Form 3160-3
(June 2015)

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.
NMNM020979

6. If Indian, Allotee or Tribe Name

1a. Type of work: ☑ DRILL ☐ REENTER

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

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

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

8. Lease Name and Well No.
IGLOO 19-24 STATE FED COM
12H (326190)

2. Name of Operator
CAZA OPERATING LLC (249099)

9. API Well No.
30-025-46411

3a. Address
200 N. Loraine Street, Suite 1550 Midland TX 79701

3b. Phone No. *(include area code)*
(432)682-7424

10. Field and Pool, or Exploratory
LEA / BONE SPRING, SOUTH (37580)

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*
At surface SWSE / 400 FSL / 2514 FEL / LAT 32.552477 / LONG -103.496194
At proposed prod. zone SWSW / 400 FSL / 330 FWL / LAT 32.552454 / LONG -103.521255

11. Sec., T. R. M. or Blk. and Survey or Area
SEC 19 / T20S / R35E / NMP

14. Distance in miles and direction from nearest town or post office*
22.6 miles

12. County or Parish
LEA

13. State
NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any)
400 feet

16. No of acres in lease
320

17. Spacing Unit dedicated to this well
240

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.
470 feet

19. Proposed Depth
10500 feet / 18314 feet

20. BLM/BIA Bond No. in file
FED: NMB000471

21. Elevations (Show whether DF, KDB, RT, GL, etc.)
3690 feet

22. Approximate date work will start*
02/23/2018

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

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)	Tony B Sam / Ph: (432)682-7424	01/09/2018
Title: VP Operations		
Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Cody Layton / Ph: (575)234-5959	09/26/2019
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.

ECP Rec 10/04/19

KA 10/04/19

APPROVED WITH CONDITIONS

Approval Date: 09/26/2019

(Continued on page 2)

*(Instructions on page 2)

INSTRUCTIONS

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

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

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

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

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

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

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

NOTICES

The Privacy Act of 1974 and regulation in 43 CFR 2.48(d) provide that you be furnished the following information in connection with information required by this application.

AUTHORITY: 30 U.S.C. 181 et seq., 25 U.S.C. 396; 43 CFR 3160

PRINCIPAL PURPOSES: The information will be used to: (1) process and evaluate your application for a permit to drill a new oil, gas, or service wen or to reenter a plugged and abandoned well; and (2) document, for administrative use, information for the management, disposal and use of National Resource Lands and resources including (a) analyzing your proposal to discover and extract the Federal or Indian resources encountered; (b) reviewing procedures and equipment and the projected impact on the land involved; and (c) evaluating the effects of the proposed operation on the surface and subsurface water and other environmental impacts.

ROUTINE USE: Information from the record and/or the record win be transferred to appropriate Federal, State, and local or foreign agencies, when relevant to civil, criminal or regulatory investigations or prosecution, in connection with congressional inquiries and for regulatory responsibilities.

EFFECT OF NOT PROVIDING INFORMATION: Filing of this application and disclosure of the information is mandatory only if you elect to initiate a drilling or reentry operation on an oil and gas lease.

The Paperwork Reduction Act of 1995 requires us to inform you that:

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

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

(Continued on page 3)

Additional Operator Remarks

Location of Well

1. SHL: SWSE / 400 FSL / 2514 FEL / TWSP: 20S / RANGE: 35E / SECTION: 19 / LAT: 32.552477 / LONG: -103.496194 (TVD: 0 feet, MD: 0 feet)
   PPP: SESW / 400 FSL / 2485 FWL / TWSP: 20S / RANGE: 35E / SECTION: 19 / LAT: 32.55247 / LONG: -103.495283 (TVD: 10498 feet, MD: 10506 feet)
   PPP: SWSW / 400 FSL / 0 FEL / TWSP: 20S / RANGE: 34E / SECTION: 24 / LAT: 32.552463 / LONG: -103.505171 (TVD: 10729 feet, MD: 13353 feet)
   BHL: SWSW / 400 FSL / 330 FWL / TWSP: 20S / RANGE: 34E / SECTION: 24 / LAT: 32.552454 / LONG: -103.521255 (TVD: 10500 feet, MD: 18314 feet)

BLM Point of Contact

Name: Priscilla Perez
Title: Legal Instruments Examiner
Phone: 5752345934
Email: pperez@blm.gov

Approval Date: 09/26/2019

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.

PECOS DISTRICT DRILLING
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Caza Operating, LLC.**
LEASE NO.:	**NMNM-020979**
WELL NAME & NO.:	**Igloo 19-24 State Fed Com 12H**
SURFACE HOLE FOOTAGE:	**0400' FSL & 2514' FEL**
BOTTOM HOLE FOOTAGE	**0400' FSL & 0330' FWL Sec. 24, T. 20 S., R 34 E.**
LOCATION:	**Section 19, T. 20 S., R 35 E., NMPM**
COUNTY:	**County, New Mexico**

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.

A. DRILLING OPERATIONS REQUIREMENTS

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

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

☐ **Lea County**
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 3933612

1. [redacted]

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

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

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

B. CASING

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

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

[redacted]

[redacted]

[redacted]

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

Capitan Reef
Possible of water flows in the Salado.
Possible lost circulation in the Red beds, Rustler, Capitan Reef, Delaware and Bone Spring.

1. [redacted]

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

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

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

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

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

[redacted]

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

Operator has proposed DV tool at depth of 3900', but will adjust cement proportionately if moved. DV tool shall be set a minimum of 50' below previous shoe and a minimum of 200' above current shoe. Operator shall submit sundry if DV tool depth cannot be set in this range. If an ECP is used, it is to be set a minimum of 50' below the shoe to provide cement across the shoe. If it cannot be set below the shoe, a CBL shall be run to verify cement coverage.

a. First stage to DV tool:___

☒ Cement to circulate. If cement does not circulate, contact the appropriate BLM office before proceeding with second stage cement job. Operator should have plans as to how they will achieve circulation on the next stage. **Excess calculates to negative 1% - Additional cement will be required.**

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 Capitan Reef.**

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

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

3. [redacted]

☐ [redacted]

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

C. PRESSURE CONTROL

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

2. [redacted]

[redacted]

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

4. The appropriate BLM office shall be notified a minimum of 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).

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

    b. [redacted]

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

    d. 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.**

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

D. DRILL STEM TEST

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

E. WASTE MATERIAL AND FLUIDS

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

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

JAM 090619

AFMSS

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

Operator Certification Data Report

09/26/2019

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: Tony B Sam **Signed on:** 01/09/2018

Title: VP Operations

Street Address: 200 N. Loraine Street, Suite 1550

City: Midland **State:** TX **Zip:** 79701

Phone: (432)682-7424

Email address: steve.morris@morcorengineering.com

Field Representative

Representative Name: Kevin Garrett

Street Address: 200 N. Lorraine St #1550

City: Midland **State:** TX **Zip:** 79701

Phone: (432)556-8508

Email address: kgarrett@cazapetro.com

AFMSS

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

Application Data Report

09/26/2019

APD ID: 10400025853 **Submission Date:** 01/09/2018

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

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

[redacted]

Show Final Text

Section 1 - General

APD ID: 10400025853 **Tie to previous NOS?** Y **Submission Date:** 01/09/2018

BLM Office: CARLSBAD **User:** Tony B Sam **Title:** VP Operations

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

Lease number: NMNM020979 **Lease Acres:** 320

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

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

Agreement number:

Agreement name:

Keep application confidential? YES

Permitting Agent? YES **APD Operator:** CAZA OPERATING LLC

Operator letter of designation:

Operator Info

Operator Organization Name: CAZA OPERATING LLC

Operator Address: 200 N. Loraine Street, Suite 1550

Zip: 79701

Operator PO Box:

Operator City: Midland **State:** TX

Operator Phone: (432)682-7424

Operator Internet Address:

Section 2 - Well Information

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

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

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

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H **Well API Number:**

Field/Pool or Exploratory? Field and Pool **Field Name:** LEA **Pool Name:** BONE SPRING

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

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

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

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

Type of Well Pad: SINGLE WELL **Multiple Well Pad Name:** **Number:**

Well Class: HORIZONTAL **Number of Legs:** 1

Well Work Type: Drill

Well Type: OIL WELL

Describe Well Type:

Well sub-Type: INFILL

Describe sub-type:

Distance to town: 22.6 Miles **Distance to nearest well:** 470 FT **Distance to lease line:** 400 FT

Reservoir well spacing assigned acres Measurement: 240 Acres

Well plat: Caza_Igloo_12H_NOS_map_v1_060717_06-08-2017.pdf

IGLOO_19_24_STATE_FED_COM_12H___C_102___BLM_signed_20171227095732.pdf

Well work start Date: 02/23/2018 **Duration:** 30 DAYS

Section 3 - Well Location Table

Survey Type: RECTANGULAR

Describe Survey Type:

Datum: NAD83 **Vertical Datum:** NAVD88

Survey number: 33025 **Reference Datum:**

	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	400	FSL	2514	FEL	20S	35E	19	Aliquot SWSE	32.552477	-103.496194	LEA	NEW MEXICO	NEW MEXICO	S	STATE	3690	0	0
KOP Leg #1	400	FSL	2514	FEL	20S	35E	19	Aliquot SWSE	32.552477	-103.496194	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-6567	10257	10257
PPP Leg #1	400	FSL	0	FEL	20S	34E	24	Aliquot SWSW	32.552463	-103.505171	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 020979	-7039	13353	10729

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

	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	400	FSL	2485	FWL	20S	35E	19	Aliquot SESW	32.55247	-103.495283	LEA	NEW MEXICO	NEW MEXICO	S	STATE	-6808	10506	10498
EXIT Leg #1	400	FSL	330	FWL	20S	34E	24	Aliquot SWSW	32.552454	-103.521255	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 123525	-6810	18314	10500
BHL Leg #1	400	FSL	330	FWL	20S	34E	24	Aliquot SWSW	32.552454	-103.521255	LEA	NEW MEXICO	NEW MEXICO	F	NMNM 123525	-6810	18314	10500

APD ID: 10400025853 **Submission Date:** 01/09/2018

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

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

[redacted]

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
1	QUATERNARY	3693	0	0		USEABLE WATER	N
2	RUSTLER	1836	1857	1857		NONE	N
3	TOP SALT	1637	2056	2056	SALT	NONE	N
4	BASE OF SALT	226	3467	3467		NONE	N
5	YATES	-90	3783	3783		NONE	N
6	CAPITAN REEF	-372	4065	4065		USEABLE WATER	N
7	DELAWARE	-1899	5592	5592		NATURAL GAS,OIL	N
8	CHERRY CANYON	-2111	5804	5804		NATURAL GAS,OIL	N
9	BRUSHY CANYON	-3169	6862	6862		NATURAL GAS,OIL	N
10	BONE SPRING	-4883	8576	8576		NATURAL GAS,OIL	N
11	BONE SPRING 1ST	-6434	10127	10127		NATURAL GAS,OIL	N
12	BONE SPRING 2ND	-6805	10498	10506		NATURAL GAS,OIL	Y

Section 2 - Blowout Prevention

Pressure Rating (PSI): 5M **Rating Depth:** 15000

Equipment: Rotating head with a rating of 500psi will be used. A remote kill line and gas buster will be used

Requesting Variance? YES

Variance request: Variance is requested for the use of a coflex hose for the choke line to from the BOP to the choke manifold. A variance is requested to use 1502(15,000psi working pressure) hammer unions downstream of the Choke Manifold used to connect the mud/gas separator and panic line. See choke manifold diagram
Testing Procedure: Minimum Working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the 13-3/8 inch casing shoe shall be 5000 (5M) psi. 5M system requires an HCR valve, remote kill line and

annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips the minimum wait time before cut-off is eight hours after bumping the pug. BOP/BOPE testing can begin after cut-off or once cement reaches 500PSI compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified). The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (18 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater prior to initiating the test (see casing segment as lead cement may be critical item). a. The results of the test shall be reported to the appropriate BLM office. b. All Tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office. c. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug.

Choke Diagram Attachment:

Igloo_19_24_State_Fed_Com_12H_Choke_Schematic_20190326200355.pdf

Igloo_19_24_State_Fed_Com_12H_Coflex_Test_20190326200356.pdf

Igloo_19_24_State_Fed_Com_12H_Coflex_Hose_Cert_20190326200355.pdf

BOP Diagram Attachment:

Igloo_19_24_State_Fed_Com_12H_BOP_Schematic_20190326200404.pdf

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	CONDUCTOR	26	20.0	NEW	API	N	0	120	0	120	3693	3573	120	H-40	94	SLIM LINE HIGH PERFORMANCE						
2	SURFACE	17.5	13.375	NEW	API	N	0	2000	0	2000	3693	1693	2000	J-55	54.5	ST&C	1.22	1.65	DRY	4.72	DRY	7.83
3	INTERMEDIATE	12.25	9.625	NEW	API	N	0	3800	0	3800	3693	-107	3800	J-55	40	LT&C	1.3	1.44	DRY	2.35	DRY	2.85
4	INTERMEDIATE	12.25	9.625	NEW	API	N	0	5542	0	5542	3693	-1849	5542	HCL-80	40	LT&C	1.47	1.12	DRY	12.01	DRY	13.15
5	PRODUCTION	8.75	5.5	NEW	API	N	0	18314	0	10499	3693	-6806	18314	P-110	17	BUTT	1.54	2.08	DRY	3.09	DRY	2.97

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

Casing Attachments

Casing ID: 1 **String Type:** CONDUCTOR

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Casing ID: 2 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Igloo_19_24_State_Fed_Com_12H_Casing_and_Cement_Design_20171231073305.pdf

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Casing ID: 3 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Igloo_19_24_State_Fed_Com_12H_Casing_and_Cement_Design_20171231073321.pdf

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Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

Casing Attachments

Casing ID: 4 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Igloo_19_24_State_Fed_Com_12H_Casing_and_Cement_Design_20171231073333.pdf

Casing ID: 5 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Igloo_19_24_State_Fed_Com_12H_Casing_and_Cement_Design_20171231073346.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
CONDUCTOR	Lead		0	120	100	1.93	13.5	190	5	Class C	+ 4% bwoc Bentonite II + 2% bwoc Calcium Chloride + 0.25 lbs/sack Cello Flake + 0.005% bwoc Static Free + 0.005 gps FP- 6L
SURFACE	Lead		0	1700	1066	1.93	13.5	1930	50	Class C	+ 4% bwoc Bentonite II + 2% bwoc Calcium Chloride + 0.25 lbs/sack

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
											Cello Flake + 0.005% bwoc Static Free + 0.005 gps FP- 6L
SURFACE	Tail		1700	2000	166	1.34	14.8	222	50	Class C	1.5% bwoc Calcium Chloride + 0.005 lbs/sack Static Free + 0.005 gps FP-6L
INTERMEDIATE	Lead	3900	0	3900	1300	2.13	12.6	2769	50	Class C	(35:65) + Poz (Fly Ash) + 4% bwoc Bentonite II + 5% bwoc MPA-5 + 0.25% bwoc FL-52 + 5 lbs/sack LCM- 1 + 0.125 lbs/sack Cello Flake + 0.005 lbs/sack Static Free + 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
INTERMEDIATE	Lead	3900	3900	5042	475	2.13	12.6	1015	50	Class C	(35:65) + Poz (Fly Ash) + 4% bwoc Bentonite II + 5% bwoc MPA-5 + 0.25% bwoc FL-52 + 5 lbs/sack LCM- 1 + 0.125 lbs/sack Cello Flake + 0.005 lbs/sack Static Free + 0.005 gps FP-6L + 1.2% bwoc Sodium Metasilicate + 5% bwow Sodium Chloride
INTERMEDIATE	Tail		5042	5542	220	1.33	14.8	292	50	Class C	CaCl2
PRODUCTION	Lead		0	10200	1630	2.38	11.9	3879	50	Class H	(50:50) + Poz (Fly Ash) + 10% bwoc Bentonite II + 5% bwow Sodium Chloride + 5 lbs/sack LCM-1 + 0.005 lbs/sack Static Free + 0.005 gps FP-6L
PRODUCTION	Tail		10200	18314	1930	1.62	13.5	3215	50	Class C	(15:61:11) Poz (Fly Ash):Class H Cement:CSE-2 + 4% bwow Sodium Chloride

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

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

Describe the mud monitoring system utilized: A Pason PVT system will be rigged up prior to spudding the well. A volume monitoring system that measures, calculates, and displays readings from the mud system on the rig to alert the rig crew of impending gas kicks and lost circulation issues. Components a) PVT Pit Bull monitor: Acts as the heart of the system, containing all the controls, switches, and alarms. Typically, it is mounted near the driller's console. b) Junction box: Provides a safe, convenient place for making the wiring connections. c) Mud probes: Measure the volume of drilling fluid in each individual tank. d) Flow sensor: Measures the relative amount of mud flowing in the return line.

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
0	2000	SPUD MUD	8.4	8.9	62.8	0.1	9.5	2	0	0	
2000	5542	SALT SATURATED	9.2	10	75	0.1	9.5	2	150000	18	
5542	18314	SALT SATURATED	8.6	9.2	71	0.4	9.5	6	125000	18	

Operator Name: CAZA OPERATING LLC

Well Name: IGLOO 19-24 STATE FED COM **Well Number:** 12H

Section 6 - Test, Logging, Coring

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

no production tests

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

DS,GR,MWD,MUDLOG

Coring operation description for the well:

no coring

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 4000 **Anticipated Surface Pressure:** 1690

Anticipated Bottom Hole Temperature(F): 165

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

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? NO

Hydrogen sulfide drilling operations plan:

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

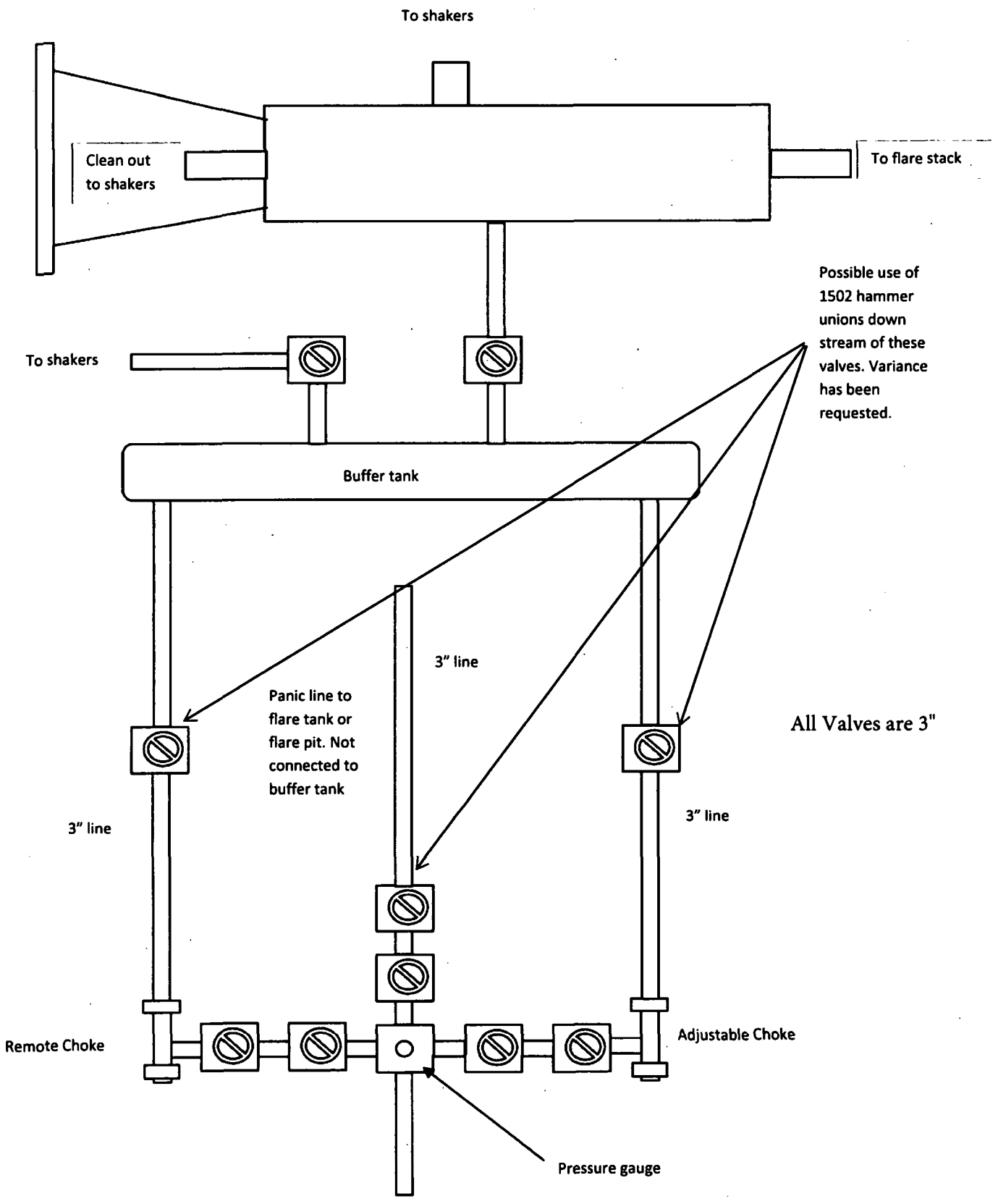
Igloo_19_24_State_Fed_Com_12H_Directional_Plan_20171227100853.pdf

Other proposed operations facets description:

Other proposed operations facets attachment:

Igloo_19_24_State_Fed_Com_12H_Directional_Plot_20171227100918.pdf
Igloo_19_24_State_Fed_Com_12H_Gas_Capture_Plan_20190326200443.pdf

Other Variance attachment:


To shakers
Clean out to shakers
To flare stack
To shakers
Possible use of 1502 hammer unions down stream of these valves. Variance has been requested.
Buffer tank
3" line
Panic line to flare tank or flare pit. Not connected to buffer tank
All Valves are 3"
3" line
3" line
Remote Choke
Adjustable Choke
Pressure gauge

Midwest Hose
& Specialty, Inc.

INTERNAL HYDROSTATIC TEST CERTIFICATE

Customer:	Customer P.O. Number:
HWD	RIGM 92112-11

HOSE SPECIFICATIONS

Type:	Hose Length:
Rotary / Vibrator Hose D / API 7K	173 IN

I.D.	O.D.
4 INCHES	5.87 INCHES

WORKING PRESSURE	TEST PRESSURE	BURST PRESSURE
5,000 PSI	5,000 PSI	N/A PSI

COUPLINGS

Part Number	Stem Lot Number	Ferrule Lot Number
E4.0X64WB	2Q11LOT1	NQ748
E4.0X64WB	2Q11LOT1	NQ748

Type of Coupling:	Die Size:
Swage-It	6.38 INCHES

PROCEDURE

Hose assembly pressure tested with water at ambient temperature.

TIME HELD AT TEST PRESSURE	ACTUAL BURST PRESSURE:
11 1/4 MIN.	N/A PSI

Hose Assembly Serial Number:	Hose Serial Number:
170980	6268

Comments:

Date:	Tested:	Approved:
9/21/2012		Kim Thomas

COPPER STATE RUBBER
VISUAL INSPECTION / HYDROSTATIC TEST REPORT
CHOKE & KILL HOSE
10,000 P.S.I. W/P X 15,000 P.S.I. T/P
SPEC: 090-1915 HS
H2S SUITABLE

SHOP ORDER NO.: 16454 SIZE: 4" I.D.

SERIAL NO.: 22199 LENGTH 50 FT. IN.

CONNECTIONS: 4-1/16" 10,000 PSI API FLANGES

HT-X1840

VISUAL INSPECTION

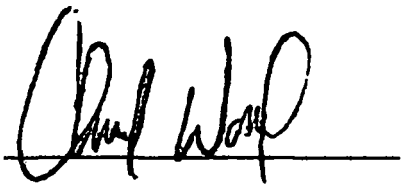
(A) END CAPS / SLEEVE RECESS: OK
(B) EXTERIOR / COVER / BRANDING: OK
(C) INTERIOR TUBE: OK

HYDROSTATIC TEST

5 MIN. @ 10,000 PSI

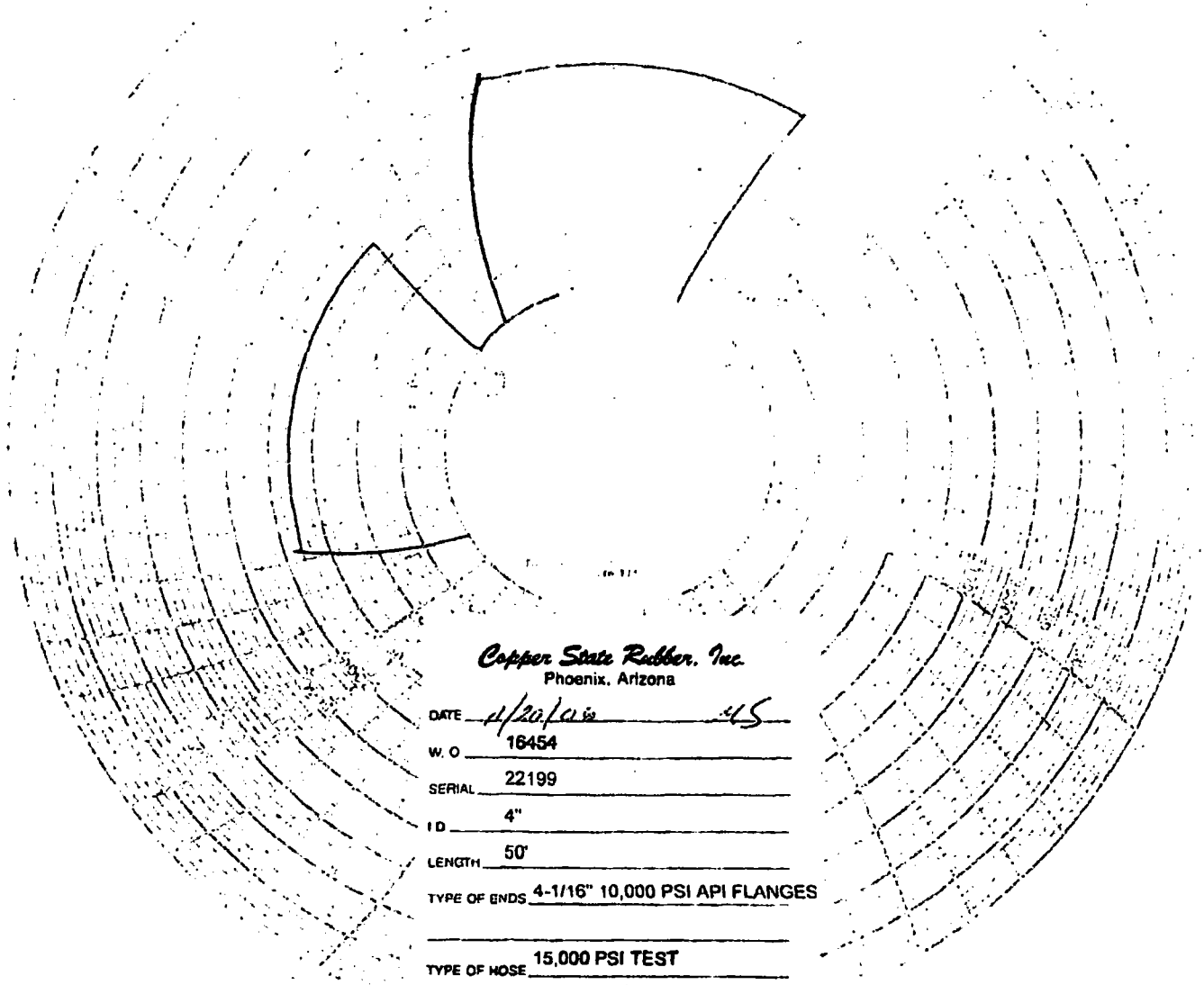
2 MIN. @ 0 PSI 51' OAL

3 MIN. @ 15,000 PSI

WITNESSED BY: 

DATE November 20, 2006

FORM QA-21- REV-2
3-22-00



Copper State Rubber, Inc.
Phoenix, Arizona

DATE 4/20/2012 45

W. O 16454

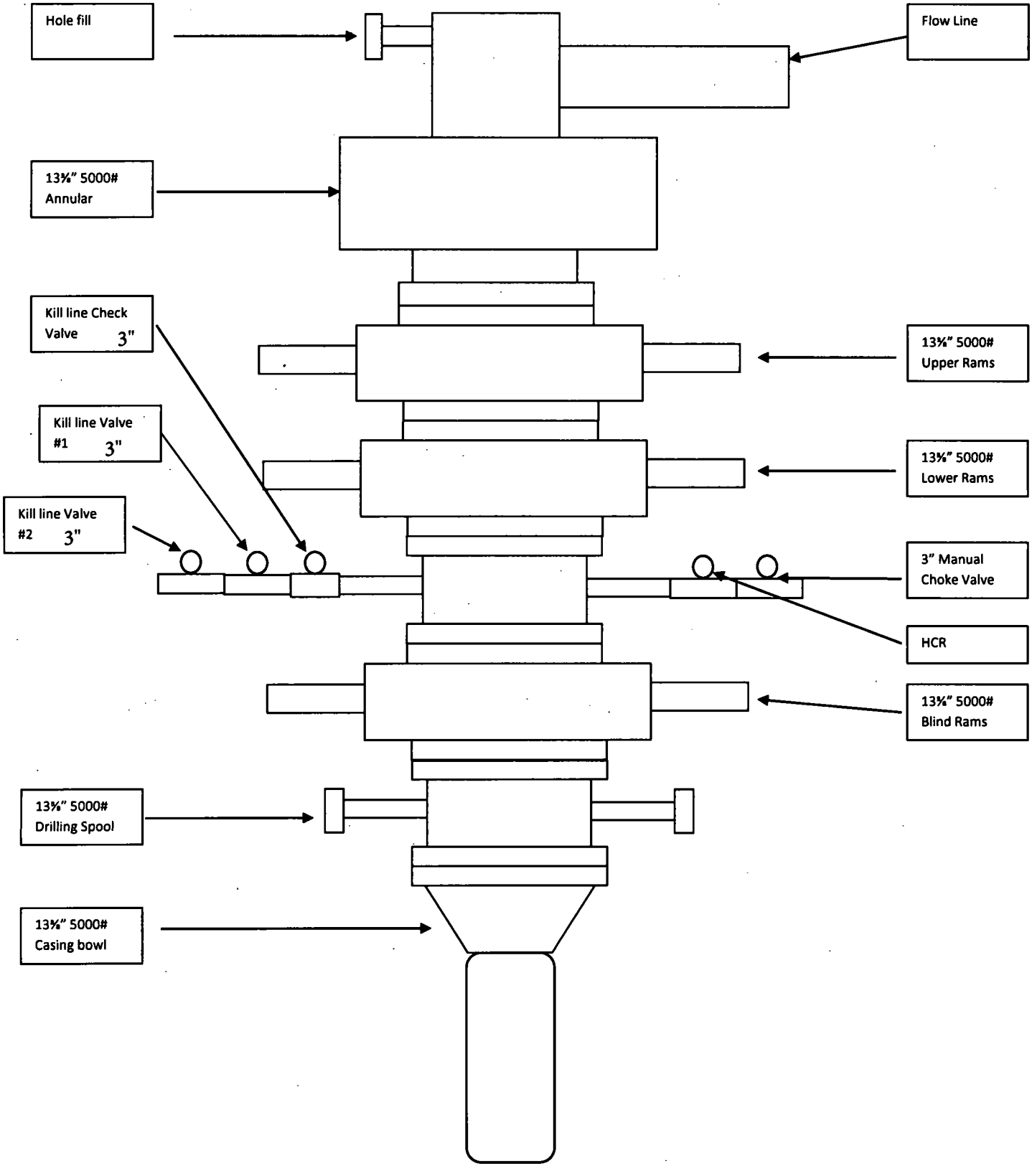
SERIAL 22199

I D 4"

LENGTH 50'

TYPE OF ENDS 4-1/16" 10,000 PSI API FLANGES

TYPE OF HOSE 15,000 PSI TEST
CHOKE & KILL


Hole fill
Flow Line
13⅝" 5000#
Annular
Kill line Check
Valve 3"
13⅝" 5000#
Upper Rams
Kill line Valve
#1 3"
13⅝" 5000#
Lower Rams
Kill line Valve
#2 3"
3" Manual
Choke Valve
HCR
13⅝" 5000#
Blind Rams
13⅝" 5000#
Drilling Spool
13⅝" 5000#
Casing bowl

Igloo 19-24 State Fed Com 12H Casing and Cement Design

In a Lesser Prairie-Chicken section.

13 3/8	surface csg in a	17 1/2	inch hole.	Design Factors			SURFACE	
Segment	**#/ft**	**Grade**	**Coupling**	**Joint**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	54.50	J 55	ST&C	4.72	1.22	0.95	2,000	109,000
"B"							**0**	**0**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,038			**Tail Cmt**	**does not**	**circ to sfc.**	Totals:	2,000	109,000

Comparison of Proposed to Minimum Required Cement Volumes

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	**1186**	2191	**1463**	50	**8.90**	1660	**2M**	1.56

Burst Frac Gradient(s) for Segment(s) A, B = 1.37, b All > 0.70,

9 5/8	casing inside the	13 3/8		Design Factors			INTERMEDIATE	
Segment	**#/ft**	**Grade**	**Coupling**	**Joint**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	40.00	J 55	LT&C	2.35	1.3	0.77	3,800	152,000
"B"	**40.00**	**HCL 80**	**LT&C**	12.01	**1.47**	**1.12**	**1,742**	**69,680**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,107						Totals:	5,542	221,680

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 2000 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	**1301**	2771	**1853**	50	**10.00**	2737	**3M**	0.81
Setting Depths for D V Tool(s):		**3900**					sum of sx	Σ CuFt	Σ%excess
excess cmt by stage % :		**145**	**11**				1385	2774	50

Class 'C' tail cmt yld > 1.35

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.04, b, c, d All > 0.70, OK.

5 1/2	casing inside the	9 5/8		Design Factors			PRODUCTION	
Segment	**#/ft**	**Grade**	**Coupling**	**Body**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	17.00	P 110	BUTT	2.97	1.54	2.08	10,257	174,369
"B"	**17.00**	**P 110**	**BUTT**	7.95	**1.34**	**2.08**	**8,057**	**136,969**
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,257						Totals:	18,314	311,338

B Segment Design Factors would be: 56.14 1.46 if it were a vertical wellbore.

No Pilot Hole Planned	MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°	MEOC
	18314	10829	10829	10257	93	10	11184

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 5542 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.2526	**3590**	7032	**4677**	50	**9.10**			1.35

Class 'H' tail cmt yld > 1.20

Igloo 19-24 State Fed Com 12H Casing and Cement Design

In a Lesser Prairie-Chicken section.

13 3/8 surface csg in a 17 1/2 inch hole. **Design Factors** SURFACE

Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	Weight
"A"	54.50	J 55	ST&C	4.72	1.22	0.95	2,000	109,000
"B"							**0**	**0**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,038			**Tail Cmt**	**does not**	**circ to sfc.**	Totals:	2,000	109,000

Comparison of Proposed to Minimum Required Cement Volumes

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	**1186**	2191	**1463**	50	**8.90**	1660	**2M**	1.56

Burst Frac Gradient(s) for Segment(s) A, B = 1.37, b All > 0.70,

9 5/8 casing inside the 13 3/8 **Design Factors** INTERMEDIATE

Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	Weight
"A"	40.00	J 55	LT&C	2.35	1.3	0.77	3,800	152,000
"B"	**40.00**	**HCL 80**	**LT&C**	12.01	**1.47**	**1.12**	**1,742**	**69,680**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,107						Totals:	5,542	221,680

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 2000 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	**1301**	2771	**1853**	50	**10.00**	2737	**3M**	0.81
Setting Depths for D V Tool(s):		**3900**					sum of sx	Σ CuFt	Σ%excess
excess cmt by stage % :		**145**	**11**				1385	2774	50

Class 'C' tail cmt yld > 1.35

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.04, b, c, d All > 0.70, OK.

5 1/2 casing inside the 9 5/8 **Design Factors** PRODUCTION

Segment	#/ft	Grade	Coupling	Body	Collapse	Burst	Length	Weight
"A"	17.00	P 110	BUTT	2.97	1.54	2.08	10,257	174,369
"B"	**17.00**	**P 110**	**BUTT**	7.95	**1.34**	**2.08**	**8,057**	**136,969**
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,257						Totals:	18,314	311,338

B Segment Design Factors would be: 56.14 1.46 if it were a vertical wellbore.

No Pilot Hole Planned	MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°	MEOC
	18314	10829	10829	10257	93	10	11184

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 5542 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.2526	**3590**	7032	**4677**	50	**9.10**			1.35

Class 'H' tail cmt yld > 1.20

Igloo 19-24 State Fed Com 12H Casing and Cement Design

In a Lesser Prairie-Chicken section.

13 3/8	surface csg in a	17 1/2	inch hole.	Design Factors			SURFACE	
Segment	**#/ft**	**Grade**	**Coupling**	**Joint**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	54.50	J 55	ST&C	4.72	1.22	0.95	2,000	109,000
"B"							**0**	**0**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,038			**Tail Cmt**	**does not**	**circ to sfc.**	Totals:	2,000	109,000

Comparison of Proposed to Minimum Required Cement Volumes

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	**1186**	2191	**1463**	50	**8.90**	1660	**2M**	1.56

Burst Frac Gradient(s) for Segment(s) A, B = 1.37, b All > 0.70,

9 5/8	casing inside the	13 3/8		Design Factors			INTERMEDIATE	
Segment	**#/ft**	**Grade**	**Coupling**	**Joint**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	40.00	J 55	LT&C	2.35	1.3	0.77	3,800	152,000
"B"	**40.00**	**HCL 80**	**LT&C**	12.01	**1.47**	**1.12**	**1,742**	**69,680**
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,107						Totals:	5,542	221,680

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 2000 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	**1301**	2771	**1853**	50	**10.00**	2737	**3M**	0.81
Setting Depths for D V Tool(s):			**3900**				sum of sx	Σ CuFt	Σ%excess
excess cmt by stage % :		**145**	11				1385	2774	50

Class 'C' tail cmt yld > 1.35

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.04, b, c, d All > 0.70, OK.

5 1/2	casing inside the	9 5/8		Design Factors			PRODUCTION	
Segment	**#/ft**	**Grade**	**Coupling**	**Body**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	17.00	P 110	BUTT	2.97	1.54	2.08	10,257	174,369
"B"	**17.00**	**P 110**	**BUTT**	7.95	**1.34**	**2.08**	**8,057**	**136,969**
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,257						Totals:	18,314	311,338

B Segment Design Factors would be: 56.14 1.46 if it were a vertical wellbore.

No Pilot Hole Planned	MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°	MEOC
	18314	10829	10829	10257	93	10	11184

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 5542 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.2526	**3590**	7032	**4677**	50	**9.10**			1.35

Class 'H' tail cmt yld > 1.20

Igloo 19-24 State Fed Com 12H Casing and Cement Design

In a Lesser Prairie-Chicken section.

13 3/8	surface csg in a	17 1/2	inch hole.	Design Factors			SURFACE	
Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	Weight
"A"	54.50	J 55	ST&C	4.72	1.22	0.95	2,000	109,000
"B"							0	0
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,038			Tail Cmt	does not	circ to sfc.	Totals:	2,000	109,000

Comparison of Proposed to Minimum Required Cement Volumes

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	1186	2191	1463	50	8.90	1660	2M	1.56

Burst Frac Gradient(s) for Segment(s) A, B = 1.37, b All > 0.70,

9 5/8	casing inside the	13 3/8		Design Factors			INTERMEDIATE	
Segment	#/ft	Grade	Coupling	Joint	Collapse	Burst	Length	Weight
"A"	40.00	J 55	LT&C	2.35	1.3	0.77	3,800	152,000
"B"	40.00	HCL 80	LT&C	12.01	1.47	1.12	1,742	69,680
w/8.4#/g mud, 30min Sfc Csg Test psig: 1,107						Totals:	5,542	221,680

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 2000 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	1301	2771	1853	50	10.00	2737	3M	0.81
Setting Depths for D V Tool(s):		3900					sum of sx	Σ CuFt	Σ%excess
excess cmt by stage % :		145	11				1385	2774	50

Class 'C' tail cmt yld > 1.35

Burst Frac Gradient(s) for Segment(s): A, B, C, D = 1.04, b, c, d All > 0.70, OK.

5 1/2	casing inside the	9 5/8		Design Factors			PRODUCTION	
Segment	#/ft	Grade	Coupling	Body	Collapse	Burst	Length	Weight
"A"	17.00	P 110	BUTT	2.97	1.54	2.08	10,257	174,369
"B"	17.00	P 110	BUTT	7.95	1.34	2.08	8,057	136,969
w/8.4#/g mud, 30min Sfc Csg Test psig: 2,257						Totals:	18,314	311,338
B	Segment Design Factors would be:			56.14	1.46	if it were a vertical wellbore.		

No Pilot Hole Planned	MTD	Max VTD	Csg VD	Curve KOP	Dogleg°	Severity°	MEOC
	18314	10829	10829	10257	93	10	11184

The cement volume(s) are intended to achieve a top of 0 ft from surface or a 5542 overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
8 3/4	0.2526	3590	7032	4677	50	9.10			1.35

Class 'H' tail cmt yld > 1.20

Caza Operating, LLC

Lea County, NM (NAD 27 NME)
Igloo 19-24 State
#12H

OH

Plan: Plan #1

Standard Planning Report

15 June, 2017

Scientific Drilling

www.scientificdrilling.com

Planning Report

Database:	Midland District	**Local Co-ordinate Reference:**	Well #12H
Company:	Caza Operating, LLC	**TVD Reference:**	KB = 27' @ 3720.00usft
Project:	Lea County, NM (NAD 27 NME)	**MD Reference:**	KB = 27' @ 3720.00usft
Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Project	Lea County, NM (NAD 27 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	Igloo 19-24 State				
Site Position:		**Northing:**	565,657.00 usft	**Latitude:**	32° 33' 8.307 N
From:	Map	**Easting:**	758,129.00 usft	**Longitude:**	103° 29' 44.149 W
Position Uncertainty:	0.00 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.45 °

Well	#12H					
Well Position	**+N/-S**	0.00 usft	**Northing:**	565,657.00 usft	**Latitude:**	32° 33' 8.307 N
	+E/-W	0.00 usft	**Easting:**	758,129.00 usft	**Longitude:**	103° 29' 44.149 W
Position Uncertainty		0.00 usft	**Wellhead Elevation:**	0.00 usft	**Ground Level:**	3,693.00 usft

Wellbore	OH				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	6/15/2017	6.73	60.55	48,296

Design	Plan #1				
Audit Notes:					
Version:		**Phase:**	PLAN	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (bearing)**	
	0.00	0.00	0.00	269.64	

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	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	
9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00	
10,257.57	0.00	0.00	10,257.57	0.00	0.00	0.00	0.00	0.00	0.00	
11,184.17	92.66	269.64	10,829.91	-3.73	-599.54	10.00	10.00	0.00	269.64	
18,314.45	92.66	269.64	10,499.00	-48.00	-7,722.00	0.00	0.00	0.00	0.00	BHL#1[I19-24#12H]

Database:	Midland District	**Local Co-ordinate Reference:**	Well #12H
Company:	Caza Operating, LLC	**TVD Reference:**	KB = 27' @ 3720.00usft
Project:	Lea County, NM (NAD 27 NME)	**MD Reference:**	KB = 27' @ 3720.00usft
Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,857.00	0.00	0.00	1,857.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,950.00	0.00	0.00	1,950.00	0.00	0.00	0.00	0.00	0.00	0.00
13 3/8"									
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,056.00	0.00	0.00	2,056.00	0.00	0.00	0.00	0.00	0.00	0.00
Top of Salt									
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,467.00	0.00	0.00	3,467.00	0.00	0.00	0.00	0.00	0.00	0.00
Base of Salt									
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,783.00	0.00	0.00	3,783.00	0.00	0.00	0.00	0.00	0.00	0.00
Yates									
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,065.00	0.00	0.00	4,065.00	0.00	0.00	0.00	0.00	0.00	0.00
Capitan									

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Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,592.00	0.00	0.00	5,592.00	0.00	0.00	0.00	0.00	0.00	0.00
Delaware									
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,650.00	0.00	0.00	5,650.00	0.00	0.00	0.00	0.00	0.00	0.00
9 5/8"									
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,804.00	0.00	0.00	5,804.00	0.00	0.00	0.00	0.00	0.00	0.00
Cherry Canyon									
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,862.00	0.00	0.00	6,862.00	0.00	0.00	0.00	0.00	0.00	0.00
Brushy Canyon									
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00

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Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,576.00	0.00	0.00	8,576.00	0.00	0.00	0.00	0.00	0.00	0.00
Bone Spring Glorietta									
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00
9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00
9,815.00	0.00	0.00	9,815.00	0.00	0.00	0.00	0.00	0.00	0.00
1st Bone Spring Sand									
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00
10,100.00	0.00	0.00	10,100.00	0.00	0.00	0.00	0.00	0.00	0.00
10,127.00	0.00	0.00	10,127.00	0.00	0.00	0.00	0.00	0.00	0.00
Base 1st Bone Spring Sand									
10,200.00	0.00	0.00	10,200.00	0.00	0.00	0.00	0.00	0.00	0.00
10,257.57	0.00	0.00	10,257.57	0.00	0.00	0.00	0.00	0.00	0.00
Curve KOP - Build 10.0° / 100									
10,300.00	4.24	269.64	10,299.96	-0.01	-1.57	1.57	10.00	10.00	0.00
10,350.00	9.24	269.64	10,349.60	-0.05	-7.44	7.44	10.00	10.00	0.00
10,400.00	14.24	269.64	10,398.54	-0.11	-17.61	17.61	10.00	10.00	0.00
10,450.00	19.24	269.64	10,446.40	-0.20	-32.01	32.01	10.00	10.00	0.00
10,500.00	24.24	269.64	10,492.83	-0.31	-50.53	50.53	10.00	10.00	0.00
10,506.27	24.87	269.64	10,498.53	-0.33	-53.13	53.13	10.00	10.00	0.00
Top of the 2nd Bone Spring Sand									
10,550.00	29.24	269.64	10,537.47	-0.45	-73.02	73.02	10.00	10.00	0.00
10,600.00	34.24	269.64	10,579.98	-0.62	-99.32	99.32	10.00	10.00	0.00
10,650.00	39.24	269.64	10,620.03	-0.80	-129.22	129.22	10.00	10.00	0.00
10,700.00	44.24	269.64	10,657.32	-1.01	-162.50	162.50	10.00	10.00	0.00
10,750.00	49.24	269.64	10,691.58	-1.24	-198.90	198.90	10.00	10.00	0.00
10,800.00	54.24	269.64	10,722.53	-1.48	-238.15	238.15	10.00	10.00	0.00
10,850.00	59.24	269.64	10,749.94	-1.74	-279.94	279.95	10.00	10.00	0.00
10,900.00	64.24	269.64	10,773.60	-2.01	-323.97	323.98	10.00	10.00	0.00
10,950.00	69.24	269.64	10,793.34	-2.30	-369.89	369.90	10.00	10.00	0.00
10,989.57	73.20	269.64	10,806.07	-2.53	-407.35	407.36	10.00	10.00	0.00
2nd Bone Spring Target									
11,000.00	74.24	269.64	10,809.00	-2.59	-417.36	417.37	10.00	10.00	0.00
11,050.00	79.24	269.64	10,820.46	-2.90	-466.01	466.02	10.00	10.00	0.00
11,065.10	80.75	269.64	10,823.08	-2.99	-480.88	480.89	10.00	10.00	0.00
LP[19-24#12H]									
11,100.00	84.24	269.64	10,827.64	-3.20	-515.48	515.49	10.00	10.00	0.00
11,150.00	89.24	269.64	10,830.48	-3.51	-565.38	565.39	10.00	10.00	0.00
11,184.17	92.66	269.64	10,829.91	-3.73	-599.54	599.55	10.00	10.00	0.00
EOC - HOLD									
11,200.00	92.66	269.64	10,829.18	-3.83	-615.35	615.36	0.00	0.00	0.00
11,300.00	92.66	269.64	10,824.53	-4.45	-715.24	715.25	0.00	0.00	0.00

Database:	Midland District	**Local Co-ordinate Reference:**	Well #12H
Company:	Caza Operating, LLC	**TVD Reference:**	KB = 27' @ 3720.00usft
Project:	Lea County, NM (NAD 27 NME)	**MD Reference:**	KB = 27' @ 3720.00usft
Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,400.00	92.66	269.64	10,819.89	-5.07	-815.13	815.15	0.00	0.00	0.00
11,500.00	92.66	269.64	10,815.25	-5.69	-915.02	915.04	0.00	0.00	0.00
11,600.00	92.66	269.64	10,810.61	-6.31	-1,014.91	1,014.93	0.00	0.00	0.00
11,700.00	92.66	269.64	10,805.97	-6.93	-1,114.80	1,114.82	0.00	0.00	0.00
11,800.00	92.66	269.64	10,801.33	-7.55	-1,214.69	1,214.72	0.00	0.00	0.00
11,900.00	92.66	269.64	10,796.69	-8.17	-1,314.58	1,314.61	0.00	0.00	0.00
12,000.00	92.66	269.64	10,792.05	-8.79	-1,414.47	1,414.50	0.00	0.00	0.00
12,100.00	92.66	269.64	10,787.41	-9.41	-1,514.36	1,514.39	0.00	0.00	0.00
12,200.00	92.66	269.64	10,782.77	-10.03	-1,614.25	1,614.28	0.00	0.00	0.00
12,300.00	92.66	269.64	10,778.13	-10.66	-1,714.14	1,714.18	0.00	0.00	0.00
12,400.00	92.66	269.64	10,773.48	-11.28	-1,814.03	1,814.07	0.00	0.00	0.00
12,500.00	92.66	269.64	10,768.84	-11.90	-1,913.92	1,913.96	0.00	0.00	0.00
12,600.00	92.66	269.64	10,764.20	-12.52	-2,013.81	2,013.85	0.00	0.00	0.00
12,700.00	92.66	269.64	10,759.56	-13.14	-2,113.70	2,113.75	0.00	0.00	0.00
12,800.00	92.66	269.64	10,754.92	-13.76	-2,213.60	2,213.64	0.00	0.00	0.00
12,900.00	92.66	269.64	10,750.28	-14.38	-2,313.49	2,313.53	0.00	0.00	0.00
13,000.00	92.66	269.64	10,745.64	-15.00	-2,413.38	2,413.42	0.00	0.00	0.00
13,100.00	92.66	269.64	10,741.00	-15.62	-2,513.27	2,513.31	0.00	0.00	0.00
13,200.00	92.66	269.64	10,736.36	-16.24	-2,613.16	2,613.21	0.00	0.00	0.00
13,300.00	92.66	269.64	10,731.72	-16.86	-2,713.05	2,713.10	0.00	0.00	0.00
13,400.00	92.66	269.64	10,727.08	-17.49	-2,812.94	2,812.99	0.00	0.00	0.00
13,500.00	92.66	269.64	10,722.43	-18.11	-2,912.83	2,912.88	0.00	0.00	0.00
13,600.00	92.66	269.64	10,717.79	-18.73	-3,012.72	3,012.78	0.00	0.00	0.00
13,700.00	92.66	269.64	10,713.15	-19.35	-3,112.61	3,112.67	0.00	0.00	0.00
13,800.00	92.66	269.64	10,708.51	-19.97	-3,212.50	3,212.56	0.00	0.00	0.00
13,900.00	92.66	269.64	10,703.87	-20.59	-3,312.39	3,312.45	0.00	0.00	0.00
14,000.00	92.66	269.64	10,699.23	-21.21	-3,412.28	3,412.34	0.00	0.00	0.00
14,100.00	92.66	269.64	10,694.59	-21.83	-3,512.17	3,512.24	0.00	0.00	0.00
14,200.00	92.66	269.64	10,689.95	-22.45	-3,612.06	3,612.13	0.00	0.00	0.00
14,300.00	92.66	269.64	10,685.31	-23.07	-3,711.95	3,712.02	0.00	0.00	0.00
14,400.00	92.66	269.64	10,680.67	-23.69	-3,811.84	3,811.91	0.00	0.00	0.00
14,500.00	92.66	269.64	10,676.03	-24.32	-3,911.73	3,911.81	0.00	0.00	0.00
14,600.00	92.66	269.64	10,671.38	-24.94	-4,011.62	4,011.70	0.00	0.00	0.00
14,700.00	92.66	269.64	10,666.74	-25.56	-4,111.51	4,111.59	0.00	0.00	0.00
14,800.00	92.66	269.64	10,662.10	-26.18	-4,211.40	4,211.48	0.00	0.00	0.00
14,900.00	92.66	269.64	10,657.46	-26.80	-4,311.29	4,311.38	0.00	0.00	0.00
15,000.00	92.66	269.64	10,652.82	-27.42	-4,411.18	4,411.27	0.00	0.00	0.00
15,100.00	92.66	269.64	10,648.18	-28.04	-4,511.07	4,511.16	0.00	0.00	0.00
15,200.00	92.66	269.64	10,643.54	-28.66	-4,610.96	4,611.05	0.00	0.00	0.00
15,300.00	92.66	269.64	10,638.90	-29.28	-4,710.85	4,710.94	0.00	0.00	0.00
15,400.00	92.66	269.64	10,634.26	-29.90	-4,810.74	4,810.84	0.00	0.00	0.00
15,500.00	92.66	269.64	10,629.62	-30.52	-4,910.63	4,910.73	0.00	0.00	0.00
15,600.00	92.66	269.64	10,624.98	-31.15	-5,010.52	5,010.62	0.00	0.00	0.00
15,700.00	92.66	269.64	10,620.33	-31.77	-5,110.41	5,110.51	0.00	0.00	0.00
15,800.00	92.66	269.64	10,615.69	-32.39	-5,210.30	5,210.41	0.00	0.00	0.00
15,900.00	92.66	269.64	10,611.05	-33.01	-5,310.20	5,310.30	0.00	0.00	0.00
16,000.00	92.66	269.64	10,606.41	-33.63	-5,410.09	5,410.19	0.00	0.00	0.00
16,100.00	92.66	269.64	10,601.77	-34.25	-5,509.98	5,510.08	0.00	0.00	0.00
16,200.00	92.66	269.64	10,597.13	-34.87	-5,609.87	5,609.97	0.00	0.00	0.00
16,300.00	92.66	269.64	10,592.49	-35.49	-5,709.76	5,709.87	0.00	0.00	0.00
16,400.00	92.66	269.64	10,587.85	-36.11	-5,809.65	5,809.76	0.00	0.00	0.00
16,500.00	92.66	269.64	10,583.21	-36.73	-5,909.54	5,909.65	0.00	0.00	0.00
16,600.00	92.66	269.64	10,578.57	-37.35	-6,009.43	6,009.54	0.00	0.00	0.00
16,700.00	92.66	269.64	10,573.93	-37.98	-6,109.32	6,109.44	0.00	0.00	0.00

Database:	Midland District	**Local Co-ordinate Reference:**	Well #12H
Company:	Caza Operating, LLC	**TVD Reference:**	KB = 27' @ 3720.00usft
Project:	Lea County, NM (NAD 27 NME)	**MD Reference:**	KB = 27' @ 3720.00usft
Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
16,800.00	92.66	269.64	10,569.28	-38.60	-6,209.21	6,209.33	0.00	0.00	0.00
16,900.00	92.66	269.64	10,564.64	-39.22	-6,309.10	6,309.22	0.00	0.00	0.00
17,000.00	92.66	269.64	10,560.00	-39.84	-6,408.99	6,409.11	0.00	0.00	0.00
17,100.00	92.66	269.64	10,555.36	-40.46	-6,508.88	6,509.00	0.00	0.00	0.00
17,200.00	92.66	269.64	10,550.72	-41.08	-6,608.77	6,608.90	0.00	0.00	0.00
17,300.00	92.66	269.64	10,546.08	-41.70	-6,708.66	6,708.79	0.00	0.00	0.00
17,400.00	92.66	269.64	10,541.44	-42.32	-6,808.55	6,808.68	0.00	0.00	0.00
17,500.00	92.66	269.64	10,536.80	-42.94	-6,908.44	6,908.57	0.00	0.00	0.00
17,600.00	92.66	269.64	10,532.16	-43.56	-7,008.33	7,008.47	0.00	0.00	0.00
17,700.00	92.66	269.64	10,527.52	-44.18	-7,108.22	7,108.36	0.00	0.00	0.00
17,800.00	92.66	269.64	10,522.88	-44.81	-7,208.11	7,208.25	0.00	0.00	0.00
17,900.00	92.66	269.64	10,518.23	-45.43	-7,308.00	7,308.14	0.00	0.00	0.00
18,000.00	92.66	269.64	10,513.59	-46.05	-7,407.89	7,408.03	0.00	0.00	0.00
18,100.00	92.66	269.64	10,508.95	-46.67	-7,507.78	7,507.93	0.00	0.00	0.00
18,200.00	92.66	269.64	10,504.31	-47.29	-7,607.67	7,607.82	0.00	0.00	0.00
18,300.00	92.66	269.64	10,499.67	-47.91	-7,707.56	7,707.71	0.00	0.00	0.00
18,314.45	92.66	269.64	10,499.00	-48.00	-7,722.00	7,722.15	0.00	0.00	0.00

TD at 18314.45 - BHL#1[I19-24#12H]

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (bearing	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
BHL#1[I19-24#12H] - plan hits target center - Point	0.00	0.00	10,499.00	-48.00	-7,722.00	565,609.00	750,407.00	32° 33' 8.424 N	103° 31' 14.366 W
LP[I19-24#12H] - plan misses target center by 13.09usft at 11065.10usft MD (10823.08 TVD, -2.99 N, -480.88 E) - Point	0.00	0.00	10,836.00	-4.00	-479.00	565,653.00	757,650.00	32° 33' 8.305 N	103° 29' 49.746 W

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,950.00	1,950.00	13 3/8"	13-3/8	17-1/2
5,650.00	5,650.00	9 5/8"	9-5/8	13-1/2

Planning Report

Database:	Midland District	**Local Co-ordinate Reference:**	Well #12H
Company:	Caza Operating, LLC	**TVD Reference:**	KB = 27' @ 3720.00usft
Project:	Lea County, NM (NAD 27 NME)	**MD Reference:**	KB = 27' @ 3720.00usft
Site:	Igloo 19-24 State	**North Reference:**	Grid
Well:	#12H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1		

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (bearing)
1,857.00	1,857.00	Rustler		-2.66	269.64
2,056.00	2,056.00	Top of Salt		-2.66	269.64
3,467.00	3,467.00	Base of Salt		-2.66	269.64
3,783.00	3,783.00	Yates		-2.66	269.64
4,065.00	4,065.00	Capitan		-2.66	269.64
5,592.00	5,592.00	Delaware		-2.66	269.64
5,804.00	5,804.00	Cherry Canyon		-2.66	269.64
6,862.00	6,862.00	Brushy Canyon		-2.66	269.64
8,576.00	8,576.00	Bone Spring Glorietta		-2.66	269.64
9,815.00	9,815.00	1st Bone Spring Sand		-2.66	269.64
10,127.00	10,127.00	Base 1st Bone Spring Sand		-2.66	269.64
10,506.27	10,498.53	Top of the 2nd Bone Spring Sand		-2.66	269.64
10,989.57	10,806.07	2nd Bone Spring Target		-2.66	269.64

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
10,257.57	10,257.57	0.00	0.00	Curve KOP - Build 10.0° / 100
11,184.17	10,829.91	0.00	0.00	EOC - HOLD
18,314.45	10,499.00	-3.73	-599.54	TD at 18314.45