐ Multiple Zone		7. If Unit or CA Agreement, Name and No.
2. Name of Operator COG OPERATING LLC		8. Lease Name and Well No. QUIEN SABE, FEDERAL COM 602H 325762
3a. Address 600 West Illinois Ave Midland TX 79701	3b. Phone No. (include area code) (432)683-7443	9. API Well No. 30-015-46124
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface NENE / 460 FNL / 1080 FEL / LAT 32.209051 / LONG -104.138969. At proposed prod. zone SESE / 200 FSL / 1310 FEL / LAT 32.181624 / LONG -104.13973		10. Field and Pool, or Exploratory PURPLE SAGE / WOLFCAMP GAS
11. Sec. T. R. M. or Blk. and Survey or Area SEC 24 / T24S / R27E / NMP		12. County or Parish EDDY
13. State NM		
14. Distance in miles and direction from nearest town or post office* 4 miles	15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 200 feet	16. No of acres in lease 760.24
17. Spacing Unit dedicated to this well 640	18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 200 feet	19. Proposed Depth 9260 feet / 19383 feet
20. BLM/BIA Bond No. in file FED: NMB000215	21. Elevations (Show whether DF, KDB, RT, GL, etc.) 3107 feet	22. Approximate date work will start* 05/01/2019
23. Estimated duration 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. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification. |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be requested by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Mayte Reyes / Ph: (575)748-6945	Date 02/26/2019
Title Regulatory Analyst		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Cody Layton / Ph: (575)234-5959	Date 06/19/2019
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.

APPROVED WITH CONDITIONS
Approval Date: 06/19/2019

RWP 624-19

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 1: 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 well, 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 directionally 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 well 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 will 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 connects this information to a new 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 Connection Clearance Officer (WO-630), 1849 C Street, N.W., Mail Stop 401 LS, Washington, D.C. 20240.

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.

CONFIDENTIAL



APD ID: 10400039517

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Type: OIL WELL

Submission Date: 02/26/2019

Federal/Indian APD: FED

Well Number: 602H

Well Work Type: Drill

Highlighted data
reflects the most
recent changes

[Show Final Text](#)

Application

Section 1 - General

APD ID: 10400039517

BLM Office: CARLSBAD

Federal/Indian APD: FED

Lease number: NMNM018613A

Surface access agreement in place?

Agreement in place? NO

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? NO

Operator letter of designation:

Tie to previous NOS?

User: Mayte Reyes

Is the first lease penetrated for production Federal or Indian? FED

Lease Acres: 760.24

Allotted?

Federal or Indian agreement:

Submission Date: 02/26/2019

Title: Regulatory Analyst

Reservation:

APD Operator: COG OPERATING LLC

Operator Info

Operator Organization Name: COG OPERATING LLC

Operator Address: 600 West Illinois Ave

Operator PO Box:

Operator City: Midland

State: TX

Operator Phone: (432)683-7443

Operator Internet Address: RODOM@CONCHO.COM

Zip: 79701

Section 2 - Well Information

Well in Master Development Plan? NO

Well in Master SUPO? NO

Well in Master Drilling Plan? NO

Master Development Plan name:

Master SUPO name:

Master Drilling Plan name:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Well API Number:

Field/Pool or Exploratory? Field and Pool

Field Name: PURPLE SAGE

Pool Name: WOLFCAMP GAS

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: QUIEN

Number: 601H/602H/701H

SABE FEDERAL COM

Well Class: HORIZONTAL

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: EXPLORATORY (WILDCAT)

Describe sub-type:

Distance to town: 4 Miles

Distance to nearest well: 200 FT

Distance to lease line: 200 FT

Reservoir well spacing assigned acres Measurement: 640 Acres

Well plat: COG_Quien_Sabe_602H_C102_20190225143639.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	460	FNL	108 0	FEL	24S	27E	24	Aliquot NENE	32.20905 1	- 104.1389 69	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 018613 A	310 7	0	0
KOP Leg #1	460	FNL	108 0	FEL	24S	27E	24	Aliquot NENE	32.20905 1	- 104.1389 69	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 018613 A	310 7	0	0
PPP Leg #1	330	FNL	131 0	FEL	24S	27E	24	Aliquot NENE	32.20939 3	- 104.1397 19	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 018613 A	- 287 6	600 0	598 3

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

	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	264 1	FNL	131 0	FEL	24S	27E	24	Aliquot NESE	32.20300 6	- 104.1397 22	EDD Y	NEW MEXI CO	NEW MEXI CO	S	STATE	- 612 7	117 50	923 4
EXIT Leg #1	330	FSL	131 0	FEL	24S	27E	25	Aliquot SESE	32.18198 1	- 104.1397 3	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 111412	- 615 2	192 53	925 9
BHL Leg #1	200	FSL	131 0	FEL	24S	27E	25	Aliquot SESE	32.18162 4	- 104.1397 3	EDD Y	NEW MEXI CO	NEW MEXI CO	F	NMNM 111412	- 615 3	193 83	926 0

Drilling Plan

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	PERMIAN	3107	0	0	ALLUVIUM	NONE	No
2	RUSTLER	2442	664	664		NONE	No
3	TOP SALT	2278	828	828	SALT	NONE	No
4	BASE OF SALT	892	2214	2214	SALT	NONE	No
5	LAMAR	690	2416	2416	LIMESTONE	NONE	No
6	BELL CANYON	659	2447	2447	SANDSTONE	NONE	No
7	CHERRY CANYON	-146	3252	3252	SANDSTONE	NATURAL GAS,OIL	No
8	BRUSHY CANYON	-1271	4377	4377	SANDSTONE	NATURAL GAS,OIL	No
9	BONE SPRING LIME	-2803	5909	5909	LIMESTONE	NATURAL GAS,OIL	No
10	UPPER AVALON SHALE	-2975	6081	6081	SHALE	NATURAL GAS,OIL	No
11	BONE SPRING 1ST	-3806	6912	6912	SANDSTONE	NATURAL GAS,OIL	No
12	BONE SPRING 2ND	-4537	7643	7643	SANDSTONE	NATURAL GAS,OIL	No

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
13	BONE SPRING 3RD	-5695	8801	8801	SANDSTONE	NATURAL GAS,OIL	No
14	WOLFCAMP	-6049	9155	9155		NATURAL GAS,OIL	Yes

Section 2 - Blowout Prevention

Pressure Rating (PSI): 3M

Rating Depth: 8805

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_Quien_Sabe_602H_3M_Choke_20190225151134.pdf

BOP Diagram Attachment:

COG_Quien_Sabe_602H_3M_BOP_20190225151143.pdf

COG_Quien_Sabe_602H_Flex_Hose_20190225151155.pdf

Pressure Rating (PSI): 5M

Rating Depth: 9260

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_Quien_Sabe_602H_5M_Choke_20190225151215.pdf

BOP Diagram Attachment:

COG_Quien_Sabe_602H_5M_BOP_20190225151224.pdf

COG_Quien_Sabe_602H_Flex_Hose_20190225151232.pdf

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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	755	0	755	3330	2205	755	J-55	54.5	STC	3.35	9.33	DRY	12.49	DRY	12.49
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	8805	0	8805	3330	-8403	8805	HCL-80	40	OTHER-BTC	1.35	1.19	DRY	2.69	DRY	2.69
3	PRODUCTION	8.5	5.5	NEW	API	N	0	19383	0	19383	3330	-7903	19383	P-110	20	OTHER-BTC	1.84	2.48	DRY	3.6	DRY	3.6

Casing Attachments

Casing ID: 1 String Type: SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Quien_Sabe_602H_Casing_Prog_20190225151905.pdf

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Casing Attachments

Casing ID: 2 String Type: INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Quien_Sabe_602H_Casing_Prog_20190225151852.pdf

Casing ID: 3 String Type: PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

COG_Quien_Sabe_602H_Casing_Prog_20190225151914.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	755	260	1.75	13.5	455	50	Class C	4% Gel
SURFACE	Tail			755	250	1.34	14.8	335	50	Class C	2% CaCl2
INTERMEDIATE	Lead		0	8805	960	2.8	11	2688	50	NeoCem	As needed
INTERMEDIATE	Tail			300	300	1.1	16.4	330	50	Class H	As needed

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
PRODUCTION	Lead		0	1938 3	400	2	12.7	800	35	35:65:6 H Blend	As needed
PRODUCTION	Tail			1938 6	2910	1.24	14.4	3608	35	50:50:2 Class H Blend	As needed

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
755	8805	OTHER : Diesel Brine Emulsion	8.6	9.4							Diesel Brine Emulsion
8805	1938 3	OIL-BASED MUD	10.5	12.5							OBM
0	755	OTHER : Fresh water gel	8.4	8.6							Fresh water gel

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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: 6020

Anticipated Surface Pressure: 3982.8

Anticipated Bottom Hole Temperature(F): 150

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

Describe:

Contingency Plans geohazards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

COG_Quien_Sabe_602H_H2S_Schem_20190225152336.pdf

COG_Quien_Sabe_602H_H2S_SUP_20190225152346.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

COG_Quien_Sabe_602H_Direct_Plan_20190225152425.pdf

COG_Quien_Sabe_602H_AC_Report_20190225152513.pdf

Other proposed operations facets description:

None

Other proposed operations facets attachment:

COG_Quien_Sabe_602H_Drilling_Prog_20190225152439.pdf

Other Variance attachment:

SUPD

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Section 1 - Existing Roads

Will existing roads be used? YES

Existing Road Map:

COG_Quien_Sabe_602H_Existing_Rd_20190225152549.pdf

Existing Road Purpose: ACCESS,FLUID TRANSPORT

Row(s) Exist? NO

ROW ID(s)

ID:

Do the existing roads need to be improved? YES

Existing Road Improvement Description: Existing roads will be maintained in the same condition or better.

Existing Road Improvement Attachment:

Section 2 - New or Reconstructed Access Roads

Will new roads be needed? YES

New Road Map:

COG_Quien_Sabe_602H_Map_Plats_20190225152612.pdf

New road type: RESOURCE

Length: 254.6

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: QUIEN SABE FEDERAL COM

Well Number: 602H

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_Quien_Sabe_602H_1Mile_Data_20190226082816.pdf

Existing Wells description:

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

Submit or defer a Proposed Production Facilities plan? SUBMIT

Production Facilities description: A Central Tank Battery and production facilities are proposed in Section 24. T24S. R27E. Production will be sent to the proposed Quien Sabe Central Tank Battery facility. 3 buried flow lines of approximately 248.4' of 4" flex pipe carrying oil, gas and water under a maximum pressure of 250 psi will follow the access road to the Quien Sabe Central Tank Battery facility location. We plan to install a 4" buried flex pipe transporting Gas Lift Gas from the Quien Sabe Central Tank Battery facility to the Quien Sabe Federal Com 601H, 602H and 701H wells. The buried Gas Lift Gas pipe of approximately 348.4' under a maximum pressure of 250 psi will be installed no further than 10' from the edge of the road.

Production Facilities map:

COG_Quien_Sabe_602H_CTB_20190226082850.pdf

COG_Quien_Sabe_602H_Reclamation_20190226082902.pdf

COG_Quien_Sabe_602H_Layout_20190226082912.pdf

COG_Quien_Sabe_CTB_Layout_20190226140055.pdf

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Section 5 - Location and Types of Water Supply

Water Source Table

Water source use type: ICE PAD CONSTRUCTION & MAINTENANCE, STIMULATION, SURFACE CASING
Describe type: Fresh Water

Water source type: OTHER

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_Quien_Sabe_602H_Fresh_H2O_20190226082936.pdf

COG_Quien_Sabe_602H_Brine_H2O_20190226082947.pdf

Water source comments: Fresh water will be obtained from Efren B. Collins fresh water well located in Section 16. T24S, R28E. Brine water will be obtained from the Malaga I Brine station in Section 2. T21S. R25E. See attached maps

New water well? NO

New Water Well Info

Well latitude:

Well Longitude:

Well datum:

Well target aquifer:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Est. depth to top of aquifer(ft):

Est thickness of aquifer:

Aquifer comments:

Aquifer documentation:

Well depth (ft):

Well casing type:

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 caliche does not exist or is not plentiful from the well site, the caliche source will be from George H and Nancy Brantley caliche pit located in Sec 13. T24S. R27E.

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

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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

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 FACILITY **Disposal location ownership:** COMMERCIAL

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.)**

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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

WCuttings area liner

Cuttings area liner specifications and installation description

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments: Gas Capture Plan attached

Section 9 - Well Site Layout

Well Site Layout Diagram:

COG_Quien_Sabe_602H_CTB_20190226083020.pdf

COG_Quien_Sabe_602H_Layout_20190226083031.pdf

COG_Quien_Sabe_602H_Reclamation_20190226083040.pdf

COG_Quien_Sabe_CTB_Layout_20190226140129.pdf

Comments: A Central Tank Battery and production facilities are proposed in Section 24. T24S. R27E. Production will be sent to the proposed Quien Sabe Central Tank Battery facility. 3 buried flow lines of approximately 248.4' of 4" flex pipe carrying oil, gas and water under a maximum pressure of 250 psi will follow the access road to the Quien Sabe Central Tank Battery facility location. We plan to install a 4" buried flex pipe transporting Gas Lift Gas from the Quien Sabe Central Tank Battery facility to the Quien Sabe Federal Com 601H, 602H and 701H wells. The buried Gas Lift Gas pipe of approximately 348.4' under a maximum pressure of 250 psi will be installed no further than 10' from the edge of the road. 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: QUIEN SABE FEDERAL COM

Multiple Well Pad Number: 601H/602H/701H

Recontouring attachment:

COG_Quien_Sabe_602H_Reclamation_20190226083056.pdf

Drainage/Erosion control construction: Straw Waddles will be used as necessary at the well site to reduce sediment impacts to fragile/sensitive soils.

Drainage/Erosion control reclamation: North 50'. Northwest 50'.

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Well pad proposed disturbance (acres): 3.67	Well pad interim reclamation (acres): 0.06	Well pad long term disturbance (acres): 2.81
Road proposed disturbance (acres): 0.08	Road interim reclamation (acres): 0.08	Road long term disturbance (acres): 0.08
Powerline proposed disturbance (acres): 0	Powerline interim reclamation (acres): 0	Powerline long term disturbance (acres): 0
Pipeline proposed disturbance (acres): 0.11	Pipeline interim reclamation (acres): 0.11	Pipeline long term disturbance (acres): 0.11
Other proposed disturbance (acres): 5.74	Other interim reclamation (acres): 5.74	Other long term disturbance (acres): 5.74
Total proposed disturbance: 9.6	Total interim reclamation: 5.99	Total long term disturbance: 8.74

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: West

Soil treatment: None

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

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:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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
-----------	-------------

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:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

COG_Quien_Sabe_602H_Closed_Loop_20190226083114.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:

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 11/29/2018 by Gerald Herrera (COG) and Jeff Robertson (BLM).

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

Other SUPO Attachment

COG_Quien_Sabe_602H_CTB_20190226083153.pdf
COG_Quien_Sabe_602H_1Mile_Data_20190226083200.pdf
COG_Quien_Sabe_602H_Brine_H2O_20190226083212.pdf
COG_Quien_Sabe_602H_C102_20190226083220.pdf
COG_Quien_Sabe_602H_Closed_Loop_20190226083230.pdf
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COG_Quien_Sabe_602H_Layout_20190226083325.pdf
COG_Quien_Sabe_602H_SUP_20190226140214.pdf

PWD

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:

Describe precipitated solids disposal:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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?

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:

Describe 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:

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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:

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?

Operator Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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:

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 Name: COG OPERATING LLC

Well Name: QUIEN SABE FEDERAL COM

Well Number: 602H

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: 02/20/2019

Title: Regulatory Analyst

Street Address: 2208 W Main Street

City: Artesia

State: NM

Zip: 88210

Phone: (575)748-6945

Email address: Mreyes1@concho.com

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

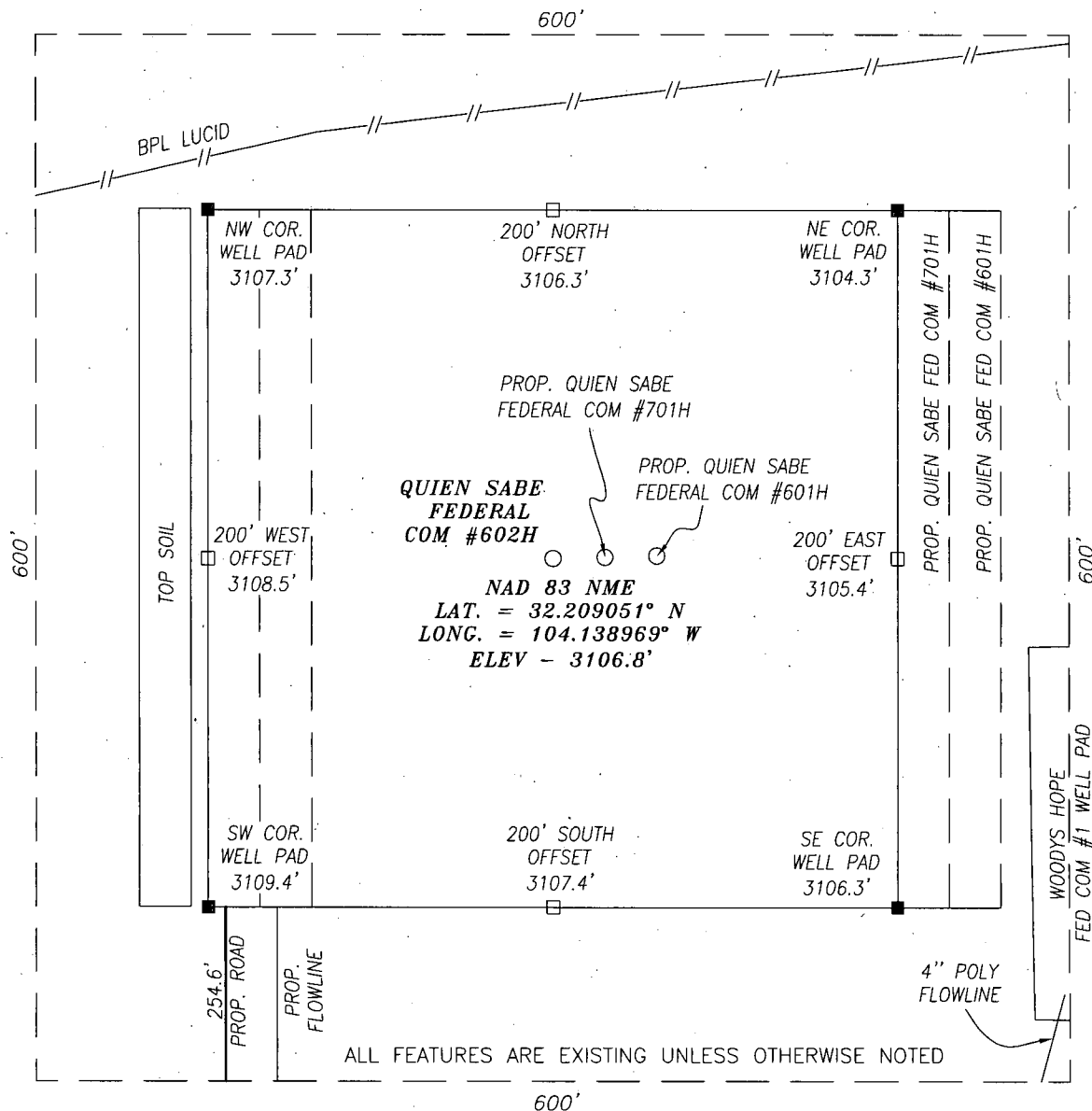
Payment Info

Payment

APD Fee Payment Method: PAY.GOV

pay.gov Tracking ID: 26FM4M9U

SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY NEW MEXICO

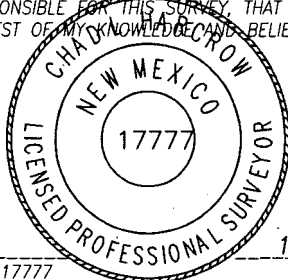


DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF HIGHWAY 285 AND BLACK RIVER VILLAGE RD. (CR. 720), GO WEST ON BLACK RIVER VILLAGE RD. FOR APPROX. 2.75 MILES; THEN TURN LEFT (SOUTHWEST) ON ROADRUNNER RD. (CR. 774) AND GO APPROX. 1.5 MILES; THEN TURN RIGHT (WEST) AND GO APPROX. 770 FEET TO THE PROPOSED ROAD. PROPOSED WELL LIES APPROX. 780 FEET NORTHWEST.

CERTIFICATION

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



Chad Harcrow

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

1/23/19

DATE

HARCROW SURVEYING, LLC

2314 W. MAIN ST, ARTESIA, N.M. 88210

PH: (575) 746-2158

c.harcrow@harcrowsurveying.com



100 0 100 200 Feet



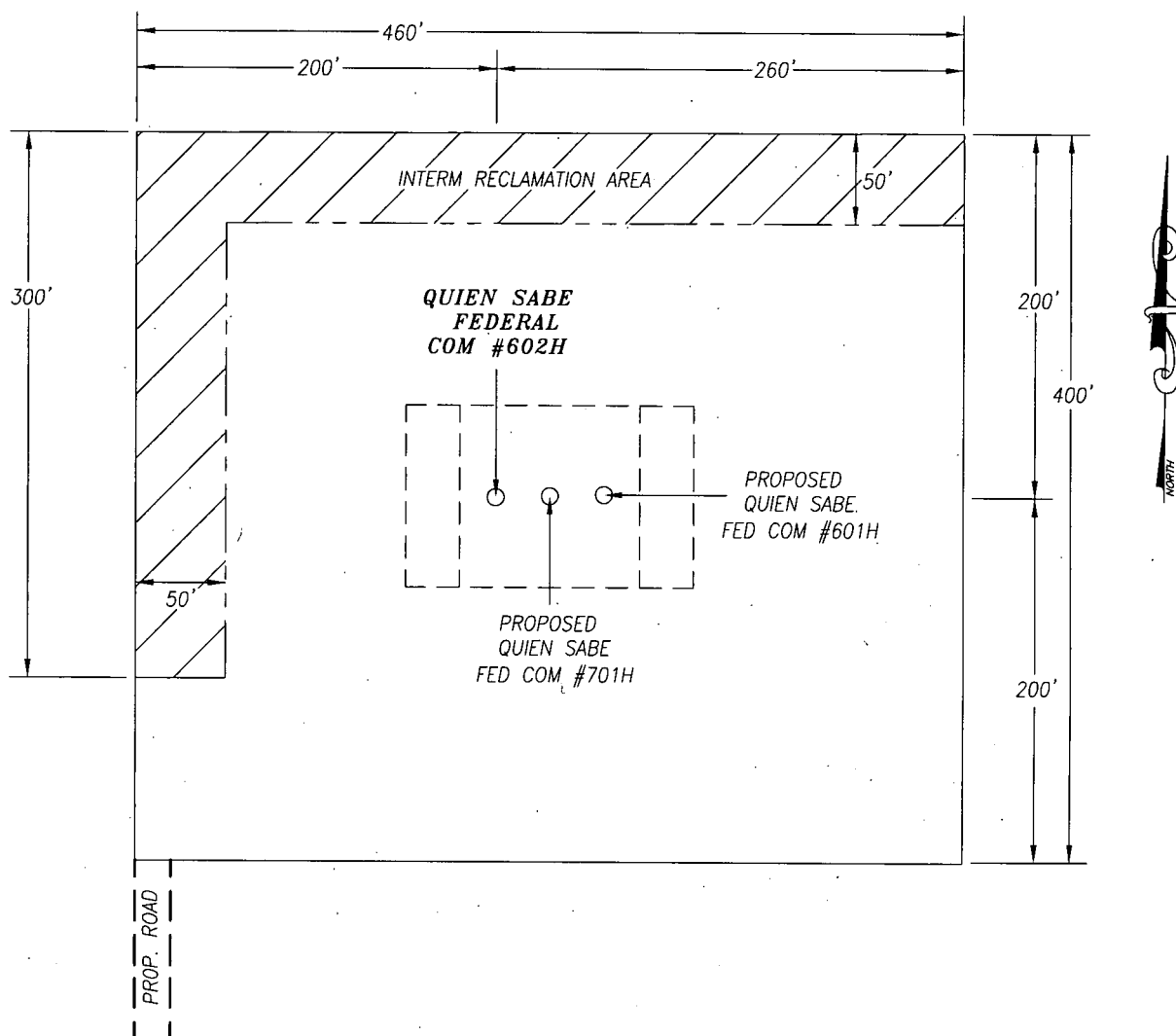
Scale: 1"=100'

COG OPERATING, LLC

QUIEN SABE FEDERAL COM #602H WELL
LOCATED 460 FEET FROM THE NORTH LINE
AND 1060 FEET FROM THE EAST LINE OF SECTION 24,
TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO

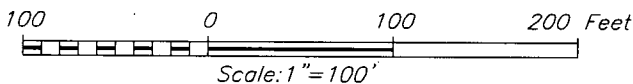
SURVEY DATE: DECEMBER 3, 2018	600S
DRAFTING DATE: JANUARY 7, 2018	PAGE: 1 OF 1
APPROVED BY: CH	DRAWN BY: VD
FILE: 18-1692	

RECLAMATION AND FACILITY DIAGRAM – PRODUCTION FACILITIES DIAGRAM
 COG OPERATING, LLC
 SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
 EDDY COUNTY, NEW MEXICO.



LEASE NAME WELL & WELL NUMBER: QUIEN SABE FEDERAL COM #602H
 NAD 83 NME
 LATITUDE: 32.209051° N
 LONGITUDE: 104.138969° W

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



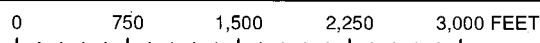
COG OPERATING, LLC		
SURVEY DATE: DECEMBER 3, 2018	RECLAMATION	
DRAFTING DATE: JANUARY 18, 2019	PAGE: 1 OF 1	
APPROVED BY: CH	DRAWN BY: VD	FILE: 18-1692

LEGEND

-  **WELL**
 **TANKBATTERY**
 **WELLPAD**
 **EXISTING ROAD**
 **PROPOSED ROAD**

QUIEN SABE FEDERAL COM WELLS

SECTION: 24	TOWNSHIP: 24 S.	RANGE: 27 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M
W.O. # 18-1692-1697 & 1718	LEASE: QUIEN SABE FED COM	



0 0.075 0.15 0.3 Miles

1 IN = 1,250 FT

LOCATION MAP

TOPO

1/8/2019

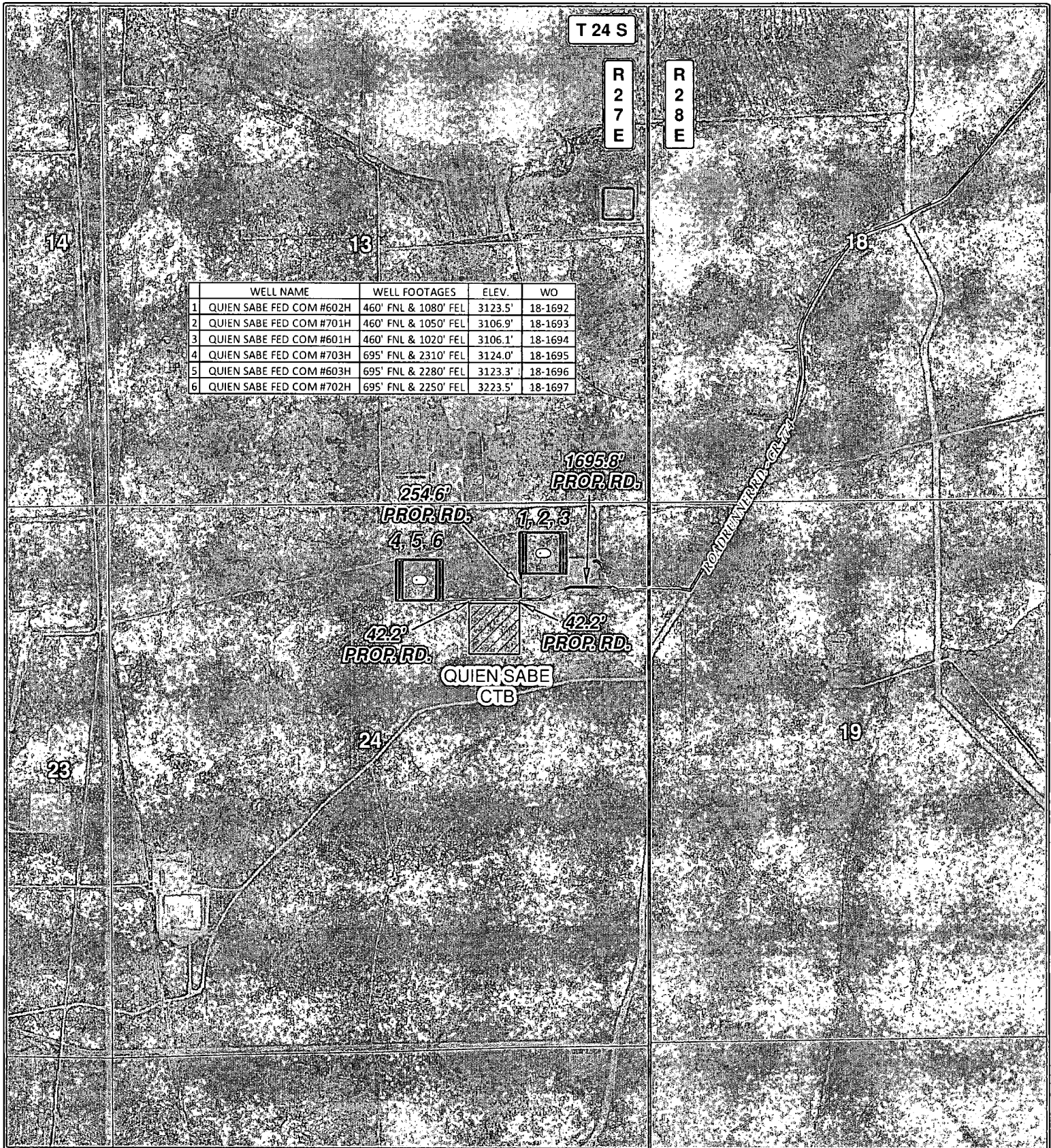
V.D.



COG OPERATING, LLC



HARCROW SURVEYING, LLC.
2314 W. MAIN ST, ARTESIA, NM 88210
PH: (575) 746-2158 FAX: (575) 746-2158
TEXAS FIRM NO. 10194089
c.harcrow@harcrowsurveying.com



LEGEND

- WELL
- TANKBATTERY
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

QUIEN SABE FEDERAL COM WELLS

SECTION: 24 TOWNSHIP: 24 S. RANGE: 27 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M
 W.O. # 18-1692-1697 & 1718 LEASE: QUIEN SABE FED COM

0 750 1,500 2,250 3,000 FEET

0 0.075 0.15 0.3 Miles

1 IN = 1,250 FT

LOCATION MAP

IMAGERY

1/8/2019

V.D.



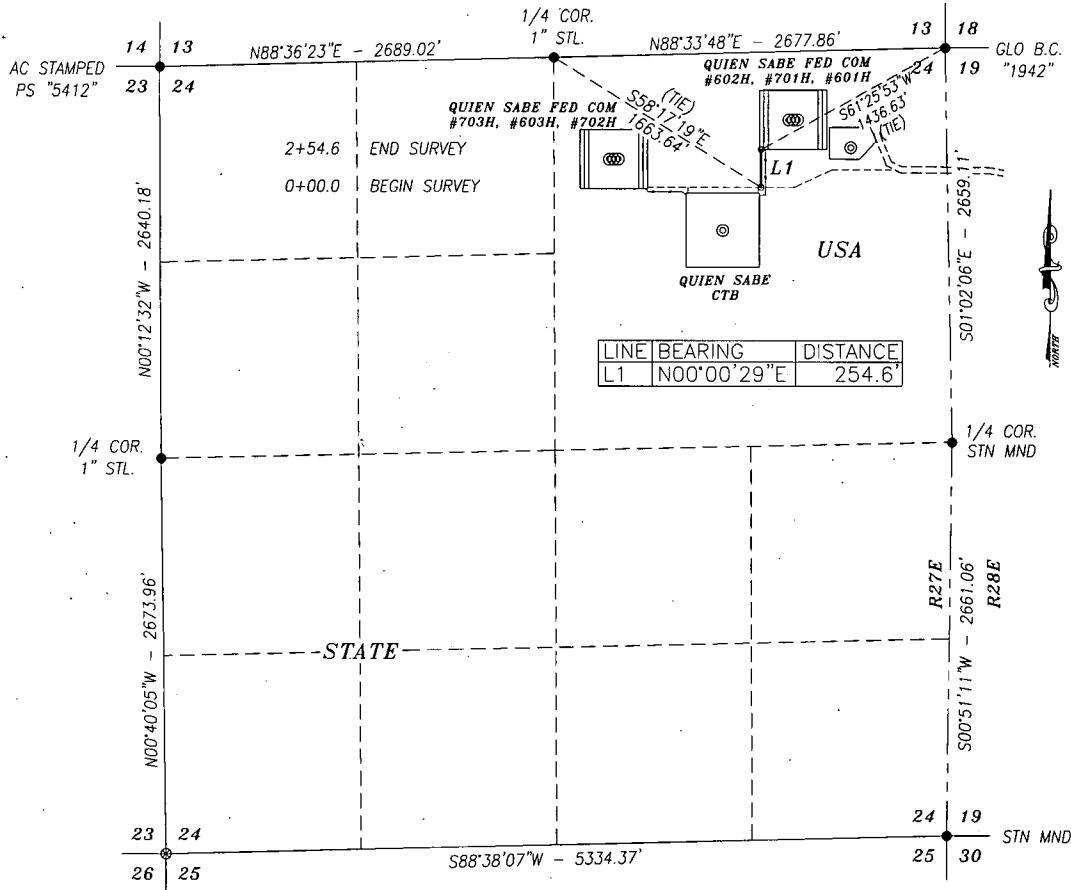
COG OPERATING, LLC



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 TEXAS FIRM NO. 10194089
 c.harcrow@harcrowsurveying.com

ACCESS ROAD PLAT COG OPERATING, LLC

A PROPOSED ACCESS ROAD FROM PROPOSED MAIN ROAD LINE
TO QUIEN SABE FED COM #602H, #701H, AND #601H IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 254.6 FEET OR 15.43 RODS OR 0.048 MILES IN LENGTH CROSSING USA LAND IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:

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

CERTIFICATION

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



Chad Harcrow

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

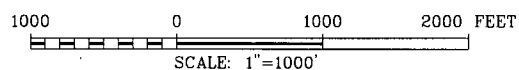
1/24/19
DATE

HARCROW SURVEYING, LLC

2314 W. MAIN ST, ARTESIA, N.M. 88210

PH: (575) 746-2158

c.harcrow@harcrowsurveying.com



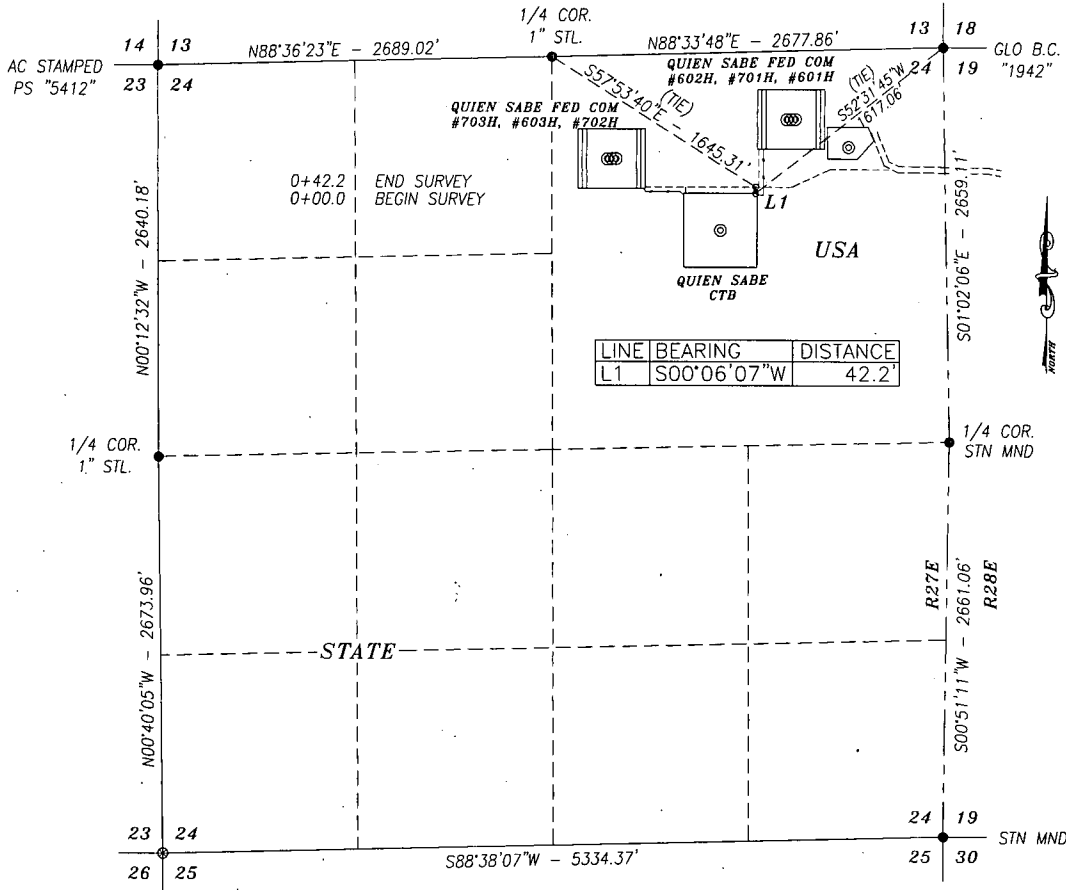
COG OPERATING, LLC

SURVEY OF A PROPOSED ACCESS ROAD LOCATED IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: JANUARY 8, 2018	LATERAL RD.
DRAFTING DATE: JANUARY 12, 2019	PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: VD
	FILE: 18-1719

ACCESS ROAD PLAT COG OPERATING, LLC

A PROPOSED ACCESS ROAD FROM PROPOSED MAIN ACCESS ROAD
TO QUIEN SABE CTB IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 42.2 FEET OR 2.56 RODS OR 0.008 MILES IN LENGTH CROSSING USA LAND IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

BASIS OF BEARING:

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

HARCROW SURVEYING, LLC

2314 W. MAIN ST, ARTESIA, N.M. 88210

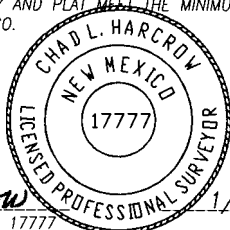
PH: (575) 746-2158

c.harcrow@harcrowsurveying.com



CERTIFICATION

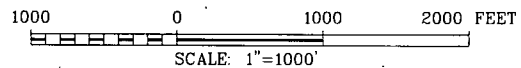
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.



Chad Harcrow

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

1/24/19
DATE



COG OPERATING, LLC

SURVEY OF A PROPOSED ACCESS ROAD LOCATED IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST,
NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: JANUARY 8, 2018 ACCESS RD.

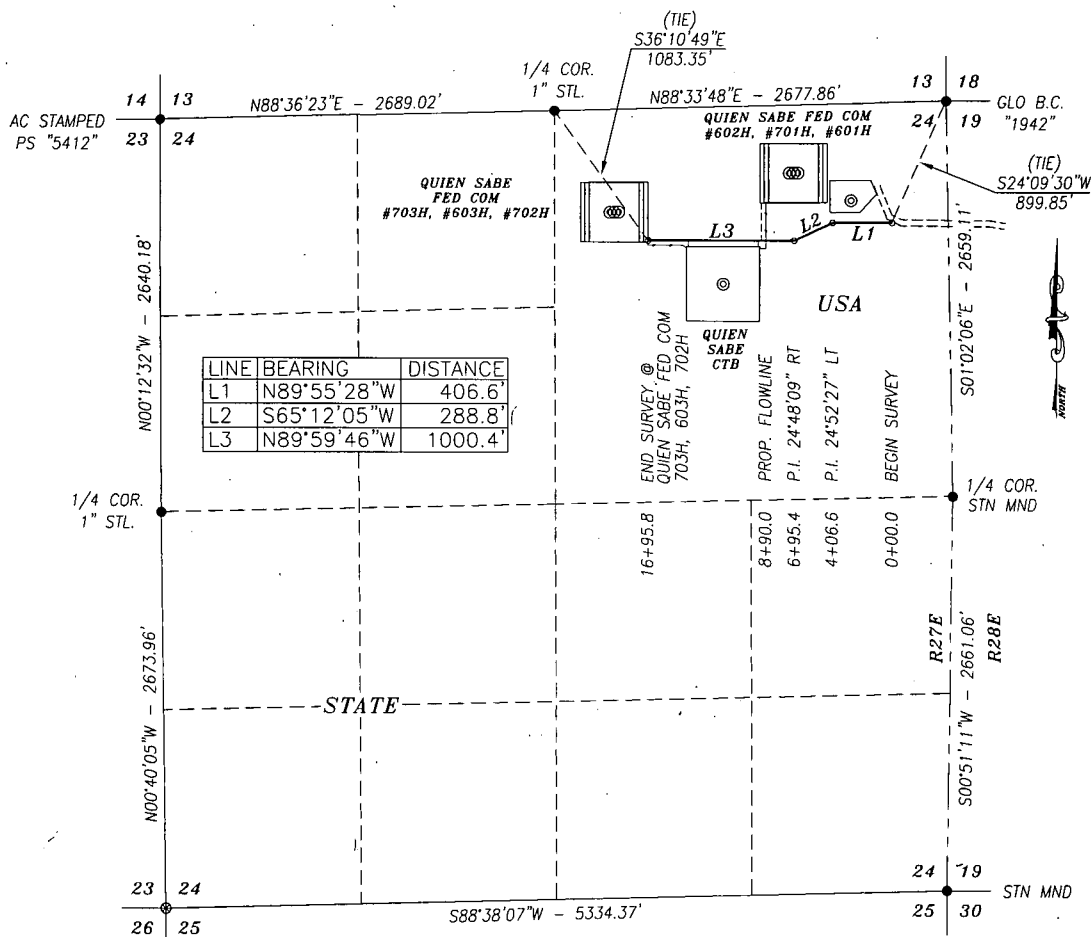
DRAFTING DATE: JANUARY 12, 2019 PAGE 1 OF 1

APPROVED BY: CH DRAWN BY: VD FILE: 18-1719

ACCESS ROAD PLAT

COG OPERATING, LLC

A PROPOSED ACCESS ROAD FROM EXISTING LINE TO
QUIEN SABE FED COM 703H, 603H, AND 702H IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

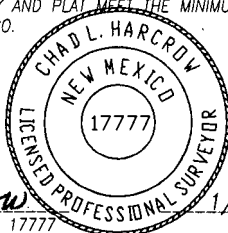
A STRIP OF LAND 30.0 FEET WIDE AND 1695.8 FEET OR 102.78 RODS OR 0.321 MILES IN LENGTH CROSSING USA LAND IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

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

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

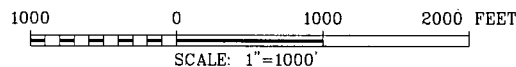


CERTIFICATION
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.



Chad Harcrow
CHAD HARCROW N.M.P.S. NO. 17777

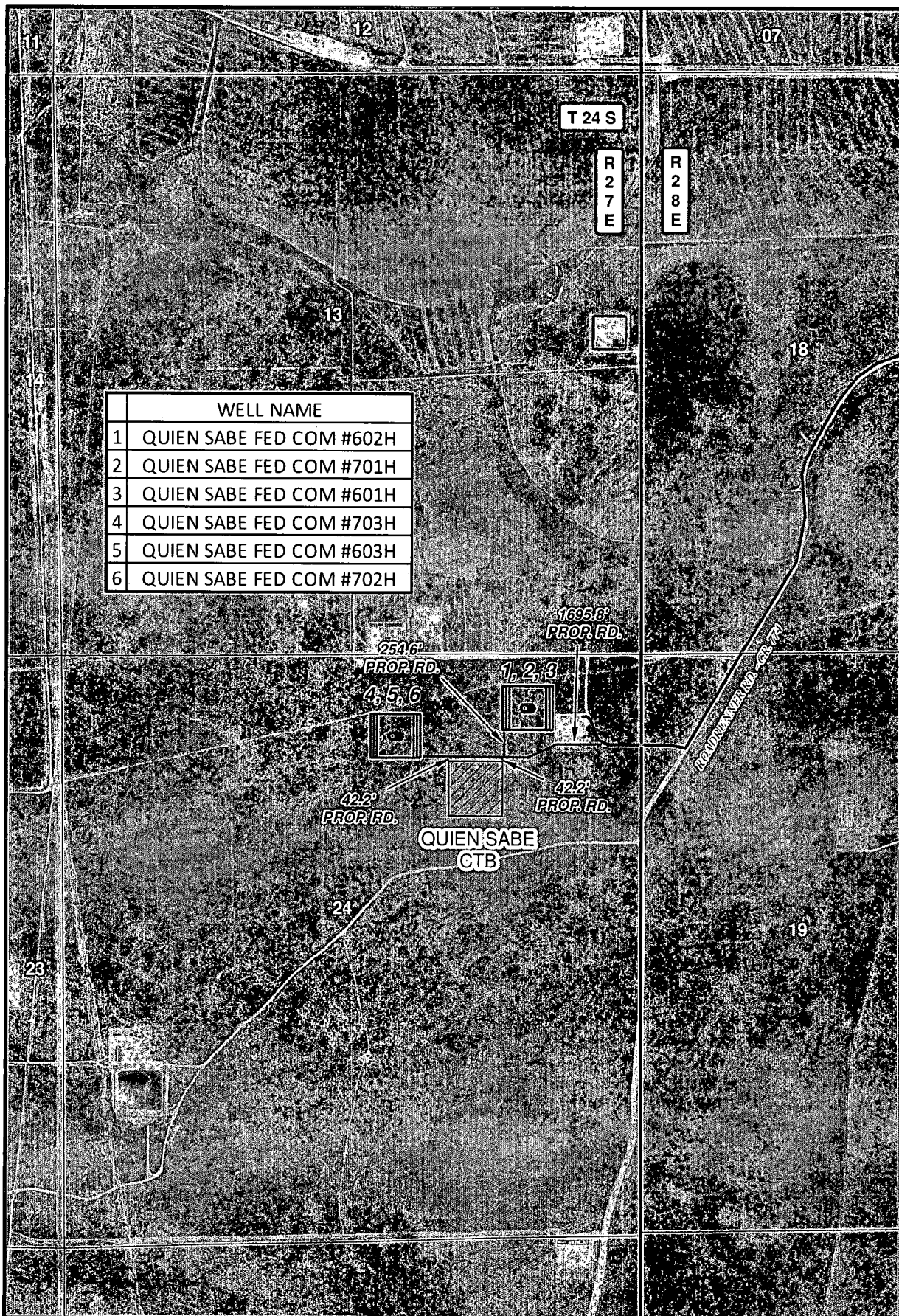
1/24/19
DATE



COG OPERATING, LLC

SURVEY OF A PROPOSED ACCESS ROAD LOCATED IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: JANUARY 8, 2018	MAIN RD.
DRAFTING DATE: JANUARY 12, 2019	PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: VD
FILE: 18-1719	



	WELL NAME
1	QUIEN SABE FED COM #602H
2	QUIEN SABE FED COM #701H
3	QUIEN SABE FED COM #601H
4	QUIEN SABE FED COM #703H
5	QUIEN SABE FED COM #603H
6	QUIEN SABE FED COM #702H

LEGEND

- WELL
- TANKBATTERY
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

QUIEN SABE FEDERAL COM ACCESS ROADS

SECTION: 24	TOWNSHIP: 24 S.	RANGE: 27 E.
STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M.
W.O. # 18-1719		LEASE: QUIEN SABE FED COM

0 750 1,500 2,250 FEET

0 0.05 0.1 0.2 Miles

1 IN = 1,000 FT

LOCATION MAP IMAGERY 1/8/2019 V.D.

CONCHO

COG OPERATING, LLC

HARCROW SURVEYING, LLC.
 2314 W. MAIN ST. ARTESIA, NM 88210
 PH: (575) 746-2158 FAX: (575) 746-2158
 TEXAS FIRM NO. 10194089
 c.harcrow@harcrowsurveying.com

NEW MEXICO

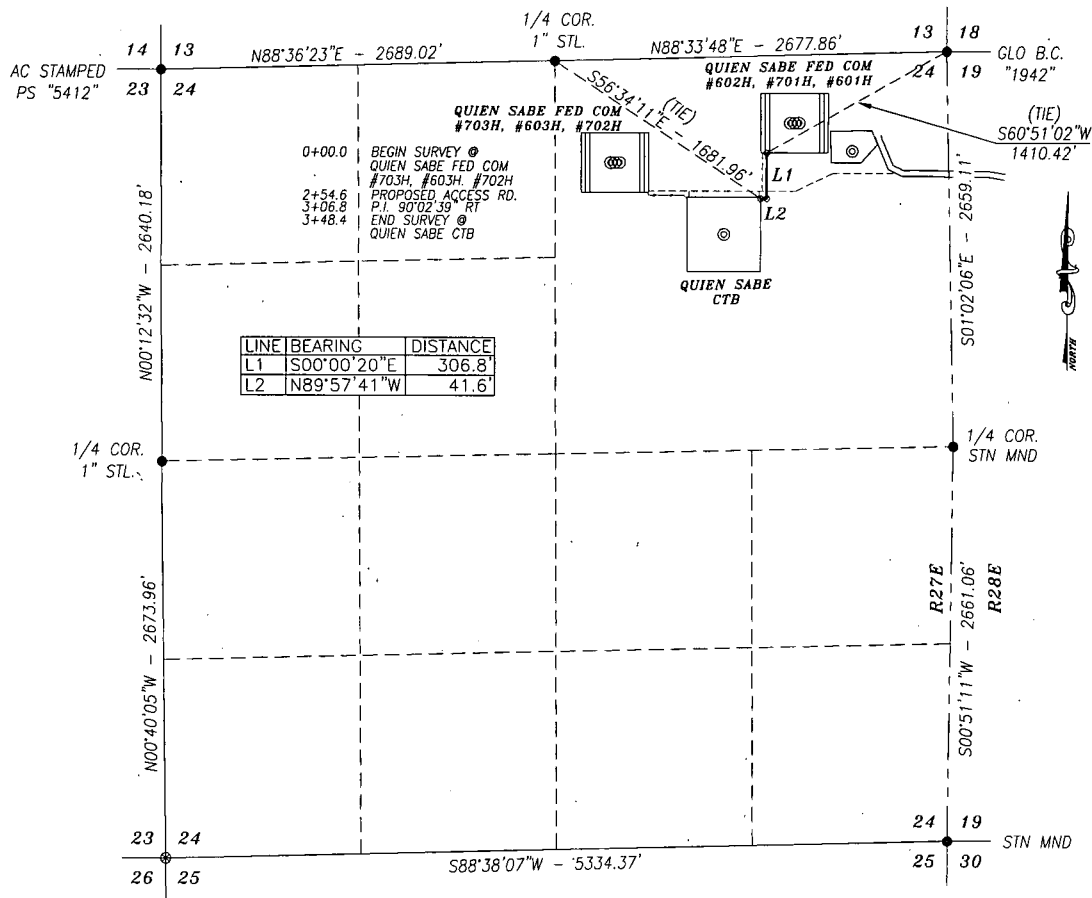


ALL FEATURES ARE EXISTING UNLESS OTHERWISE NOTED

APPROVED BY: CH	DRAWN BY: VD	FILE: 18-1718
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PIPELINE PLAT **COG OPERATING, LLC**

A PROPOSED PIPELINE FROM QUIEN SABE FED COM #602H, #701H, #601H TO
QUIEN SABE CTB IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, N.M.P.M.,
EDDY COUNTY, NEW MEXICO.



DESCRIPTION

A STRIP OF LAND 30.0 FEET WIDE AND 348.4 FEET OR 21.12 RODS OR 0.066 MILES IN LENGTH CROSSING USA LAND IN SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST, EDDY COUNTY, NEW MEXICO AND BEING 15.0 FEET LEFT AND 15.0 FEET RIGHT OF THE ABOVE PLATTED CENTERLINE SURVEY.

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

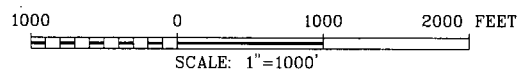
CERTIFICATION
I, CHAD HARCROW, A NEW MEXICO REGISTERED PROFESSIONAL SURVEYOR CERTIFY THAT I DIRECTED AND AM RESPONSIBLE FOR THIS SURVEY, THAT THIS SURVEY IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF, AND THIS SURVEY AND PLAT MEET THE MINIMUM STANDARDS FOR SURVEYING IN NEW MEXICO.



Chad Harcrow
CHAD HARCROW N.M.P.S. NO. 17777

1/24/19
DATE

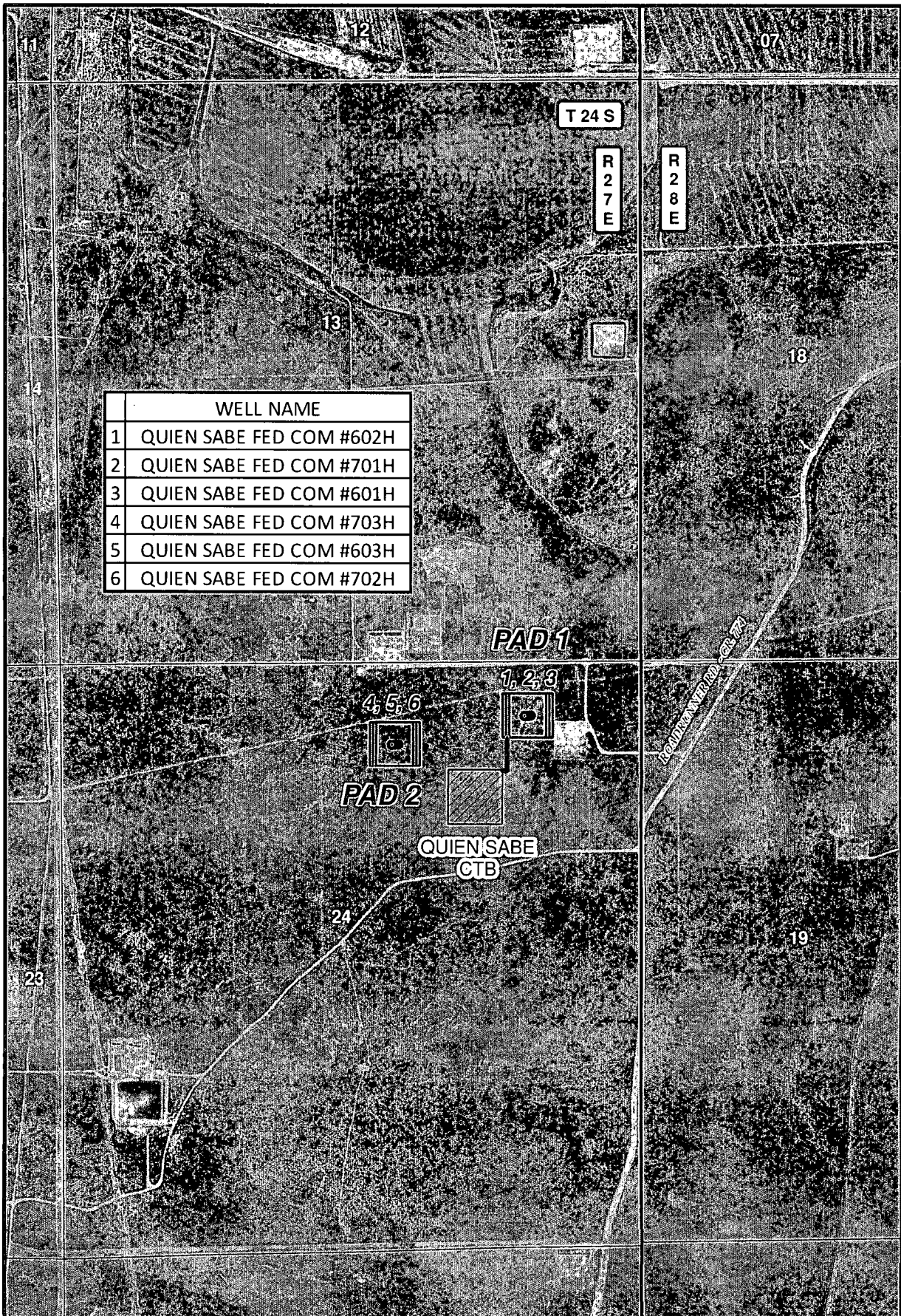
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COG OPERATING, LLC

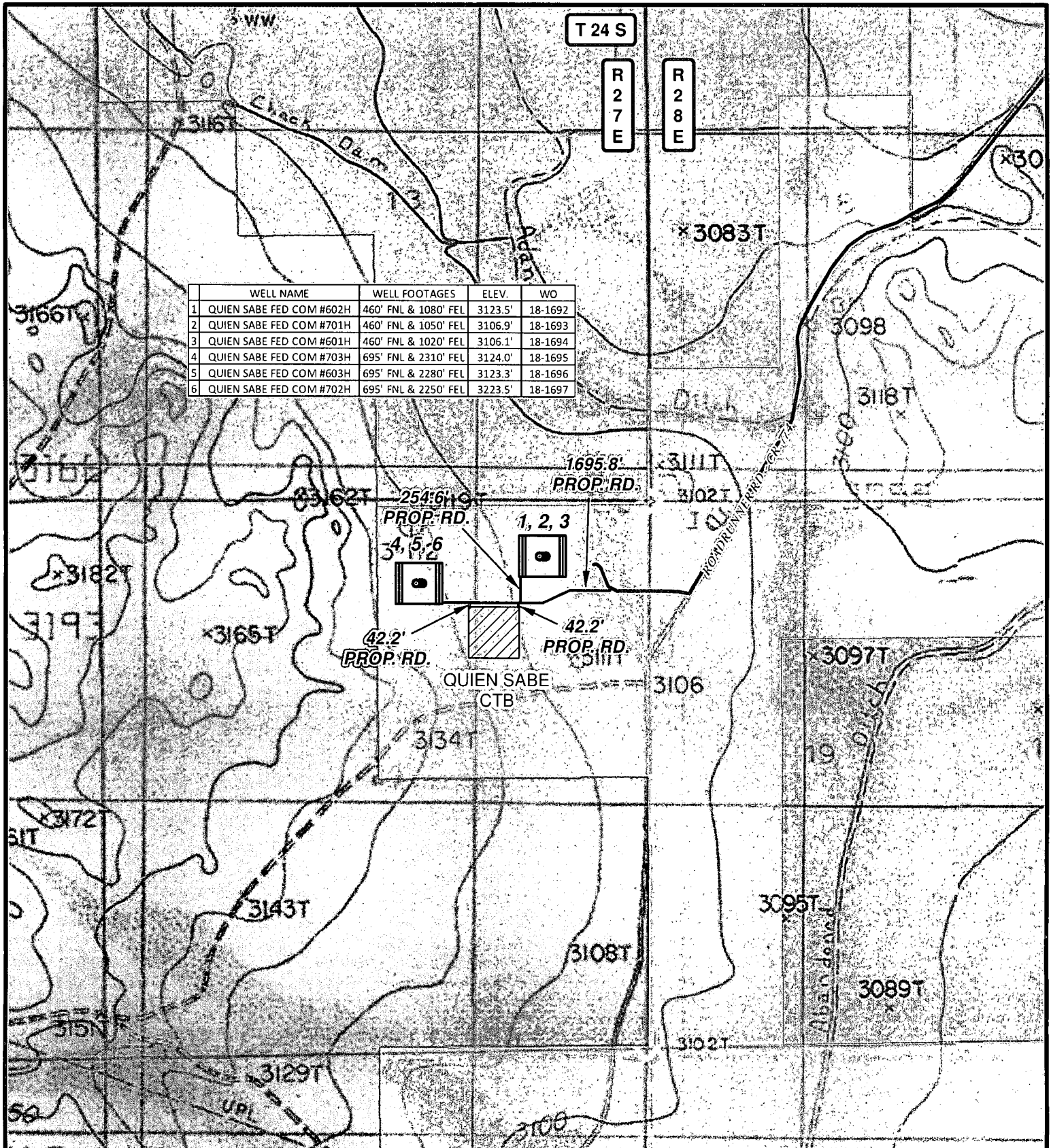
SURVEY OF A PROPOSED PIPELINE LOCATED IN
SECTION 24, TOWNSHIP 24 SOUTH, RANGE 27 EAST,
NMPM, EDDY COUNTY, NEW MEXICO

SURVEY DATE: JANUARY 8, 2018	PIPELINE
DRAFTING DATE: JANUARY 14, 2019	PAGE 1 OF 1
APPROVED BY: CH	DRAWN BY: VD
FILE: 18-1720	



	WELL NAME
1	QUIEN SABE FED COM #602H
2	QUIEN SABE FED COM #701H
3	QUIEN SABE FED COM #601H
4	QUIEN SABE FED COM #703H
5	QUIEN SABE FED COM #603H
6	QUIEN SABE FED COM #702H

LEGEND • WELL WELLPAD TANKBATTERY PIPELINE	QUIEN SABE FED COM 602H, 701H, & 601H TO CTB PIPELINE			 CONCHO COG OPERATING, LLC HARCROW SURVEYING, LLC. 2314 W. MAIN ST, ARTESIA, NM 88210 PH: (575) 746-2158 FAX: (575) 746-2158 TEXAS FIRM NO. 10194089 c.harcrow@harcrowsurveying.com
	SECTION: 24	TOWNSHIP: 24 S.	RANGE: 27 E.	
	STATE: NEW MEXICO	COUNTY: EDDY	SURVEY: N.M.P.M	
	W.O. # 18-1721	LEASE: QUIEN SABE FED COM		
	0 750 1,500 2,250 FEET 0 0.05 0.1 0.2 Miles 1 IN = 1,000 FT			
LOCATION MAP	IMAGERY	1/8/2019	V.D.	



LEGEND

- WELL
- TANKBATTERY
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD
- PRIVATE
- STATE OF NM
- US BLM

QUIEN SABE FEDERAL COM WELLS

SECTION: 24 TOWNSHIP: 24 S. RANGE: 27 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M.
 W.O. # 18-1692-1697 & 1718 LEASE: QUIEN SABE FED COM

0 750 1,500 2,250 3,000 FEET

0 0.075 0.15 0.3 Miles

1 IN = 1,250 FT

LOCATION MAP

TOPO

1/8/2019

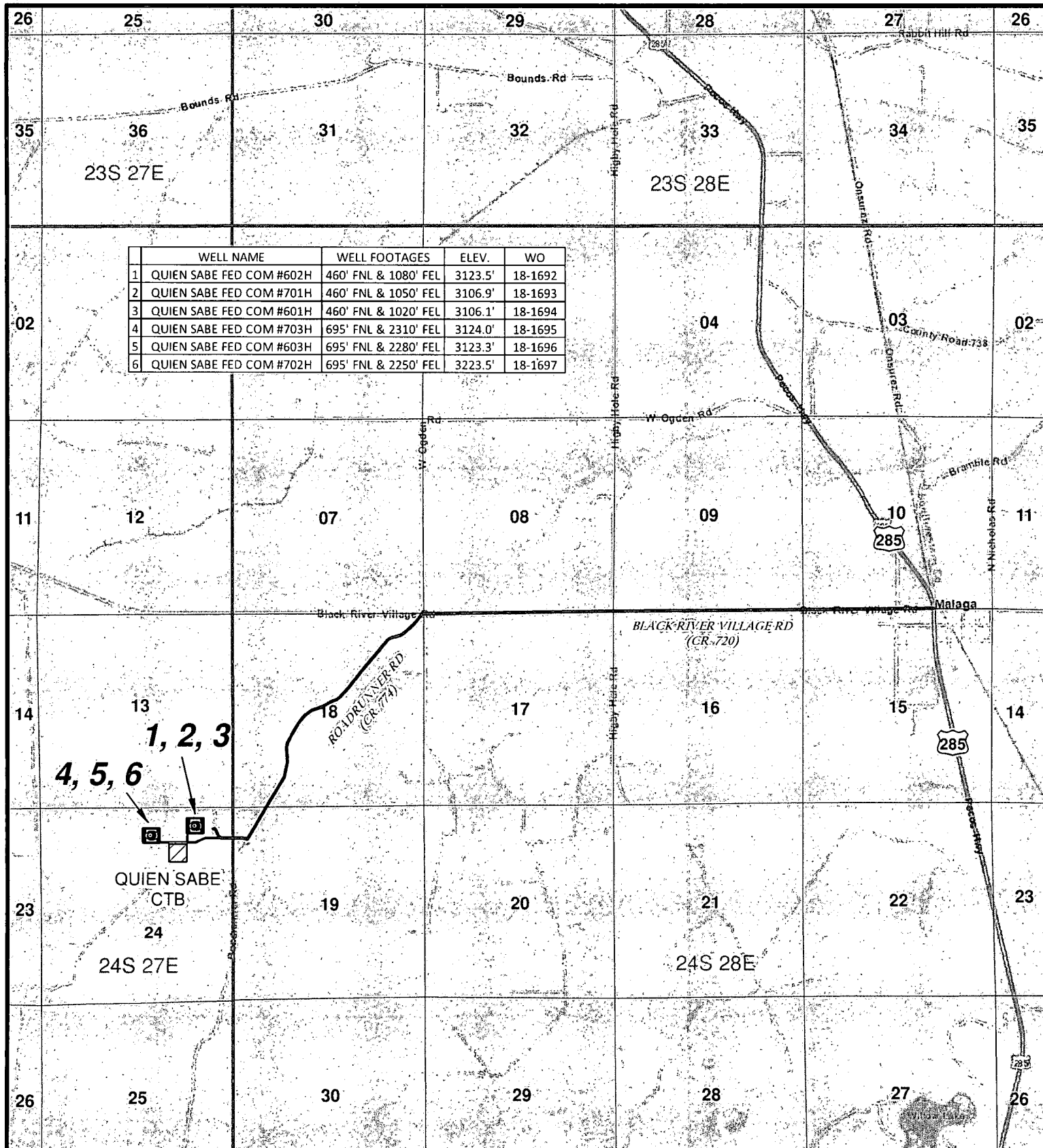
V.D.



COG OPERATING, LLC



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LEGEND

- WELL
- TANKBATTERY
- WELLPAD
- EXISTING ROAD
- PROPOSED ROAD

QUIEN SABE FEDERAL COM WELLS

SECTION: 24 TOWNSHIP: 24 S. RANGE: 27 E.
 STATE: NEW MEXICO COUNTY: EDDY SURVEY: N.M.P.M
 W.O. # 18-1692-1697 & 1718 LEASE: QUIEN SABE FED COM

0 0.25 0.5 1 Miles

1 IN = 3,500 FT

LOCATION MAP

VICINITY MAP

1/8/2019

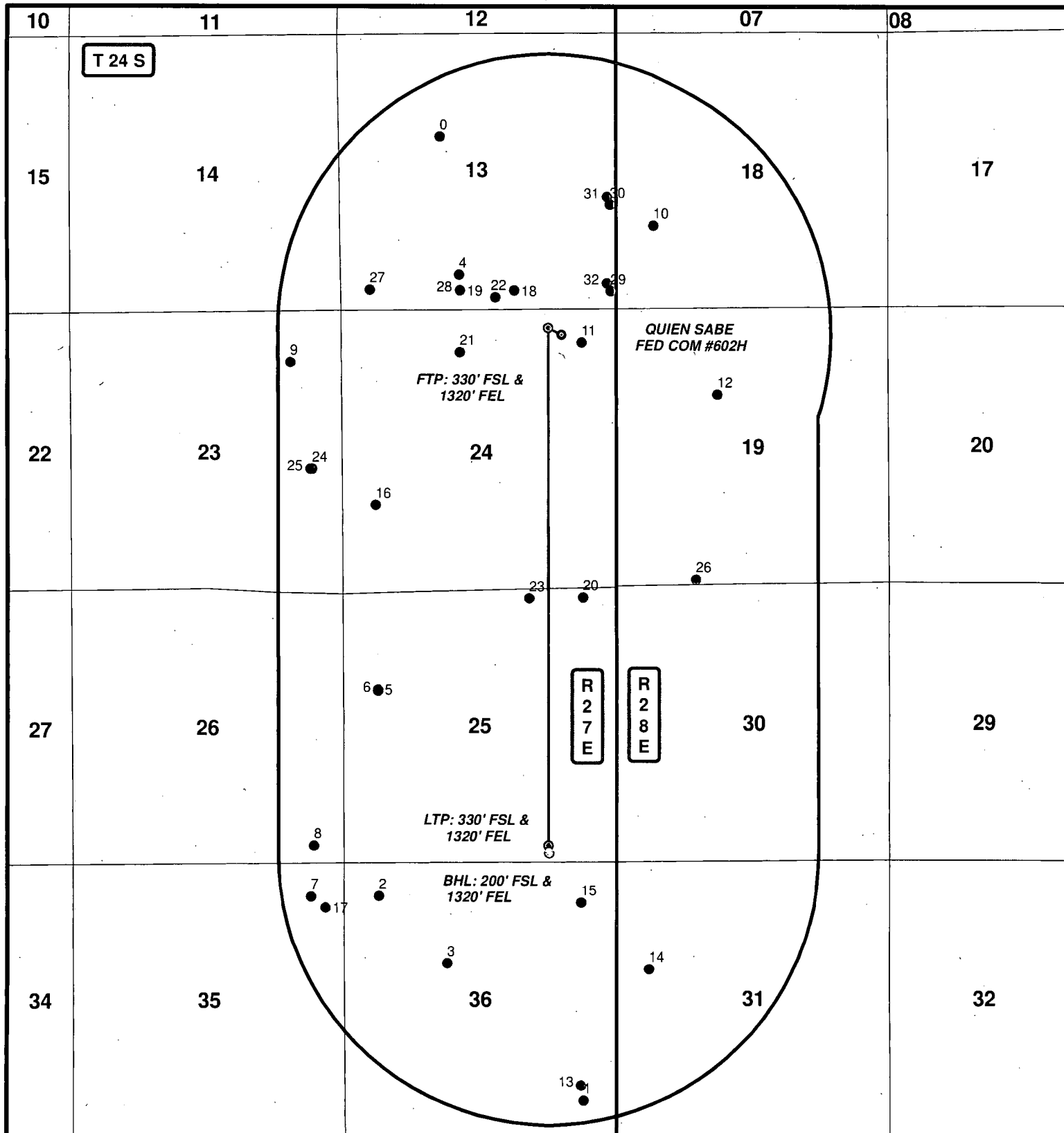
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DATA FOR "WELLS WITHIN 1 MI." IS TAKEN FROM THE NEW MEXICO EMNRD WEBSITE. THE DATA HAS BEEN UPDATED THROUGH SEPTEMBER 16, 2018.

LEGEND

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

QUIEN SABE FEDERAL COM #602H

SEC: 24 TWP: 24 S. RGE: 27 E. ELEVATION: 3106.8'
 STATE: NEW MEXICO COUNTY: EDDY 460' FNL & 1080' FEL
 W.O. # 18-1692 LEASE: QUIEN SABE FED COM SURVEY: N.M.P.M

0 2,500 5,000 FEET

0 0.175 0.35 0.7 Miles

1 IN = 2,500 FT

1 MILE MAP

1/8/2019

V.D



COG OPERATING, LLC



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QUIEN SABE FEDERAL COM #602H 1 MILE DATA													
FID	API	OPERATOR	RANGE	SECTION	TOWNSHIP	WELL NAME	COMPL STAT	EW_CD	FTG_EW	FTG_NS	LATITUDE	LONGITUDE	NS_CD
0	3001501124	UNION OIL CO OF CALIFORNIA	27E	13	24.0S	BEEMAN 001	Plugged	W	1980	1980	32.219556	-104.146637	N
1	3001501140	W H MCKINLEY	27E	36	24.0S	KELLY ST 001	Plugged	E	660	660	32.168434	-104.1376	S
2	3001501167	YORK & HARPER	27E	36	24.0S	STATE 002	Plugged	W	660	660	32.179319	-104.150493	N
3	3001522352	PURVIS OPERATING CO	27E	36	24.0S	RED BLUFF STATE 001	Plugged	W	1980	1980	32.175717	-104.146181	N
4	3001523022	HNG FOSSIL FUELS CO	27E	13	24.0S	BRANTLEY 13 STATE CO 001	Plugged	W	2310	660	32.212205	-104.145408	S
5	3001523411	AMOCO PRODUCTION CO	27E	25	24.0S	STATE 15 001	Plugged	W	660	1980	32.190284	-104.150561	N
6	3001523751	AMOCO PRODUCTION CO	27E	25	24.0S	STATE 15 001	Zone Plugged	W	660	2005	32.190216	-104.15056	N
7	3001523972	DINERO OPERATING CO	27E	35	24.0S	PUBCO STATE 001	Plugged	E	660	660	32.179287	-104.154779	N
8	3001526812	DINERO OPERATING CO	27E	26	24.0S	RJR STATE 001	Plugged	E	600	330	32.18201	-104.154603	S
9	3001532889	EOG Y RESOURCES, INC.	27E	23	24.0S	HUMIDOR BMJ STATE COM 001	Active	E	990	990	32.207579	-104.156065	N
10	3001533639	MARBOB ENERGY CORP	28E	18	24.0S	CHRIS DUNGHILL FEE COM 001C	New (Not drilled or compl)	W	735	1575	32.214813	-104.133126	S
11	3001535495	COG OPERATING LLC	27E	24	24.0S	WOODY'S HOPE FEDERAL COM 001	Active	E	660	660	32.208634	-104.137654	N
12	3001535760	TRINITY RIVER ENERGY, LLC	28E	19	24.0S	WEATHERBY 001F	New (Not drilled or compl)	W	1981	1651	32.205865	-104.129102	N
13	3001535838	EOG Y RESOURCES, INC.	27E	36	24.0S	GURKHA BKG STATE COM 001	Active	E	660	990	32.16922	-104.13774	S
14	3001535957	TRINITY RIVER ENERGY, LLC	28E	31	24.0S	RUGER 31 STATE 001E	New (Not drilled or compl)	W	661	1981	32.175415	-104.13345	N
15	3001536305	EOG Y RESOURCES, INC.	27E	36	24.0S	STOGEY BLG STATE COM 001H	Active	E	660	660	32.178983	-104.13774	N
16	3001536499	EOG Y RESOURCES, INC.	27E	24	24.0S	PERDOMO BMP STATE COM 001H	New (Not drilled or compl)	W	660	1650	32.200025	-104.150695	S
17	3001538260	EOG Y RESOURCES, INC.	27E	35	24.0S	HARKEY 35 STATE 002H	New (Not drilled or compl)	E	330	760	32.178722	-104.15385	N
18	3001540950	COG OPERATING LLC	27E	13	24.0S	BONGO FEE 001H	New (Not drilled or compl)	E	1980	330	32.211376	-104.141932	S
19	3001541407	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 001C	New (Not drilled or compl)	W	2310	331	32.211395	-104.145368	S
20	3001541528	COG OPERATING LLC	27E	25	24.0S	QUIEN SABE 25 FEDERAL 001H	New (Not drilled or compl)	E	600	190	32.195156	-104.13759	N
21	3001541748	EOG Y RESOURCES, INC.	27E	24	24.0S	FONSECA BTD STATE COM 001H	New (Not drilled or compl)	W	2310	860	32.208121	-104.145359	N
22	3001542029	COG OPERATING LLC	27E	13	24.0S	KUDU FEE 001H	New (Not drilled or compl)	E	2350	200	32.211025	-104.143131	S
23	3001542662	COG OPERATING LLC	27E	25	24.0S	QUIEN SABE 25 FEDERAL 002H	New (Not drilled or compl)	E	1650	190	32.195107	-104.141	N
24	3001542755	EOG Y RESOURCES, INC.	27E	23	24.0S	HUMIDOR BML STATE COM 005H	New (Not drilled or compl)	E	575	2365	32.201934	-104.154713	S
25	3001542893	EOG Y RESOURCES, INC.	27E	23	24.0S	MACANUDO BTE STATE COM 001H	New (Not drilled or compl)	E	605	2365	32.201933	-104.15481	S
26	3001543214	COG OPERATING LLC	28E	19	24.0S	PARDUE 19 FEDERAL COM 004H	New (Not drilled or compl)	W	1600	110	32.196106	-104.130441	S
27	3001543581	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 002H	New (Not drilled or compl)	W	560	330	32.21142	-104.151054	S
28	3001543674	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 001H	New (Not drilled or compl)	W	2310	330	32.211393	-104.145368	S
29	3001543898	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 003H	New (Not drilled or compl)	E	100	330	32.211347	-104.135823	S
30	3001544042	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 004H	New (Not drilled or compl)	E	100	1987	32.215902	-104.135864	S
31	3001544062	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 005H	New (Not drilled or compl)	E	160	2137	32.216315	-104.136063	S
32	3001544077	CAZA OPERATING, LLC	27E	13	24.0S	MAD RIVER 13 STATE COM 006H	New (Not drilled or compl)	E	175	480	32.21176	-104.136071	S

COG Operating, LLC - Quien Sabe Federal Com 602H

1. Geologic Formations

TVD of target	9,260' EOL	Pilot hole depth	NA
MD at TD:	19,383'	Deepest expected fresh water:	110'

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Quaternary Fill	Surface	Water	
Rustler	664	Water	
Top of Salt	828	Salt	
Base of Salt	2214	Salt	
Lamar	2416	Salt Water	
Bell Canyon	2447	Salt Water	
Cherry Canyon	3252	Oil/Gas	
Brushy Canyon	4377	Oil/Gas	
Bone Spring Lime	5909	Oil/Gas	
U. Avalon Shale	6081	Oil/Gas	
L. Avalon Shale	6316	Oil/Gas	
1st Bone Spring Sand	6912	Oil/Gas	
2nd Bone Spring Sand	7643	Oil/Gas	
3rd Bone Spring Sand	8801	Oil/Gas	
Wolfcamp	9155	Target Oil/Gas	

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	755	13.375"	54.5	J55	STC	3.35	9.33	12.49
12.25"	0	8805	9.625"	40	HCL80	BTC	1.35	1.19	2.69
8.5	0	19,383	5.5"	20	P110	BTC	1.84	2.48	3.60
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 Operating, LLC - Quien Sabe Federal Com 602H

	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 3 rd 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 2 nd 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?	

COG Operating, LLC - Quien Sabe Federal Com 602H

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	Yld ft ³ / sack	H ₂ O gal/sk	500# Comp. Strength (hours)	Slurry Description
Surf.	260	13.5	1.75	9	12	Lead: Class C + 4% Gel
	250	14.8	1.34	6.34	8	Tail: Class C + 2% CaCl ₂
Inter. Stage1	960	11	2.8	19	48	Lead: NeoCem
	300	16.4	1.1	5	8	Tail: Class H
DV Tool @ 2400'						
Inter. Stage2	260	11	2.8	19	48	Lead: NeoCem
	100	14.8	1.35	6.34	8	Tail: Class C + 2% Cacl
5.5 Prod	400	12.7	2	10.6	16	Lead: 35:65:6 H Blend
	2910	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%
1 st Intermediate	0'	50%
Production	8,305'	35%

COG Operating, LLC - Quien Sabe Federal Com 602H

4. Pressure Control Equipment

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

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	x	Tested to:
12-1/4"	13-5/8"	3M	Annular	x	1500 psi
			Blind Ram	x	3M
			Pipe Ram	x	
			Double Ram	x	
			Other*		
8 1/2"	13-5/8"	5M	5M Annular	x	2500 psi
			Blind Ram	x	5M
			Pipe Ram	x	
			Double Ram	x	
			Other*		

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

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

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

COG Operating, LLC - Quien Sabe Federal Com 602H

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	Surf. Shoe	FW Gel	8.4 - 8.6	28-29	N/C
Surf csg	Int shoe	Diesel Brine Emul	8.6 - 9.4	30-40	N/C
Int shoe	Lateral TD	OBM	10.5 - 12.5	30-40	20

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.
N	Are 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	

COG Operating, LLC - Quien Sabe Federal Com 602H

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	6020 psi at 9260' 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

Eddy County, NM (NAD27 NME)

Quien Sabe Fed Com

602H

OH

Plan: Plan 1 02-21-19

Standard Planning Report

21 February, 2019



Database:	USA Compass	Local Co-ordinate Reference:	Well 602H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site:	Quien Sabe Fed Com	North Reference:	Grid
Well:	602H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-19		

Project:	Eddy 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:	Quien Sabe Fed Com		
Site Position:		Northing:	439,517.70 usft
From:	Map	Easting:	559,072.60 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"
		Latitude:	32° 12' 29.54517 N
		Longitude:	104° 8' 32.42618 W
		Grid Convergence:	0.10 °

Well:	602H		
Well Position	+N/-S	265.10 usft	Northing: 439,782.80 usft
	+E/-W	1,195.40 usft	Easting: 560,268.00 usft
Position Uncertainty	0.00 usft		Latitude: 32° 12' 32.14746 N
		Wellhead Elevation:	Longitude: 104° 8' 18.50683 W
			Ground Level: 3,106.80 usft

Wellbore:	OH		
------------------	----	--	--

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	MVHD	4/10/2019	7.17	59.95	47,891.53188309

Design:	Plan 1 02-21-19		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD):	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction (°)
			181.25

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	
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,749.78	5.00	330.08	1,749.47	9.43	-5.43	2.00	2.00	0.00	330.08	
6,857.16	5.00	330.08	6,837.44	394.91	-227.27	0.00	0.00	0.00	0.00	
7,106.94	0.00	0.00	7,086.91	404.34	-232.70	2.00	-2.00	0.00	180.00	
8,674.08	0.00	0.00	8,654.05	404.34	-232.70	0.00	0.00	0.00	0.00	
9,572.16	89.81	179.92	9,227.00	-166.69	-231.88	10.00	10.00	20.03	179.92	
19,383.13	89.81	179.92	9,260.00	-9,977.60	-217.80	0.00	0.00	0.00	0.00	BHL - Quien Sabe f

Database:	USA Compass	Local Co-ordinate Reference:	Well 602H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site:	Quien Sabe Fed Com	North Reference:	Grid
Well:	602H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-19		

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
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP Begin 2.00°/100' Build									
1,600.00	2.00	330.08	1,599.98	1.51	-0.87	-1.49	2.00	2.00	0.00
1,700.00	4.00	330.08	1,699.84	6.05	-3.48	-5.97	2.00	2.00	0.00
1,749.78	5.00	330.08	1,749.47	9.43	-5.43	-9.31	2.00	2.00	0.00
Hold 5.00° Inc at 330.08° Azm									
1,800.00	5.00	330.08	1,799.49	13.22	-7.61	-13.05	0.00	0.00	0.00
1,900.00	5.00	330.08	1,899.11	20.77	-11.95	-20.50	0.00	0.00	0.00
2,000.00	5.00	330.08	1,998.73	28.32	-16.30	-27.95	0.00	0.00	0.00
2,100.00	5.00	330.08	2,098.35	35.86	-20.64	-35.41	0.00	0.00	0.00
2,200.00	5.00	330.08	2,197.97	43.41	-24.98	-42.86	0.00	0.00	0.00
2,300.00	5.00	330.08	2,297.59	50.96	-29.33	-50.31	0.00	0.00	0.00
2,400.00	5.00	330.08	2,397.21	58.51	-33.67	-57.76	0.00	0.00	0.00
2,500.00	5.00	330.08	2,496.83	66.05	-38.01	-65.21	0.00	0.00	0.00
2,600.00	5.00	330.08	2,596.45	73.60	-42.36	-72.66	0.00	0.00	0.00
2,700.00	5.00	330.08	2,696.07	81.15	-46.70	-80.11	0.00	0.00	0.00
2,800.00	5.00	330.08	2,795.69	88.70	-51.05	-87.56	0.00	0.00	0.00
2,900.00	5.00	330.08	2,895.31	96.24	-55.39	-95.01	0.00	0.00	0.00
3,000.00	5.00	330.08	2,994.93	103.79	-59.73	-102.46	0.00	0.00	0.00
3,100.00	5.00	330.08	3,094.55	111.34	-64.08	-109.91	0.00	0.00	0.00
3,200.00	5.00	330.08	3,194.17	118.89	-68.42	-117.36	0.00	0.00	0.00
3,300.00	5.00	330.08	3,293.79	126.43	-72.76	-124.81	0.00	0.00	0.00
3,400.00	5.00	330.08	3,393.41	133.98	-77.11	-132.27	0.00	0.00	0.00
3,500.00	5.00	330.08	3,493.04	141.53	-81.45	-139.72	0.00	0.00	0.00
3,600.00	5.00	330.08	3,592.66	149.08	-85.79	-147.17	0.00	0.00	0.00
3,700.00	5.00	330.08	3,692.28	156.62	-90.14	-154.62	0.00	0.00	0.00
3,800.00	5.00	330.08	3,791.90	164.17	-94.48	-162.07	0.00	0.00	0.00
3,900.00	5.00	330.08	3,891.52	171.72	-98.83	-169.52	0.00	0.00	0.00
4,000.00	5.00	330.08	3,991.14	179.26	-103.17	-176.97	0.00	0.00	0.00
4,100.00	5.00	330.08	4,090.76	186.81	-107.51	-184.42	0.00	0.00	0.00
4,200.00	5.00	330.08	4,190.38	194.36	-111.86	-191.87	0.00	0.00	0.00
4,300.00	5.00	330.08	4,290.00	201.91	-116.20	-199.32	0.00	0.00	0.00
4,400.00	5.00	330.08	4,389.62	209.45	-120.54	-206.77	0.00	0.00	0.00
4,500.00	5.00	330.08	4,489.24	217.00	-124.89	-214.22	0.00	0.00	0.00
4,600.00	5.00	330.08	4,588.86	224.55	-129.23	-221.68	0.00	0.00	0.00
4,700.00	5.00	330.08	4,688.48	232.10	-133.57	-229.13	0.00	0.00	0.00
4,800.00	5.00	330.08	4,788.10	239.64	-137.92	-236.58	0.00	0.00	0.00
4,900.00	5.00	330.08	4,887.72	247.19	-142.26	-244.03	0.00	0.00	0.00
5,000.00	5.00	330.08	4,987.34	254.74	-146.61	-251.48	0.00	0.00	0.00
5,100.00	5.00	330.08	5,086.96	262.29	-150.95	-258.93	0.00	0.00	0.00
5,200.00	5.00	330.08	5,186.58	269.83	-155.29	-266.38	0.00	0.00	0.00
5,300.00	5.00	330.08	5,286.20	277.38	-159.64	-273.83	0.00	0.00	0.00
5,400.00	5.00	330.08	5,385.82	284.93	-163.98	-281.28	0.00	0.00	0.00
5,500.00	5.00	330.08	5,485.44	292.48	-168.32	-288.73	0.00	0.00	0.00
5,600.00	5.00	330.08	5,585.06	300.02	-172.67	-296.18	0.00	0.00	0.00
5,700.00	5.00	330.08	5,684.68	307.57	-177.01	-303.63	0.00	0.00	0.00
5,800.00	5.00	330.08	5,784.30	315.12	-181.35	-311.08	0.00	0.00	0.00
5,900.00	5.00	330.08	5,883.92	322.67	-185.70	-318.54	0.00	0.00	0.00
6,000.00	5.00	330.08	5,983.54	330.21	-190.04	-325.99	0.00	0.00	0.00
6,100.00	5.00	330.08	6,083.16	337.76	-194.39	-333.44	0.00	0.00	0.00
6,200.00	5.00	330.08	6,182.78	345.31	-198.73	-340.89	0.00	0.00	0.00
6,300.00	5.00	330.08	6,282.40	352.85	-203.07	-348.34	0.00	0.00	0.00
6,400.00	5.00	330.08	6,382.02	360.40	-207.42	-355.79	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 602H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site:	Quien Sabe Fed Com	North Reference:	Grid
Well:	602H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-19		

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)
6,500.00	5.00	330.08	6,481.64	367.95	-211.76	-363.24	0.00	0.00	0.00
6,600.00	5.00	330.08	6,581.26	375.50	-216.10	-370.69	0.00	0.00	0.00
6,700.00	5.00	330.08	6,680.88	383.04	-220.45	-378.14	0.00	0.00	0.00
6,800.00	5.00	330.08	6,780.50	390.59	-224.79	-385.59	0.00	0.00	0.00
6,857.16	5.00	330.08	6,837.44	394.91	-227.27	-389.85	0.00	0.00	0.00
Begin 2.00°/100' Drop									
6,900.00	4.14	330.08	6,880.15	397.86	-228.98	-392.77	2.00	-2.00	0.00
7,000.00	2.14	330.08	6,979.99	402.61	-231.71	-397.46	2.00	-2.00	0.00
7,100.00	0.14	330.08	7,079.97	404.33	-232.70	-399.16	2.00	-2.00	0.00
7,106.94	0.00	0.00	7,086.91	404.34	-232.70	-399.16	2.00	-2.00	0.00
Begin Vertical Hold									
8,674.08	0.00	0.00	8,654.05	404.34	-232.70	-399.16	0.00	0.00	0.00
KOP2, Begin 10.00°/100' Build									
8,700.00	2.59	179.92	8,679.96	403.75	-232.70	-398.58	10.00	10.00	0.00
8,800.00	12.59	179.92	8,778.95	390.56	-232.68	-385.39	10.00	10.00	0.00
8,900.00	22.59	179.92	8,874.16	360.37	-232.64	-355.21	10.00	10.00	0.00
9,000.00	32.59	179.92	8,962.67	314.12	-232.57	-308.96	10.00	10.00	0.00
9,100.00	42.59	179.92	9,041.81	253.19	-232.49	-248.06	10.00	10.00	0.00
9,200.00	52.59	179.92	9,109.17	179.45	-232.38	-174.33	10.00	10.00	0.00
9,300.00	62.59	179.92	9,162.69	95.13	-232.26	-90.04	10.00	10.00	0.00
9,400.00	72.59	179.92	9,200.76	2.80	-232.13	2.27	10.00	10.00	0.00
9,500.00	82.59	179.92	9,222.23	-94.74	-231.99	99.78	10.00	10.00	0.00
9,572.16	89.81	179.92	9,227.00	-166.69	-231.88	171.71	10.00	10.00	0.00
LP, Hold 89.81° Inc at 179.92° Azm									
9,600.00	89.81	179.92	9,227.10	-194.53	-231.84	199.55	0.00	0.00	0.00
9,700.00	89.81	179.92	9,227.43	-294.53	-231.70	299.52	0.00	0.00	0.00
9,800.00	89.81	179.92	9,227.77	-394.53	-231.56	399.49	0.00	0.00	0.00
9,900.00	89.81	179.92	9,228.11	-494.53	-231.41	499.47	0.00	0.00	0.00
10,000.00	89.81	179.92	9,228.44	-594.53	-231.27	599.44	0.00	0.00	0.00
10,100.00	89.81	179.92	9,228.78	-694.53	-231.12	699.41	0.00	0.00	0.00
10,200.00	89.81	179.92	9,229.12	-794.53	-230.98	799.38	0.00	0.00	0.00
10,300.00	89.81	179.92	9,229.45	-894.53	-230.84	899.35	0.00	0.00	0.00
10,400.00	89.81	179.92	9,229.79	-994.53	-230.69	999.33	0.00	0.00	0.00
10,500.00	89.81	179.92	9,230.13	-1,094.53	-230.55	1,099.30	0.00	0.00	0.00
10,600.00	89.81	179.92	9,230.46	-1,194.53	-230.41	1,199.27	0.00	0.00	0.00
10,700.00	89.81	179.92	9,230.80	-1,294.53	-230.26	1,299.24	0.00	0.00	0.00
10,800.00	89.81	179.92	9,231.13	-1,394.53	-230.12	1,399.22	0.00	0.00	0.00
10,900.00	89.81	179.92	9,231.47	-1,494.53	-229.98	1,499.19	0.00	0.00	0.00
11,000.00	89.81	179.92	9,231.81	-1,594.53	-229.83	1,599.16	0.00	0.00	0.00
11,100.00	89.81	179.92	9,232.14	-1,694.52	-229.69	1,699.13	0.00	0.00	0.00
11,200.00	89.81	179.92	9,232.48	-1,794.52	-229.55	1,799.11	0.00	0.00	0.00
11,300.00	89.81	179.92	9,232.82	-1,894.52	-229.40	1,899.08	0.00	0.00	0.00
11,400.00	89.81	179.92	9,233.15	-1,994.52	-229.26	1,999.05	0.00	0.00	0.00
11,500.00	89.81	179.92	9,233.49	-2,094.52	-229.12	2,099.02	0.00	0.00	0.00
11,600.00	89.81	179.92	9,233.82	-2,194.52	-228.97	2,199.00	0.00	0.00	0.00
11,700.00	89.81	179.92	9,234.16	-2,294.52	-228.83	2,298.97	0.00	0.00	0.00
11,800.00	89.81	179.92	9,234.50	-2,394.52	-228.68	2,398.94	0.00	0.00	0.00
11,900.00	89.81	179.92	9,234.83	-2,494.52	-228.54	2,498.91	0.00	0.00	0.00
12,000.00	89.81	179.92	9,235.17	-2,594.52	-228.40	2,598.89	0.00	0.00	0.00
12,100.00	89.81	179.92	9,235.51	-2,694.52	-228.25	2,698.86	0.00	0.00	0.00
12,200.00	89.81	179.92	9,235.84	-2,794.52	-228.11	2,798.83	0.00	0.00	0.00
12,300.00	89.81	179.92	9,236.18	-2,894.52	-227.97	2,898.80	0.00	0.00	0.00
12,400.00	89.81	179.92	9,236.52	-2,994.52	-227.82	2,998.77	0.00	0.00	0.00

Database:	USA Compass	Local Co-ordinate Reference:	Well 602H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site:	Quien Sabe Fed Com	North Reference:	Grid
Well:	602H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-19		

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)	
12,500.00	89.81	179.92	9,236.85	-3,094.52	-227.68	3,098.75	0.00	0.00	0.00	
12,600.00	89.81	179.92	9,237.19	-3,194.51	-227.54	3,198.72	0.00	0.00	0.00	
12,700.00	89.81	179.92	9,237.52	-3,294.51	-227.39	3,298.69	0.00	0.00	0.00	
12,800.00	89.81	179.92	9,237.86	-3,394.51	-227.25	3,398.66	0.00	0.00	0.00	
12,900.00	89.81	179.92	9,238.20	-3,494.51	-227.11	3,498.64	0.00	0.00	0.00	
13,000.00	89.81	179.92	9,238.53	-3,594.51	-226.96	3,598.61	0.00	0.00	0.00	
13,100.00	89.81	179.92	9,238.87	-3,694.51	-226.82	3,698.58	0.00	0.00	0.00	
13,200.00	89.81	179.92	9,239.21	-3,794.51	-226.68	3,798.55	0.00	0.00	0.00	
13,300.00	89.81	179.92	9,239.54	-3,894.51	-226.53	3,898.53	0.00	0.00	0.00	
13,400.00	89.81	179.92	9,239.88	-3,994.51	-226.39	3,998.50	0.00	0.00	0.00	
13,500.00	89.81	179.92	9,240.21	-4,094.51	-226.24	4,098.47	0.00	0.00	0.00	
13,600.00	89.81	179.92	9,240.55	-4,194.51	-226.10	4,198.44	0.00	0.00	0.00	
13,700.00	89.81	179.92	9,240.89	-4,294.51	-225.96	4,298.42	0.00	0.00	0.00	
13,800.00	89.81	179.92	9,241.22	-4,394.51	-225.81	4,398.39	0.00	0.00	0.00	
13,900.00	89.81	179.92	9,241.56	-4,494.51	-225.67	4,498.36	0.00	0.00	0.00	
14,000.00	89.81	179.92	9,241.90	-4,594.51	-225.53	4,598.33	0.00	0.00	0.00	
14,100.00	89.81	179.92	9,242.23	-4,694.50	-225.38	4,698.31	0.00	0.00	0.00	
14,200.00	89.81	179.92	9,242.57	-4,794.50	-225.24	4,798.28	0.00	0.00	0.00	
14,300.00	89.81	179.92	9,242.91	-4,894.50	-225.10	4,898.25	0.00	0.00	0.00	
14,400.00	89.81	179.92	9,243.24	-4,994.50	-224.95	4,998.22	0.00	0.00	0.00	
14,500.00	89.81	179.92	9,243.58	-5,094.50	-224.81	5,098.19	0.00	0.00	0.00	
14,600.00	89.81	179.92	9,243.91	-5,194.50	-224.67	5,198.17	0.00	0.00	0.00	
14,700.00	89.81	179.92	9,244.25	-5,294.50	-224.52	5,298.14	0.00	0.00	0.00	
14,800.00	89.81	179.92	9,244.59	-5,394.50	-224.38	5,398.11	0.00	0.00	0.00	
14,900.00	89.81	179.92	9,244.92	-5,494.50	-224.23	5,498.08	0.00	0.00	0.00	
15,000.00	89.81	179.92	9,245.26	-5,594.50	-224.09	5,598.06	0.00	0.00	0.00	
15,100.00	89.81	179.92	9,245.60	-5,694.50	-223.95	5,698.03	0.00	0.00	0.00	
15,200.00	89.81	179.92	9,245.93	-5,794.50	-223.80	5,798.00	0.00	0.00	0.00	
15,300.00	89.81	179.92	9,246.27	-5,894.50	-223.66	5,897.97	0.00	0.00	0.00	
15,400.00	89.81	179.92	9,246.60	-5,994.50	-223.52	5,997.95	0.00	0.00	0.00	
15,500.00	89.81	179.92	9,246.94	-6,094.50	-223.37	6,097.92	0.00	0.00	0.00	
15,600.00	89.81	179.92	9,247.28	-6,194.49	-223.23	6,197.89	0.00	0.00	0.00	
15,700.00	89.81	179.92	9,247.61	-6,294.49	-223.09	6,297.86	0.00	0.00	0.00	
15,800.00	89.81	179.92	9,247.95	-6,394.49	-222.94	6,397.84	0.00	0.00	0.00	
15,900.00	89.81	179.92	9,248.29	-6,494.49	-222.80	6,497.81	0.00	0.00	0.00	
16,000.00	89.81	179.92	9,248.62	-6,594.49	-222.66	6,597.78	0.00	0.00	0.00	
16,100.00	89.81	179.92	9,248.96	-6,694.49	-222.51	6,697.75	0.00	0.00	0.00	
16,200.00	89.81	179.92	9,249.29	-6,794.49	-222.37	6,797.73	0.00	0.00	0.00	
16,300.00	89.81	179.92	9,249.63	-6,894.49	-222.23	6,897.70	0.00	0.00	0.00	
16,400.00	89.81	179.92	9,249.97	-6,994.49	-222.08	6,997.67	0.00	0.00	0.00	
16,500.00	89.81	179.92	9,250.30	-7,094.49	-221.94	7,097.64	0.00	0.00	0.00	
16,600.00	89.81	179.92	9,250.64	-7,194.49	-221.79	7,197.61	0.00	0.00	0.00	
16,700.00	89.81	179.92	9,250.98	-7,294.49	-221.65	7,297.59	0.00	0.00	0.00	
16,800.00	89.81	179.92	9,251.31	-7,394.49	-221.51	7,397.56	0.00	0.00	0.00	
16,900.00	89.81	179.92	9,251.65	-7,494.49	-221.36	7,497.53	0.00	0.00	0.00	
17,000.00	89.81	179.92	9,251.99	-7,594.49	-221.22	7,597.50	0.00	0.00	0.00	
17,100.00	89.81	179.92	9,252.32	-7,694.48	-221.08	7,697.48	0.00	0.00	0.00	
17,200.00	89.81	179.92	9,252.66	-7,794.48	-220.93	7,797.45	0.00	0.00	0.00	
17,300.00	89.81	179.92	9,252.99	-7,894.48	-220.79	7,897.42	0.00	0.00	0.00	
17,400.00	89.81	179.92	9,253.33	-7,994.48	-220.65	7,997.39	0.00	0.00	0.00	
17,500.00	89.81	179.92	9,253.67	-8,094.48	-220.50	8,097.37	0.00	0.00	0.00	
17,600.00	89.81	179.92	9,254.00	-8,194.48	-220.36	8,197.34	0.00	0.00	0.00	
17,700.00	89.81	179.92	9,254.34	-8,294.48	-220.22	8,297.31	0.00	0.00	0.00	
17,800.00	89.81	179.92	9,254.68	-8,394.48	-220.07	8,397.28	0.00	0.00	0.00	

Database:	USA Compass	Local Co-ordinate Reference:	Well 602H
Company:	COG Operating LLC	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Project:	Eddy County, NM (NAD27 NME)	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site:	Quien Sabe Fed Com	North Reference:	Grid
Well:	602H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan 1 02-21-19		

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)
17,900.00	89.81	179.92	9,255.01	-8,494.48	-219.93	8,497.26	0.00	0.00	0.00
18,000.00	89.81	179.92	9,255.35	-8,594.48	-219.79	8,597.23	0.00	0.00	0.00
18,100.00	89.81	179.92	9,255.68	-8,694.48	-219.64	8,697.20	0.00	0.00	0.00
18,200.00	89.81	179.92	9,256.02	-8,794.48	-219.50	8,797.17	0.00	0.00	0.00
18,300.00	89.81	179.92	9,256.36	-8,894.48	-219.35	8,897.15	0.00	0.00	0.00
18,400.00	89.81	179.92	9,256.69	-8,994.48	-219.21	8,997.12	0.00	0.00	0.00
18,500.00	89.81	179.92	9,257.03	-9,094.48	-219.07	9,097.09	0.00	0.00	0.00
18,600.00	89.81	179.92	9,257.37	-9,194.47	-218.92	9,197.06	0.00	0.00	0.00
18,700.00	89.81	179.92	9,257.70	-9,294.47	-218.78	9,297.04	0.00	0.00	0.00
18,800.00	89.81	179.92	9,258.04	-9,394.47	-218.64	9,397.01	0.00	0.00	0.00
18,900.00	89.81	179.92	9,258.38	-9,494.47	-218.49	9,496.98	0.00	0.00	0.00
19,000.00	89.81	179.92	9,258.71	-9,594.47	-218.35	9,596.95	0.00	0.00	0.00
19,100.00	89.81	179.92	9,259.05	-9,694.47	-218.21	9,696.92	0.00	0.00	0.00
19,200.00	89.81	179.92	9,259.38	-9,794.47	-218.06	9,796.90	0.00	0.00	0.00
19,300.00	89.81	179.92	9,259.72	-9,894.47	-217.92	9,896.87	0.00	0.00	0.00
19,383.13	89.81	179.92	9,260.00	-9,977.60	-217.80	9,979.98	0.00	0.00	0.00
TD at 19383.13									

Design Targets									
Target Name	hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude Longitude
FTP - Quien Sabe Fer	- plan misses target center by 70.57usft at 9300.00usft MD (9162.69 TVD, 95.13 N, -232.26 E)	0.00	0.00	9,227.00	124.20	-232.30	439,907.00	560,035.70	32° 12' 33.38074 N 104° 8' 21.20808 W
LTP - Quien Sabe Fer	- plan misses target center by 0.01usft at 19253.03usft MD (9259.56 TVD, -9847.50 N, -217.99 E)	0.00	0.00	9,259.56	-9,847.50	-218.00	429,935.30	560,050.00	32° 10' 54.69684 N 104° 8' 21.25113 W
BHL - Quien Sabe Fer	- plan hits target center	0.00	0.00	9,260.00	-9,977.60	-217.80	429,805.20	560,050.20	32° 10' 53.40932 N 104° 8' 21.25154 W

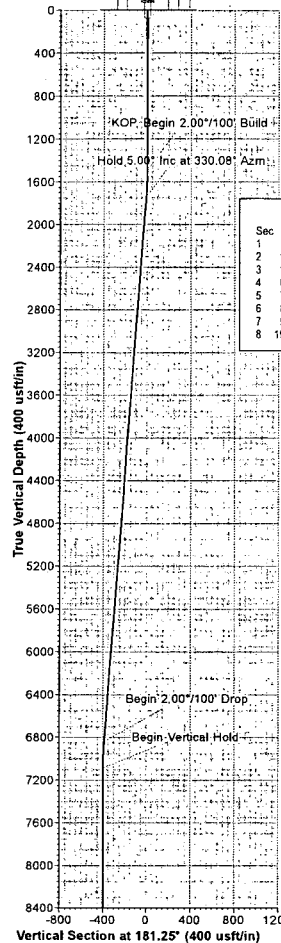
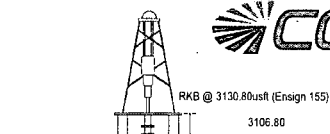
Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,500.00	1,500.00	0.00	0.00	KOP, Begin 2.00°/100' Build
1,749.78	1,749.47	9.43	-5.43	Hold 5.00° Inc at 330.08° Azm
6,857.16	6,837.44	394.91	-227.27	Begin 2.00°/100' Drop
7,106.94	7,086.91	404.34	-232.70	Begin Vertical Hold
8,674.08	8,654.05	404.34	-232.70	KOP2, Begin 10.00°/100' Build
9,572.16	9,227.00	-166.69	-231.88	LP, Hold 89.81° Inc at 179.92° Azm
19,383.13	9,260.00	-9,977.60	-217.80	TD at 19383.13



Project: Eddy County, NM (NAD27 NME)
 Site: Quien Sabe Fed Com
 Well: 602H
 Wellbore: OH
 Design: Plan 1 02-21-19
 Rig: Ensign 155



Azimuths to Grid North
 True North: -0.10°
 Magnetic North: 7.06°
 Magnetic Field
 Strength: 47891.5nT
 Dip Angle: 59.95°
 Date: 4/10/2019
 Model: MVHD



WELL DETAILS						
			3106.80			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	
0.00	0.00	439782.80	560268.00	32° 12' 32.14746 N	104° 8' 18.50683 W	

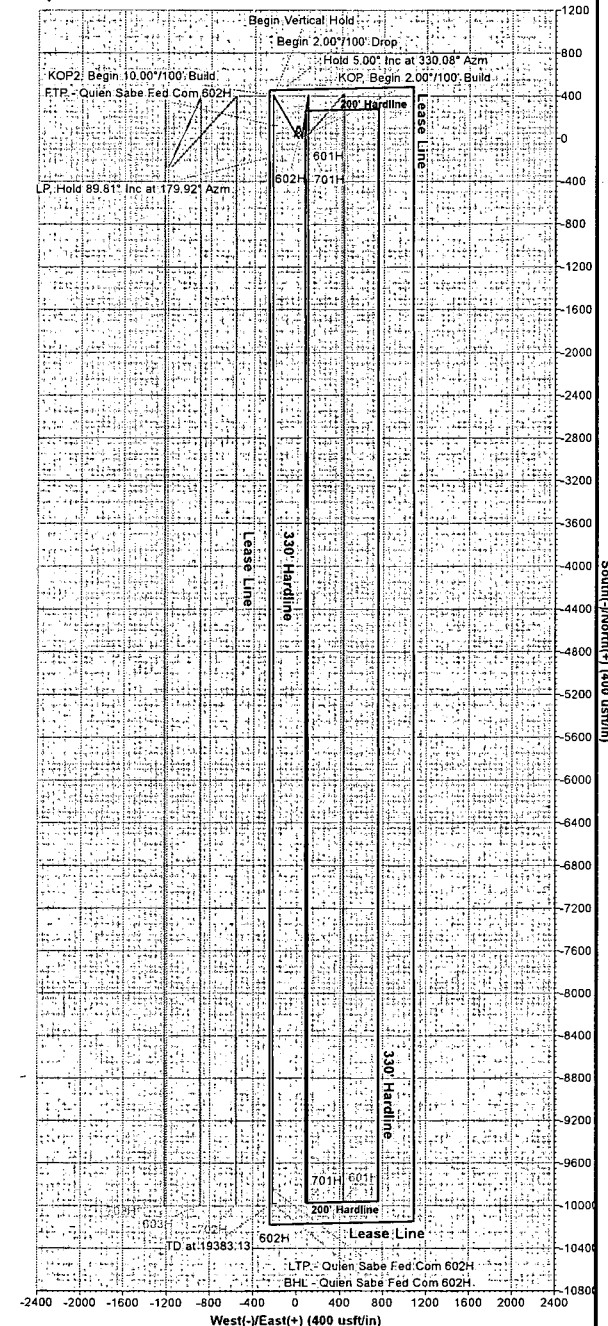
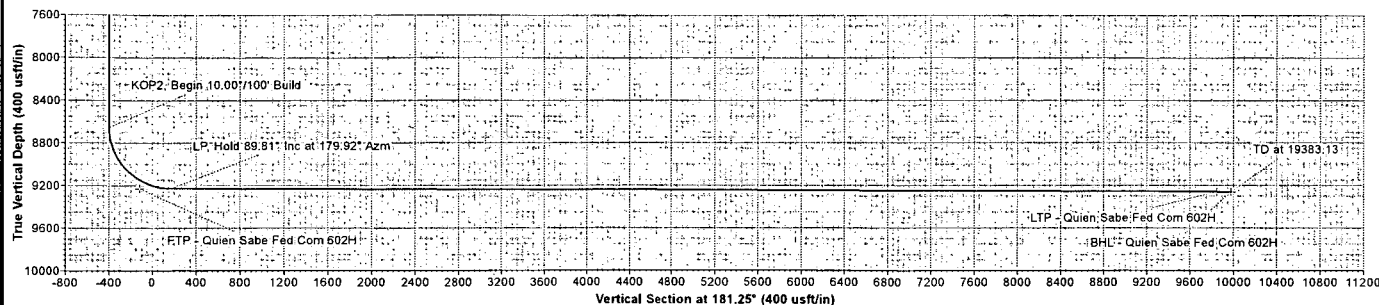
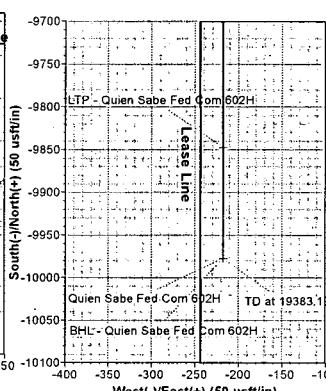
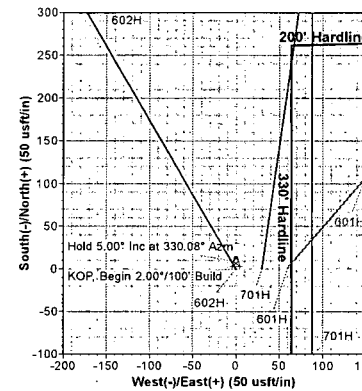
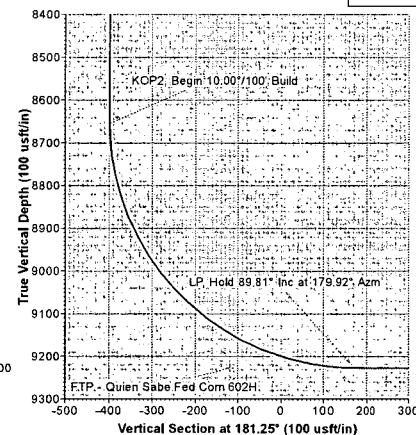
DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude
FTP - Quien Sabe Fed Com 602H	9227.00	124.20	-232.30	439907.00	560035.70	32° 12' 33.38074 N
LTP - Quien Sabe Fed Com 602H	9259.56	-9847.50	-218.00	429935.30	560050.00	32° 10' 54.69684 N
BHL - Quien Sabe Fed Com 602H	9260.00	-9977.60	-217.80	429805.20	560050.20	32° 10' 53.40932 N

SECTION DETAILS											
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	KOP, Begin 2.00°/100' Build
2	1500.00	0.00	0.00	1500.00	0.00	0.00	0.00	0.00	0.00	0.00	Hold 5.00° Inc at 330.08° Azm
3	1749.78	5.00	330.08	1749.47	9.43	-5.43	2.00	330.08	-9.31	0.00	Begin 2.00°/100' Drop
4	6857.16	5.00	330.08	6837.44	394.91	-227.27	0.00	0.00	-369.85	0.00	Begin Vertical Hold
5	7106.94	0.00	0.00	7086.91	404.34	-232.70	2.00	180.00	-399.16	0.00	KOP2, Begin 10.00°/100' Build
6	8674.08	0.00	0.00	8654.05	404.34	-232.70	0.00	0.00	-399.16	0.00	LP, Hold 89.81° Inc at 179.92° Azm
7	9572.16	89.81	179.92	9227.00	-166.69	-231.88	10.00	179.92	171.71	0.00	TD at 19383.13
8	19383.13	89.81	179.92	9260.00	-9977.60	-217.80	0.00	0.00	9979.98	0.00	BHL - Quien Sabe Fed Com 602H

LEGEND	
—	701H, OH, Plan 1 02-21-19 V0
—	703H, OH, Plan 1 02-15-19 V0
—	603H, OH, Plan 1 02-15-19 V0
—	702H, OH, Plan 1 02-15-19 V0
—	601H, OH, Plan 1 02-21-19 V0
—	Plan 1 02-21-19

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 602H, Grid North
 Latitude: 32° 12' 32.14746 N
 Longitude: 104° 8' 18.50683 W
 Grid East: 560268.00
 Grid North: 439782.80
 Scale Factor: 1.000
 Geomagnetic Model: MVHD
 Sample Date: 10-Apr-19
 Magnetic Declination: 7.17°
 Dip Angle from Horizontal: 59.95°
 Magnetic Field Strength: 47891.53188309nT
 To convert a Magnetic Direction to a Grid Direction, Add 7.06°
 To convert a Magnetic Direction to a True Direction, Add 7.17° East
 To convert a True Direction to a Grid Direction, Subtract 0.10°

FORMATION TOP DETAILS
 No formation data is available





PHOENIX
TECHNOLOGY SERVICES

COG Operating LLC

Eddy County, NM (NAD27 NME)

Quien Sabe Fed Com

602H

OH

Plan 1 02-21-19

Anticollision Report

21 February, 2019



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Reference:	Plan 1 02-21-19
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 50,000.00 u
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Pedal Curve
Casing Method:	Not applied

Survey Tool Program		Date	2/21/2019	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
0.00	19,383.13	Plan 1 02-21-19 (OH)	MWD+HRGM	OWSG MWD + HRGM

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Quien Sabe Fed Com						
601H - OH - Plan 1 02-21-19	1,500.00	1,499.30	59.92	48.64	5.311 CC, ES	
601H - OH - Plan 1 02-21-19	19,383.13	19,396.42	650.11	351.48	2.177 SF	
603H - OH - Plan 1 02-15-19	8,652.57	8,686.61	669.99	607.00	10.635 CC	
603H - OH - Plan 1 02-15-19	19,383.13	19,366.33	670.51	374.54	2.265 ES, SF	
701H - OH - Plan 1 02-21-19	1,416.63	1,416.73	29.91	19.23	2.801 CC	
701H - OH - Plan 1 02-21-19	1,500.00	1,500.10	29.91	18.63	2.651 ES	
701H - OH - Plan 1 02-21-19	19,383.13	19,562.54	368.16	95.27	1.349 Level 3, SF	
702H - OH - Plan 1 02-15-19	8,770.21	8,828.15	339.91	275.65	5.290 CC	
702H - OH - Plan 1 02-15-19	19,383.13	19,559.96	373.36	94.27	1.338 Level 3, ES, SF	
703H - OH - Plan 1 02-15-19	8,841.80	8,870.83	999.73	935.32	15.520 CC	
703H - OH - Plan 1 02-15-19	19,383.13	19,527.06	1,010.49	716.49	3.437 ES, SF	

Offset Design: Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19												Offset Site Error: 0.00 usft	
Survey Program: 0-MWD+HRGM												Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance				Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)		Minimum Separation (usft)	Separation Factor
0.00	0.00	0.00	0.00	0.00	0.00	88.57	1.50	59.90	59.92				
100.00	100.00	99.30	99.30	0.28	0.28	88.57	1.50	59.90	59.92	59.47	0.45	134.170	
200.00	200.00	199.30	199.30	0.93	0.93	88.57	1.50	59.90	59.92	58.41	1.51	39.770	
300.00	300.00	299.30	299.30	1.44	1.44	88.57	1.50	59.90	59.92	57.53	2.39	25.060	
400.00	400.00	399.30	399.30	1.88	1.88	88.57	1.50	59.90	59.92	56.73	3.19	18.768	
500.00	500.00	499.30	499.30	2.29	2.29	88.57	1.50	59.90	59.92	55.96	3.96	15.124	
600.00	600.00	599.30	599.30	2.69	2.69	88.57	1.50	59.90	59.92	55.20	4.71	12.709	
700.00	700.00	699.30	699.30	3.08	3.07	88.57	1.50	59.90	59.92	54.46	5.46	10.979	
800.00	800.00	799.30	799.30	3.46	3.46	88.57	1.50	59.90	59.92	53.72	6.19	9.673	
900.00	900.00	899.30	899.30	3.83	3.83	88.57	1.50	59.90	59.92	52.99	6.93	8.649	
1,000.00	1,000.00	999.30	999.30	4.21	4.21	88.57	1.50	59.90	59.92	52.26	7.66	7.825	
1,100.00	1,100.00	1,099.30	1,099.30	4.58	4.58	88.57	1.50	59.90	59.92	51.53	8.38	7.146	
1,200.00	1,200.00	1,199.30	1,199.30	4.95	4.95	88.57	1.50	59.90	59.92	50.81	9.11	6.577	
1,300.00	1,300.00	1,299.30	1,299.30	5.32	5.31	88.57	1.50	59.90	59.92	50.08	9.84	6.092	
1,400.00	1,400.00	1,399.30	1,399.30	5.68	5.68	88.57	1.50	59.90	59.92	49.36	10.56	5.675	
1,500.00	1,500.00	1,499.30	1,499.30	6.05	6.05	88.57	1.50	59.90	59.92	48.64	11.28	5.31 CC, ES	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 1-02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HRGM														Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Semi Major Axis (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
1,600.00	1,599.98	1,597.89	1,597.88	6.45	6.55	118.70	2.77	60.98	61.88	49.82	12.06	5.131			
1,700.00	1,699.84	1,696.25	1,696.09	6.96	7.23	119.23	6.61	64.26	67.81	54.81	13.00	5.217			
1,800.00	1,799.49	1,794.93	1,794.45	7.31	7.60	119.91	12.78	69.51	77.25	63.58	13.67	5.651			
1,900.00	1,899.11	1,894.43	1,893.56	7.64	7.91	120.50	19.38	75.14	87.24	72.91	14.33	6.089			
2,000.00	1,998.73	1,993.93	1,992.68	8.00	8.23	120.97	25.98	80.76	97.24	82.22	15.02	6.475			
2,100.00	2,098.35	2,093.42	2,091.80	8.36	8.56	121.35	32.58	86.39	107.24	91.52	15.72	6.824			
2,200.00	2,197.97	2,192.92	2,190.91	8.72	8.89	121.66	39.18	92.02	117.25	100.83	16.42	7.141			
2,300.00	2,297.59	2,292.41	2,290.03	9.08	9.22	121.93	45.78	97.64	127.26	110.13	17.13	7.431			
2,400.00	2,397.21	2,391.91	2,389.15	9.44	9.56	122.16	52.38	103.27	137.27	119.44	17.84	7.696			
2,500.00	2,496.83	2,491.41	2,488.27	9.80	9.90	122.35	58.98	108.89	147.29	128.74	18.55	7.941			
2,600.00	2,596.45	2,590.90	2,587.38	10.16	10.24	122.52	65.59	114.52	157.31	138.04	19.26	8.166			
2,700.00	2,696.07	2,690.40	2,686.50	10.52	10.58	122.67	72.19	120.14	167.32	147.34	19.98	8.374			
2,800.00	2,795.69	2,789.89	2,785.62	10.89	10.92	122.81	78.79	125.77	177.34	156.64	20.70	8.567			
2,900.00	2,895.31	2,889.39	2,884.74	11.25	11.27	122.93	85.39	131.40	187.36	165.94	21.42	8.746			
3,000.00	2,994.93	2,988.89	2,983.85	11.62	11.62	123.03	91.99	137.02	197.38	175.24	22.14	8.914			
3,100.00	3,094.55	3,088.38	3,082.97	11.98	11.97	123.13	98.59	142.65	207.40	184.54	22.87	9.070			
3,200.00	3,194.17	3,187.88	3,182.09	12.35	12.32	123.22	105.19	148.27	217.43	193.83	23.59	9.216			
3,300.00	3,293.79	3,287.37	3,281.20	12.71	12.67	123.30	111.79	153.90	227.45	203.13	24.32	9.354			
3,400.00	3,393.41	3,386.87	3,380.32	13.08	13.02	123.37	118.39	159.53	237.47	212.43	25.04	9.483			
3,500.00	3,493.04	3,486.37	3,479.44	13.45	13.37	123.44	124.99	165.15	247.49	221.72	25.77	9.604			
3,600.00	3,592.66	3,585.86	3,578.56	13.81	13.73	123.50	131.59	170.78	257.52	231.02	26.50	9.719			
3,700.00	3,692.28	3,685.36	3,677.67	14.18	14.08	123.56	138.19	176.40	267.54	240.31	27.23	9.827			
3,800.00	3,791.90	3,784.85	3,776.79	14.55	14.44	123.61	144.80	182.03	277.56	249.61	27.95	9.929			
3,900.00	3,891.52	3,884.35	3,875.91	14.91	14.79	123.66	151.40	187.66	287.59	258.90	28.68	10.026			
4,000.00	3,991.14	3,983.85	3,975.03	15.28	15.15	123.71	158.00	193.28	297.61	268.20	29.41	10.118			
4,100.00	4,090.76	4,083.34	4,074.14	15.65	15.51	123.75	164.60	198.91	307.64	277.49	30.14	10.206			
4,200.00	4,190.38	4,182.84	4,173.26	16.02	15.86	123.79	171.20	204.53	317.66	286.79	30.87	10.289			
4,300.00	4,290.00	4,282.33	4,272.38	16.39	16.22	123.83	177.80	210.16	327.69	296.08	31.61	10.368			
4,400.00	4,389.62	4,381.83	4,371.49	16.75	16.58	123.87	184.40	215.78	337.71	305.37	32.34	10.443			
4,500.00	4,489.24	4,481.33	4,470.61	17.12	16.94	123.90	191.00	221.41	347.74	314.67	33.07	10.516			
4,600.00	4,588.86	4,580.82	4,569.73	17.49	17.30	123.93	197.60	227.04	357.76	323.96	33.80	10.584			
4,700.00	4,688.48	4,680.32	4,668.85	17.86	17.66	123.96	204.20	232.66	367.79	333.25	34.53	10.650			
4,800.00	4,788.10	4,779.81	4,767.96	18.23	18.02	123.99	210.80	238.29	377.81	342.54	35.27	10.713			
4,900.00	4,887.72	4,879.31	4,867.08	18.60	18.39	124.02	217.41	243.91	387.84	351.84	36.00	10.774			
5,000.00	4,987.34	4,978.81	4,966.20	18.97	18.75	124.04	224.01	249.54	397.86	361.13	36.73	10.831			
5,100.00	5,086.96	5,078.30	5,065.32	19.34	19.11	124.07	230.61	255.17	407.89	370.42	37.47	10.887			
5,200.00	5,186.58	5,177.80	5,164.43	19.71	19.47	124.09	237.21	260.79	417.91	379.71	38.20	10.940			
5,300.00	5,286.20	5,277.29	5,263.55	20.08	19.84	124.11	243.81	266.42	427.94	389.01	38.93	10.992			
5,400.00	5,385.82	5,376.79	5,362.67	20.45	20.20	124.13	250.41	272.04	437.96	398.30	39.67	11.041			
5,500.00	5,485.44	5,476.29	5,461.78	20.82	20.56	124.15	257.01	277.67	447.99	407.59	40.40	11.089			
5,600.00	5,585.06	5,575.78	5,560.90	21.19	20.93	124.17	263.61	283.30	458.02	416.88	41.14	11.134			
5,700.00	5,684.68	5,675.28	5,660.02	21.56	21.29	124.19	270.21	288.92	468.04	426.17	41.87	11.179			
5,800.00	5,784.30	5,774.77	5,759.14	21.93	21.66	124.21	276.81	294.55	478.07	435.46	42.60	11.221			
5,900.00	5,883.92	5,874.27	5,858.25	22.30	22.02	124.23	283.41	300.17	488.09	444.75	43.34	11.262			
6,000.00	5,983.54	5,973.77	5,957.37	22.67	22.39	124.24	290.02	305.80	498.12	454.05	44.07	11.302			
6,100.00	6,083.16	6,073.26	6,056.49	23.04	22.75	124.26	296.62	311.42	508.15	463.34	44.81	11.340			
6,200.00	6,182.78	6,172.76	6,155.61	23.41	23.12	124.27	303.22	317.05	518.17	472.63	45.54	11.377			
6,300.00	6,282.40	6,272.25	6,254.72	23.78	23.48	124.29	309.82	322.68	528.20	481.92	46.28	11.413			
6,400.00	6,382.02	6,371.75	6,353.84	24.15	23.85	124.30	316.42	328.30	538.22	491.21	47.01	11.448			
6,500.00	6,481.64	6,471.25	6,452.96	24.52	24.22	124.32	323.02	333.93	548.25	500.50	47.75	11.482			
6,600.00	6,581.26	6,570.74	6,552.08	24.89	24.58	124.33	329.62	339.55	558.28	509.79	48.49	11.514			
6,700.00	6,680.88	6,670.24	6,651.19	25.27	24.95	124.34	336.22	345.18	568.30	519.08	49.22	11.546			

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HRGM												Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Semi Major Axis Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/S (usft)	+E/W (usft)	Distance Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
6,800.00	6,780.50	6,769.73	6,750.31	25.64	25.32	124.35	342.82	350.81	578.33	528.37	49.96	11.576	
6,900.00	6,880.15	6,869.25	6,849.44	26.00	25.69	124.41	349.42	356.43	588.17	537.48	50.69	11.603	
7,000.00	6,979.99	6,968.87	6,948.69	26.38	26.05	124.30	356.03	362.07	596.38	544.95	51.43	11.596	
7,100.00	7,079.97	7,068.53	7,047.96	26.81	26.42	123.89	362.65	367.70	602.66	550.50	52.16	11.554	
7,200.00	7,179.97	7,168.15	7,147.20	27.19	26.79	93.31	369.25	373.33	607.90	555.01	52.89	11.494	
7,300.00	7,279.97	7,267.76	7,246.44	27.54	27.16	92.67	375.86	378.97	613.21	559.59	53.62	11.436	
7,400.00	7,379.97	7,367.38	7,345.68	27.89	27.53	92.03	382.47	384.60	618.60	564.25	54.35	11.382	
7,500.00	7,479.97	7,467.00	7,444.92	28.23	27.90	91.40	389.08	390.23	624.07	568.99	55.08	11.330	
7,600.00	7,579.97	7,566.62	7,544.16	28.58	28.26	90.79	395.69	395.87	629.61	573.80	55.81	11.281	
7,700.00	7,679.97	7,666.24	7,643.40	28.93	28.63	90.18	402.30	401.50	635.22	578.68	56.54	11.235	
7,800.00	7,779.97	7,765.86	7,742.64	29.28	29.00	89.59	408.91	407.13	640.90	583.63	57.27	11.191	
7,900.00	7,879.97	7,874.00	7,850.41	29.63	29.40	89.00	415.65	412.88	646.33	588.28	58.05	11.134	
8,000.00	7,979.97	7,991.57	7,967.85	29.97	29.86	88.63	419.85	416.45	649.44	590.54	58.90	11.026	
8,100.00	8,079.97	8,103.00	8,079.27	30.32	30.25	88.57	420.61	417.10	650.01	590.36	59.65	10.988	
8,200.00	8,179.97	8,203.00	8,179.27	30.67	30.58	88.57	420.61	417.10	650.01	589.67	60.34	10.773	
8,300.00	8,279.97	8,303.00	8,279.27	31.02	30.93	88.57	420.61	417.10	650.01	588.97	61.03	10.650	
8,400.00	8,379.97	8,403.00	8,379.27	31.37	31.27	88.57	420.61	417.10	650.01	588.27	61.73	10.530	
8,500.00	8,479.97	8,503.00	8,479.27	31.72	31.61	88.57	420.61	417.10	650.01	587.58	62.43	10.412	
8,600.00	8,579.97	8,603.00	8,579.27	32.07	31.95	88.57	420.61	417.10	650.01	586.88	63.13	10.297	
8,700.00	8,679.97	8,703.00	8,679.27	32.41	32.29	-91.38	420.33	417.10	650.01	586.20	63.81	10.186	
8,800.00	8,778.95	8,806.39	8,781.77	32.87	32.59	-91.48	407.96	417.12	650.04	585.65	64.40	10.094	
8,900.00	8,874.16	8,909.48	8,880.11	33.33	32.85	-91.54	377.49	417.16	650.06	585.16	64.90	10.016	
9,000.00	8,962.67	9,012.65	8,971.48	33.73	33.12	-91.55	329.87	417.23	650.06	584.73	65.33	9.950	
9,100.00	9,041.81	9,115.79	9,052.81	34.04	33.45	-91.51	266.68	417.32	650.05	584.35	65.71	9.893	
9,200.00	9,109.17	9,218.79	9,121.44	34.27	33.73	-91.43	190.06	417.43	650.03	583.99	66.04	9.843	
9,300.00	9,162.69	9,321.55	9,175.15	34.42	33.93	-91.30	102.61	417.56	649.99	583.64	66.35	9.796	
9,400.00	9,200.76	9,423.99	9,212.32	34.49	34.09	-91.12	7.29	417.70	649.95	583.28	66.67	9.748	
9,500.00	9,222.23	9,526.04	9,231.90	34.51	34.25	-90.92	-92.72	417.84	649.91	582.91	67.01	9.699	
9,599.40	9,228.85	9,626.32	9,235.14	34.51	34.42	-90.62	-192.89	417.99	649.87	582.50	67.36	9.647	
9,600.00	9,227.10	9,627.00	9,235.15	34.51	34.42	-90.77	-193.57	417.99	649.89	582.52	67.36	9.647	
9,700.00	9,227.43	9,727.00	9,235.47	34.50	34.64	-90.77	-293.57	418.13	649.89	582.07	67.82	9.582	
9,800.00	9,227.77	9,827.00	9,235.80	34.50	34.91	-90.77	-393.57	418.28	649.89	581.49	68.40	9.501	
9,900.00	9,228.11	9,927.00	9,236.12	34.52	35.24	-90.77	-493.57	418.42	649.89	580.79	69.10	9.405	
10,000.00	9,228.44	10,027.00	9,236.45	34.64	35.63	-90.77	-593.56	418.57	649.89	579.99	69.91	9.297	
10,100.00	9,228.78	10,127.00	9,236.78	35.04	36.07	-90.77	-693.56	418.71	649.89	579.07	70.82	9.176	
10,200.00	9,229.12	10,227.00	9,237.10	35.55	36.56	-90.77	-793.56	418.85	649.89	578.05	71.84	9.046	
10,300.00	9,229.45	10,327.00	9,237.43	36.11	37.11	-90.76	-893.56	419.00	649.89	576.93	72.96	8.907	
10,400.00	9,229.79	10,427.00	9,237.75	36.73	37.70	-90.76	-993.56	419.14	649.90	575.72	74.18	8.761	
10,500.00	9,230.13	10,527.00	9,238.08	37.39	38.34	-90.76	-1,093.56	419.29	649.90	574.41	75.48	8.610	
10,600.00	9,230.46	10,627.00	9,238.41	38.09	39.02	-90.76	-1,193.56	419.43	649.90	573.02	76.87	8.454	
10,700.00	9,230.80	10,727.00	9,238.73	38.83	39.74	-90.76	-1,293.56	419.58	649.90	571.55	78.35	8.295	
10,800.00	9,231.13	10,827.00	9,239.06	39.61	40.51	-90.76	-1,393.56	419.72	649.90	570.00	79.90	8.134	
10,900.00	9,231.47	10,927.00	9,239.38	40.43	41.30	-90.76	-1,493.56	419.87	649.90	568.38	81.52	7.972	
11,000.00	9,231.81	11,027.00	9,239.71	41.28	42.14	-90.76	-1,593.56	420.01	649.90	566.69	83.21	7.810	
11,100.00	9,232.14	11,127.00	9,240.04	42.17	43.00	-90.76	-1,693.56	420.15	649.90	564.94	84.96	7.649	
11,200.00	9,232.48	11,227.00	9,240.36	43.08	43.90	-90.76	-1,793.56	420.30	649.90	563.12	86.78	7.489	
11,300.00	9,232.82	11,327.00	9,240.69	44.03	44.82	-90.76	-1,893.56	420.44	649.90	561.25	88.65	7.331	
11,400.00	9,233.15	11,427.00	9,241.01	44.99	45.77	-90.75	-1,993.56	420.59	649.90	559.33	90.57	7.175	
11,500.00	9,233.49	11,527.00	9,241.34	45.99	46.75	-90.75	-2,093.56	420.73	649.90	557.36	92.55	7.022	
11,600.00	9,233.82	11,627.00	9,241.67	47.00	47.75	-90.75	-2,193.55	420.88	649.91	555.34	94.57	6.872	
11,700.00	9,234.16	11,727.00	9,241.99	48.04	48.77	-90.75	-2,293.55	421.02	649.91	553.27	96.63	6.726	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabé Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 1.02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabé Fed Com - 601H - OH - Plan 1.02-21-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HRGM												Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	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
11,800.00	9,234.50	11,827.00	9,242.32	49.10	49.82	-90.75	-2,393.55	421.17	649.91	551.17	98.74	6.582	
11,900.00	9,234.83	11,927.00	9,242.65	50.18	50.88	-90.75	-2,493.55	421.31	649.91	549.03	100.88	6.442	
12,000.00	9,235.17	12,027.00	9,242.97	51.27	51.96	-90.75	-2,593.55	421.45	649.91	546.85	103.06	6.306	
12,100.00	9,235.51	12,127.00	9,243.30	52.38	53.06	-90.75	-2,693.55	421.60	649.91	544.64	105.27	6.174	
12,200.00	9,235.84	12,227.00	9,243.62	53.51	54.17	-90.75	-2,793.55	421.74	649.91	542.39	107.52	6.045	
12,300.00	9,236.18	12,327.00	9,243.95	54.65	55.30	-90.75	-2,893.55	421.89	649.91	540.12	109.79	5.919	
12,400.00	9,236.52	12,427.00	9,244.28	55.81	56.45	-90.75	-2,993.55	422.03	649.91	537.82	112.10	5.798	
12,500.00	9,236.85	12,527.00	9,244.60	56.98	57.60	-90.74	-3,093.55	422.18	649.91	535.49	114.42	5.680	
12,600.00	9,237.19	12,627.00	9,244.93	58.16	58.77	-90.74	-3,193.55	422.32	649.91	533.14	116.78	5.565	
12,700.00	9,237.52	12,727.00	9,245.25	59.35	59.95	-90.74	-3,293.55	422.47	649.91	530.76	119.15	5.454	
12,800.00	9,237.86	12,827.00	9,245.58	60.56	61.15	-90.74	-3,393.55	422.61	649.91	528.36	121.55	5.347	
12,900.00	9,238.20	12,927.00	9,245.91	61.77	62.35	-90.74	-3,493.55	422.75	649.92	525.94	123.97	5.242	
13,000.00	9,238.53	13,027.00	9,246.23	62.99	63.56	-90.74	-3,593.55	422.90	649.92	523.51	126.41	5.141	
13,100.00	9,238.87	13,127.00	9,246.56	64.22	64.78	-90.74	-3,693.55	423.04	649.92	521.05	128.87	5.043	
13,200.00	9,239.21	13,227.00	9,246.88	65.47	66.02	-90.74	-3,793.54	423.19	649.92	518.58	131.34	4.948	
13,300.00	9,239.54	13,327.00	9,247.21	66.71	67.25	-90.74	-3,893.54	423.33	649.92	516.09	133.83	4.856	
13,400.00	9,239.88	13,427.00	9,247.54	67.97	68.50	-90.74	-3,993.54	423.48	649.92	513.58	136.34	4.767	
13,500.00	9,240.21	13,527.00	9,247.86	69.23	69.76	-90.74	-4,093.54	423.62	649.92	511.06	138.86	4.680	
13,600.00	9,240.55	13,627.00	9,248.19	70.50	71.02	-90.74	-4,193.54	423.77	649.92	508.53	141.39	4.597	
13,700.00	9,240.89	13,727.00	9,248.51	71.78	72.29	-90.73	-4,293.54	423.91	649.92	505.98	143.94	4.515	
13,800.00	9,241.22	13,827.00	9,248.84	73.06	73.56	-90.73	-4,393.54	424.05	649.92	503.42	146.50	4.436	
13,900.00	9,241.56	13,927.00	9,249.17	74.35	74.84	-90.73	-4,493.54	424.20	649.92	500.85	149.07	4.360	
14,000.00	9,241.90	14,027.00	9,249.49	75.65	76.13	-90.73	-4,593.54	424.34	649.92	498.27	151.65	4.286	
14,100.00	9,242.23	14,127.00	9,249.82	76.94	77.42	-90.73	-4,693.54	424.49	649.92	495.68	154.25	4.214	
14,200.00	9,242.57	14,227.00	9,250.14	78.25	78.72	-90.73	-4,793.54	424.63	649.93	493.08	156.85	4.144	
14,300.00	9,242.91	14,327.00	9,250.47	79.56	80.02	-90.73	-4,893.54	424.78	649.93	490.46	159.46	4.076	
14,400.00	9,243.24	14,427.00	9,250.80	80.87	81.33	-90.73	-4,993.54	424.92	649.93	487.84	162.08	4.010	
14,500.00	9,243.58	14,527.00	9,251.12	82.19	82.64	-90.73	-5,093.54	425.07	649.93	485.21	164.71	3.946	
14,600.00	9,243.91	14,627.00	9,251.45	83.51	83.96	-90.73	-5,193.54	425.21	649.93	482.58	167.35	3.884	
14,700.00	9,244.25	14,727.00	9,251.78	84.84	85.28	-90.73	-5,293.54	425.35	649.93	479.93	170.00	3.823	
14,800.00	9,244.59	14,827.00	9,252.10	86.17	86.60	-90.72	-5,393.53	425.50	649.93	477.28	172.65	3.764	
14,900.00	9,244.92	14,927.00	9,252.43	87.50	87.93	-90.72	-5,493.53	425.64	649.93	474.62	175.32	3.707	
15,000.00	9,245.26	15,027.00	9,252.75	88.83	89.26	-90.72	-5,593.53	425.79	649.93	471.95	177.98	3.652	
15,100.00	9,245.60	15,127.00	9,253.08	90.17	90.59	-90.72	-5,693.53	425.93	649.93	469.27	180.66	3.598	
15,200.00	9,245.93	15,227.00	9,253.41	91.52	91.93	-90.72	-5,793.53	426.08	649.93	466.59	183.34	3.545	
15,300.00	9,246.27	15,327.00	9,253.73	92.86	93.27	-90.72	-5,893.53	426.22	649.93	463.91	186.03	3.494	
15,400.00	9,246.60	15,427.00	9,254.06	94.21	94.61	-90.72	-5,993.53	426.37	649.94	461.21	188.72	3.444	
15,500.00	9,246.94	15,527.00	9,254.38	95.56	95.96	-90.72	-6,093.53	426.51	649.94	458.52	191.42	3.395	
15,600.00	9,247.28	15,627.00	9,254.71	96.91	97.31	-90.72	-6,193.53	426.66	649.94	455.81	194.12	3.348	
15,700.00	9,247.61	15,727.00	9,255.04	98.27	98.66	-90.72	-6,293.53	426.80	649.94	453.11	196.83	3.302	
15,800.00	9,247.95	15,827.00	9,255.36	99.63	100.02	-90.72	-6,393.53	426.94	649.94	450.39	199.54	3.257	
15,900.00	9,248.29	15,927.00	9,255.69	100.99	101.37	-90.71	-6,493.53	427.09	649.94	447.68	202.26	3.213	
16,000.00	9,248.62	16,027.00	9,256.01	102.35	102.73	-90.71	-6,593.53	427.23	649.94	444.95	204.99	3.171	
16,100.00	9,248.96	16,127.00	9,256.34	103.72	104.09	-90.71	-6,693.53	427.38	649.94	442.23	207.71	3.129	
16,200.00	9,249.29	16,227.00	9,256.67	105.08	105.45	-90.71	-6,793.53	427.52	649.94	439.50	210.44	3.088	
16,300.00	9,249.63	16,327.00	9,256.99	106.45	106.82	-90.71	-6,893.52	427.67	649.94	436.76	213.18	3.049	
16,400.00	9,249.97	16,427.00	9,257.32	107.82	108.19	-90.71	-6,993.52	427.81	649.94	434.03	215.92	3.010	
16,500.00	9,250.30	16,527.00	9,257.64	109.20	109.56	-90.71	-7,093.52	427.96	649.94	431.28	218.66	2.972	
16,600.00	9,250.64	16,627.00	9,257.97	110.57	110.93	-90.71	-7,193.52	428.10	649.94	428.54	221.41	2.936	
16,700.00	9,250.98	16,727.00	9,258.30	111.95	112.30	-90.71	-7,293.52	428.24	649.95	425.79	224.16	2.900	
16,800.00	9,251.31	16,827.00	9,258.62	113.33	113.67	-90.71	-7,393.52	428.39	649.95	423.04	226.91	2.864	
16,900.00	9,251.65	16,927.00	9,258.95	114.70	115.05	-90.71	-7,493.52	428.53	649.95	420.28	229.66	2.830	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 601H - OH - Plan 1 02-21-19													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HRGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
17,000.00	9,251.99	17,027.00	9,259.28	116.09	116.43	-90.70	-7,593.52	428.68	649.95	417.52	232.42	2.796		
17,100.00	9,252.32	17,127.00	9,259.60	117.47	117.81	-90.70	-7,693.52	428.82	649.95	414.76	235.19	2.764		
17,200.00	9,252.66	17,227.00	9,259.93	118.85	119.19	-90.70	-7,793.52	428.97	649.95	412.00	237.95	2.731		
17,300.00	9,252.99	17,327.00	9,260.25	120.24	120.57	-90.70	-7,893.52	429.11	649.95	409.23	240.72	2.700		
17,400.00	9,253.33	17,427.00	9,260.58	121.62	121.95	-90.70	-7,993.52	429.26	649.95	406.46	243.49	2.669		
17,500.00	9,253.67	17,527.00	9,260.91	123.01	123.34	-90.70	-8,093.52	429.40	649.95	403.69	246.26	2.639		
17,600.00	9,254.00	17,627.00	9,261.23	124.40	124.72	-90.70	-8,193.52	429.54	649.95	400.92	249.04	2.610		
17,700.00	9,254.34	17,727.00	9,261.56	125.79	126.11	-90.70	-8,293.52	429.69	649.95	398.14	251.81	2.581		
17,800.00	9,254.68	17,827.00	9,261.88	127.18	127.50	-90.70	-8,393.52	429.83	649.95	395.36	254.59	2.553		
17,900.00	9,255.01	17,927.00	9,262.21	128.57	128.89	-90.70	-8,493.51	429.98	649.96	392.58	257.37	2.525		
18,000.00	9,255.35	18,027.00	9,262.54	129.96	130.28	-90.70	-8,593.51	430.12	649.96	389.80	260.16	2.498		
18,100.00	9,255.68	18,127.00	9,262.86	131.36	131.67	-90.69	-8,693.51	430.27	649.96	387.01	262.95	2.472		
18,200.00	9,256.02	18,227.00	9,263.19	132.75	133.06	-90.69	-8,793.51	430.41	649.96	384.22	265.73	2.446		
18,300.00	9,256.36	18,327.00	9,263.51	134.15	134.46	-90.69	-8,893.51	430.56	649.96	381.43	268.52	2.420		
18,400.00	9,256.69	18,427.00	9,263.84	135.55	135.85	-90.69	-8,993.51	430.70	649.96	378.64	271.32	2.396		
18,500.00	9,257.03	18,527.00	9,264.17	136.94	137.25	-90.69	-9,093.51	430.84	649.96	375.85	274.11	2.371		
18,600.00	9,257.37	18,627.00	9,264.49	138.34	138.64	-90.69	-9,193.51	430.99	649.96	373.05	276.91	2.347		
18,700.00	9,257.70	18,727.00	9,264.82	139.74	140.04	-90.69	-9,293.51	431.13	649.96	370.26	279.70	2.324		
18,800.00	9,258.04	18,827.00	9,265.14	141.14	141.44	-90.69	-9,393.51	431.28	649.96	367.46	282.50	2.301		
18,900.00	9,258.38	18,927.00	9,265.47	142.54	142.84	-90.69	-9,493.51	431.42	649.96	364.66	285.30	2.278		
19,000.00	9,258.71	19,027.00	9,265.80	143.95	144.24	-90.69	-9,593.51	431.57	649.96	361.86	288.11	2.256		
19,100.00	9,259.05	19,127.00	9,266.12	145.35	145.64	-90.69	-9,693.51	431.71	649.96	359.05	290.91	2.234		
19,200.00	9,259.38	19,227.00	9,266.45	146.75	147.04	-90.68	-9,793.51	431.86	649.97	356.25	293.72	2.213		
19,300.00	9,259.72	19,327.00	9,266.77	148.16	148.44	-90.68	-9,893.51	432.00	649.97	353.44	296.52	2.192		
19,303.75	9,259.73	19,330.74	9,266.79	148.21	148.50	-90.68	-9,897.25	432.01	649.97	353.34	296.63	2.191		
19,383.13	9,260.00	19,396.42	9,267.00	149.33	149.42	-90.68	-9,962.93	432.10	650.11	351.48	298.64	2.177 SF		



Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 603H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 30-MWD+HDGM												Offset Well Error:	0.00 usft
Reference		Offset		Semi-Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	100.00	100.00	0.00	0.00	-102.50	-265.10	-1,195.40	1,227.22				
100.00	100.00	117.50	117.50	0.28	0.03	-102.50	-265.10	-1,195.40	1,224.44	1,224.16	0.28	4,382.163	
200.00	200.00	217.50	217.50	0.93	0.24	-102.50	-265.10	-1,195.40	1,224.44	1,223.37	1.07	1,144.209	
300.00	300.00	317.50	317.50	1.44	0.60	-102.50	-265.10	-1,195.40	1,224.44	1,222.54	1.90	645.177	
400.00	400.00	417.50	417.50	1.88	0.96	-102.50	-265.10	-1,195.40	1,224.44	1,221.77	2.67	458.100	
500.00	500.00	517.50	517.50	2.29	1.32	-102.50	-265.10	-1,195.40	1,224.44	1,221.02	3.43	357.328	
600.00	600.00	617.50	617.50	2.69	1.68	-102.50	-265.10	-1,195.40	1,224.44	1,220.27	4.17	293.677	
700.00	700.00	717.50	717.50	3.08	2.03	-102.50	-265.10	-1,195.40	1,224.44	1,219.54	4.91	249.612	
800.00	800.00	817.50	817.50	3.46	2.39	-102.50	-265.10	-1,195.40	1,224.44	1,218.81	5.64	217.212	
900.00	900.00	917.50	917.50	3.83	2.75	-102.50	-265.10	-1,195.40	1,224.44	1,218.08	6.37	192.347	
1,000.00	1,000.00	1,017.50	1,017.50	4.21	3.11	-102.50	-265.10	-1,195.40	1,224.44	1,217.35	7.09	172.643	
1,100.00	1,100.00	1,117.50	1,117.50	4.58	3.47	-102.50	-265.10	-1,195.40	1,224.44	1,216.63	7.82	156.632	
1,200.00	1,200.00	1,217.50	1,217.50	4.95	3.83	-102.50	-265.10	-1,195.40	1,224.44	1,215.90	8.54	143.360	
1,300.00	1,300.00	1,317.50	1,317.50	5.32	4.19	-102.50	-265.10	-1,195.40	1,224.44	1,215.18	9.26	132.175	
1,400.00	1,400.00	1,417.50	1,417.50	5.68	4.54	-102.50	-265.10	-1,195.40	1,224.44	1,214.46	9.99	122.619	
1,500.00	1,500.00	1,523.50	1,523.50	6.05	4.92	-102.50	-265.01	-1,195.36	1,224.40	1,213.67	10.73	114.129	
1,600.00	1,599.98	1,657.67	1,657.59	6.45	5.40	-72.57	-261.14	-1,193.62	1,221.99	1,210.46	11.53	106.008	
1,700.00	1,699.84	1,791.39	1,790.89	6.96	5.88	-72.61	-251.59	-1,189.34	1,215.75	1,203.44	12.31	98.745	
1,800.00	1,799.49	1,893.20	1,892.14	7.31	6.25	-72.67	-241.89	-1,184.98	1,207.04	1,194.04	13.00	92.848	
1,900.00	1,899.11	1,992.81	1,991.20	7.64	6.61	-72.66	-232.39	-1,180.72	1,198.19	1,184.50	13.69	87.500	
2,000.00	1,998.73	2,092.41	2,090.26	8.00	6.97	-72.66	-222.89	-1,176.46	1,189.35	1,174.95	14.40	82.611	
2,100.00	2,098.35	2,192.02	2,189.33	8.36	7.33	-72.65	-213.39	-1,172.19	1,180.51	1,165.40	15.10	78.155	
2,200.00	2,197.97	2,291.63	2,288.39	8.72	7.70	-72.65	-203.89	-1,167.93	1,171.66	1,155.85	15.82	74.082	
2,300.00	2,297.59	2,391.24	2,387.45	9.08	8.07	-72.64	-194.39	-1,163.66	1,162.82	1,146.29	16.53	70.346	
2,400.00	2,397.21	2,490.85	2,486.51	9.44	8.44	-72.64	-184.89	-1,159.40	1,153.98	1,136.73	17.25	66.908	
2,500.00	2,496.83	2,590.46	2,585.58	9.80	8.81	-72.63	-175.39	-1,155.14	1,145.13	1,127.17	17.97	63.737	
2,600.00	2,596.45	2,690.06	2,684.64	10.16	9.18	-72.63	-165.89	-1,150.87	1,136.29	1,117.60	18.69	60.802	
2,700.00	2,696.07	2,789.67	2,783.70	10.52	9.55	-72.63	-156.39	-1,146.61	1,127.44	1,108.03	19.41	58.080	
2,800.00	2,795.69	2,889.28	2,882.76	10.89	9.92	-72.62	-146.88	-1,142.34	1,118.60	1,098.46	20.14	55.549	
2,900.00	2,895.31	2,988.89	2,981.82	11.25	10.29	-72.62	-137.38	-1,138.08	1,109.76	1,088.89	20.86	53.190	
3,000.00	2,994.93	3,088.50	3,080.89	11.62	10.67	-72.61	-127.88	-1,133.82	1,100.91	1,079.32	21.59	50.986	
3,100.00	3,094.55	3,188.10	3,179.95	11.98	11.04	-72.61	-118.38	-1,129.55	1,092.07	1,069.75	22.32	48.924	
3,200.00	3,194.17	3,287.71	3,279.01	12.35	11.41	-72.60	-108.88	-1,125.29	1,083.23	1,060.17	23.05	46.990	
3,300.00	3,293.79	3,387.32	3,378.07	12.71	11.79	-72.60	-99.38	-1,121.02	1,074.38	1,050.60	23.78	45.172	
3,400.00	3,393.41	3,486.93	3,477.14	13.08	12.16	-72.59	-89.88	-1,116.76	1,065.54	1,041.02	24.52	43.462	
3,500.00	3,493.04	3,586.54	3,576.20	13.45	12.54	-72.58	-80.38	-1,112.49	1,056.70	1,031.45	25.25	41.849	
3,600.00	3,592.66	3,686.15	3,675.26	13.81	12.92	-72.58	-70.88	-1,108.23	1,047.85	1,021.87	25.98	40.326	
3,700.00	3,692.28	3,785.75	3,774.32	14.18	13.29	-72.57	-61.38	-1,103.97	1,039.01	1,012.29	26.72	38.886	
3,800.00	3,791.90	3,885.36	3,873.39	14.55	13.67	-72.57	-51.88	-1,099.70	1,030.16	1,002.71	27.46	37.522	
3,900.00	3,891.52	3,984.97	3,972.45	14.91	14.04	-72.56	-42.37	-1,095.44	1,021.32	993.13	28.19	36.228	
4,000.00	3,991.14	4,084.58	4,071.51	15.28	14.42	-72.56	-32.87	-1,091.17	1,012.48	983.55	28.93	35.000	
4,100.00	4,090.76	4,184.19	4,170.57	15.65	14.80	-72.55	-23.37	-1,086.91	1,003.63	973.97	29.67	33.832	
4,200.00	4,190.38	4,283.79	4,269.63	16.02	15.18	-72.54	-13.87	-1,082.65	994.79	964.39	30.40	32.720	
4,300.00	4,290.00	4,383.40	4,368.70	16.39	15.55	-72.54	-4.37	-1,078.38	985.95	954.80	31.14	31.660	
4,400.00	4,389.62	4,483.01	4,467.76	16.75	15.93	-72.53	5.13	-1,074.12	977.10	945.22	31.88	30.649	
4,500.00	4,489.24	4,582.62	4,566.82	17.12	16.31	-72.53	14.63	-1,069.85	968.26	935.64	32.62	29.683	
4,600.00	4,588.86	4,682.23	4,665.88	17.49	16.69	-72.52	24.13	-1,065.59	959.42	926.06	33.36	28.760	
4,700.00	4,688.48	4,781.83	4,764.95	17.86	17.06	-72.51	33.63	-1,061.33	950.57	916.47	34.10	27.877	
4,800.00	4,788.10	4,881.44	4,864.01	18.23	17.44	-72.51	43.13	-1,057.06	941.73	906.89	34.84	27.031	
4,900.00	4,887.72	4,981.05	4,963.07	18.60	17.82	-72.50	52.63	-1,052.80	932.89	897.31	35.58	26.220	
5,000.00	4,987.34	5,080.66	5,062.13	18.97	18.20	-72.49	62.13	-1,048.53	924.04	887.72	36.32	25.441	
5,100.00	5,086.96	5,180.27	5,161.19	19.34	18.58	-72.49	71.64	-1,044.27	915.20	878.14	37.06	24.694	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 603H - OH - Plan 1 02-15-19														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/S (usft)	+E/W (usft)							
5,200.00	5,186.58	5,279.88	5,260.26	19.71	18.96	-72.48	81.14	-1,040.01	906.35	868.55	37.80	23.976			
5,300.00	5,286.20	5,379.48	5,359.32	20.08	19.34	-72.47	90.64	-1,035.74	897.51	858.97	38.54	23.285			
5,400.00	5,385.82	5,479.09	5,458.38	20.45	19.71	-72.46	100.14	-1,031.48	888.67	849.38	39.29	22.620			
5,500.00	5,485.44	5,578.70	5,557.44	20.82	20.09	-72.46	109.64	-1,027.21	879.82	839.80	40.03	21.980			
5,600.00	5,585.06	5,678.31	5,656.51	21.19	20.47	-72.45	119.14	-1,022.95	870.98	830.21	40.77	21.363			
5,700.00	5,684.68	5,777.92	5,755.57	21.56	20.85	-72.44	128.64	-1,018.69	862.14	820.62	41.51	20.768			
5,800.00	5,784.30	5,877.52	5,854.63	21.93	21.23	-72.43	138.14	-1,014.42	853.29	811.04	42.26	20.194			
5,900.00	5,883.92	5,977.13	5,953.69	22.30	21.61	-72.42	147.64	-1,010.16	844.45	801.45	43.00	19.639			
6,000.00	5,983.54	6,076.74	6,052.75	22.67	21.99	-72.41	157.14	-1,005.89	835.61	791.87	43.74	19.103			
6,100.00	6,083.16	6,176.35	6,151.82	23.04	22.37	-72.41	166.64	-1,001.63	826.76	782.28	44.48	18.585			
6,200.00	6,182.78	6,275.96	6,250.88	23.41	22.75	-72.40	176.15	-997.36	817.92	772.69	45.23	18.085			
6,300.00	6,282.40	6,375.56	6,349.94	23.78	23.13	-72.39	185.65	-993.10	809.08	763.11	45.97	17.600			
6,400.00	6,382.02	6,475.17	6,449.00	24.15	23.51	-72.38	195.15	-988.84	800.23	753.52	46.71	17.130			
6,500.00	6,481.64	6,574.78	6,548.07	24.52	23.89	-72.37	204.65	-984.57	791.39	743.93	47.46	16.675			
6,600.00	6,581.26	6,674.39	6,647.13	24.89	24.27	-72.36	214.15	-980.31	782.55	734.35	48.20	16.235			
6,700.00	6,680.88	6,774.00	6,746.19	25.27	24.64	-72.35	223.65	-976.04	773.71	724.76	48.95	15.807			
6,800.00	6,780.50	6,873.61	6,845.25	25.64	25.02	-72.34	233.15	-971.78	764.86	715.17	49.69	15.393			
6,900.00	6,880.15	6,973.22	6,944.32	26.00	25.40	-72.24	242.65	-967.52	756.12	705.68	50.43	14.993			
7,000.00	6,979.99	7,072.85	7,043.41	26.38	25.78	-71.84	252.15	-963.25	748.27	697.10	51.16	14.625			
7,100.00	7,079.97	7,172.40	7,142.41	26.81	26.16	-71.20	261.65	-958.99	741.54	689.65	51.89	14.292			
7,200.00	7,179.97	7,271.86	7,241.32	27.19	26.54	-100.45	271.14	-954.73	735.52	682.91	52.61	13.981			
7,300.00	7,279.97	7,371.31	7,340.23	27.54	26.92	-99.78	280.62	-950.47	729.61	676.28	53.33	13.681			
7,400.00	7,379.97	7,470.76	7,439.13	27.89	27.30	-99.10	290.11	-946.22	723.80	669.75	54.05	13.391			
7,500.00	7,479.97	7,570.21	7,538.04	28.23	27.68	-98.40	299.59	-941.96	718.10	663.32	54.78	13.110			
7,600.00	7,579.97	7,669.66	7,636.95	28.58	28.06	-97.70	309.08	-937.70	712.50	657.00	55.50	12.838			
7,700.00	7,679.97	7,769.12	7,735.86	28.93	28.44	-96.98	318.57	-933.44	707.02	650.79	56.22	12.575			
7,800.00	7,779.97	7,868.57	7,834.76	29.28	28.82	-96.25	328.05	-929.19	701.64	644.69	56.95	12.321			
7,900.00	7,879.97	7,968.02	7,933.67	29.63	29.20	-95.51	337.54	-924.93	696.39	638.71	57.67	12.075			
8,000.00	7,979.97	8,067.47	8,032.58	29.97	29.58	-94.76	347.02	-920.67	691.25	632.85	58.40	11.837			
8,100.00	8,079.97	8,166.92	8,131.48	30.32	29.96	-94.00	356.51	-916.42	686.23	627.10	59.12	11.606			
8,200.00	8,179.97	8,266.38	8,230.39	30.67	30.34	-93.23	366.00	-912.16	681.33	621.48	59.85	11.384			
8,300.00	8,279.97	8,363.53	8,327.02	31.02	30.71	-92.47	375.19	-908.03	676.60	616.03	60.58	11.170			
8,400.00	8,379.97	8,453.74	8,416.93	31.37	31.04	-91.91	381.88	-905.03	672.98	611.70	61.28	10.982			
8,500.00	8,479.97	8,544.32	8,507.40	31.72	31.37	-91.57	386.00	-903.18	670.80	608.83	61.97	10.825			
8,600.00	8,579.97	8,635.10	8,598.16	32.07	31.68	-91.44	387.51	-902.50	670.01	607.37	62.64	10.696			
8,652.57	8,632.53	8,686.61	8,649.66	32.25	31.86	88.68	387.36	-902.50	669.99	607.00	63.00	10.635 CC			
8,700.00	8,679.96	8,732.59	8,695.54	32.41	31.99	88.42	384.43	-902.49	670.07	606.77	63.30	10.586			
8,800.00	8,778.95	8,828.86	8,790.00	32.87	32.23	87.95	366.45	-902.47	670.25	606.42	63.83	10.500			
8,900.00	8,874.16	8,924.32	8,879.39	33.33	32.43	87.53	333.28	-902.42	670.44	606.16	64.28	10.431			
9,000.00	8,962.67	9,019.12	8,961.50	33.73	32.57	87.19	286.12	-902.35	670.63	605.99	64.63	10.376			
9,100.00	9,041.81	9,113.40	9,034.35	34.04	32.67	86.93	226.43	-902.27	670.78	605.86	64.92	10.332			
9,200.00	9,109.17	9,207.32	9,096.22	34.27	32.73	86.76	155.92	-902.17	670.89	605.73	65.16	10.296			
9,300.00	9,162.69	9,300.00	9,145.19	34.42	32.77	86.68	77.35	-902.06	670.95	605.57	65.38	10.262			
9,400.00	9,200.76	9,394.68	9,181.48	34.49	32.80	86.70	-9.98	-901.93	670.94	605.33	65.61	10.227			
9,500.00	9,222.23	9,488.44	9,202.78	34.51	32.84	86.81	-101.18	-901.80	670.87	605.02	65.84	10.189			
9,600.00	9,227.10	9,583.20	9,209.06	34.51	32.89	86.96	-195.64	-901.67	670.77	604.67	66.10	10.147			
9,700.00	9,227.43	9,683.20	9,209.50	34.50	33.01	86.97	-295.64	-901.53	670.77	604.31	66.46	10.093			
9,800.00	9,227.77	9,783.20	9,209.93	34.50	33.19	86.98	-395.64	-901.39	670.76	603.83	66.94	10.021			
9,900.00	9,228.11	9,883.20	9,210.37	34.52	33.45	86.99	-495.64	-901.25	670.76	603.22	67.54	9.932			
10,000.00	9,228.44	9,983.20	9,210.81	34.64	33.76	87.00	-595.63	-901.10	670.76	602.51	68.25	9.828			
10,100.00	9,228.78	10,083.20	9,211.25	35.04	34.14	87.01	-695.63	-900.96	670.75	601.68	69.08	9.710			
10,200.00	9,229.12	10,183.20	9,211.69	35.55	34.57	87.02	-795.63	-900.82	670.75	600.74	70.01	9.580			

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

Company:	COG Operating LLC	Local/Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 603H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum		Separation		Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference	Offset	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
10,300.00	9,229.45	10,283.20	9,212.13	36.11	35.05	87.02	-895.63	-900.68	670.75	599.69	71.05	9.440	
10,400.00	9,229.79	10,383.20	9,212.56	36.73	35.58	87.03	-895.63	-900.54	670.74	598.55	72.19	9.291	
10,500.00	9,230.13	10,483.20	9,213.00	37.39	36.17	87.04	-1,095.63	-900.40	670.74	597.31	73.43	9.134	
10,600.00	9,230.46	10,583.20	9,213.44	38.09	36.80	87.05	-1,195.63	-900.26	670.74	595.98	74.76	8.972	
10,700.00	9,230.80	10,683.20	9,213.88	38.83	37.47	87.06	-1,295.63	-900.11	670.73	594.57	76.17	8.806	
10,800.00	9,231.13	10,783.20	9,214.32	39.61	38.19	87.07	-1,395.63	-899.97	670.73	593.07	77.66	8.637	
10,900.00	9,231.47	10,883.20	9,214.76	40.43	38.94	87.08	-1,495.62	-899.83	670.73	591.50	79.23	8.466	
11,000.00	9,231.81	10,983.20	9,215.19	41.28	39.73	87.08	-1,595.62	-899.69	670.72	589.85	80.87	8.294	
11,100.00	9,232.14	11,083.20	9,215.63	42.17	40.56	87.09	-1,695.62	-899.55	670.72	588.14	82.58	8.122	
11,200.00	9,232.48	11,183.20	9,216.07	43.08	41.43	87.10	-1,795.62	-899.41	670.72	586.37	84.35	7.951	
11,300.00	9,232.82	11,283.20	9,216.51	44.03	42.32	87.11	-1,895.62	-899.26	670.72	584.53	86.19	7.782	
11,400.00	9,233.15	11,383.20	9,216.95	44.99	43.24	87.12	-1,995.62	-899.12	670.71	582.64	88.08	7.615	
11,500.00	9,233.49	11,483.20	9,217.39	45.99	44.19	87.13	-2,095.62	-898.98	670.71	580.69	90.02	7.451	
11,600.00	9,233.82	11,583.20	9,217.82	47.00	45.17	87.14	-2,195.62	-898.84	670.71	578.70	92.01	7.290	
11,700.00	9,234.16	11,683.20	9,218.26	48.04	46.17	87.15	-2,295.62	-898.70	670.70	576.66	94.04	7.132	
11,800.00	9,234.50	11,783.20	9,218.70	49.10	47.19	87.15	-2,395.61	-898.56	670.70	574.58	96.12	6.977	
11,900.00	9,234.83	11,883.20	9,219.14	50.18	48.24	87.16	-2,495.61	-898.41	670.70	572.45	98.24	6.827	
12,000.00	9,235.17	11,983.20	9,219.58	51.27	49.30	87.17	-2,595.61	-898.27	670.69	570.29	100.40	6.680	
12,100.00	9,235.51	12,083.20	9,220.02	52.38	50.38	87.18	-2,695.61	-898.13	670.69	568.09	102.60	6.537	
12,200.00	9,235.84	12,183.20	9,220.45	53.51	51.48	87.19	-2,795.61	-897.99	670.69	565.86	104.82	6.398	
12,300.00	9,236.18	12,283.20	9,220.89	54.65	52.60	87.20	-2,895.61	-897.85	670.68	563.60	107.08	6.263	
12,400.00	9,236.52	12,383.20	9,221.33	55.81	53.73	87.21	-2,995.61	-897.71	670.68	561.31	109.37	6.132	
12,500.00	9,236.85	12,483.20	9,221.77	56.98	54.88	87.22	-3,095.61	-897.57	670.68	558.99	111.68	6.005	
12,600.00	9,237.19	12,583.20	9,222.21	58.16	56.04	87.22	-3,195.61	-897.42	670.68	556.65	114.03	5.882	
12,700.00	9,237.52	12,683.20	9,222.65	59.35	57.21	87.23	-3,295.60	-897.28	670.67	554.28	116.39	5.762	
12,800.00	9,237.86	12,783.20	9,223.08	60.56	58.40	87.24	-3,395.60	-897.14	670.67	551.89	118.78	5.646	
12,900.00	9,238.20	12,883.20	9,223.52	61.77	59.60	87.25	-3,495.60	-897.00	670.67	549.48	121.19	5.534	
13,000.00	9,238.53	12,983.20	9,223.96	62.99	60.80	87.26	-3,595.60	-896.86	670.66	547.05	123.62	5.425	
13,100.00	9,238.87	13,083.20	9,224.40	64.22	62.02	87.27	-3,695.60	-896.72	670.66	544.60	126.07	5.320	
13,200.00	9,239.21	13,183.20	9,224.84	65.47	63.25	87.28	-3,795.60	-896.57	670.66	542.13	128.53	5.218	
13,300.00	9,239.54	13,283.20	9,225.28	66.71	64.48	87.29	-3,895.60	-896.43	670.65	539.64	131.01	5.119	
13,400.00	9,239.88	13,383.20	9,225.71	67.97	65.72	87.29	-3,995.60	-896.29	670.65	537.14	133.51	5.023	
13,500.00	9,240.21	13,483.20	9,226.15	69.23	66.98	87.30	-4,095.60	-896.15	670.65	534.62	136.03	4.930	
13,600.00	9,240.55	13,583.20	9,226.59	70.50	68.23	87.31	-4,195.59	-896.01	670.65	532.09	138.56	4.840	
13,700.00	9,240.89	13,683.20	9,227.03	71.78	69.50	87.32	-4,295.59	-895.87	670.64	529.54	141.10	4.753	
13,800.00	9,241.22	13,783.20	9,227.47	73.06	70.77	87.33	-4,395.59	-895.72	670.64	526.99	143.65	4.668	
13,900.00	9,241.56	13,883.20	9,227.90	74.35	72.05	87.34	-4,495.59	-895.58	670.64	524.42	146.22	4.586	
14,000.00	9,241.90	13,983.20	9,228.34	75.65	73.34	87.35	-4,595.59	-895.44	670.63	521.84	148.80	4.507	
14,100.00	9,242.23	14,083.20	9,228.78	76.94	74.63	87.35	-4,695.59	-895.30	670.63	519.24	151.39	4.430	
14,200.00	9,242.57	14,183.20	9,229.22	78.25	75.92	87.36	-4,795.59	-895.16	670.63	516.64	153.99	4.355	
14,300.00	9,242.91	14,283.20	9,229.66	79.56	77.22	87.37	-4,895.59	-895.02	670.63	514.03	156.60	4.282	
14,400.00	9,243.24	14,383.20	9,230.10	80.87	78.53	87.38	-4,995.59	-894.88	670.62	511.41	159.22	4.212	
14,500.00	9,243.58	14,483.20	9,230.53	82.19	79.84	87.39	-5,095.58	-894.73	670.62	508.78	161.85	4.144	
14,600.00	9,243.91	14,583.20	9,230.97	83.51	81.16	87.40	-5,195.58	-894.59	670.62	506.14	164.48	4.077	
14,700.00	9,244.25	14,683.20	9,231.41	84.84	82.48	87.41	-5,295.58	-894.45	670.62	503.49	167.13	4.013	
14,800.00	9,244.59	14,783.20	9,231.85	86.17	83.80	87.42	-5,395.58	-894.31	670.61	500.83	169.78	3.950	
14,900.00	9,244.92	14,883.20	9,232.29	87.50	85.13	87.42	-5,495.58	-894.17	670.61	498.17	172.44	3.889	
15,000.00	9,245.26	14,983.20	9,232.73	88.83	86.46	87.43	-5,595.58	-894.03	670.61	495.50	175.10	3.830	
15,100.00	9,245.60	15,083.20	9,233.16	90.17	87.79	87.44	-5,695.58	-893.88	670.61	492.83	177.78	3.772	
15,200.00	9,245.93	15,183.20	9,233.60	91.52	89.13	87.45	-5,795.58	-893.74	670.60	490.15	180.46	3.716	
15,300.00	9,246.27	15,283.20	9,234.04	92.86	90.47	87.46	-5,895.58	-893.60	670.60	487.46	183.14	3.662	
15,400.00	9,246.60	15,383.20	9,234.48	94.21	91.81	87.47	-5,995.57	-893.46	670.60	484.76	185.83	3.609	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 603H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre: +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	
15,500.00	9,246.94	15,483.20	9,234.92	95.56	93.16	87.48	-6,095.57	-893.32	670.60	482.06	188.53	3.557	
15,600.00	9,247.28	15,583.20	9,235.36	96.91	94.51	87.49	-6,195.57	-893.18	670.59	479.36	191.23	3.507	
15,700.00	9,247.61	15,683.20	9,235.79	98.27	95.86	87.49	-6,295.57	-893.03	670.59	476.65	193.94	3.458	
15,800.00	9,247.95	15,783.20	9,236.23	99.63	97.22	87.50	-6,395.57	-892.89	670.59	473.93	196.66	3.410	
15,900.00	9,248.29	15,883.20	9,236.67	100.99	98.57	87.51	-6,495.57	-892.75	670.59	471.21	199.37	3.363	
16,000.00	9,248.62	15,983.20	9,237.11	102.35	99.93	87.52	-6,595.57	-892.61	670.58	468.49	202.09	3.318	
16,100.00	9,248.96	16,083.20	9,237.55	103.72	101.29	87.53	-6,695.57	-892.47	670.58	465.76	204.82	3.274	
16,200.00	9,249.29	16,183.20	9,237.99	105.08	102.66	87.54	-6,795.57	-892.33	670.58	463.03	207.55	3.231	
16,300.00	9,249.63	16,283.20	9,238.42	106.45	104.02	87.55	-6,895.56	-892.19	670.58	460.29	210.29	3.189	
16,400.00	9,249.97	16,383.20	9,238.86	107.82	105.39	87.56	-6,995.56	-892.04	670.57	457.55	213.02	3.148	
16,500.00	9,250.30	16,483.20	9,239.30	109.20	106.76	87.56	-7,095.56	-891.90	670.57	454.80	215.77	3.108	
16,600.00	9,250.64	16,583.20	9,239.74	110.57	108.13	87.57	-7,195.56	-891.76	670.57	452.06	218.51	3.069	
16,700.00	9,250.98	16,683.20	9,240.18	111.95	109.51	87.58	-7,295.56	-891.62	670.57	449.30	221.26	3.031	
16,800.00	9,251.31	16,783.20	9,240.62	113.33	110.88	87.59	-7,395.56	-891.48	670.56	446.55	224.01	2.993	
16,900.00	9,251.65	16,883.20	9,241.05	114.70	112.26	87.60	-7,495.56	-891.34	670.56	443.79	226.77	2.957	
17,000.00	9,251.99	16,983.20	9,241.49	116.09	113.64	87.61	-7,595.56	-891.19	670.56	441.03	229.53	2.921	
17,100.00	9,252.32	17,083.20	9,241.93	117.47	115.02	87.62	-7,695.56	-891.05	670.56	438.27	232.29	2.887	
17,200.00	9,252.66	17,183.20	9,242.37	118.85	116.40	87.62	-7,795.55	-890.91	670.55	435.50	235.06	2.853	
17,300.00	9,252.99	17,283.20	9,242.81	120.24	117.78	87.63	-7,895.55	-890.77	670.55	432.73	237.82	2.820	
17,400.00	9,253.33	17,383.20	9,243.25	121.62	119.17	87.64	-7,995.55	-890.63	670.55	429.96	240.59	2.787	
17,500.00	9,253.67	17,483.20	9,243.68	123.01	120.55	87.65	-8,095.55	-890.49	670.55	427.18	243.37	2.755	
17,600.00	9,254.00	17,583.20	9,244.12	124.40	121.94	87.66	-8,195.55	-890.34	670.55	424.40	246.14	2.724	
17,700.00	9,254.34	17,683.20	9,244.56	125.79	123.33	87.67	-8,295.55	-890.20	670.54	421.62	248.92	2.694	
17,800.00	9,254.68	17,783.20	9,245.00	127.18	124.72	87.68	-8,395.55	-890.06	670.54	418.84	251.70	2.664	
17,900.00	9,255.01	17,883.20	9,245.44	128.57	126.11	87.69	-8,495.55	-889.92	670.54	416.06	254.48	2.635	
18,000.00	9,255.35	17,983.20	9,245.88	129.96	127.50	87.69	-8,595.55	-889.78	670.54	413.27	257.27	2.606	
18,100.00	9,255.68	18,083.20	9,246.31	131.36	128.89	87.70	-8,695.54	-889.64	670.53	410.48	260.05	2.578	
18,200.00	9,256.02	18,183.20	9,246.75	132.75	130.28	87.71	-8,795.54	-889.50	670.53	407.69	262.84	2.551	
18,300.00	9,256.36	18,283.20	9,247.19	134.15	131.68	87.72	-8,895.54	-889.35	670.53	404.90	265.63	2.524	
18,400.00	9,256.69	18,383.20	9,247.63	135.55	133.07	87.73	-8,995.54	-889.21	670.53	402.10	268.43	2.498	
18,500.00	9,257.03	18,483.20	9,248.07	136.94	134.47	87.74	-9,095.54	-889.07	670.53	399.31	271.22	2.472	
18,600.00	9,257.37	18,583.20	9,248.50	138.34	135.87	87.75	-9,195.54	-888.93	670.52	396.51	274.02	2.447	
18,700.00	9,257.70	18,683.20	9,248.94	139.74	137.27	87.76	-9,295.54	-888.79	670.52	393.71	276.81	2.422	
18,800.00	9,258.04	18,783.20	9,249.38	141.14	138.67	87.76	-9,395.54	-888.65	670.52	390.91	279.61	2.398	
18,900.00	9,258.38	18,883.20	9,249.82	142.54	140.07	87.77	-9,495.54	-888.50	670.52	388.10	282.42	2.374	
19,000.00	9,258.71	18,983.20	9,250.26	143.95	141.47	87.78	-9,595.53	-888.36	670.52	385.30	285.22	2.351	
19,100.00	9,259.05	19,083.20	9,250.70	145.35	142.87	87.79	-9,695.53	-888.22	670.51	382.49	288.02	2.328	
19,200.00	9,259.38	19,183.20	9,251.13	146.75	144.27	87.80	-9,795.53	-888.08	670.51	379.68	290.83	2.306	
19,300.00	9,259.72	19,283.20	9,251.57	148.16	145.68	87.81	-9,895.53	-887.94	670.51	376.87	293.64	2.283	
19,383.13	9,260.00	19,366.33	9,251.94	149.33	146.84	87.82	-9,978.66	-887.82	670.51	374.54	295.97	2.265 ES, SF	



Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19													Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HRGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	+E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.10	0.10	0.00	0.00	88.66	0.70	29.90	29.91					
100.00	100.00	100.10	100.10	0.28	0.28	88.66	0.70	29.90	29.91	29.46	0.45	66.722		
200.00	200.00	200.10	200.10	0.93	0.93	88.66	0.70	29.90	29.91	28.40	1.51	19.814		
300.00	300.00	300.10	300.10	1.44	1.44	88.66	0.70	29.90	29.91	27.52	2.39	12.500		
400.00	400.00	400.10	400.10	1.88	1.88	88.66	0.70	29.90	29.91	26.71	3.19	9.365		
500.00	500.00	500.10	500.10	2.29	2.29	88.66	0.70	29.90	29.91	25.95	3.96	7.548		
600.00	600.00	600.10	600.10	2.69	2.69	88.66	0.70	29.90	29.91	25.19	4.72	6.343		
700.00	700.00	700.10	700.10	3.08	3.08	88.66	0.70	29.90	29.91	24.45	5.46	5.480		
800.00	800.00	800.10	800.10	3.46	3.46	88.66	0.70	29.90	29.91	23.71	6.20	4.828		
900.00	900.00	900.10	900.10	3.83	3.83	88.66	0.70	29.90	29.91	22.98	6.93	4.317		
1,000.00	1,000.00	1,000.10	1,000.10	4.21	4.21	88.66	0.70	29.90	29.91	22.25	7.66	3.906		
1,100.00	1,100.00	1,100.10	1,100.10	4.58	4.58	88.66	0.70	29.90	29.91	21.52	8.38	3.567		
1,200.00	1,200.00	1,200.10	1,200.10	4.95	4.95	88.66	0.70	29.90	29.91	20.80	9.11	3.283		
1,300.00	1,300.00	1,300.10	1,300.10	5.32	5.32	88.66	0.70	29.90	29.91	20.07	9.84	3.041		
1,400.00	1,400.00	1,400.10	1,400.10	5.68	5.68	88.66	0.70	29.90	29.91	19.35	10.56	2.833		
1,416.63	1,416.63	1,416.73	1,416.73	5.74	5.74	88.66	0.70	29.90	29.91	19.23	10.68	2.801 CC		
1,500.00	1,500.00	1,500.10	1,500.10	6.05	6.05	88.66	0.70	29.90	29.91	18.63	11.28	2.651 ES		
1,600.00	1,599.98	1,600.00	1,599.98	6.45	6.54	118.21	2.43	30.14	31.02	19.02	12.00	2.585		
1,700.00	1,699.84	1,699.66	1,699.50	6.96	7.23	117.25	7.59	30.86	34.38	21.59	12.79	2.688		
1,800.00	1,799.49	1,799.40	1,798.90	7.31	7.58	116.09	15.76	32.00	39.69	26.20	13.50	2.941		
1,900.00	1,899.11	1,899.24	1,898.36	7.64	7.90	115.18	24.38	33.20	45.30	31.09	14.21	3.188		
2,000.00	1,998.73	1,999.08	1,997.82	8.00	8.24	114.47	33.00	34.40	50.92	35.98	14.94	3.408		
2,100.00	2,098.35	2,098.92	2,097.28	8.36	8.58	113.90	41.62	35.60	56.54	40.87	15.67	3.608		
2,200.00	2,197.97	2,198.76	2,196.74	8.72	8.93	113.43	50.24	36.80	62.17	45.77	16.40	3.791		
2,300.00	2,297.59	2,298.60	2,296.20	9.08	9.27	113.05	58.86	38.00	67.80	50.67	17.13	3.958		
2,400.00	2,397.21	2,398.44	2,395.66	9.44	9.62	112.72	67.48	39.19	73.44	55.58	17.86	4.112		
2,500.00	2,496.83	2,498.28	2,495.12	9.80	9.97	112.44	76.10	40.39	79.07	60.48	18.59	4.254		
2,600.00	2,596.45	2,598.12	2,594.58	10.16	10.32	112.19	84.72	41.59	84.71	65.39	19.32	4.385		
2,700.00	2,696.07	2,697.96	2,694.04	10.52	10.67	111.98	93.34	42.79	90.35	70.30	20.05	4.506		
2,800.00	2,795.69	2,797.80	2,793.50	10.89	11.03	111.79	101.96	43.99	95.99	75.20	20.78	4.618		
2,900.00	2,895.31	2,897.64	2,892.96	11.25	11.38	111.62	110.58	45.19	101.63	80.11	21.52	4.723		
3,000.00	2,994.93	2,997.48	2,992.42	11.62	11.74	111.47	119.20	46.39	107.27	85.02	22.25	4.821		
3,100.00	3,094.55	3,097.32	3,091.88	11.98	12.09	111.34	127.82	47.59	112.91	89.93	22.98	4.913		
3,200.00	3,194.17	3,197.17	3,191.34	12.35	12.45	111.21	136.44	48.79	118.56	94.84	23.72	4.998		
3,300.00	3,293.79	3,297.01	3,290.80	12.71	12.81	111.10	145.06	49.99	124.20	99.75	24.46	5.079		
3,400.00	3,393.41	3,396.85	3,390.26	13.08	13.17	111.00	153.68	51.19	129.84	104.65	25.19	5.154		
3,500.00	3,493.04	3,496.69	3,489.72	13.45	13.52	110.91	162.30	52.39	135.49	109.56	25.93	5.226		
3,600.00	3,592.66	3,596.53	3,589.18	13.81	13.88	110.82	170.92	53.59	141.13	114.47	26.66	5.293		
3,700.00	3,692.28	3,696.37	3,688.64	14.18	14.24	110.74	179.54	54.79	146.78	119.38	27.40	5.357		
3,800.00	3,791.90	3,796.21	3,788.10	14.55	14.60	110.67	188.16	55.99	152.42	124.28	28.14	5.417		
3,900.00	3,891.52	3,896.05	3,887.56	14.91	14.96	110.60	196.78	57.19	158.07	129.19	28.88	5.474		
4,000.00	3,991.14	3,995.89	3,987.02	15.28	15.33	110.54	205.40	58.39	163.71	134.10	29.62	5.528		
4,100.00	4,090.76	4,095.73	4,086.48	15.65	15.69	110.48	214.02	59.59	169.36	139.01	30.35	5.579		
4,200.00	4,190.38	4,195.57	4,185.94	16.02	16.05	110.43	222.64	60.79	175.01	143.91	31.09	5.628		
4,300.00	4,290.00	4,295.41	4,285.40	16.39	16.41	110.37	231.26	61.99	180.65	148.82	31.83	5.675		
4,400.00	4,389.62	4,395.25	4,384.86	16.75	16.77	110.33	239.88	63.19	186.30	153.73	32.57	5.719		
4,500.00	4,489.24	4,495.09	4,484.32	17.12	17.14	110.28	248.50	64.39	191.95	158.63	33.31	5.762		
4,600.00	4,588.86	4,594.93	4,583.78	17.49	17.50	110.24	257.12	65.59	197.59	163.54	34.05	5.802		
4,700.00	4,688.48	4,694.77	4,683.24	17.86	17.86	110.20	265.74	66.79	203.24	168.44	34.79	5.841		
4,800.00	4,788.10	4,794.61	4,782.70	18.23	18.23	110.16	274.36	67.99	208.89	173.35	35.53	5.878		
4,900.00	4,887.72	4,894.45	4,882.16	18.60	18.59	110.12	282.98	69.19	214.53	178.26	36.28	5.914		
5,000.00	4,987.34	4,994.29	4,981.63	18.97	18.96	110.09	291.60	70.39	220.18	183.16	37.02	5.948		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 1-02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 701H - OH - Plan 1-02-21-19													Offset Site Error:
Survey Program: 0-MWD-HRGM													Offset Well Error:
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)					
5,100.00	5,086.96	5,094.13	5,081.09	19.34	19.32	110.05	300.22	71.59	225.83	188.07	37.76	5.981	
5,200.00	5,186.58	5,193.97	5,180.55	19.71	19.69	110.02	308.84	72.79	231.47	192.97	38.50	6.012	
5,300.00	5,286.20	5,293.81	5,280.01	20.08	20.05	109.99	317.46	73.99	237.12	197.88	39.24	6.043	
5,400.00	5,385.82	5,393.65	5,379.47	20.45	20.42	109.96	326.08	75.19	242.77	202.78	39.98	6.072	
5,500.00	5,485.44	5,493.49	5,478.93	20.82	20.78	109.94	334.70	76.39	248.41	207.69	40.72	6.100	
5,600.00	5,585.06	5,593.33	5,578.39	21.19	21.15	109.91	343.32	77.59	254.06	212.60	41.47	6.127	
5,700.00	5,684.68	5,693.17	5,677.85	21.56	21.52	109.89	351.94	78.79	259.71	217.50	42.21	6.153	
5,800.00	5,784.30	5,793.01	5,777.31	21.93	21.88	109.86	360.56	79.99	265.36	222.41	42.95	6.178	
5,900.00	5,883.92	5,892.85	5,876.77	22.30	22.25	109.84	369.18	81.19	271.00	227.31	43.69	6.202	
6,000.00	5,983.54	5,992.69	5,976.23	22.67	22.62	109.82	377.80	82.39	276.65	232.22	44.44	6.226	
6,100.00	6,083.16	6,092.54	6,075.69	23.04	22.98	109.80	386.42	83.59	282.30	237.12	45.18	6.248	
6,200.00	6,182.78	6,192.38	6,175.15	23.41	23.35	109.78	395.03	84.79	287.95	242.02	45.92	6.270	
6,300.00	6,282.40	6,293.01	6,275.41	23.78	23.71	109.78	403.61	85.98	293.56	246.90	46.66	6.291	
6,400.00	6,382.02	6,396.11	6,378.31	24.15	24.10	110.26	409.79	86.84	298.39	250.99	47.41	6.294	
6,500.00	6,481.64	6,499.01	6,481.18	24.52	24.54	111.40	412.29	87.19	302.22	254.09	48.13	6.279	
6,600.00	6,581.26	6,599.19	6,581.36	24.89	24.88	112.92	412.35	87.20	305.53	256.74	48.79	6.262	
6,700.00	6,680.88	6,698.81	6,680.98	25.27	25.22	114.40	412.35	87.20	309.03	259.58	49.45	6.249	
6,800.00	6,780.50	6,798.43	6,780.60	25.64	25.57	115.85	412.35	87.20	312.74	262.62	50.12	6.240	
6,900.00	6,880.15	6,898.08	6,880.25	26.00	25.92	117.24	412.35	87.20	316.50	265.71	50.79	6.232	
7,000.00	6,979.99	6,997.92	6,980.09	26.38	26.27	118.16	412.35	87.20	319.05	267.58	51.47	6.199	
7,100.00	7,079.97	7,097.90	7,080.07	26.81	26.62	118.49	412.35	87.20	319.99	267.84	52.16	6.135	
7,200.00	7,179.97	7,197.90	7,180.07	27.19	26.97	88.57	412.35	87.20	320.00	267.14	52.86	6.054	
7,300.00	7,279.97	7,297.90	7,280.07	27.54	27.32	88.57	412.35	87.20	320.00	266.44	53.56	5.975	
7,400.00	7,379.97	7,397.90	7,380.07	27.89	27.67	88.57	412.35	87.20	320.00	265.74	54.26	5.898	
7,500.00	7,479.97	7,497.90	7,480.07	28.23	28.03	88.57	412.35	87.20	320.00	265.04	54.96	5.822	
7,600.00	7,579.97	7,597.90	7,580.07	28.58	28.38	88.57	412.35	87.20	320.00	264.33	55.66	5.749	
7,700.00	7,679.97	7,697.90	7,680.07	28.93	28.73	88.57	412.35	87.20	320.00	263.63	56.37	5.677	
7,800.00	7,779.97	7,797.90	7,780.07	29.28	29.08	88.57	412.35	87.20	320.00	262.93	57.07	5.607	
7,900.00	7,879.97	7,897.90	7,880.07	29.63	29.43	88.57	412.35	87.20	320.00	262.22	57.77	5.539	
8,000.00	7,979.97	7,997.90	7,980.07	29.97	29.78	88.57	412.35	87.20	320.00	261.52	58.48	5.472	
8,100.00	8,079.97	8,097.90	8,080.07	30.32	30.14	88.57	412.35	87.20	320.00	260.81	59.18	5.407	
8,200.00	8,179.97	8,197.90	8,180.07	30.67	30.49	88.57	412.35	87.20	320.00	260.11	59.89	5.343	
8,300.00	8,279.97	8,297.90	8,280.07	31.02	30.84	88.57	412.35	87.20	320.00	259.41	60.59	5.281	
8,400.00	8,379.97	8,397.90	8,380.07	31.37	31.19	88.57	412.35	87.20	320.00	258.70	61.30	5.220	
8,500.00	8,479.97	8,497.90	8,480.07	31.72	31.55	88.57	412.35	87.20	320.00	257.99	62.00	5.161	
8,600.00	8,579.97	8,597.90	8,580.07	32.07	31.90	88.57	412.35	87.20	320.00	257.29	62.71	5.103	
8,600.01	8,579.97	8,597.90	8,580.07	32.07	31.90	88.57	412.35	87.20	320.00	257.29	62.71	5.103	
8,700.00	8,679.96	8,697.89	8,680.06	32.41	32.25	-91.46	412.35	87.20	320.01	256.60	63.41	5.047	
8,800.00	8,778.95	8,796.88	8,779.05	32.87	32.60	-93.72	412.35	87.20	320.62	256.49	64.13	4.999	
8,900.00	8,874.16	8,895.88	8,878.01	33.33	32.94	-98.45	410.73	87.20	323.80	258.90	64.90	4.989	
9,000.00	8,962.67	9,003.33	8,983.77	33.73	33.38	-103.56	392.71	87.22	329.98	264.44	65.54	5.035	
9,100.00	9,041.81	9,118.23	9,091.02	34.04	33.83	-108.27	351.99	87.28	338.27	272.50	65.76	5.144	
9,200.00	9,109.17	9,241.32	9,194.41	34.27	34.24	-112.40	285.64	87.38	347.52	282.17	65.35	5.318	
9,300.00	9,162.69	9,372.73	9,286.45	34.42	34.57	-115.75	192.26	87.51	356.34	292.05	64.29	5.543	
9,400.00	9,200.76	9,511.57	9,357.94	34.49	34.79	-118.12	73.63	87.68	363.27	300.31	62.96	5.770	
9,500.00	9,222.23	9,655.69	9,399.78	34.51	34.93	-119.35	-63.88	87.88	367.10	305.02	62.08	5.913	
9,600.00	9,227.10	9,785.72	9,408.13	34.51	35.02	-119.49	-193.45	88.07	367.53	305.33	62.20	5.909	
9,700.00	9,227.43	9,885.72	9,408.47	34.50	35.13	-119.49	-293.44	88.22	367.54	304.89	62.65	5.866	
9,800.00	9,227.77	9,985.72	9,408.82	34.50	35.29	-119.49	-393.44	88.36	367.54	304.33	63.21	5.814	
9,900.00	9,228.11	10,085.72	9,409.16	34.52	35.52	-119.49	-493.44	88.50	367.55	303.67	63.88	5.754	
10,000.00	9,228.44	10,185.72	9,409.51	34.64	35.82	-119.50	-593.44	88.65	367.56	302.91	64.65	5.686	
10,100.00	9,228.78	10,285.72	9,409.86	35.04	36.20	-119.50	-693.44	88.79	367.56	302.05	65.51	5.611	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 701H - OH - Plan 1 02-21-19													Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HRGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Warning								
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,200.00	9,229.12	10,385.72	9,410.20	35.55	36.66	-119.50	-793.44	88.94	367.57	301.10	66.47	5.530		
10,300.00	9,229.45	10,485.72	9,410.55	36.11	37.17	-119.50	-893.44	89.08	367.57	300.06	67.51	5.445		
10,400.00	9,229.79	10,585.72	9,410.90	36.73	37.74	-119.50	-993.44	89.23	367.58	298.94	68.64	5.355		
10,500.00	9,230.13	10,685.72	9,411.24	37.39	38.37	-119.50	-1,093.44	89.37	367.59	297.74	69.85	5.263		
10,600.00	9,230.46	10,785.72	9,411.59	38.09	39.04	-119.50	-1,193.44	89.52	367.59	296.46	71.13	5.168		
10,700.00	9,230.80	10,885.72	9,411.94	38.83	39.75	-119.50	-1,293.44	89.66	367.60	295.11	72.49	5.071		
10,800.00	9,231.13	10,985.72	9,412.28	39.61	40.51	-119.51	-1,393.44	89.80	367.60	293.69	73.91	4.973		
10,900.00	9,231.47	11,085.72	9,412.63	40.43	41.30	-119.51	-1,493.44	89.95	367.61	292.21	75.40	4.875		
11,000.00	9,231.81	11,185.72	9,412.98	41.28	42.13	-119.51	-1,593.44	90.09	367.61	290.66	76.95	4.777		
11,100.00	9,232.14	11,285.72	9,413.32	42.17	42.99	-119.51	-1,693.43	90.24	367.62	289.06	78.56	4.680		
11,200.00	9,232.48	11,385.72	9,413.67	43.08	43.88	-119.51	-1,793.43	90.38	367.63	287.41	80.22	4.583		
11,300.00	9,232.82	11,485.72	9,414.02	44.03	44.80	-119.51	-1,893.43	90.53	367.63	285.70	81.93	4.487		
11,400.00	9,233.15	11,585.72	9,414.36	44.99	45.75	-119.51	-1,993.43	90.67	367.64	283.95	83.69	4.393		
11,500.00	9,233.49	11,685.72	9,414.71	45.99	46.73	-119.52	-2,093.43	90.82	367.64	282.15	85.49	4.300		
11,600.00	9,233.82	11,785.72	9,415.05	47.00	47.73	-119.52	-2,193.43	90.96	367.65	280.32	87.33	4.210		
11,700.00	9,234.16	11,885.72	9,415.40	48.04	48.75	-119.52	-2,293.43	91.11	367.66	278.44	89.22	4.121		
11,800.00	9,234.50	11,985.72	9,415.75	49.10	49.79	-119.52	-2,393.43	91.25	367.66	276.52	91.14	4.034		
11,900.00	9,234.83	12,085.72	9,416.09	50.18	50.85	-119.52	-2,493.43	91.39	367.67	274.58	93.09	3.950		
12,000.00	9,235.17	12,185.72	9,416.44	51.27	51.93	-119.52	-2,593.43	91.54	367.67	272.60	95.08	3.867		
12,100.00	9,235.51	12,285.72	9,416.79	52.38	53.03	-119.52	-2,693.43	91.68	367.68	270.59	97.09	3.787		
12,200.00	9,235.84	12,385.72	9,417.13	53.51	54.14	-119.52	-2,793.43	91.83	367.68	268.55	99.14	3.709		
12,300.00	9,236.18	12,485.72	9,417.48	54.65	55.27	-119.53	-2,893.43	91.97	367.69	266.48	101.21	3.633		
12,400.00	9,236.52	12,585.72	9,417.83	55.81	56.41	-119.53	-2,993.43	92.12	367.70	264.39	103.30	3.559		
12,500.00	9,236.85	12,685.72	9,418.17	56.98	57.57	-119.53	-3,093.43	92.26	367.70	262.28	105.42	3.488		
12,600.00	9,237.19	12,785.72	9,418.52	58.16	58.74	-119.53	-3,193.42	92.41	367.71	260.14	107.57	3.418		
12,700.00	9,237.52	12,885.72	9,418.87	59.35	59.92	-119.53	-3,293.42	92.55	367.71	257.99	109.73	3.351		
12,800.00	9,237.86	12,985.72	9,419.21	60.56	61.11	-119.53	-3,393.42	92.70	367.72	255.81	111.91	3.286		
12,900.00	9,238.20	13,085.72	9,419.56	61.77	62.31	-119.53	-3,493.42	92.84	367.73	253.61	114.11	3.223		
13,000.00	9,238.53	13,185.72	9,419.91	62.99	63.53	-119.53	-3,593.42	92.98	367.73	251.40	116.33	3.161		
13,100.00	9,238.87	13,285.72	9,420.25	64.22	64.75	-119.54	-3,693.42	93.13	367.74	249.17	118.56	3.102		
13,200.00	9,239.21	13,385.72	9,420.60	65.47	65.98	-119.54	-3,793.42	93.27	367.74	246.93	120.81	3.044		
13,300.00	9,239.54	13,485.72	9,420.95	66.71	67.22	-119.54	-3,893.42	93.42	367.75	244.67	123.08	2.988		
13,400.00	9,239.88	13,585.72	9,421.29	67.97	68.47	-119.54	-3,993.42	93.56	367.76	242.40	125.36	2.934		
13,500.00	9,240.21	13,685.72	9,421.64	69.23	69.72	-119.54	-4,093.42	93.71	367.76	240.11	127.65	2.881		
13,600.00	9,240.55	13,785.72	9,421.98	70.50	70.98	-119.54	-4,193.42	93.85	367.77	237.81	129.96	2.830		
13,700.00	9,240.89	13,885.72	9,422.33	71.78	72.25	-119.54	-4,293.42	94.00	367.77	235.50	132.27	2.780		
13,800.00	9,241.22	13,985.72	9,422.68	73.06	73.52	-119.55	-4,393.42	94.14	367.78	233.18	134.60	2.732		
13,900.00	9,241.56	14,085.72	9,423.02	74.35	74.81	-119.55	-4,493.42	94.28	367.78	230.85	136.94	2.686		
14,000.00	9,241.90	14,185.72	9,423.37	75.65	76.09	-119.55	-4,593.41	94.43	367.79	228.51	139.28	2.641		
14,100.00	9,242.23	14,285.72	9,423.72	76.94	77.38	-119.55	-4,693.41	94.57	367.80	226.15	141.64	2.597		
14,200.00	9,242.57	14,385.72	9,424.06	78.25	78.68	-119.55	-4,793.41	94.72	367.80	223.79	144.01	2.554		
14,300.00	9,242.91	14,485.72	9,424.41	79.56	79.98	-119.55	-4,893.41	94.86	367.81	221.42	146.38	2.513		
14,400.00	9,243.24	14,585.72	9,424.76	80.87	81.29	-119.55	-4,993.41	95.01	367.81	219.05	148.77	2.472		
14,500.00	9,243.58	14,685.72	9,425.10	82.19	82.60	-119.55	-5,093.41	95.15	367.82	216.66	151.16	2.433		
14,600.00	9,243.91	14,785.72	9,425.45	83.51	83.92	-119.56	-5,193.41	95.30	367.83	214.27	153.56	2.395		
14,700.00	9,244.25	14,885.72	9,425.80	84.84	85.24	-119.56	-5,293.41	95.44	367.83	211.87	155.96	2.358		
14,800.00	9,244.59	14,985.72	9,426.14	86.17	86.56	-119.56	-5,393.41	95.59	367.84	209.46	158.38	2.323		
14,900.00	9,244.92	15,085.72	9,426.49	87.50	87.89	-119.56	-5,493.41	95.73	367.84	207.05	160.80	2.288		
15,000.00	9,245.26	15,185.72	9,426.84	88.83	89.22	-119.56	-5,593.41	95.87	367.85	204.63	163.22	2.254		
15,100.00	9,245.60	15,285.72	9,427.18	90.17	90.55	-119.56	-5,693.41	96.02	367.86	202.20	165.65	2.221		
15,200.00	9,245.93	15,385.72	9,427.53	91.52	91.89	-119.56	-5,793.41	96.16	367.86	199.77	168.09	2.188		
15,300.00	9,246.27	15,485.72	9,427.87	92.86	93.23	-119.56	-5,893.41	96.31	367.87	197.33	170.53	2.157		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design: Quien Sabe Fed Com - 701H - OH - Plan.1 02-21-19													Offset Site Error:	0.00 usft
Survey Program: 0-MVD+HRGM													Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	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)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
15,400.00	9,246.60	15,585.72	9,428.22	94.21	94.57	-119.57	-5,993.40	96.45	367.87	194.89	172.98	2.127		
15,500.00	9,246.94	15,685.72	9,428.57	95.56	95.92	-119.57	-6,093.40	96.60	367.88	192.44	175.43	2.097		
15,600.00	9,247.28	15,785.72	9,428.91	96.91	97.27	-119.57	-6,193.40	96.74	367.88	189.99	177.89	2.068		
15,700.00	9,247.61	15,885.72	9,429.26	98.27	98.62	-119.57	-6,293.40	96.89	367.89	187.54	180.35	2.040		
15,800.00	9,247.95	15,985.72	9,429.61	99.63	99.97	-119.57	-6,393.40	97.03	367.90	185.08	182.82	2.012		
15,900.00	9,248.29	16,085.72	9,429.95	100.99	101.33	-119.57	-6,493.40	97.18	367.90	182.61	185.29	1.986		
16,000.00	9,248.62	16,185.72	9,430.30	102.35	102.69	-119.57	-6,593.40	97.32	367.91	180.14	187.77	1.959		
16,100.00	9,248.96	16,285.72	9,430.65	103.72	104.05	-119.58	-6,693.40	97.46	367.91	177.67	190.24	1.934		
16,200.00	9,249.29	16,385.72	9,430.99	105.08	105.41	-119.58	-6,793.40	97.61	367.92	175.19	192.73	1.909		
16,300.00	9,249.63	16,485.72	9,431.34	106.45	106.78	-119.58	-6,893.40	97.75	367.93	172.71	195.21	1.885		
16,400.00	9,249.97	16,585.72	9,431.69	107.82	108.14	-119.58	-6,993.40	97.90	367.93	170.23	197.70	1.861		
16,500.00	9,250.30	16,685.72	9,432.03	109.20	109.51	-119.58	-7,093.40	98.04	367.94	167.74	200.19	1.838		
16,600.00	9,250.64	16,785.72	9,432.38	110.57	110.88	-119.58	-7,193.40	98.19	367.94	165.25	202.69	1.815		
16,700.00	9,250.98	16,885.72	9,432.73	111.95	112.26	-119.58	-7,293.40	98.33	367.95	162.76	205.19	1.793		
16,800.00	9,251.31	16,985.72	9,433.07	113.33	113.63	-119.58	-7,393.39	98.48	367.95	160.26	207.69	1.772		
16,900.00	9,251.65	17,085.72	9,433.42	114.70	115.01	-119.59	-7,493.39	98.62	367.96	157.76	210.20	1.751		
17,000.00	9,251.99	17,185.72	9,433.76	116.09	116.38	-119.59	-7,593.39	98.77	367.97	155.26	212.70	1.730		
17,100.00	9,252.32	17,285.72	9,434.11	117.47	117.76	-119.59	-7,693.39	98.91	367.97	152.76	215.21	1.710		
17,200.00	9,252.66	17,385.72	9,434.46	118.85	119.14	-119.59	-7,793.39	99.05	367.98	150.25	217.73	1.690		
17,300.00	9,252.99	17,485.72	9,434.80	120.24	120.53	-119.59	-7,893.39	99.20	367.98	147.74	220.24	1.671		
17,400.00	9,253.33	17,585.72	9,435.15	121.62	121.91	-119.59	-7,993.39	99.34	367.99	145.23	222.76	1.652		
17,500.00	9,253.67	17,685.72	9,435.50	123.01	123.29	-119.59	-8,093.39	99.49	368.00	142.72	225.28	1.634		
17,600.00	9,254.00	17,785.72	9,435.84	124.40	124.68	-119.59	-8,193.39	99.63	368.00	140.20	227.80	1.615		
17,700.00	9,254.34	17,885.72	9,436.19	125.79	126.07	-119.60	-8,293.39	99.78	368.01	137.68	230.33	1.598		
17,800.00	9,254.68	17,985.72	9,436.54	127.18	127.45	-119.60	-8,393.39	99.92	368.01	135.16	232.85	1.580		
17,900.00	9,255.01	18,085.72	9,436.88	128.57	128.84	-119.60	-8,493.39	100.07	368.02	132.64	235.38	1.564		
18,000.00	9,255.35	18,185.72	9,437.23	129.96	130.23	-119.60	-8,593.39	100.21	368.03	130.12	237.91	1.547		
18,100.00	9,255.68	18,285.72	9,437.58	131.36	131.63	-119.60	-8,693.39	100.35	368.03	127.59	240.44	1.531		
18,200.00	9,256.02	18,385.72	9,437.92	132.75	133.02	-119.60	-8,793.39	100.50	368.04	125.06	242.98	1.515		
18,300.00	9,256.36	18,485.72	9,438.27	134.15	134.41	-119.60	-8,893.38	100.64	368.04	122.53	245.51	1.499 Level 3		
18,400.00	9,256.69	18,585.72	9,438.62	135.55	135.81	-119.61	-8,993.38	100.79	368.05	120.00	248.05	1.484 Level 3		
18,500.00	9,257.03	18,685.72	9,438.96	136.94	137.20	-119.61	-9,093.38	100.93	368.05	117.47	250.59	1.469 Level 3		
18,600.00	9,257.37	18,785.72	9,439.31	138.34	138.60	-119.61	-9,193.38	101.08	368.06	114.93	253.13	1.454 Level 3		
18,700.00	9,257.70	18,885.72	9,439.66	139.74	140.00	-119.61	-9,293.38	101.22	368.07	112.39	255.67	1.440 Level 3		
18,800.00	9,258.04	18,985.72	9,440.00	141.14	141.40	-119.61	-9,393.38	101.37	368.07	109.86	258.22	1.425 Level 3		
18,900.00	9,258.38	19,085.72	9,440.35	142.54	142.79	-119.61	-9,493.38	101.51	368.08	107.32	260.76	1.412 Level 3		
19,000.00	9,258.71	19,185.72	9,440.69	143.95	144.19	-119.61	-9,593.38	101.66	368.08	104.78	263.31	1.398 Level 3		
19,100.00	9,259.05	19,285.72	9,441.04	145.35	145.60	-119.61	-9,693.38	101.80	368.09	102.23	265.86	1.385 Level 3		
19,200.00	9,259.38	19,385.72	9,441.39	146.75	147.00	-119.62	-9,793.38	101.94	368.10	99.69	268.41	1.371 Level 3		
19,300.00	9,259.72	19,485.72	9,441.73	148.16	148.40	-119.62	-9,893.38	102.09	368.10	97.15	270.96	1.359 Level 3		
19,306.80	9,259.74	19,492.52	9,441.76	148.25	148.49	-119.62	-9,900.18	102.10	368.10	96.97	271.13	1.358 Level 3		
19,383.13	9,260.00	19,562.54	9,442.00	149.33	149.48	-119.62	-9,970.20	102.20	368.16	95.27	272.90	1.349 Level 3, SF		



Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19													Offset Site Error: 0.00 usft	
Survey Program: 0-MWD-HDGM													Offset Well Error: 0.00 usft	
Reference		Offset		Semi-Major Axis			Distance						Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N-S (usft)	Offset Wellbore Centre +E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	17.70	17.70	0.00	0.02	-102.78	-264.30	-1,165.40	1,194.99					
100.00	100.00	117.70	117.70	0.28	0.20	-102.78	-264.30	-1,165.40	1,194.99	1,194.55	0.45	2,677.645		
200.00	200.00	217.70	217.70	0.93	0.56	-102.78	-264.30	-1,165.40	1,194.99	1,193.61	1.39	862.116		
300.00	300.00	317.70	317.70	1.44	0.91	-102.78	-264.30	-1,165.40	1,194.99	1,192.78	2.21	539.634		
400.00	400.00	417.70	417.70	1.88	1.27	-102.78	-264.30	-1,165.40	1,194.99	1,192.00	2.99	399.683		
500.00	500.00	517.70	517.70	2.29	1.63	-102.78	-264.30	-1,165.40	1,194.99	1,191.25	3.74	319.184		
600.00	600.00	617.70	617.70	2.69	1.99	-102.78	-264.30	-1,165.40	1,194.99	1,190.51	4.49	266.338		
700.00	700.00	717.70	717.70	3.08	2.35	-102.78	-264.30	-1,165.40	1,194.99	1,189.77	5.22	228.797		
800.00	800.00	817.70	817.70	3.46	2.71	-102.78	-264.30	-1,165.40	1,194.99	1,189.04	5.95	200.679		
900.00	900.00	917.70	917.70	3.83	3.07	-102.78	-264.30	-1,165.40	1,194.99	1,188.31	6.68	178.796		
1,000.00	1,000.00	1,017.70	1,017.70	4.21	3.42	-102.78	-264.30	-1,165.40	1,194.99	1,187.58	7.41	161.263		
1,100.00	1,100.00	1,117.70	1,117.70	4.58	3.78	-102.78	-264.30	-1,165.40	1,194.99	1,186.86	8.14	146.891		
1,200.00	1,200.00	1,217.70	1,217.70	4.95	4.14	-102.78	-264.30	-1,165.40	1,194.99	1,186.14	8.86	134.890		
1,300.00	1,300.00	1,317.70	1,317.70	5.32	4.50	-102.78	-264.30	-1,165.40	1,194.99	1,185.41	9.58	124.715		
1,400.00	1,400.00	1,417.70	1,417.70	5.68	4.86	-102.78	-264.30	-1,165.40	1,194.99	1,184.69	10.30	115.976		
1,500.00	1,500.00	1,526.84	1,526.84	6.05	5.25	-102.77	-264.21	-1,165.32	1,194.93	1,183.87	11.06	108.070		
1,600.00	1,599.98	1,678.25	1,678.13	6.45	5.79	-72.89	-260.18	-1,161.70	1,191.49	1,179.58	11.91	100.059		
1,700.00	1,699.84	1,828.76	1,828.04	6.96	6.32	-73.05	-250.28	-1,152.81	1,182.74	1,170.01	12.73	92.906		
1,800.00	1,799.49	1,951.77	1,949.97	7.31	6.77	-73.18	-238.20	-1,141.96	1,169.44	1,155.97	13.47	86.825		
1,900.00	1,899.11	2,050.80	2,048.03	7.64	7.13	-73.20	-227.95	-1,132.75	1,155.54	1,141.38	14.16	81.621		
2,000.00	1,998.73	2,149.83	2,146.10	8.00	7.50	-73.21	-217.69	-1,123.55	1,141.64	1,126.78	14.86	76.847		
2,100.00	2,098.35	2,248.86	2,244.16	8.36	7.87	-73.23	-207.44	-1,114.34	1,127.74	1,112.18	15.56	72.480		
2,200.00	2,197.97	2,347.89	2,342.23	8.72	8.24	-73.25	-197.19	-1,105.13	1,113.84	1,097.57	16.27	68.474		
2,300.00	2,297.59	2,446.91	2,440.30	9.08	8.61	-73.26	-186.94	-1,095.93	1,099.93	1,082.96	16.98	64.789		
2,400.00	2,397.21	2,545.94	2,538.36	9.44	8.99	-73.28	-176.69	-1,086.72	1,086.03	1,068.34	17.69	61.389		
2,500.00	2,496.83	2,644.97	2,636.43	9.80	9.37	-73.29	-166.44	-1,077.51	1,072.13	1,053.72	18.41	58.244		
2,600.00	2,596.45	2,744.00	2,734.49	10.16	9.75	-73.31	-156.18	-1,068.31	1,058.23	1,039.11	19.13	55.328		
2,700.00	2,696.07	2,843.03	2,832.56	10.52	10.13	-73.33	-145.93	-1,059.10	1,044.33	1,024.48	19.85	52.617		
2,800.00	2,795.69	2,942.06	2,930.62	10.89	10.51	-73.35	-135.68	-1,049.89	1,030.43	1,009.86	20.57	50.092		
2,900.00	2,895.31	3,041.09	3,028.69	11.25	10.89	-73.37	-125.43	-1,040.69	1,016.53	995.23	21.30	47.734		
3,000.00	2,994.93	3,140.11	3,126.75	11.62	11.28	-73.39	-115.18	-1,031.48	1,002.63	980.61	22.02	45.528		
3,100.00	3,094.55	3,239.14	3,224.82	11.98	11.66	-73.41	-104.93	-1,022.28	988.73	965.98	22.75	43.460		
3,200.00	3,194.17	3,338.17	3,322.88	12.35	12.05	-73.43	-94.67	-1,013.07	974.83	951.35	23.48	41.519		
3,300.00	3,293.79	3,437.20	3,420.95	12.71	12.44	-73.45	-84.42	-1,003.86	960.93	936.72	24.21	39.692		
3,400.00	3,393.41	3,536.23	3,519.01	13.08	12.82	-73.47	-74.17	-994.66	947.03	922.09	24.94	37.971		
3,500.00	3,493.04	3,635.26	3,617.08	13.45	13.21	-73.49	-63.92	-985.45	933.13	907.46	25.67	36.346		
3,600.00	3,592.66	3,734.29	3,715.15	13.81	13.60	-73.52	-53.67	-976.24	919.23	892.82	26.41	34.811		
3,700.00	3,692.28	3,833.31	3,813.21	14.18	13.99	-73.54	-43.42	-967.04	905.33	878.19	27.14	33.357		
3,800.00	3,791.90	3,932.34	3,911.28	14.55	14.38	-73.56	-33.16	-957.83	891.43	863.56	27.88	31.979		
3,900.00	3,891.52	4,031.37	4,009.34	14.91	14.77	-73.59	-22.91	-948.62	877.53	848.92	28.61	30.671		
4,000.00	3,991.14	4,130.40	4,107.41	15.28	15.16	-73.62	-12.66	-939.42	863.63	834.29	29.35	29.428		
4,100.00	4,090.76	4,229.43	4,205.47	15.65	15.55	-73.64	-2.41	-930.21	849.74	819.65	30.08	28.245		
4,200.00	4,190.38	4,328.46	4,303.54	16.02	15.95	-73.67	7.84	-921.01	835.84	805.02	30.82	27.119		
4,300.00	4,290.00	4,427.49	4,401.60	16.39	16.34	-73.70	18.09	-911.80	821.94	790.38	31.56	26.044		
4,400.00	4,389.62	4,526.51	4,499.67	16.75	16.73	-73.73	28.35	-902.59	808.04	775.74	32.30	25.018		
4,500.00	4,489.24	4,625.54	4,597.73	17.12	17.12	-73.76	38.60	-893.39	794.14	761.11	33.04	24.038		
4,600.00	4,588.86	4,724.57	4,695.80	17.49	17.52	-73.79	48.85	-884.18	780.25	746.47	33.78	23.101		
4,700.00	4,688.48	4,823.60	4,793.86	17.86	17.91	-73.83	59.10	-874.97	766.35	731.83	34.52	22.203		
4,800.00	4,788.10	4,922.63	4,891.93	18.23	18.30	-73.86	69.35	-865.77	752.45	717.20	35.26	21.343		
4,900.00	4,887.72	5,021.66	4,989.99	18.60	18.70	-73.90	79.60	-856.56	738.55	702.56	36.00	20.518		
5,000.00	4,987.34	5,120.69	5,088.06	18.97	19.09	-73.93	89.86	-847.35	724.66	687.92	36.74	19.726		
5,100.00	5,086.96	5,219.72	5,186.13	19.34	19.48	-73.97	100.11	-838.15	710.76	673.28	37.48	18.965		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19														Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HDGM														Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Reference		Highside	Offset Wellbore Centre		Distance		Minimum	Separation	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor			
5,200.00	5,186.58	5,318.74	5,284.19	19.71	19.88	-74.01	110.36	-828.94	696.87	658.65	38.22	18.234			
5,300.00	5,286.20	5,417.77	5,382.26	20.08	20.27	-74.05	120.61	-819.74	682.97	644.01	38.96	17.530			
5,400.00	5,385.82	5,516.80	5,480.32	20.45	20.67	-74.10	130.86	-810.53	669.07	629.37	39.70	16.852			
5,500.00	5,485.44	5,615.83	5,578.39	20.82	21.06	-74.14	141.11	-801.32	655.18	614.74	40.44	16.200			
5,600.00	5,585.06	5,714.86	5,676.45	21.19	21.45	-74.19	151.37	-792.12	641.29	600.10	41.19	15.570			
5,700.00	5,684.68	5,813.89	5,774.52	21.56	21.85	-74.24	161.62	-782.91	627.39	585.46	41.93	14.963			
5,800.00	5,784.30	5,912.92	5,872.58	21.93	22.24	-74.29	171.87	-773.70	613.50	570.83	42.67	14.377			
5,900.00	5,883.92	6,011.94	5,970.65	22.30	22.64	-74.34	182.12	-764.50	599.60	556.19	43.41	13.811			
6,000.00	5,983.54	6,110.97	6,068.71	22.67	23.03	-74.40	192.37	-755.29	585.71	541.55	44.16	13.264			
6,100.00	6,083.16	6,210.00	6,166.78	23.04	23.43	-74.46	202.62	-746.08	571.82	526.92	44.90	12.735			
6,200.00	6,182.78	6,309.03	6,264.84	23.41	23.83	-74.52	212.88	-736.88	557.93	512.29	45.64	12.223			
6,300.00	6,282.40	6,408.06	6,362.91	23.78	24.22	-74.59	223.13	-727.67	544.04	497.65	46.39	11.728			
6,400.00	6,382.02	6,507.09	6,460.98	24.15	24.62	-74.65	233.38	-718.47	530.15	483.02	47.13	11.248			
6,500.00	6,481.64	6,606.12	6,559.04	24.52	25.01	-74.73	243.63	-709.26	516.26	468.38	47.88	10.783			
6,600.00	6,581.26	6,705.14	6,657.11	24.89	25.41	-74.80	253.88	-700.05	502.37	453.75	48.62	10.333			
6,700.00	6,680.88	6,804.17	6,755.17	25.27	25.80	-74.88	264.13	-690.85	488.48	439.12	49.36	9.896			
6,800.00	6,780.50	6,903.20	6,853.24	25.64	26.20	-74.97	274.38	-681.64	474.60	424.49	50.11	9.472			
6,900.00	6,880.15	7,002.24	6,951.31	26.00	26.60	-74.91	284.64	-672.43	460.80	409.95	50.85	9.062			
7,000.00	6,979.99	7,101.35	7,049.46	26.38	26.99	-74.34	294.90	-663.22	447.75	396.17	51.58	8.681			
7,100.00	7,079.97	7,200.44	7,147.59	26.81	27.39	-73.34	305.16	-654.01	435.69	383.38	52.31	8.329			
7,200.00	7,179.97	7,299.47	7,245.65	27.19	27.78	-102.18	315.41	-644.80	424.31	371.26	53.05	7.999			
7,300.00	7,279.97	7,398.50	7,343.71	27.54	28.18	-101.05	325.66	-635.59	413.08	359.30	53.78	7.681			
7,400.00	7,379.97	7,497.52	7,441.78	27.89	28.58	-99.86	335.91	-626.39	402.02	347.50	54.51	7.375			
7,500.00	7,479.97	7,596.55	7,539.84	28.23	28.97	-98.60	346.16	-617.18	391.14	335.89	55.25	7.080			
7,600.00	7,579.97	7,695.58	7,637.91	28.58	29.37	-97.28	356.41	-607.97	380.45	324.47	55.99	6.795			
7,700.00	7,679.97	7,794.61	7,735.97	28.93	29.77	-95.88	366.66	-598.77	369.99	313.26	56.73	6.522			
7,800.00	7,779.97	7,892.14	7,832.57	29.28	30.16	-94.42	376.73	-589.73	359.79	302.30	57.49	6.259			
7,900.00	7,879.97	7,989.32	7,929.10	29.63	30.51	-93.21	384.71	-582.56	351.33	293.07	58.26	6.031			
8,000.00	7,979.97	8,075.09	8,014.53	29.97	30.85	-92.29	390.58	-577.29	345.28	286.28	59.00	5.853			
8,100.00	8,079.97	8,167.28	8,106.58	30.32	31.18	-91.69	394.28	-573.97	341.53	281.83	59.70	5.721			
8,200.00	8,179.97	8,259.70	8,198.97	30.67	31.50	-91.44	395.77	-572.63	340.04	279.67	60.37	5.633			
8,240.32	8,220.29	8,298.71	8,237.99	30.81	31.62	-91.44	395.81	-572.60	340.00	279.37	60.64	5.607			
8,300.00	8,279.97	8,358.39	8,297.67	31.02	31.82	-91.44	395.81	-572.60	340.00	278.96	61.05	5.569			
8,400.00	8,379.97	8,458.39	8,397.67	31.37	32.15	-91.44	395.81	-572.60	340.00	278.27	61.74	5.507			
8,500.00	8,479.97	8,558.39	8,497.67	31.72	32.48	-91.44	395.81	-572.60	340.00	277.58	62.43	5.446			
8,600.00	8,579.97	8,658.39	8,597.67	32.07	32.81	-91.44	395.81	-572.60	340.00	276.89	63.12	5.387			
8,700.00	8,679.96	8,758.38	8,697.66	32.41	33.14	88.74	395.81	-572.60	339.99	276.19	63.80	5.329			
8,770.21	8,749.72	8,828.15	8,767.42	32.73	33.37	90.00	395.81	-572.60	339.91	275.65	64.26	5.290 CC			
8,800.00	8,778.95	8,857.38	8,796.65	32.87	33.47	90.94	395.81	-572.60	339.96	275.50	64.45	5.275			
8,900.00	8,874.16	8,957.82	8,896.62	33.33	33.75	94.59	387.44	-572.59	341.06	276.01	65.05	5.243			
9,000.00	8,962.67	9,062.54	8,997.61	33.73	33.99	98.14	360.30	-572.55	343.53	278.01	65.52	5.243			
9,100.00	9,041.81	9,171.90	9,095.96	34.04	34.17	101.47	312.87	-572.48	347.11	281.36	65.75	5.279			
9,200.00	9,109.17	9,286.08	9,187.10	34.27	34.28	104.45	244.39	-572.38	351.35	285.69	65.66	5.351			
9,300.00	9,162.69	9,404.98	9,265.63	34.42	34.32	106.96	155.40	-572.26	355.66	290.38	65.28	5.448			
9,400.00	9,200.76	9,528.11	9,325.81	34.49	34.29	108.87	48.25	-572.10	359.41	294.62	64.79	5.547			
9,500.00	9,222.23	9,654.50	9,362.36	34.51	34.21	110.09	-72.47	-571.93	362.01	297.52	64.49	5.613			
9,600.00	9,227.10	9,776.86	9,372.12	34.51	34.11	110.54	-194.24	-571.76	362.98	298.36	64.62	5.617			
9,700.00	9,227.43	9,876.86	9,372.73	34.50	34.07	110.58	-294.24	-571.62	363.08	298.10	64.98	5.587			
9,800.00	9,227.77	9,976.86	9,373.35	34.50	34.20	110.62	-394.24	-571.47	363.17	297.72	65.45	5.549			
9,900.00	9,228.11	10,076.86	9,373.96	34.52	34.46	110.66	-494.23	-571.33	363.27	297.24	66.03	5.502			
10,000.00	9,228.44	10,176.86	9,374.57	34.64	34.79	110.70	-594.23	-571.19	363.37	296.65	66.72	5.446			
10,100.00	9,228.78	10,276.86	9,375.18	35.04	35.18	110.74	-694.23	-571.05	363.47	295.95	67.52	5.384			

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



Anticollision Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference													
Offset													
Semi Major Axis													
Distance													
Measured	Vertical	Measured	Vertical	Reference	Offset	Highside	Offset Wellbore Centre	Between	Between	Minimum	Separation	Warning	
Depth	Depth	Depth	Depth	(usft)	(usft)	Toolface	+N/-S	+E/-W	Centres	Ellipses	Separation		
(usft)	(usft)	(usft)	(usft)	(usft)	(usft)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
10,200.00	9,229.12	10,376.86	9,375.79	35.55	35.62	110.78	-794.23	-570.90	363.57	295.16	68.41	5.314	
10,300.00	9,229.45	10,476.86	9,376.40	36.11	36.10	110.82	-894.22	-570.76	363.67	294.26	69.40	5.240	
10,400.00	9,229.79	10,576.86	9,377.02	36.73	36.64	110.86	-994.22	-570.62	363.77	293.28	70.49	5.161	
10,500.00	9,230.13	10,676.86	9,377.63	37.39	37.21	110.90	-1,094.22	-570.47	363.86	292.20	71.66	5.077	
10,600.00	9,230.46	10,776.86	9,378.24	38.09	37.83	110.94	-1,194.22	-570.33	363.96	291.04	72.92	4.991	
10,700.00	9,230.80	10,876.86	9,378.85	38.83	38.50	110.98	-1,294.21	-570.19	364.06	289.80	74.26	4.903	
10,800.00	9,231.13	10,976.86	9,379.46	39.61	39.20	111.02	-1,394.21	-570.05	364.16	288.49	75.67	4.812	
10,900.00	9,231.47	11,076.86	9,380.07	40.43	39.94	111.06	-1,494.21	-569.90	364.26	287.11	77.16	4.721	
11,000.00	9,231.81	11,176.86	9,380.68	41.28	40.72	111.10	-1,594.21	-569.76	364.36	285.65	78.71	4.629	
11,100.00	9,232.14	11,276.86	9,381.30	42.17	41.53	111.14	-1,694.21	-569.62	364.46	284.14	80.32	4.538	
11,200.00	9,232.48	11,376.86	9,381.91	43.08	42.38	111.18	-1,794.20	-569.48	364.56	282.57	81.99	4.446	
11,300.00	9,232.82	11,476.86	9,382.52	44.03	43.25	111.22	-1,894.20	-569.33	364.66	280.94	83.72	4.356	
11,400.00	9,233.15	11,576.86	9,383.13	44.99	44.16	111.26	-1,994.20	-569.19	364.76	279.26	85.51	4.266	
11,500.00	9,233.49	11,676.86	9,383.74	45.99	45.09	111.30	-2,094.20	-569.05	364.86	277.53	87.34	4.178	
11,600.00	9,233.82	11,776.86	9,384.35	47.00	46.05	111.34	-2,194.19	-568.91	364.97	275.75	89.21	4.091	
11,700.00	9,234.16	11,876.86	9,384.97	48.04	47.03	111.38	-2,294.19	-568.76	365.07	273.94	91.13	4.006	
11,800.00	9,234.50	11,976.85	9,385.58	49.10	48.04	111.42	-2,394.19	-568.62	365.17	272.08	93.09	3.923	
11,900.00	9,234.83	12,076.85	9,386.19	50.18	49.06	111.46	-2,494.19	-568.48	365.27	270.18	95.09	3.842	
12,000.00	9,235.17	12,176.85	9,386.80	51.27	50.11	111.50	-2,594.18	-568.34	365.37	268.25	97.12	3.762	
12,100.00	9,235.51	12,276.85	9,387.41	52.38	51.17	111.54	-2,694.18	-568.19	365.47	266.29	99.18	3.685	
12,200.00	9,235.84	12,376.85	9,388.02	53.51	52.26	111.58	-2,794.18	-568.05	365.57	264.30	101.28	3.610	
12,300.00	9,236.18	12,476.85	9,388.63	54.65	53.36	111.62	-2,894.18	-567.91	365.68	262.28	103.40	3.537	
12,400.00	9,236.52	12,576.85	9,389.25	55.81	54.47	111.66	-2,994.17	-567.77	365.78	260.23	105.55	3.465	
12,500.00	9,236.85	12,676.85	9,389.86	56.98	55.60	111.70	-3,094.17	-567.62	365.88	258.16	107.73	3.396	
12,600.00	9,237.19	12,776.85	9,390.47	58.16	56.75	111.74	-3,194.17	-567.48	365.98	256.06	109.93	3.329	
12,700.00	9,237.52	12,876.85	9,391.08	59.35	57.91	111.78	-3,294.17	-567.34	366.09	253.94	112.15	3.264	
12,800.00	9,237.86	12,976.85	9,391.69	60.56	59.08	111.82	-3,394.17	-567.20	366.19	251.80	114.39	3.201	
12,900.00	9,238.20	13,076.85	9,392.30	61.77	60.26	111.86	-3,494.16	-567.05	366.29	249.64	116.65	3.140	
13,000.00	9,238.53	13,176.85	9,392.92	62.99	61.45	111.90	-3,594.16	-566.91	366.40	247.46	118.94	3.081	
13,100.00	9,238.87	13,276.85	9,393.53	64.22	62.66	111.94	-3,694.16	-566.77	366.50	245.27	121.23	3.023	
13,200.00	9,239.21	13,376.85	9,394.14	65.47	63.87	111.98	-3,794.16	-566.63	366.61	243.06	123.55	2.967	
13,300.00	9,239.54	13,476.85	9,394.75	66.71	65.09	112.02	-3,894.15	-566.48	366.71	240.83	125.88	2.913	
13,400.00	9,239.88	13,576.85	9,395.36	67.97	66.32	112.06	-3,994.15	-566.34	366.81	238.59	128.22	2.861	
13,500.00	9,240.21	13,676.85	9,395.97	69.23	67.56	112.10	-4,094.15	-566.20	366.92	236.34	130.58	2.810	
13,600.00	9,240.55	13,776.85	9,396.58	70.50	68.81	112.14	-4,194.15	-566.06	367.02	234.07	132.95	2.761	
13,700.00	9,240.89	13,876.85	9,397.20	71.78	70.06	112.18	-4,294.14	-565.91	367.13	231.79	135.33	2.713	
13,800.00	9,241.22	13,976.85	9,397.81	73.06	71.32	112.22	-4,394.14	-565.77	367.23	229.50	137.73	2.666	
13,900.00	9,241.56	14,076.85	9,398.42	74.35	72.59	112.26	-4,494.14	-565.63	367.34	227.20	140.13	2.621	
14,000.00	9,241.90	14,176.85	9,399.03	75.65	73.87	112.30	-4,594.14	-565.49	367.44	224.89	142.55	2.578	
14,100.00	9,242.23	14,276.85	9,399.64	76.94	75.15	112.34	-4,694.13	-565.34	367.55	222.58	144.97	2.535	
14,200.00	9,242.57	14,376.85	9,400.25	78.25	76.43	112.38	-4,794.13	-565.20	367.65	220.25	147.41	2.494	
14,300.00	9,242.91	14,476.85	9,400.86	79.56	77.72	112.42	-4,894.13	-565.06	367.76	217.91	149.85	2.454	
14,400.00	9,243.24	14,576.85	9,401.48	80.87	79.02	112.46	-4,994.13	-564.92	367.87	215.57	152.30	2.415	
14,500.00	9,243.58	14,676.84	9,402.09	82.19	80.32	112.50	-5,094.13	-564.77	367.97	213.22	154.75	2.378	
14,600.00	9,243.91	14,776.84	9,402.70	83.51	81.63	112.54	-5,194.12	-564.63	368.08	210.86	157.22	2.341	
14,700.00	9,244.25	14,876.84	9,403.31	84.84	82.94	112.58	-5,294.12	-564.49	368.18	208.49	159.69	2.306	
14,800.00	9,244.59	14,976.84	9,403.92	86.17	84.25	112.62	-5,394.12	-564.35	368.29	206.12	162.17	2.271	
14,900.00	9,244.92	15,076.84	9,404.53	87.50	85.57	112.66	-5,494.12	-564.20	368.40	203.74	164.65	2.237	
15,000.00	9,245.26	15,176.84	9,405.15	88.83	86.90	112.70	-5,594.11	-564.06	368.50	201.36	167.14	2.205	
15,100.00	9,245.60	15,276.84	9,405.76	90.17	88.22	112.74	-5,694.11	-563.92	368.61	198.97	169.64	2.173	
15,200.00	9,245.93	15,376.84	9,406.37	91.52	89.55	112.78	-5,794.11	-563.77	368.72	196.58	172.14	2.142	
15,300.00	9,246.27	15,476.84	9,406.98	92.86	90.89	112.81	-5,894.11	-563.63	368.83	194.18	174.64	2.112	

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 1-02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 702H - OH - Plan 1 02-15-19												Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM												Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum	Separation	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)	+N/S (usft)	+E/W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor	
15,400.00	9,246.60	15,576.84	9,407.59	94.21	92.22	112.85	-5,994.10	-563.49	368.93	191.78	177.15	2.083	
15,500.00	9,246.94	15,676.84	9,408.20	95.56	93.56	112.89	-6,094.10	-563.35	369.04	189.37	179.67	2.054	
15,600.00	9,247.28	15,776.84	9,408.81	96.91	94.91	112.93	-6,194.10	-563.20	369.15	186.96	182.19	2.026	
15,700.00	9,247.61	15,876.84	9,409.43	98.27	96.25	112.97	-6,294.10	-563.06	369.26	184.55	184.71	1.999	
15,800.00	9,247.95	15,976.84	9,410.04	99.63	97.60	113.01	-6,394.10	-562.92	369.37	182.13	187.24	1.973	
15,900.00	9,248.29	16,076.84	9,410.65	100.99	98.95	113.05	-6,494.09	-562.78	369.48	179.71	189.77	1.947	
16,000.00	9,248.62	16,176.84	9,411.26	102.35	100.30	113.09	-6,594.09	-562.63	369.58	177.29	192.30	1.922	
16,100.00	9,248.96	16,276.84	9,411.87	103.72	101.66	113.13	-6,694.09	-562.49	369.69	174.86	194.83	1.897	
16,200.00	9,249.29	16,376.84	9,412.48	105.08	103.02	113.17	-6,794.09	-562.35	369.80	172.43	197.37	1.874	
16,300.00	9,249.63	16,476.84	9,413.10	106.45	104.38	113.21	-6,894.08	-562.21	369.91	170.00	199.92	1.850	
16,400.00	9,249.97	16,576.84	9,413.71	107.82	105.74	113.25	-6,994.08	-562.06	370.02	167.56	202.46	1.828	
16,500.00	9,250.30	16,676.84	9,414.32	109.20	107.10	113.29	-7,094.08	-561.92	370.13	165.12	205.01	1.805	
16,600.00	9,250.64	16,776.84	9,414.93	110.57	108.47	113.32	-7,194.08	-561.78	370.24	162.68	207.56	1.784	
16,700.00	9,250.98	16,876.84	9,415.54	111.95	109.84	113.36	-7,294.07	-561.64	370.35	160.24	210.11	1.763	
16,800.00	9,251.31	16,976.84	9,416.15	113.33	111.21	113.40	-7,394.07	-561.49	370.46	157.80	212.66	1.742	
16,900.00	9,251.65	17,076.84	9,416.76	114.70	112.58	113.44	-7,494.07	-561.35	370.57	155.35	215.22	1.722	
17,000.00	9,251.99	17,176.84	9,417.38	116.09	113.95	113.48	-7,594.07	-561.21	370.68	152.90	217.78	1.702	
17,100.00	9,252.32	17,276.83	9,417.99	117.47	115.33	113.52	-7,694.06	-561.07	370.79	150.45	220.34	1.683	
17,200.00	9,252.66	17,376.83	9,418.60	118.85	116.71	113.56	-7,794.06	-560.92	370.90	148.00	222.90	1.664	
17,300.00	9,252.99	17,476.83	9,419.21	120.24	118.08	113.60	-7,894.06	-560.78	371.01	145.55	225.46	1.646	
17,400.00	9,253.33	17,576.83	9,419.82	121.62	119.46	113.64	-7,994.06	-560.64	371.13	143.10	228.03	1.628	
17,500.00	9,253.67	17,676.83	9,420.43	123.01	120.85	113.67	-8,094.06	-560.50	371.24	140.64	230.60	1.610	
17,600.00	9,254.00	17,776.83	9,421.05	124.40	122.23	113.71	-8,194.05	-560.35	371.35	138.18	233.16	1.593	
17,700.00	9,254.34	17,876.83	9,421.66	125.79	123.61	113.75	-8,294.05	-560.21	371.46	135.73	235.73	1.576	
17,800.00	9,254.68	17,976.83	9,422.27	127.18	125.00	113.79	-8,394.05	-560.07	371.57	133.27	238.30	1.559	
17,900.00	9,255.01	18,076.83	9,422.88	128.57	126.38	113.83	-8,494.05	-559.93	371.68	130.81	240.87	1.543	
18,000.00	9,255.35	18,176.83	9,423.49	129.96	127.77	113.87	-8,594.04	-559.78	371.80	128.35	243.45	1.527	
18,100.00	9,255.68	18,276.83	9,424.10	131.36	129.16	113.91	-8,694.04	-559.64	371.91	125.89	246.02	1.512	
18,200.00	9,256.02	18,376.83	9,424.71	132.75	130.55	113.95	-8,794.04	-559.50	372.02	123.43	248.59	1.497 Level 3	
18,300.00	9,256.36	18,476.83	9,425.33	134.15	131.94	113.98	-8,894.04	-559.36	372.13	120.97	251.17	1.482 Level 3	
18,400.00	9,256.69	18,576.83	9,425.94	135.55	133.33	114.02	-8,994.03	-559.21	372.25	118.50	253.74	1.467 Level 3	
18,500.00	9,257.03	18,676.83	9,426.55	136.94	134.73	114.06	-9,094.03	-559.07	372.36	116.04	256.32	1.453 Level 3	
18,600.00	9,257.37	18,776.83	9,427.16	138.34	136.12	114.10	-9,194.03	-558.93	372.47	113.58	258.90	1.439 Level 3	
18,700.00	9,257.70	18,876.83	9,427.77	139.74	137.52	114.14	-9,294.03	-558.79	372.59	111.11	261.47	1.425 Level 3	
18,800.00	9,258.04	18,976.83	9,428.38	141.14	138.91	114.18	-9,394.02	-558.64	372.70	108.65	264.05	1.411 Level 3	
18,900.00	9,258.38	19,076.83	9,429.00	142.54	140.31	114.22	-9,494.02	-558.50	372.81	106.18	266.63	1.398 Level 3	
19,000.00	9,258.71	19,176.83	9,429.61	143.95	141.71	114.25	-9,594.02	-558.36	372.93	103.72	269.21	1.385 Level 3	
19,100.00	9,259.05	19,276.83	9,430.22	145.35	143.11	114.29	-9,694.02	-558.22	373.04	101.25	271.79	1.373 Level 3	
19,200.00	9,259.38	19,376.83	9,430.83	146.75	144.51	114.33	-9,794.02	-558.07	373.16	98.79	274.37	1.360 Level 3	
19,300.00	9,259.72	19,476.83	9,431.44	148.16	145.91	114.37	-9,894.01	-557.93	373.27	96.32	276.95	1.348 Level 3	
19,383.13	9,260.00	19,559.96	9,431.95	149.33	147.07	114.40	-9,977.14	-557.81	373.38	94.27	279.09	1.338 Level 3, ES, SF	

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19													Offset Site Error:	0.00usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00usft
Reference		Offset		Semi-Major Axis			Distance				Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Offset Wellbore Centre +E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			Minimum Separation (usft)	
0.00	0.00	18.20	18.20	0.00	0.02	-102.24	-265.80	-1,225.40	1,253.90					
100.00	100.00	118.20	118.20	0.28	0.20	-102.24	-265.80	-1,225.40	1,253.90	1,253.45	0.45	2,804.884		
200.00	200.00	218.20	218.20	0.93	0.56	-102.24	-265.80	-1,225.40	1,253.90	1,252.51	1.38	905.526		
300.00	300.00	318.20	318.20	1.44	0.92	-102.24	-265.80	-1,225.40	1,253.90	1,251.68	2.21	566.904		
400.00	400.00	418.20	418.20	1.88	1.28	-102.24	-265.80	-1,225.40	1,253.90	1,250.91	2.99	419.854		
500.00	500.00	518.20	518.20	2.29	1.63	-102.24	-265.80	-1,225.40	1,253.90	1,250.16	3.74	335.262		
600.00	600.00	618.20	618.20	2.69	1.99	-102.24	-265.80	-1,225.40	1,253.90	1,249.41	4.48	279.728		
700.00	700.00	718.20	718.20	3.08	2.35	-102.24	-265.80	-1,225.40	1,253.90	1,248.68	5.22	240.282		
800.00	800.00	818.20	818.20	3.46	2.71	-102.24	-265.80	-1,225.40	1,253.90	1,247.95	5.95	210.738		
900.00	900.00	918.20	918.20	3.83	3.07	-102.24	-265.80	-1,225.40	1,253.90	1,247.22	6.68	187.747		
1,000.00	1,000.00	1,018.20	1,018.20	4.21	3.43	-102.24	-265.80	-1,225.40	1,253.90	1,246.49	7.41	169.328		
1,100.00	1,100.00	1,118.20	1,118.20	4.58	3.78	-102.24	-265.80	-1,225.40	1,253.90	1,245.77	8.13	154.230		
1,200.00	1,200.00	1,218.20	1,218.20	4.95	4.14	-102.24	-265.80	-1,225.40	1,253.90	1,245.04	8.85	141.624		
1,300.00	1,300.00	1,318.20	1,318.20	5.32	4.50	-102.24	-265.80	-1,225.40	1,253.90	1,244.32	9.58	130.936		
1,400.00	1,400.00	1,418.20	1,418.20	5.68	4.86	-102.24	-265.80	-1,225.40	1,253.90	1,243.60	10.30	121.757		
1,500.00	1,500.00	1,519.96	1,519.96	6.05	5.22	-102.24	-265.73	-1,225.40	1,253.88	1,242.86	11.03	113.723		
1,600.00	1,599.98	1,629.59	1,629.55	6.45	5.62	-72.29	-262.87	-1,225.43	1,252.83	1,241.08	11.74	106.686		
1,700.00	1,699.84	1,739.11	1,738.84	6.96	6.01	-72.28	-255.83	-1,225.51	1,249.94	1,237.49	12.46	100.352		
1,800.00	1,799.49	1,844.27	1,843.48	7.31	6.39	-72.23	-245.48	-1,225.62	1,245.45	1,232.29	13.16	94.662		
1,900.00	1,899.11	1,944.14	1,942.80	7.64	6.75	-72.14	-235.05	-1,225.73	1,240.71	1,226.86	13.85	89.568		
2,000.00	1,998.73	2,044.01	2,042.12	8.00	7.11	-72.05	-224.62	-1,225.85	1,235.97	1,221.41	14.56	84.901		
2,100.00	2,098.35	2,143.88	2,141.45	8.36	7.47	-71.96	-214.18	-1,225.96	1,231.23	1,215.97	15.27	80.643		
2,200.00	2,197.97	2,243.74	2,240.77	8.72	7.84	-71.87	-203.75	-1,226.07	1,226.50	1,210.52	15.98	76.744		
2,300.00	2,297.59	2,343.61	2,340.09	9.08	8.21	-71.77	-193.32	-1,226.19	1,221.77	1,205.07	16.70	73.164		
2,400.00	2,397.21	2,443.48	2,439.41	9.44	8.57	-71.68	-182.88	-1,226.30	1,217.05	1,199.63	17.42	69.867		
2,500.00	2,496.83	2,543.35	2,538.73	9.80	8.94	-71.59	-172.45	-1,226.41	1,212.33	1,194.18	18.14	66.822		
2,600.00	2,596.45	2,643.22	2,638.06	10.16	9.32	-71.49	-162.02	-1,226.53	1,207.61	1,188.74	18.87	64.003		
2,700.00	2,696.07	2,743.09	2,737.38	10.52	9.69	-71.39	-151.58	-1,226.64	1,202.89	1,183.30	19.60	61.386		
2,800.00	2,795.69	2,842.95	2,836.70	10.89	10.06	-71.30	-141.15	-1,226.75	1,198.18	1,177.85	20.32	58.952		
2,900.00	2,895.31	2,942.82	2,936.02	11.25	10.43	-71.20	-130.72	-1,226.87	1,193.47	1,172.42	21.06	56.681		
3,000.00	2,994.93	3,042.69	3,035.34	11.62	10.81	-71.10	-120.28	-1,226.98	1,188.77	1,166.98	21.79	54.560		
3,100.00	3,094.55	3,142.56	3,134.66	11.98	11.18	-71.00	-109.85	-1,227.09	1,184.06	1,161.54	22.52	52.573		
3,200.00	3,194.17	3,242.43	3,233.99	12.35	11.56	-70.90	-99.42	-1,227.20	1,179.37	1,156.11	23.26	50.710		
3,300.00	3,293.79	3,342.30	3,333.31	12.71	11.93	-70.80	-88.98	-1,227.32	1,174.67	1,150.68	23.99	48.958		
3,400.00	3,393.41	3,442.16	3,432.63	13.08	12.31	-70.70	-78.55	-1,227.43	1,169.98	1,145.25	24.73	47.309		
3,500.00	3,493.04	3,542.03	3,531.95	13.45	12.68	-70.60	-68.12	-1,227.54	1,165.29	1,139.83	25.47	45.754		
3,600.00	3,592.66	3,641.90	3,631.27	13.81	13.06	-70.49	-57.69	-1,227.66	1,160.61	1,134.40	26.21	44.286		
3,700.00	3,692.28	3,741.77	3,730.60	14.18	13.43	-70.39	-47.25	-1,227.77	1,155.93	1,128.98	26.95	42.896		
3,800.00	3,791.90	3,841.64	3,829.92	14.55	13.81	-70.29	-36.82	-1,227.88	1,151.26	1,123.57	27.69	41.580		
3,900.00	3,891.52	3,941.51	3,929.24	14.91	14.19	-70.18	-26.39	-1,228.00	1,146.58	1,118.15	28.43	40.332		
4,000.00	3,991.14	4,041.37	4,028.56	15.28	14.57	-70.07	-15.95	-1,228.11	1,141.92	1,112.75	29.17	39.147		
4,100.00	4,090.76	4,141.24	4,127.88	15.65	14.94	-69.97	-5.52	-1,228.22	1,137.25	1,107.34	29.91	38.020		
4,200.00	4,190.38	4,241.11	4,227.20	16.02	15.32	-69.86	4.91	-1,228.34	1,132.59	1,101.94	30.65	36.946		
4,300.00	4,290.00	4,340.98	4,326.53	16.39	15.70	-69.75	15.35	-1,228.45	1,127.94	1,096.54	31.40	35.924		
4,400.00	4,389.62	4,440.85	4,425.85	16.75	16.08	-69.64	25.78	-1,228.56	1,123.28	1,091.14	32.14	34.948		
4,500.00	4,489.24	4,540.72	4,525.17	17.12	16.46	-69.53	36.21	-1,228.68	1,118.64	1,085.75	32.89	34.016		
4,600.00	4,588.86	4,640.58	4,624.49	17.49	16.83	-69.41	46.65	-1,228.79	1,113.99	1,080.36	33.63	33.125		
4,700.00	4,688.48	4,740.45	4,723.81	17.86	17.21	-69.30	57.08	-1,228.90	1,109.35	1,074.98	34.37	32.272		
4,800.00	4,788.10	4,840.32	4,823.13	18.23	17.59	-69.19	67.51	-1,229.02	1,104.72	1,069.60	35.12	31.456		
4,900.00	4,887.72	4,940.19	4,922.46	18.60	17.97	-69.07	77.95	-1,229.13	1,100.09	1,064.22	35.86	30.673		
5,000.00	4,987.34	5,040.06	5,021.78	18.97	18.35	-68.96	88.38	-1,229.24	1,095.46	1,058.85	36.61	29.922		
5,100.00	5,086.96	5,139.93	5,121.10	19.34	18.73	-68.84	98.81	-1,229.35	1,090.84	1,053.49	37.36	29.201		

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19														Offset Site Error:	0.00 usft
Survey Program 0-MWD-HDGM														Offset Well Error:	0.00 usft
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference Offset (usft)	Semi Major Axis Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning		
5,200.00	5,186.58	5,239.79	5,220.42	19.71	19.11	-68.72	109.25	-1,229.47	1,086.23	1,048.12	38.10	28.508			
5,300.00	5,286.20	5,339.66	5,319.74	20.08	19.49	-68.60	119.68	-1,229.58	1,081.61	1,042.76	38.85	27.842			
5,400.00	5,385.82	5,439.53	5,419.07	20.45	19.87	-68.48	130.11	-1,229.69	1,077.01	1,037.41	39.60	27.200			
5,500.00	5,485.44	5,539.40	5,518.39	20.82	20.25	-68.36	140.54	-1,229.81	1,072.40	1,032.06	40.34	26.583			
5,600.00	5,585.06	5,639.27	5,617.71	21.19	20.63	-68.24	150.98	-1,229.92	1,067.81	1,026.72	41.09	25.988			
5,700.00	5,684.68	5,739.14	5,717.03	21.56	21.01	-68.12	161.41	-1,230.03	1,063.21	1,021.38	41.84	25.414			
5,800.00	5,784.30	5,839.00	5,816.35	21.93	21.39	-67.99	171.84	-1,230.15	1,058.62	1,016.04	42.58	24.860			
5,900.00	5,883.92	5,938.87	5,915.67	22.30	21.77	-67.87	182.28	-1,230.26	1,054.04	1,010.71	43.33	24.326			
6,000.00	5,983.54	6,038.74	6,015.00	22.67	22.15	-67.74	192.71	-1,230.37	1,049.46	1,005.38	44.08	23.809			
6,100.00	6,083.16	6,138.61	6,114.32	23.04	22.53	-67.62	203.14	-1,230.49	1,044.89	1,000.06	44.83	23.310			
6,200.00	6,182.78	6,238.48	6,213.64	23.41	22.91	-67.49	213.58	-1,230.60	1,040.32	994.75	45.57	22.827			
6,300.00	6,282.40	6,338.35	6,312.96	23.78	23.29	-67.36	224.01	-1,230.71	1,035.76	989.44	46.32	22.360			
6,400.00	6,382.02	6,438.21	6,412.28	24.15	23.67	-67.23	234.44	-1,230.83	1,031.20	984.13	47.07	21.908			
6,500.00	6,481.64	6,538.08	6,511.61	24.52	24.05	-67.10	244.88	-1,230.94	1,026.65	978.83	47.82	21.470			
6,600.00	6,581.26	6,637.95	6,610.93	24.89	24.43	-66.96	255.31	-1,231.05	1,022.10	973.54	48.57	21.046			
6,700.00	6,680.88	6,737.82	6,710.25	25.27	24.81	-66.83	265.74	-1,231.17	1,017.56	968.25	49.31	20.635			
6,800.00	6,780.50	6,837.69	6,809.57	25.64	25.19	-66.69	276.18	-1,231.28	1,013.03	962.97	50.06	20.235			
6,900.00	6,880.15	6,937.55	6,908.89	26.00	25.57	-66.51	286.61	-1,231.39	1,008.63	957.82	50.81	19.852			
7,000.00	6,979.99	7,037.35	7,008.14	26.38	25.95	-66.14	297.03	-1,231.50	1,005.41	953.86	51.54	19.506			
7,100.00	7,079.97	7,136.96	7,107.21	26.81	26.33	-65.62	307.44	-1,231.62	1,003.65	951.38	52.27	19.203			
7,200.00	7,179.97	7,236.41	7,206.11	27.19	26.70	-94.95	317.83	-1,231.73	1,002.80	949.81	52.99	18.924			
7,300.00	7,279.97	7,335.87	7,305.02	27.54	27.08	-94.36	328.22	-1,231.84	1,002.06	948.35	53.71	18.657			
7,400.00	7,379.97	7,435.32	7,403.93	27.89	27.46	-93.76	338.61	-1,231.96	1,001.43	947.00	54.43	18.398			
7,500.00	7,479.97	7,534.77	7,502.84	28.23	27.84	-93.17	349.00	-1,232.07	1,000.91	945.75	55.15	18.147			
7,600.00	7,579.97	7,634.22	7,601.75	28.58	28.22	-92.57	359.39	-1,232.18	1,000.50	944.62	55.88	17.905			
7,700.00	7,679.97	7,733.18	7,700.22	28.93	28.59	-92.02	369.12	-1,232.29	1,000.21	943.61	56.59	17.673			
7,800.00	7,779.97	7,832.23	7,799.05	29.28	28.96	-91.64	375.73	-1,232.36	1,000.07	942.76	57.31	17.451			
7,900.00	7,879.97	7,931.62	7,898.38	29.63	29.31	-91.46	378.92	-1,232.39	1,000.01	942.01	58.01	17.239			
7,957.61	7,937.57	7,989.01	7,955.77	29.83	29.51	-91.44	379.24	-1,232.40	1,000.01	941.60	58.41	17.121			
8,000.00	7,979.97	8,031.41	7,998.17	29.97	29.65	-91.44	379.24	-1,232.40	1,000.01	941.31	58.70	17.035			
8,100.00	8,079.97	8,131.41	8,098.17	30.32	29.99	-91.44	379.24	-1,232.40	1,000.01	940.61	59.40	16.835			
8,200.00	8,179.97	8,231.41	8,198.17	30.67	30.34	-91.44	379.24	-1,232.40	1,000.01	939.91	60.10	16.640			
8,300.00	8,279.97	8,331.41	8,298.17	31.02	30.68	-91.44	379.24	-1,232.40	1,000.01	939.22	60.79	16.450			
8,400.00	8,379.97	8,431.41	8,398.17	31.37	31.02	-91.44	379.24	-1,232.40	1,000.01	938.52	61.49	16.263			
8,500.00	8,479.97	8,531.41	8,498.17	31.72	31.36	-91.44	379.24	-1,232.40	1,000.01	937.82	62.19	16.081			
8,600.00	8,579.97	8,631.41	8,598.17	32.07	31.71	-91.44	379.24	-1,232.40	1,000.01	937.13	62.88	15.903			
8,700.00	8,679.96	8,731.40	8,698.16	32.41	32.05	88.68	379.24	-1,232.40	1,000.00	936.42	63.57	15.730			
8,800.00	8,778.95	8,830.40	8,797.15	32.87	32.39	89.45	379.24	-1,232.40	999.78	935.59	64.19	15.575			
8,841.80	8,819.38	8,870.83	8,837.58	33.06	32.52	90.00	378.53	-1,232.40	999.73	935.32	64.41	15.520 CC			
8,900.00	8,874.16	8,928.01	8,894.45	33.33	32.68	90.78	372.84	-1,232.39	999.83	935.12	64.71	15.452			
9,000.00	8,962.67	9,029.71	8,993.14	33.73	32.93	92.12	348.86	-1,232.35	1,000.46	935.32	65.14	15.359			
9,100.00	9,041.81	9,136.23	9,090.26	34.04	33.13	93.44	305.48	-1,232.29	1,001.63	936.15	65.48	15.296			
9,200.00	9,109.17	9,248.01	9,181.70	34.27	33.29	94.67	241.49	-1,232.20	1,003.22	937.48	65.74	15.261			
9,300.00	9,162.69	9,365.25	9,262.36	34.42	33.42	95.79	156.69	-1,232.08	1,005.02	939.11	65.91	15.248			
9,400.00	9,200.76	9,487.77	9,326.40	34.49	33.52	96.72	52.52	-1,231.93	1,006.79	940.74	66.05	15.243			
9,500.00	9,222.23	9,614.85	9,367.89	34.51	33.62	97.42	-67.33	-1,231.76	1,008.24	942.03	66.21	15.228			
9,600.00	9,227.10	9,745.22	9,382.00	34.51	33.73	97.79	-196.65	-1,231.58	1,009.04	942.59	66.45	15.184			
9,601.51	9,227.10	9,745.44	9,382.03	34.51	33.73	97.79	-196.87	-1,231.58	1,009.05	942.59	66.46	15.184			
9,700.00	9,227.43	9,843.94	9,382.45	34.50	33.85	97.79	-295.36	-1,231.44	1,009.06	942.26	66.80	15.106			
9,800.00	9,227.77	9,943.94	9,382.88	34.50	34.03	97.80	-395.36	-1,231.30	1,009.08	941.81	67.27	15.001			
9,900.00	9,228.11	10,043.94	9,383.30	34.52	34.27	97.80	-495.36	-1,231.16	1,009.09	941.24	67.85	14.873			
10,000.00	9,228.44	10,143.94	9,383.73	34.64	34.57	97.81	-595.36	-1,231.02	1,009.10	940.56	68.55	14.721			

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

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 703H - OH - Plan 1 02-15-19														Offset Site Error:	0.00 usft
Survey Program: 0-MWD-HDGM														Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor			
10,100.00	9,228.78	10,243.94	9,384.16	35.04	34.93	97.81	-695.36	-1,230.88	1,009.12	939.76	69.36	14.550			
10,200.00	9,229.12	10,343.94	9,384.59	35.55	35.34	97.82	-795.36	-1,230.73	1,009.13	938.86	70.27	14.360			
10,300.00	9,229.45	10,443.94	9,385.02	36.11	35.81	97.82	-895.36	-1,230.59	1,009.15	937.86	71.29	14.155			
10,400.00	9,229.79	10,543.94	9,385.45	36.73	36.32	97.83	-995.36	-1,230.45	1,009.16	936.75	72.41	13.937			
10,500.00	9,230.13	10,643.94	9,385.87	37.39	36.89	97.83	-1,095.36	-1,230.31	1,009.18	935.55	73.62	13.708			
10,600.00	9,230.46	10,743.94	9,386.30	38.09	37.50	97.84	-1,195.35	-1,230.17	1,009.19	934.27	74.92	13.470			
10,700.00	9,230.80	10,843.94	9,386.73	38.83	38.15	97.84	-1,295.35	-1,230.03	1,009.20	932.89	76.31	13.225			
10,800.00	9,231.13	10,943.94	9,387.16	39.61	38.85	97.85	-1,395.35	-1,229.88	1,009.22	931.44	77.78	12.976			
10,900.00	9,231.47	11,043.94	9,387.59	40.43	39.59	97.85	-1,495.35	-1,229.74	1,009.23	929.91	79.32	12.723			
11,000.00	9,231.81	11,143.94	9,388.01	41.28	40.37	97.86	-1,595.35	-1,229.60	1,009.25	928.31	80.94	12.469			
11,100.00	9,232.14	11,243.94	9,388.44	42.17	41.18	97.86	-1,695.35	-1,229.46	1,009.26	926.64	82.62	12.216			
11,200.00	9,232.48	11,343.94	9,388.87	43.08	42.03	97.87	-1,795.35	-1,229.32	1,009.28	924.91	84.37	11.963			
11,300.00	9,232.82	11,443.94	9,389.30	44.03	42.91	97.87	-1,895.35	-1,229.18	1,009.29	923.12	86.17	11.712			
11,400.00	9,233.15	11,543.94	9,389.73	44.99	43.82	97.88	-1,995.35	-1,229.03	1,009.31	921.27	88.04	11.465			
11,500.00	9,233.49	11,643.94	9,390.15	45.99	44.75	97.89	-2,095.34	-1,228.89	1,009.32	919.37	89.95	11.221			
11,600.00	9,233.82	11,743.94	9,390.58	47.00	45.71	97.89	-2,195.34	-1,228.75	1,009.34	917.42	91.92	10.981			
11,700.00	9,234.16	11,843.94	9,391.01	48.04	46.70	97.90	-2,295.34	-1,228.61	1,009.35	915.42	93.93	10.746			
11,800.00	9,234.50	11,943.94	9,391.44	49.10	47.71	97.90	-2,395.34	-1,228.47	1,009.36	913.39	95.98	10.517			
11,900.00	9,234.83	12,043.94	9,391.87	50.18	48.74	97.91	-2,495.34	-1,228.33	1,009.38	911.31	98.07	10.292			
12,000.00	9,235.17	12,143.94	9,392.30	51.27	49.79	97.91	-2,595.34	-1,228.18	1,009.39	909.19	100.20	10.073			
12,100.00	9,235.51	12,243.94	9,392.72	52.38	50.86	97.92	-2,695.34	-1,228.04	1,009.41	907.04	102.37	9.860			
12,200.00	9,235.84	12,343.94	9,393.15	53.51	51.95	97.92	-2,795.34	-1,227.90	1,009.42	904.85	104.57	9.653			
12,300.00	9,236.18	12,443.94	9,393.58	54.65	53.06	97.93	-2,895.34	-1,227.76	1,009.44	902.63	106.81	9.451			
12,400.00	9,236.52	12,543.94	9,394.01	55.81	54.18	97.93	-2,995.34	-1,227.62	1,009.45	900.38	109.07	9.255			
12,500.00	9,236.85	12,643.94	9,394.44	56.98	55.32	97.94	-3,095.33	-1,227.48	1,009.47	898.11	111.36	9.065			
12,600.00	9,237.19	12,743.94	9,394.86	58.16	56.47	97.94	-3,195.33	-1,227.34	1,009.48	895.81	113.67	8.881			
12,700.00	9,237.52	12,843.94	9,395.29	59.35	57.63	97.95	-3,295.33	-1,227.19	1,009.50	893.48	116.01	8.702			
12,800.00	9,237.86	12,943.94	9,395.72	60.56	58.81	97.95	-3,395.33	-1,227.05	1,009.51	891.14	118.37	8.528			
12,900.00	9,238.20	13,043.94	9,396.15	61.77	59.99	97.96	-3,495.33	-1,226.91	1,009.53	888.77	120.76	8.360			
13,000.00	9,238.53	13,143.94	9,396.58	62.99	61.19	97.96	-3,595.33	-1,226.77	1,009.54	886.38	123.16	8.197			
13,100.00	9,238.87	13,243.94	9,397.00	64.22	62.40	97.97	-3,695.33	-1,226.63	1,009.55	883.97	125.59	8.039			
13,200.00	9,239.21	13,343.94	9,397.43	65.47	63.62	97.97	-3,795.33	-1,226.49	1,009.57	881.54	128.03	7.886			
13,300.00	9,239.54	13,443.94	9,397.86	66.71	64.85	97.98	-3,895.33	-1,226.34	1,009.58	879.10	130.49	7.737			
13,400.00	9,239.88	13,543.94	9,398.29	67.97	66.08	97.98	-3,995.32	-1,226.20	1,009.60	876.64	132.96	7.593			
13,500.00	9,240.21	13,643.94	9,398.72	69.23	67.33	97.99	-4,095.32	-1,226.06	1,009.61	874.16	135.45	7.454			
13,600.00	9,240.55	13,743.94	9,399.15	70.50	68.58	97.99	-4,195.32	-1,225.92	1,009.63	871.67	137.96	7.319			
13,700.00	9,240.89	13,843.94	9,399.57	71.78	69.84	98.00	-4,295.32	-1,225.78	1,009.64	869.17	140.47	7.187			
13,800.00	9,241.22	13,943.94	9,400.00	73.06	71.10	98.00	-4,395.32	-1,225.64	1,009.66	866.65	143.00	7.060			
13,900.00	9,241.56	14,043.94	9,400.43	74.35	72.37	98.01	-4,495.32	-1,225.49	1,009.67	864.13	145.55	6.937			
14,000.00	9,241.90	14,143.94	9,400.86	75.65	73.65	98.01	-4,595.32	-1,225.35	1,009.69	861.59	148.10	6.818			
14,100.00	9,242.23	14,243.94	9,401.29	76.94	74.94	98.02	-4,695.32	-1,225.21	1,009.70	859.03	150.67	6.702			
14,200.00	9,242.57	14,343.94	9,401.71	78.25	76.23	98.02	-4,795.32	-1,225.07	1,009.72	856.47	153.24	6.589			
14,300.00	9,242.91	14,443.94	9,402.14	79.56	77.52	98.03	-4,895.32	-1,224.93	1,009.73	853.90	155.83	6.480			
14,400.00	9,243.24	14,543.94	9,402.57	80.87	78.82	98.03	-4,995.31	-1,224.79	1,009.75	851.32	158.42	6.374			
14,500.00	9,243.58	14,643.94	9,403.00	82.19	80.13	98.04	-5,095.31	-1,224.65	1,009.76	848.73	161.03	6.271			
14,600.00	9,243.91	14,743.94	9,403.43	83.51	81.44	98.04	-5,195.31	-1,224.50	1,009.78	846.13	163.64	6.171			
14,700.00	9,244.25	14,843.94	9,403.86	84.84	82.75	98.05	-5,295.31	-1,224.36	1,009.79	843.53	166.26	6.073			
14,800.00	9,244.59	14,943.94	9,404.28	86.17	84.07	98.06	-5,395.31	-1,224.22	1,009.80	840.91	168.89	5.979			
14,900.00	9,244.92	15,043.94	9,404.71	87.50	85.39	98.06	-5,495.31	-1,224.08	1,009.82	838.29	171.53	5.887			
15,000.00	9,245.26	15,143.94	9,405.14	88.83	86.72	98.07	-5,595.31	-1,223.94	1,009.83	835.66	174.17	5.798			
15,100.00	9,245.60	15,243.94	9,405.57	90.17	88.05	98.07	-5,695.31	-1,223.80	1,009.85	833.03	176.82	5.711			
15,200.00	9,245.93	15,343.94	9,406.00	91.52	89.38	98.08	-5,795.31	-1,223.65	1,009.86	830.39	179.48	5.627			

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

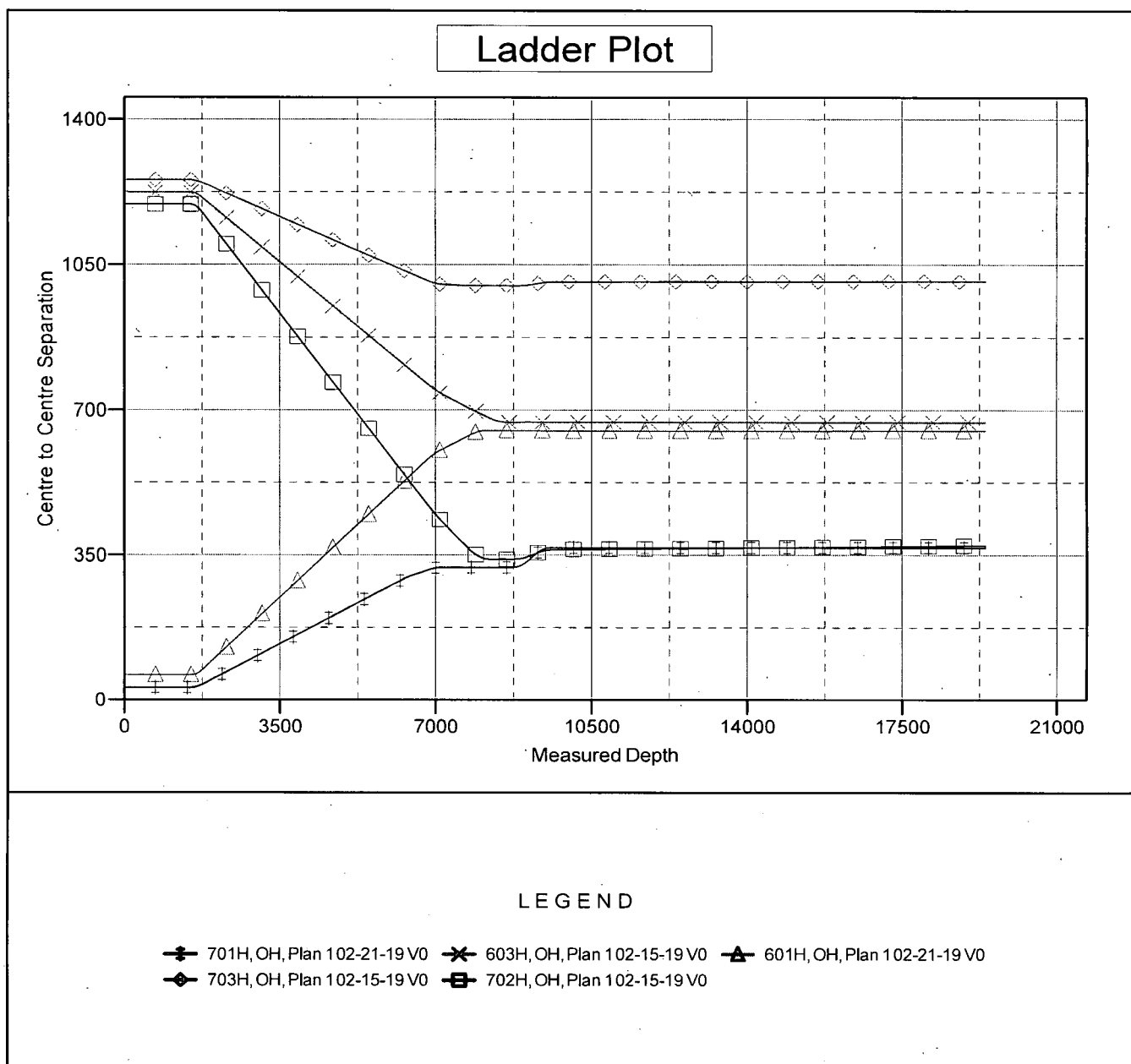
Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	Survey 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 1-02-21-19	Offset TVD Reference:	Offset Datum

Offset Design Quien Sabe Fed Com - 703H - OH - Plan 1-02-15-19													Offset Site Error:	0.00 usft
Survey Program: 0-MVD+HDGM													Offset Well Error:	0.00 usft
Reference	Offset	Semi Major Axis		Distance		Minimum Separation		Warning						
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre N-S (usft)	Offset Wellbore Centre E-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
15,300.00	9,246.27	15,443.94	9,406.42	92.86	90.72	98.08	-5,895.30	-1,223.51	1,009.88	827.74	182.14	5.545		
15,400.00	9,246.60	15,543.94	9,406.85	94.21	92.06	98.09	-5,995.30	-1,223.37	1,009.89	825.09	184.81	5.465		
15,500.00	9,246.94	15,643.94	9,407.28	95.56	93.40	98.09	-6,095.30	-1,223.23	1,009.91	822.43	187.48	5.387		
15,600.00	9,247.28	15,743.94	9,407.71	96.91	94.75	98.10	-6,195.30	-1,223.09	1,009.92	819.76	190.16	5.311		
15,700.00	9,247.61	15,843.94	9,408.14	98.27	96.10	98.10	-6,295.30	-1,222.95	1,009.94	817.09	192.84	5.237		
15,800.00	9,247.95	15,943.94	9,408.56	99.63	97.45	98.11	-6,395.30	-1,222.80	1,009.95	814.42	195.53	5.165		
15,900.00	9,248.29	16,043.93	9,408.99	100.99	98.80	98.11	-6,495.30	-1,222.66	1,009.97	811.74	198.23	5.095		
16,000.00	9,248.62	16,143.93	9,409.42	102.35	100.16	98.12	-6,595.30	-1,222.52	1,009.98	809.06	200.93	5.027		
16,100.00	9,248.96	16,243.93	9,409.85	103.72	101.51	98.12	-6,695.30	-1,222.38	1,010.00	806.37	203.63	4.960		
16,200.00	9,249.29	16,343.93	9,410.28	105.08	102.87	98.13	-6,795.30	-1,222.24	1,010.01	803.68	206.34	4.895		
16,300.00	9,249.63	16,443.93	9,410.71	106.45	104.24	98.13	-6,895.29	-1,222.10	1,010.03	800.98	209.05	4.832		
16,400.00	9,249.97	16,543.93	9,411.13	107.82	105.60	98.14	-6,995.29	-1,221.96	1,010.04	798.28	211.76	4.770		
16,500.00	9,250.30	16,643.93	9,411.56	109.20	106.97	98.14	-7,095.29	-1,221.81	1,010.06	795.58	214.48	4.709		
16,600.00	9,250.64	16,743.93	9,411.99	110.57	108.34	98.15	-7,195.29	-1,221.67	1,010.07	792.87	217.20	4.650		
16,700.00	9,250.98	16,843.93	9,412.42	111.95	109.71	98.15	-7,295.29	-1,221.53	1,010.09	790.16	219.93	4.593		
16,800.00	9,251.31	16,943.93	9,412.85	113.33	111.08	98.16	-7,395.29	-1,221.39	1,010.10	787.44	222.66	4.537		
16,900.00	9,251.65	17,043.93	9,413.27	114.70	112.45	98.16	-7,495.29	-1,221.25	1,010.12	784.73	225.39	4.482		
17,000.00	9,251.99	17,143.93	9,413.70	116.09	113.83	98.17	-7,595.29	-1,221.11	1,010.13	782.01	228.13	4.428		
17,100.00	9,252.32	17,243.93	9,414.13	117.47	115.21	98.17	-7,695.29	-1,220.96	1,010.15	779.28	230.87	4.375		
17,200.00	9,252.66	17,343.93	9,414.56	118.85	116.59	98.18	-7,795.28	-1,220.82	1,010.16	776.56	233.61	4.324		
17,300.00	9,252.99	17,443.93	9,414.99	120.24	117.97	98.18	-7,895.28	-1,220.68	1,010.18	773.83	236.35	4.274		
17,400.00	9,253.33	17,543.93	9,415.41	121.62	119.35	98.19	-7,995.28	-1,220.54	1,010.19	771.10	239.10	4.225		
17,500.00	9,253.67	17,643.93	9,415.84	123.01	120.73	98.19	-8,095.28	-1,220.40	1,010.21	768.36	241.85	4.177		
17,600.00	9,254.00	17,743.93	9,416.27	124.40	122.12	98.20	-8,195.28	-1,220.26	1,010.22	765.62	244.60	4.130		
17,700.00	9,254.34	17,843.93	9,416.70	125.79	123.50	98.20	-8,295.28	-1,220.11	1,010.24	762.89	247.35	4.084		
17,800.00	9,254.68	17,943.93	9,417.13	127.18	124.89	98.21	-8,395.28	-1,219.97	1,010.25	760.14	250.11	4.039		
17,900.00	9,255.01	18,043.93	9,417.56	128.57	126.28	98.21	-8,495.28	-1,219.83	1,010.27	757.40	252.87	3.995		
18,000.00	9,255.35	18,143.93	9,417.98	129.96	127.67	98.22	-8,595.28	-1,219.69	1,010.28	754.66	255.63	3.952		
18,100.00	9,255.68	18,243.93	9,418.41	131.36	129.06	98.22	-8,695.28	-1,219.55	1,010.30	751.91	258.39	3.910		
18,200.00	9,256.02	18,343.93	9,418.84	132.75	130.45	98.23	-8,795.27	-1,219.41	1,010.31	749.16	261.16	3.869		
18,300.00	9,256.36	18,443.93	9,419.27	134.15	131.84	98.23	-8,895.27	-1,219.27	1,010.33	746.41	263.92	3.828		
18,400.00	9,256.69	18,543.93	9,419.70	135.55	133.23	98.24	-8,995.27	-1,219.12	1,010.34	743.65	266.69	3.788		
18,500.00	9,257.03	18,643.93	9,420.12	136.94	134.63	98.25	-9,095.27	-1,218.98	1,010.36	740.90	269.46	3.750		
18,600.00	9,257.37	18,743.93	9,420.55	138.34	136.02	98.25	-9,195.27	-1,218.84	1,010.37	738.14	272.23	3.711		
18,700.00	9,257.70	18,843.93	9,420.98	139.74	137.42	98.26	-9,295.27	-1,218.70	1,010.39	735.38	275.01	3.674		
18,800.00	9,258.04	18,943.93	9,421.41	141.14	138.82	98.26	-9,395.27	-1,218.56	1,010.40	732.62	277.78	3.637		
18,900.00	9,258.38	19,043.93	9,421.84	142.54	140.22	98.27	-9,495.27	-1,218.42	1,010.42	729.86	280.56	3.601		
19,000.00	9,258.71	19,143.93	9,422.26	143.95	141.62	98.27	-9,595.27	-1,218.27	1,010.43	727.09	283.34	3.566		
19,100.00	9,259.05	19,243.93	9,422.69	145.35	143.02	98.28	-9,695.26	-1,218.13	1,010.45	724.33	286.12	3.532		
19,200.00	9,259.38	19,343.93	9,423.12	146.75	144.42	98.28	-9,795.26	-1,217.99	1,010.46	721.56	288.90	3.498		
19,300.00	9,259.72	19,443.93	9,423.55	148.16	145.82	98.29	-9,895.26	-1,217.85	1,010.48	718.79	291.69	3.464		
19,383.13	9,260.00	19,527.06	9,423.91	149.33	146.98	98.29	-9,978.39	-1,217.73	1,010.49	716.49	294.00	3.437 ES, SF		

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	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 02-21-19	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB @ 3130.80usft (Ensign 155)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 602H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.10°

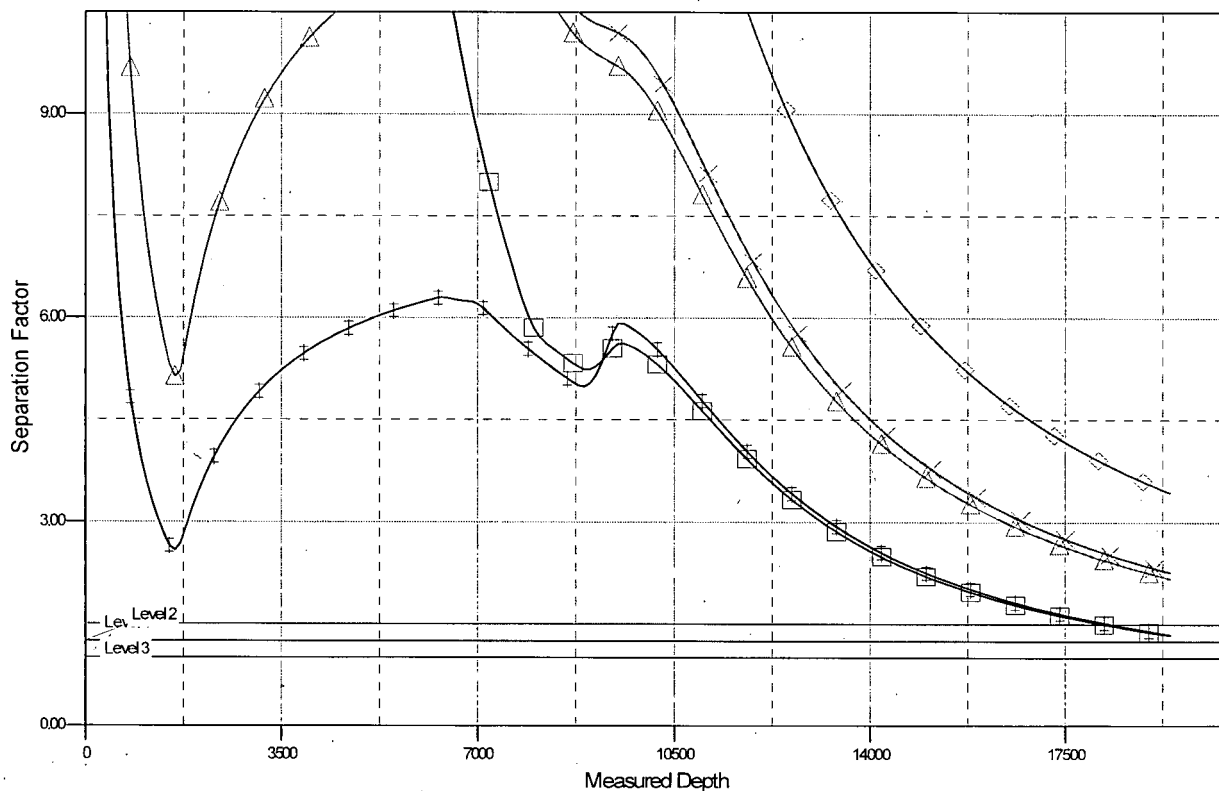


Company:	COG Operating LLC	Local Co-ordinate Reference:	Well 602H
Project:	Eddy County, NM (NAD27 NME)	TVD Reference:	RKB @ 3130.80usft (Ensign 155)
Reference Site:	Quien Sabe Fed Com	MD Reference:	RKB @ 3130.80usft (Ensign 155)
Site Error:	0.00 usft	North Reference:	Grid
Reference Well:	602H	Survey 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 02-21-19	Offset TVD Reference:	Offset Datum

Reference Depths are relative to RKB @ 3130.80usft (Ensign 155)
Offset Depths are relative to Offset Datum
Central Meridian is 104° 19' 60.00000 W

Coordinates are relative to: 602H
Coordinate System is US State Plane 1927 (Exact solution), New Mexico East 30
Grid Convergence at Surface is: 0.10°

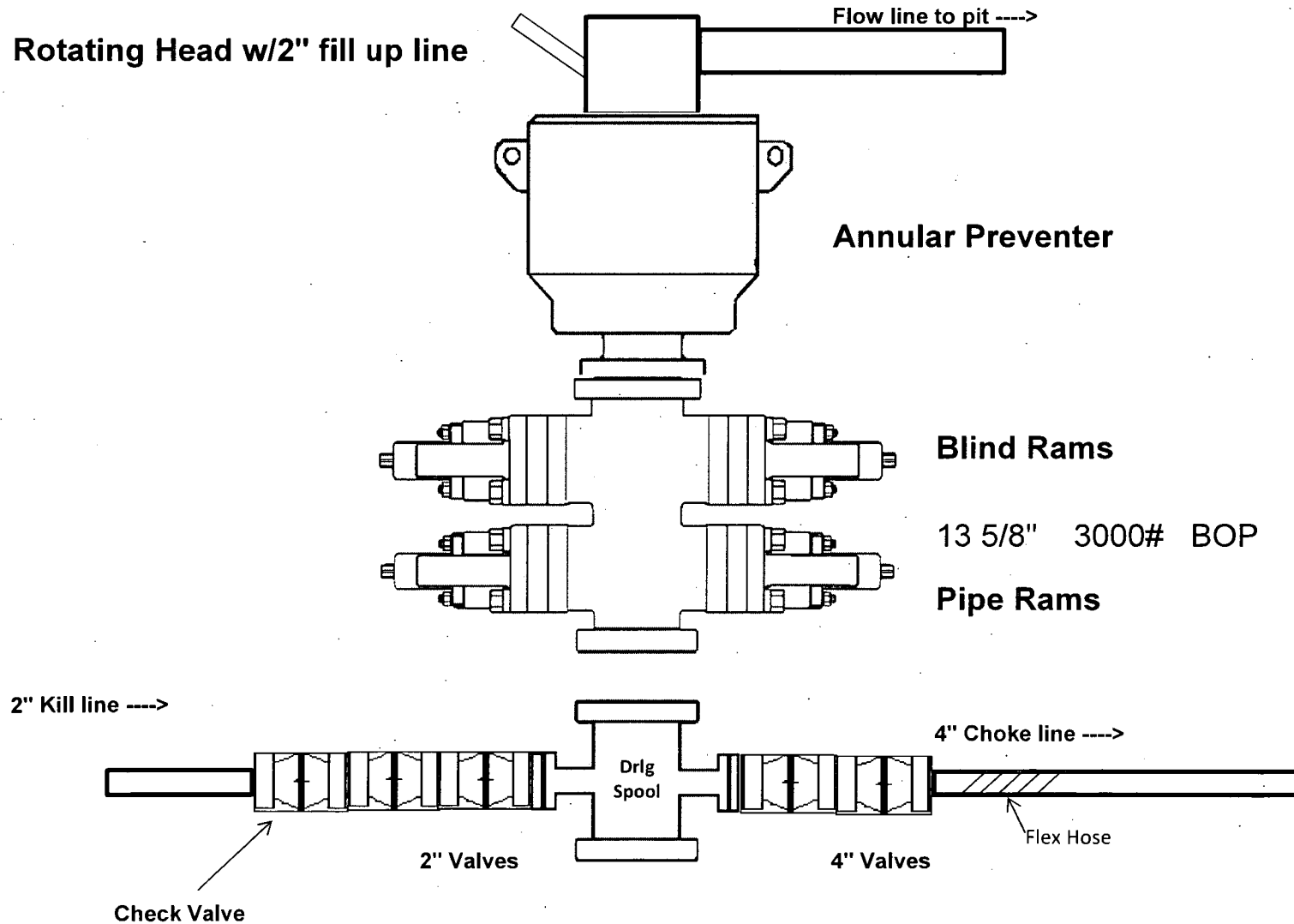
Separation Factor Plot



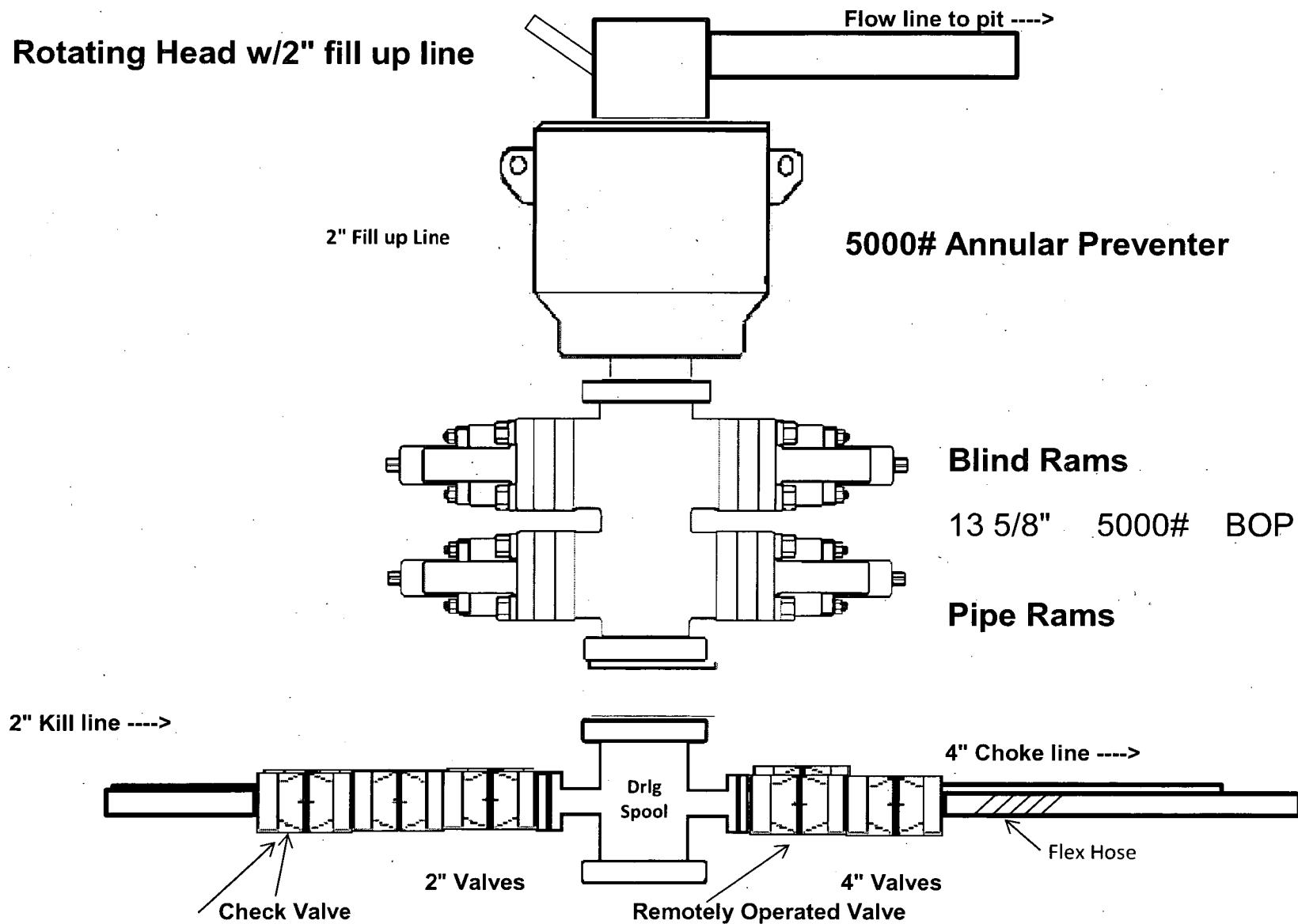
LEGEND

- 701H, OH, Plan 102-21-19 V0
- 603H, OH, Plan 102-15-19 V0
- 601H, OH, Plan 102-21-19 V0
- 703H, OH, Plan 102-15-19 V0
- 702H, OH, Plan 102-15-19 V0

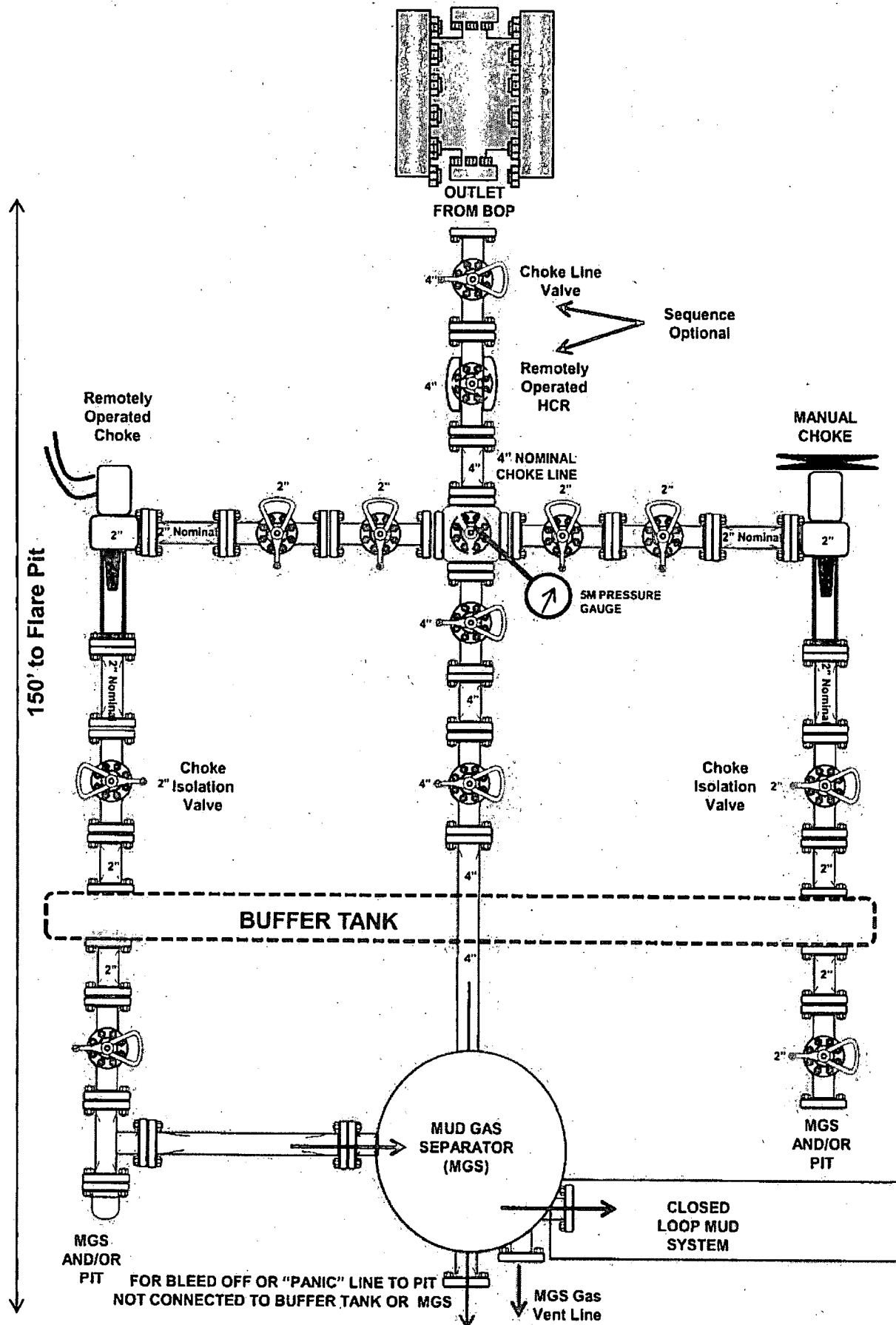
3,000 psi BOP Schematic



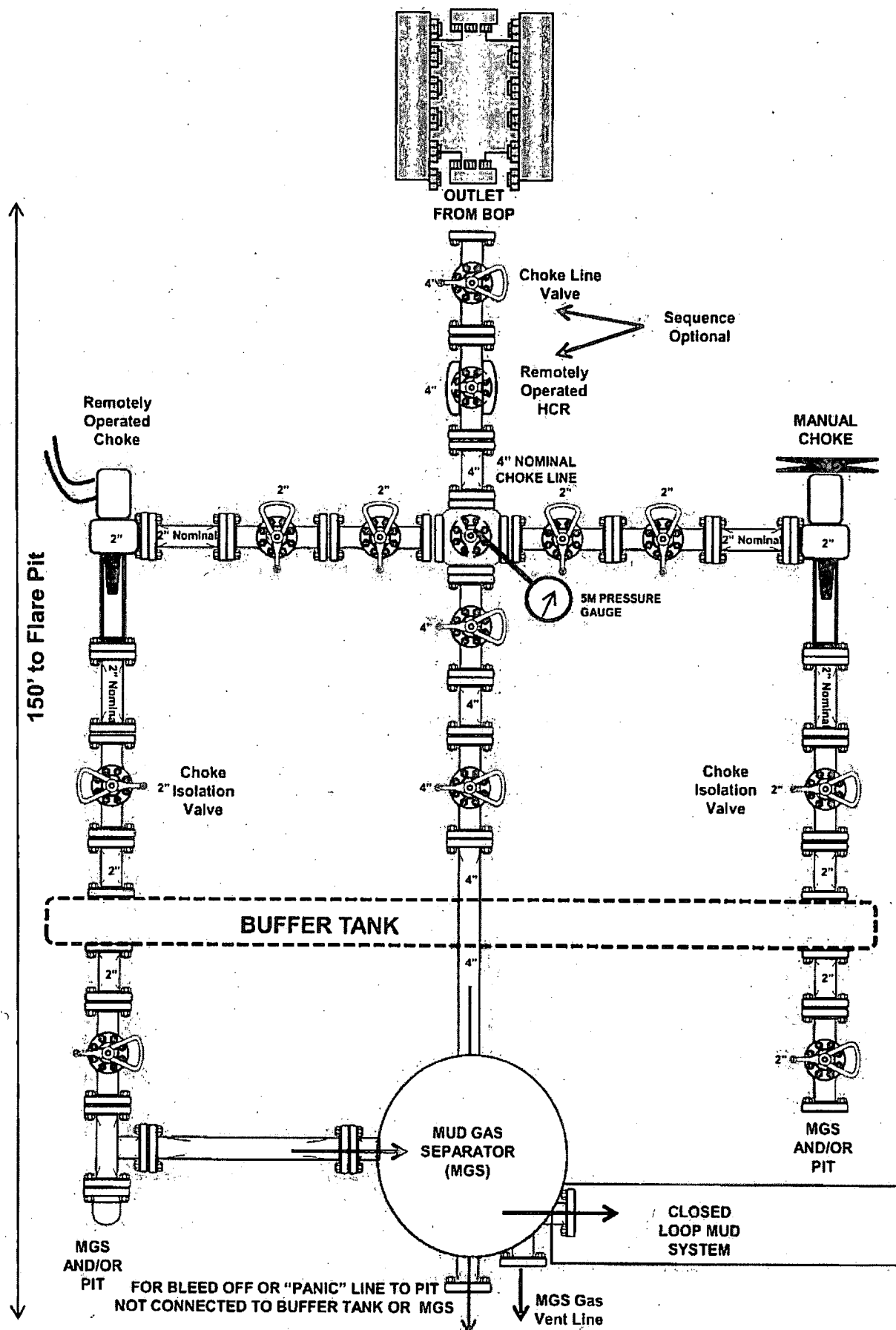
5,000 psi BOP Schematic



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



5M Choke Manifold Equipment (WITH MGS + CLOSED LOOP)





TECHNIP Umbilicals Inc.
COFLEXIP® Products and
Solutions

Quality Control Department

Control Report Dated 6/27/2017

COFLEXIP® Products and Solutions FLEXIBLE PIPE TEST CERTIFICATE

Customer OFS CANADA INC

Line Number L16883

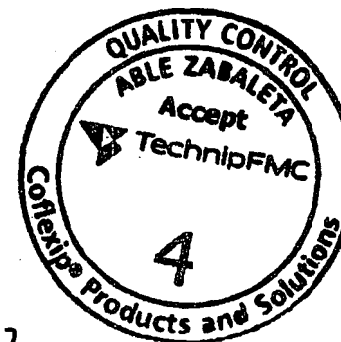
Line Serial Number L16883-201

Part Number 076 60414 05 05

Application 3" X 30' 10K CHOKE / KILL LINE

COFLEXIP® Products Division certifies that the results of the test and controls performed on the above mentioned flexible pipe is as follows:

Internal Diameter	3	inches
Length	30.46	feet
Working Pressure	10000	psi
Test Pressure	15000	psi
As per attached recorder chart Test Duration	4	hours



THIRD PARTY INSPECTION FIRM OR CUSTOMER REPRESENTATIVE

TU-INC. QUALITY CONTROL

Test Configuration 12 Zone

Production Information Input

Customer ID	
OFS CANADA INC	
Line S/N	Technician
L16883-201	JUAN

QC Information Input

QC Insp	Third Party
ABEL	BV
Witness?	Test Procedure
Yes	SIC 01 60
Special Instructions	

Station 05

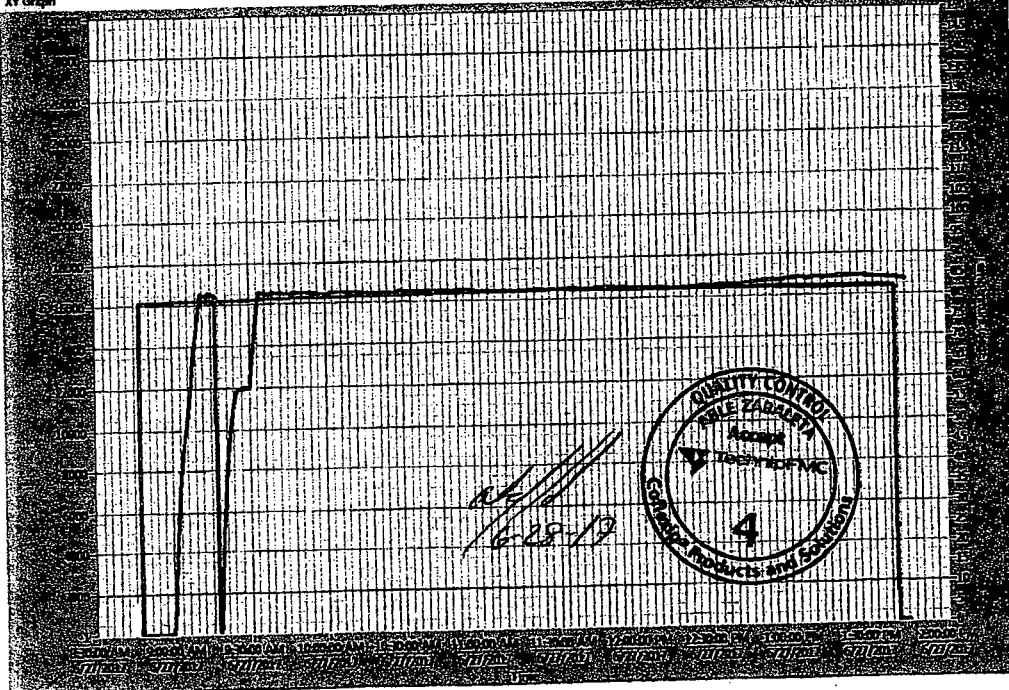
Station Information

Pressure Transducer S/N	Temperature S/N
1178574	T13A
Stable Press	Test Press
16200	15000
Calib. Due	Pressure Range
10/18/2017 8:54:42 AM	0 - 30000

Calibration

Raw Minimum	Eng Minimum
0.00000	0.000000
Raw Maximum	Eng Maximum
0.02000	30000.000000

XY Graph





ContiTech

Asset # E56384

CONTITECH RUBBER
Industrial Kft.

No: QC-DB- 607/ 2014

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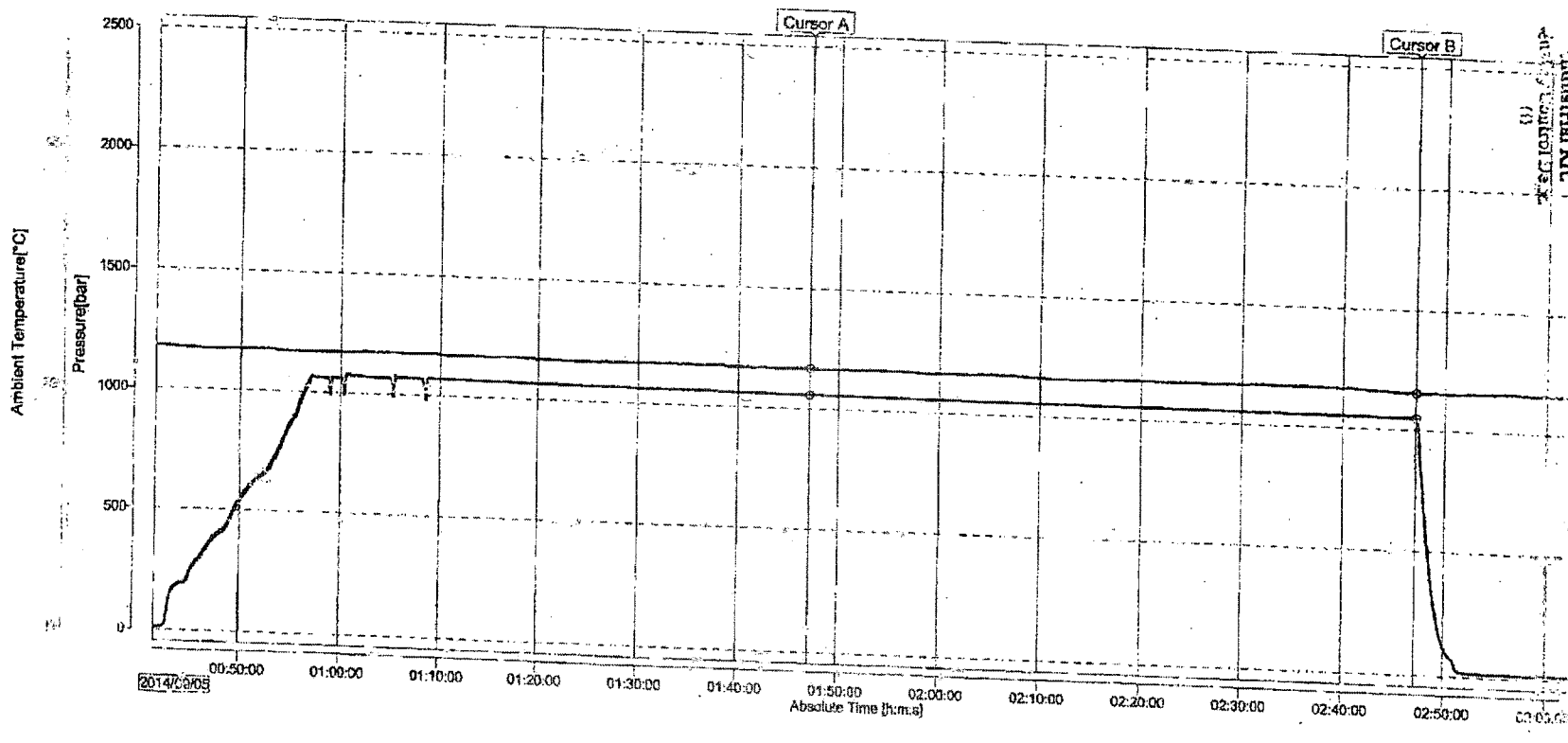
927-20 Hose, Choke 4"x30'-Data Pkg.

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE				CERT. N°: 1672	
PURCHASER: ContiTech Oil & Marine Corp.			P.O. N°: 4500464782		
CONTITECH RUBBER order N°: 539274		HOSE TYPE: 4" ID Choke and Kill Hose			
HOSE SERIAL N°: 68587		NOMINAL / ACTUAL LENGTH: 9,14 m / 9,11 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 Min. ↑ 50 MPa					
COUPLINGS Type		Serial N°		Quality	
4" coupling with		2914 2793		AISI 4130	
4 1/16" 10K API b.w. Flange end				AISI 4130	
Not Designed For Well Testing				API Spec 16 C	
Fire Rated				Temperature rate: "B"	
All metal parts are flawless					
WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.					
STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements.					
COUNTRY OF ORIGIN HUNGARY/EU					
Date:		Inspector		Quality Control	
05. September 2014.				ContiTech Rubber Industrial Kft. Quality Control Dept. <i>[Signature]</i>	

File Name 000046_68587,68574.GEV,....000060_68587,68574.GEV
 File Message 68587,68574
 Device Type GX10
 Serial No. S5P606400
 Data Count 8457
 Print Group
 Print Range
 Comment

Sampling Int. 1.000 sec
 Start Time 2014/09/05 00:41:39.000
 Stop Time 2014/09/05 03:02:45.000

	Cursor A	Cursor B	Difference
Data No.	3930	7530	3600
Absolute Time	2014/08/05 01:47:09.000	2014/09/05 02:47:09.000	01:00:00.000
Tag Comment	Value A	Value B	Value B-A
Pressure[bar]	1056.62	1050.59	-6.23
Ambient Temperature[°C]	23.36	23.10	-0.25





CONTITECH RUBBER
Industrial Kft.

No:QC-DB- 607/ 2014

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ContiTech

Hose Data Sheet

CRI Order No.	539274
Customer	ContiTech Oil & Marine Corp.
Customer Order No	4500464782 CBC615472
Item No.	1
Hose Type	Flexible Hose
Standard	API SPEC 16C - MONOGRAMMED
Inside dia in inches	4
Length	30 ft
Type of coupling one end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 ST/STINLAID RING GROOVE - SOUR
Type of coupling other end	FLANGE 4.1/16" 10K API SPEC 6A TYPE 6BX FLANGE C/W BX155 ST/ST INLAID RING GROOVE - SOUR
H2S service NACE MR0175	Yes
Working Pressure	10 000 psi
Design Pressure	10 000 psi
Test Pressure	15 000 psi
Safety Factor	2,25
Marking	USUAL PHOENIX
Cover	FIRE RESISTANT
Outside protection	St. steel outer wrap
Internal stripwound tube	Yes
Lining	OIL + GAS RESISTANT SOUR
Safety clamp	Yes
Lifting collar	Yes
Element C	Yes
Safety chain	Yes
Safety wire rope	No
Max. design temperature [°C]	100
Min. design temperature [°C]	-20
Min. Bend Radius operating [m]	1,50
Min. Bend Radius storage [m]	1,50
Electrical continuity	The Hose is electrically continuous
Type of packing	STEEL PALLET

COG Operating LLC

Rig Plat & Closed Loop Equipment Diagram

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

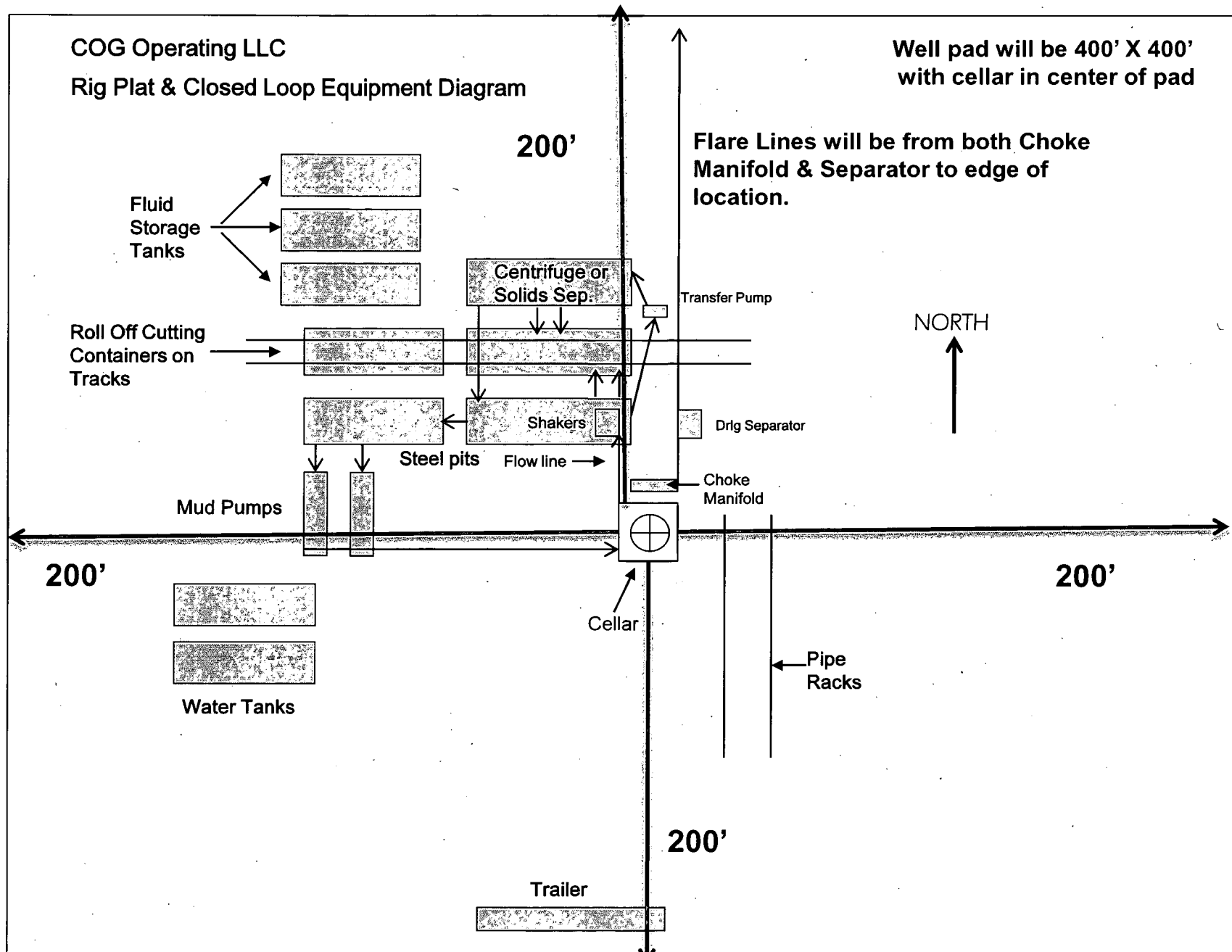
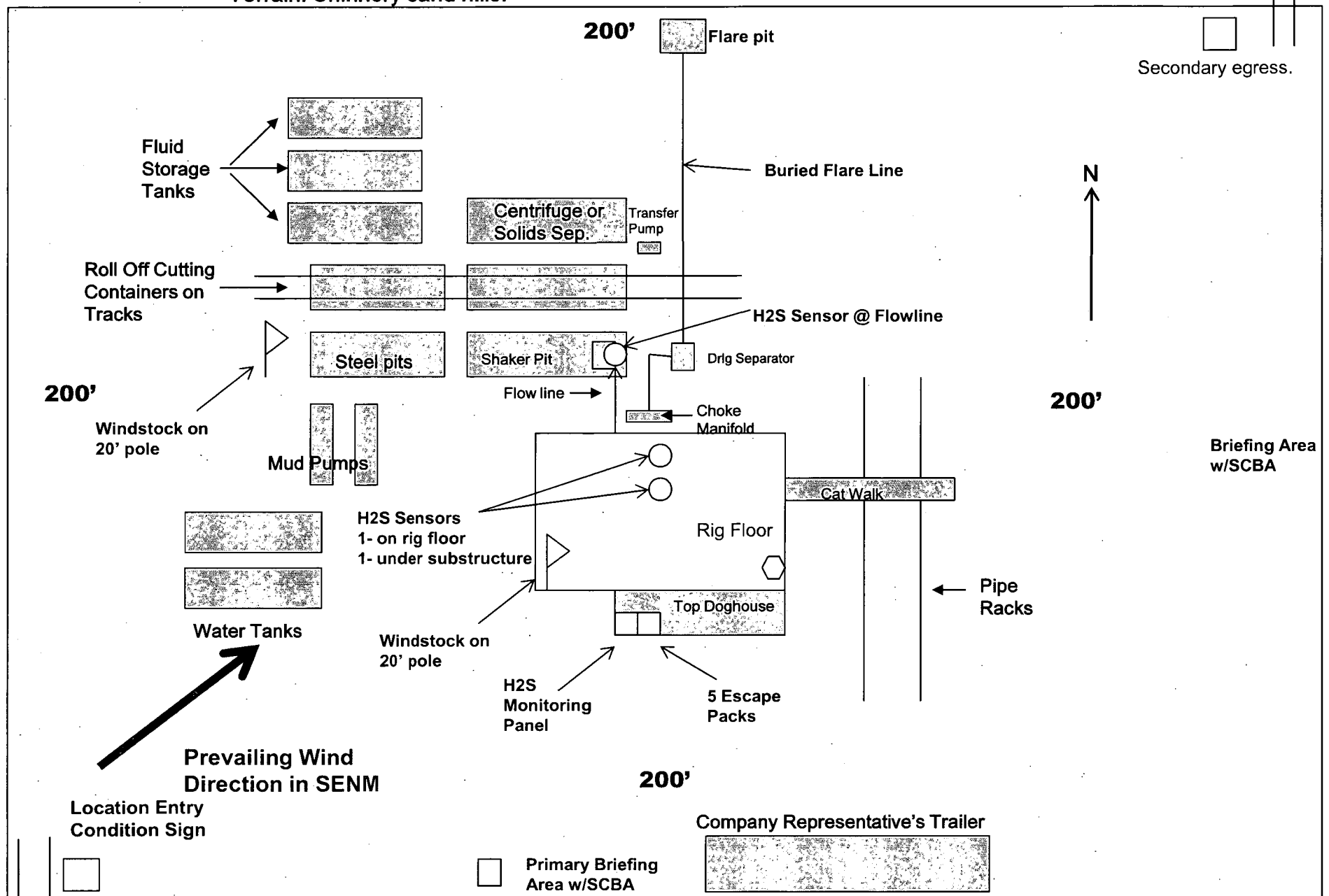


Exhibit 1

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

COG Operating LLC
H₂S 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 (H₂S).
- b. The proper use and maintenance of personal protective equipment and life support systems.
- c. The proper use of H₂S 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 H₂S 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. H₂S SAFETY EQUIPMENT AND SYSTEMS

Note: All H₂S 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.

W A R N I N G

**YOU ARE ENTERING AN H₂S 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

	<u>OFFICE</u>	<u>MOBILE</u>
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

	<u>OFFICE</u>
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
LEASE NO.:	NMNM18613A
WELL NAME & NO.:	Quien Sabe Fed Com 602H
SURFACE HOLE FOOTAGE:	460' FNL & 1080' FEL
BOTTOM HOLE FOOTAGE:	200' FSL & 1310' FEL, Sec 25
LOCATION:	Section 24, T. 24 S., R 27 E., NMPM
COUNTY:	Eddy County, New Mexico



H2S	☐ Yes	☒ No	
Potash	☒ None	☐ Secretary	☐ R-111-P
Cave/Karst Potential	☐ Low	☒ Medium	☐ High
Variance	☐ None	☒ Flex Hose	☐ Other
Wellhead	☒ Conventional	☐ Multibowl	☐ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☒ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☒ COM	☐ Unit

A. HYDROGEN SULFIDE

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 **350** (Set in first competent anhydrite layer below 350' and at least 25 above the salt) feet 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.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

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

Option 1 (Single Stage):

- Cement to surface. If cement does not circulate see B.1.a, c-d above.
Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.

Option 2:

Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

- a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.
 - b. Second stage above DV tool:
 - Cement to surface. If cement does not circulate, contact the appropriate BLM office.
Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst.
 - ❖ In Medium Cave/Karst Areas if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.
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 **3000 (3M)** psi.
3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9-5/8** inch intermediate casing shoe shall be **5000 (5M)** 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.

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.:	QUIEN SABE FEDERAL COM 602H
SURFACE HOLE FOOTAGE:	460'/N & 1080'/E
BOTTOM HOLE FOOTAGE	200'/S & 1310'/E
LOCATION:	Section 24, T.24 S., R.27 E., NMPM
COUNTY:	Eddy County, New Mexico

TABLE OF CONTENTS

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

- ☐ **General Provisions**
- ☐ **Permit Expiration**
- ☐ **Archaeology, Paleontology, and Historical Sites**
- ☐ **Noxious Weeds**
- ☒ **Special Requirements**
 - Cave/Karst
 - Hydrology
 - Texas Hornshell
- ☐ **Construction**
 - Notification
 - Topsoil
 - Closed Loop System
 - Federal Mineral Material Pits
 - Well Pads
 - Roads
- ☐ **Road Section Diagram**
- ☒ **Production (Post Drilling)**
 - Well Structures & Facilities
 - Pipelines
- ☐ **Interim Reclamation**
- ☐ **Final Abandonment & Reclamation**

I. GENERAL PROVISIONS

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

II. PERMIT EXPIRATION

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

III. ARCHAEOLOGICAL, PALEONTOLOGY & HISTORICAL SITES

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

IV. NOXIOUS WEEDS

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

V. SPECIAL REQUIREMENT(S)

Cave/Karst Surface Mitigation

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

Construction:

General Construction:

- No blasting
- The BLM, Carlsbad Field Office, will be informed immediately if any subsurface drainage channels, cave passages, or voids are penetrated during construction, and no additional construction shall occur until clearance has been issued by the Authorized Officer.
- All linear surface disturbance activities will avoid sinkholes and other karst features to lessen the possibility of encountering near surface voids during construction, minimize changes to runoff, and prevent untimely leaks and spills from entering the karst drainage system.
- All spills or leaks will be reported to the BLM immediately for their immediate and proper treatment.

Pad Construction:

- The pad will be constructed and leveled by adding the necessary fill and caliche – no blasting.
- The entire perimeter of the well pad will be bermed to prevent oil, salt, and other chemical contaminants from leaving the well pad.
- The compacted berm shall be constructed at a minimum of 12 inches high with impermeable mineral material (e.g., caliche).
- No water flow from the uphill side(s) of the pad shall be allowed to enter the well pad.
- The topsoil stockpile shall be located outside the bermed well pad.
- Topsoil, either from the well pad or surrounding area, shall not be used to construct the berm.
- No storm drains, tubing or openings shall be placed in the berm.
- If fluid collects within the bermed area, the fluid must be vacuumed into a safe container and disposed of properly at a state approved facility.
- The integrity of the berm shall be maintained around the surfaced pad throughout the life of the well and around the downsized pad after interim reclamation has been completed.
- Any access road entering the well pad shall be constructed so that the integrity of the berm height surrounding the well pad is not compromised (i.e. an access road crossing the berm cannot be lower than the berm height).
- Following a rain event, all fluids will vacuumed off of the pad and hauled off-site and disposed at a proper disposal facility.

Tank Battery Construction:

- The pad will be constructed and leveled by adding the necessary fill and caliche – no blasting.
- All tank battery locations and facilities will be lined and bermed.
- The liner should be at least 20 mil in thickness and installed with a 4 oz. felt backing, or equivalent, to prevent tears or punctures.
- Tank battery berms must be large enough to contain 1 ½ times the content of the largest tank.

Road Construction:

- Turnout ditches and drainage leadoffs will not be constructed in such a manner as to alter the natural flow of water into or out of cave or karst features.
- Special restoration stipulations or realignment may be required if subsurface features are discovered during construction.

Buried Pipeline/Cable Construction:

- Rerouting of the buried line(s) may be required if a subsurface void is encountered during construction to minimize the potential subsidence/collapse of the feature(s) as well as the possibility of leaks/spills entering the karst drainage system.

Powerline Construction:

- Smaller powerlines will be routed around sinkholes and other karst features to avoid or lessen the possibility of encountering near surface voids and to minimize changes to runoff or possible leaks and spills from entering karst systems.
- Larger powerlines will adjust their pole spacing to avoid cave and karst features.
- Special restoration stipulations or realignment may be required if subsurface voids are encountered.

Surface Flowlines Installation:

- Flowlines will be routed around sinkholes and other karst features to minimize the possibility of leaks/spills from entering the karst drainage system.

Leak Detection System:

- A method of detecting leaks is required. The method could incorporate gauges to measure loss, siting valves and lines so they can be visually inspected, or installing electronic sensors to alarm when a leak is present.
- A leak detection plan will be submitted to BLM that incorporates an automatic shut off system (see below) to minimize the effects of an undesirable event that could negatively sensitive cave/karst resources.
- Well heads, pipelines (surface and buried), storage tanks, and all supporting equipment should be monitored regularly after installation to promptly identify and fix leaks.

Automatic Shut-off Systems:

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

Cave/Karst Subsurface Mitigation

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

Closed Loop System:

- A closed loop system using steel tanks will be utilized during drilling – no pits
- All fluids and cuttings will be hauled off-site and disposed of properly at an authorized site

Rotary Drilling with Fresh Water:

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

Directional Drilling:

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

Lost Circulation:

- ALL lost circulation zones between surface and the base of the cave occurrence zone will be logged and reported in the drilling report.
- If a void of four feet or more and circulation losses greater than 70 percent occur simultaneously while drilling in any cave-bearing zone, regardless of the type of drilling machinery used, the BLM will be notified immediately by the operator. The BLM will assess the situation and work with the operator on corrective actions to resolve the problem.

Abandonment Cementing:

- Additional plugging conditions of approval may be required upon well abandonment in high and medium karst potential occurrence zones.
- The BLM will assess the situation and work with the operator to ensure proper plugging of the wellbore.

Pressure Testing:

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

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.

When crossing ephemeral drainages the pipeline will be buried to a minimum depth of 48 inches from the top of pipe to ground level. Erosion control methods such as gabions and/or rock aprons should be placed on both up and downstream sides of the pipeline crossing. In addition, curled (weed free) wood/straw fiber wattles/logs and/or silt fences should be placed on the downstream side for sediment control during construction and maintained until soils and vegetation have stabilized. Water bars should be placed within the ROW to divert and dissipate surface runoff. A pipeline access road is not permitted to cross these ephemeral drainages. Traffic should be diverted to a preexisting route. Additional seeding may be required in floodplains and drainages to restore energy dissipating vegetation.

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.

Texas Hornshell

Oil and Gas and Associated Infrastructure Mitigation Measures for Zone D – CCA Boundary Requirements:

- Provide CEHMM with the permit, lease grant, or other authorization form BLM, if applicable.

Provide CEHMM with plats or other electronic media describing the new surface disturbance for the project

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

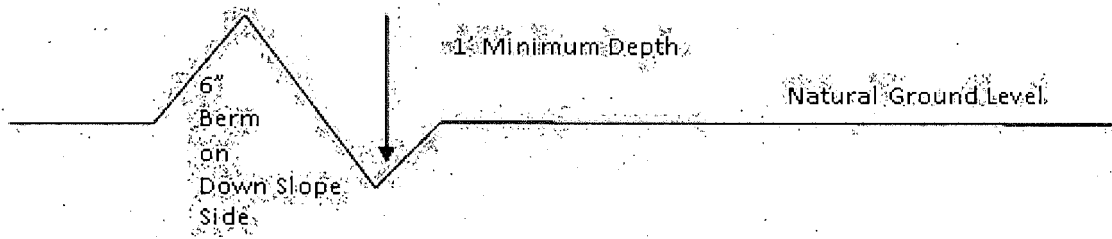
Vehicle turnouts shall be constructed on the road. Turnouts shall be intervisible with interval spacing distance less than 1000 feet. Turnouts shall conform to Figure 1; cross section and plans for typical road construction.

Drainage

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

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

Cross Section of a Typical Lead-off Ditch



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

Formula for Spacing Interval of Lead-off Ditches

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

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

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

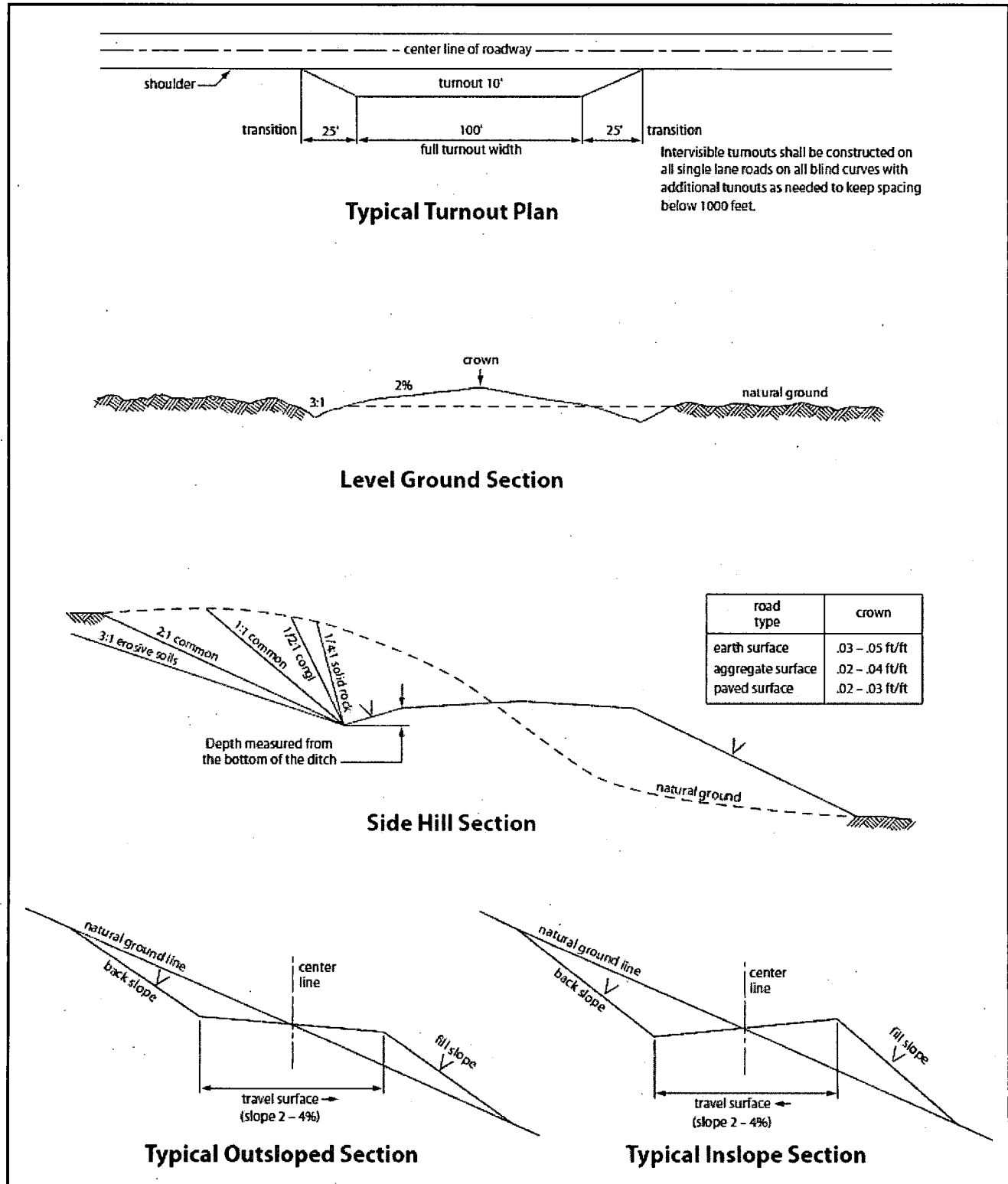


Figure 1. Cross-sections and plans for typical road sections representative of BLM resource or FS local and higher-class roads.

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).

B. PIPELINES

BURIED PIPELINE STIPULATIONS

A copy of the application (Grant, APD, or Sundry Notice) and attachments, including conditions of approval, survey plat and/or map, will be on location during construction. BLM personnel may request to you a copy of your permit during construction to ensure compliance with all stipulations.

Holder agrees to comply with the following stipulations to the satisfaction of the Authorized Officer:

1. The Holder shall indemnify the United States against any liability for damage to life or property arising from the occupancy or use of public lands under this grant.
2. The Holder shall comply with all applicable Federal laws and regulations existing or hereafter enacted or promulgated. In any event, the holder shall comply with the Toxic Substances Control Act of 1976 as amended, 15 USC 2601 et seq. (1982) with regards to any toxic substances that are used, generated by or stored on the right-of-way or on facilities authorized under this right-of-way grant. (See 40 CFR Part 702-799 and especially, provisions on polychlorinated biphenyls, 40 CFR 761.1-761.193.) Additionally, any release of toxic substances (leaks, spills, etc.) in excess of the reportable quantity established by 40 CFR Part 117 shall be reported as required by the Comprehensive Environmental Response, Compensation, and Liability Act, section 102b. A copy of any report required or requested by any Federal agency or State government as a result of a reportable release or spill of any toxic substances shall be furnished to the authorized officer concurrent with the filing of the reports to the involved Federal agency or State government.
3. The holder agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et seq. or the Resource Conservation and Recovery Act, 42 U.S.C. 6901, et seq.) on the Right-of-Way (unless the release or threatened release is wholly unrelated to the Right-of-Way holder's activity on the Right-of-Way), or resulting from the activity of

the Right-of-Way holder on the Right-of-Way. This agreement applies without regard to whether a release is caused by the holder, its agent, or unrelated third parties.

4. If, during any phase of the construction, operation, maintenance, or termination of the pipeline, any oil or other pollutant should be discharged from the pipeline system, impacting Federal lands, the control and total removal, disposal, and cleaning up of such oil or other pollutant, wherever found, shall be the responsibility of holder, regardless of fault. Upon failure of holder to control, dispose of, or clean up such discharge on or affecting Federal lands, or to repair all damages resulting therefrom, on the Federal lands, the Authorized Officer may take such measures as he deems necessary to control and clean up the discharge and restore the area, including where appropriate, the aquatic environment and fish and wildlife habitats, at the full expense of the holder. Such action by the Authorized Officer shall not relieve holder of any responsibility as provided herein.

5. All construction and maintenance activity will be confined to the authorized right-of-way.

6. The pipeline will be buried with a minimum cover of 36 inches between the top of the pipe and ground level.

7. The maximum allowable disturbance for construction in this right-of-way will be 30 feet:

- Blading of vegetation within the right-of-way will be allowed: maximum width of blading operations will not exceed 20 feet. The trench is included in this area. (*Blading is defined as the complete removal of brush and ground vegetation.*)
- Clearing of brush species within the right-of-way will be allowed: maximum width of clearing operations will not exceed 30 feet. The trench and bladed area are included in this area. (*Clearing is defined as the removal of brush while leaving ground vegetation (grasses, weeds, etc.) intact. Clearing is best accomplished by holding the blade 4 to 6 inches above the ground surface.*)
- The remaining area of the right-of-way (if any) shall only be disturbed by compressing the vegetation. (*Compressing can be caused by vehicle tires, placement of equipment, etc.*)

8. The holder shall stockpile an adequate amount of topsoil where blading is allowed. The topsoil to be stripped is approximately 6 inches in depth. The topsoil will be segregated from other spoil piles from trench construction. The topsoil will be evenly distributed over the bladed area for the preparation of seeding.

9. The holder shall minimize disturbance to existing fences and other improvements on public lands. The holder is required to promptly repair improvements to at least their former state. Functional use of these improvements will be maintained at all times. The holder will contact the owner of any improvements prior to disturbing them. When necessary to pass through a fence line, the fence shall be braced on both sides of the passageway prior to cutting of the fence. No permanent gates will be allowed unless approved by the Authorized Officer.

10. Vegetation, soil, and rocks left as a result of construction or maintenance activity will be randomly scattered on this right-of-way and will not be left in rows, piles, or berms, unless otherwise approved by the Authorized Officer. The entire right-of-way shall be recontoured to match the surrounding landscape. The backfilled soil shall be compacted and a 6 inch berm will be left over the ditch line to allow for settling back to grade.

11. In those areas where erosion control structures are required to stabilize soil conditions, the holder will install such structures as are suitable for the specific soil conditions being encountered and which are in accordance with sound resource management practices.

12. The holder will reseed all disturbed areas. Seeding will be done according to the attached seeding requirements, using the following seed mix.

☒ (X) seed mixture 1	☐ () seed mixture 3
☐ () seed mixture 2	☐ () seed mixture 4
☐ () seed mixture 2/LPC	☐ () Aplomado Falcon Mixture

13. All above-ground structures not subject to safety requirements shall be painted by the holder to blend with the natural color of the landscape. The paint used shall be color which simulates "Standard Environmental Colors" – **Shale Green**, Munsell Soil Color No. 5Y 4/2.

14. The pipeline will be identified by signs at the point of origin and completion of the right-of-way and at all road crossings. At a minimum, signs will state the holder's name, BLM serial number, and the product being transported. All signs and information thereon will be posted in a permanent, conspicuous manner, and will be maintained in a legible condition for the life of the pipeline.

15. The holder shall not use the pipeline route as a road for purposes other than routine maintenance as determined necessary by the Authorized Officer in consultation with the holder before maintenance begins. The holder will take whatever steps are necessary to ensure that the pipeline route is not used as a roadway. As determined necessary during the life of the pipeline, the Authorized Officer may ask the holder to construct temporary deterrence structures.

16. Any cultural and/or paleontological resources (historic or prehistoric site or object) discovered by the holder, or any person working on his behalf, on public or Federal land shall be immediately reported to the Authorized Officer. Holder 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 will be made by the Authorized Officer to determine appropriate actions to prevent the loss of significant cultural or scientific values. The holder will be responsible for the cost of evaluation and any decision as to proper mitigation measures will be made by the Authorized Officer after consulting with the holder.

17. 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 associated roads, 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.

18. Escape Ramps - The operator will construct and maintain pipeline/utility trenches [that are not otherwise fenced, screened, or netted] to prevent livestock, wildlife, and humans from becoming entrapped. At a minimum, the operator will construct and maintain escape ramps, ladders, or other methods of avian and terrestrial wildlife escape in the trenches according to the following criteria:

- a. Any trench left open for eight (8) hours or less is not required to have escape ramps; however, before the trench is backfilled, the contractor/operator shall inspect the trench for wildlife, remove all trapped wildlife, and release them at least 100 yards from the trench.
- b. For trenches left open for eight (8) hours or more, earthen escape ramps (built at no more than a 30 degree slope and spaced no more than 500 feet apart) shall be placed in the trench.

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).

Seed Mixture 1 for Loamy Sites

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

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

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

<u>Species</u>	<u>lb/acre</u>
Plains lovegrass (<i>Eragrostis intermedia</i>)	0.5
Sand dropseed (<i>Sporobolus cryptandrus</i>)	1.0
Sideoats grama (<i>Bouteloua curtipendula</i>)	5.0
Plains bristlegrass (<i>Setaria macrostachya</i>)	2.0

*Pounds of pure live seed:

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