BEFORE THE OIL CONSERVATION DIVISION
EXAMINER HEARING AUGUST 05, 2021

CASE NO. 22087

MESA VERDE UNIT WELLS

LEA COUNTY, NEW MEXICO

STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

HEARING PACKAGE
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STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

APPLICATION

OXY USA Inc. ("OXY" or "Applicant") (OGRID No. 16696) through its undersigned attorneys, hereby files this application with the Oil Conservation Division for an order authorizing OXY to engage in a closed loop gas capture injection pilot project in the Bone Spring formation ("pilot project"). In support of this application, OXY states:

PROJECT OVERVIEW

1. OXY proposes to create a 640-acre project area for this pilot project consisting of the E/2 of Sections 8 and 17, all within Township 24 South, Range 32 East, NMPM, Lea County, New Mexico. *See* **Exhibit A** at 6. The project area is located entirely within OXY's Mesa Verde Bone Spring Unit, which is comprised of 3,461 acres, more or less, as follows:

Township 24 South, Range 32 East

Section 7: SE/4, E/2 NE/4
Section 8: All
Section 9: W/2
Section 16: W/2
Section 17: All
Section 18: All

Township 24 South, Range 31 East

Section 13: All

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. A
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

2. Within the proposed project area, OXY seeks authority to utilize the following producing wells to occasionally inject produced gas into the Bone Spring formation, Mesa Verde Bone Spring Pool (96229):

- The Mesa Verde BS Unit 1H well (API No. 30-025-44101), with a surface location 271 feet FSL and 245 feet FEL (Unit P) in Section 17, and a bottom hole location 335 feet FNL and 992 feet FEL (Unit A) in Section 8;
- The Mesa Verde BS Unit 2H well (API No. 30-025-44196), with a surface location 240 feet FSL and 1,614 feet FEL (Unit O) in Section 17, and a bottom hole location 171 feet FNL and 1,275 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 3H well (API No. 30-025-44183), with a surface location 240 feet FSL and 1,644 feet FEL (Unit O) in Section 17, and a bottom hole location 197 feet FNL and 2,368 feet FEL (Unit B) in Section 8;
- Mesa Verde BS Unit 4H well (API No. 30-025-44064), with a surface location 280 feet FSL and 965 feet FEL (Unit P) in Section 17, and a bottom hole location 185 feet FNL and 512 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 5H well (API No. 30-025-44185), with a surface location 280 feet FSL and 995 feet FEL (Unit P) in Section 17, and a bottom hole location 196 feet FNL and 1,329 feet FEL (Unit B) in Section 8; and
- Mesa Verde BS Unit 6H well (API No. 30-025-44042), with a surface location 280 feet FSL and 2,624 feet FEL (Unit O) in Section 17, and a bottom hole location 206 feet FNL and 2,292 feet FEL (Unit B) in Section 8.

3. Injection along the horizontal portion of the wellbores will be at the following approximate total vertical depths:

- The Mesa Verde BS Unit 1H well: between 9,247 feet and 9,290 feet;
- The Mesa Verde BS Unit 2H well: between 11,815 feet and 11,860 feet;
- Mesa Verde BS Unit 3H well: between 9,901 feet and 9,216 feet;
- Mesa Verde BS Unit 4H well: between 10,339 feet and 10,448 feet;
- Mesa Verde BS Unit 5H well: between 10,339 feet and 10,449 feet; and
- Mesa Verde BS Unit 6H well: between 10,385 feet and 10,409 feet.

See Exhibit A at 14-15, 20-21, 27-28, 33-34, 40-41, 47-48 and 74.

4. A map depicting the pipeline that ties the wells proposed for the pilot project into the gathering system and the affected compressor station is included in the attached Exhibit A at page 5.

WELL DATA

5. Information on the well data, including well diagrams and well construction, casing, tubing, packers, cement, perforations, and other details for each proposed injection well are included in the attached Exhibit A at pages 14-15, 20-21, 27-28, 33-34, 40-41, 47-48 and 74, respectively.

6. The top of the Bone Spring formation in this area is at approximately 8,593 feet total vertical depth and extends down to the top of the Wolfcamp formation at approximately 12,100 feet total vertical depth. *See* Exhibit A at 79, 82-84.

7. The current average surface pressures under normal operations for the proposed injection wells range from approximately 520 psi to 1,100 psi. *See* Exhibit A at 54. The maximum achievable surface pressure (MASP) for the wells in the pilot project will be 1,200 psi. *Id.*

8. OXY plans to monitor injection and operational parameters for the pilot project using an automated supervisory control and data acquisition (SCADA) system with pre-set alarms

and automatic shut-in safety valves that will prevent injection pressures from exceeding the MASP. *See* Exhibit A at 55-56 and 68-69.

9. The proposed maximum achievable surface pressure will not exert pressure at the top perforation in the wellbore of any injection well with a full fluid column of reservoir brine water in excess of 90% of the burst pressure for the production casing or production liner. *See* Exhibit A at 54. In addition, the proposed maximum achievable surface pressure will not exceed 0.14 psi per foot as measured at the top of the uppermost perforation in any injection well and will not exert pressure at the topmost perforation in excess of 90% of the formation parting pressure. *See* Exhibit A at 54.

10. Cement bond logs[1] demonstrate the placement of cement in each of the wells proposed for this pilot project and that there is a good and sufficient cement bond with the production casing and the formation across the top of the proposed injection interval in each well. *See* Exhibit A at 16-19, 22-26, 29-32, 35-39, 42-46, 49-53.

11. All the wells proposed for the pilot project have previously demonstrated mechanical integrity at a pressure of 9,800 psi for thirty minutes. *See* Exhibit A at 57. OXY will undertake new tests to demonstrate mechanical integrity for each of the wells proposed for this pilot project as a condition of approval prior to commencing injection operations.

GEOLOGY AND RESERVOIR

12. Data and a geologic analysis confirming that the Bone Spring formation is suitable for the proposed pilot project is included in Exhibit A at pages 79-85. A general characterization of the geology of the Bone Spring formation and its suitability for the proposed injection, including

[1] Electronic version of the cement bond logs will be submitted to the Division by email.

identification of confining layers and their ability to prevent vertical movement of the injected gas is included in the analysis. *Id.*

13. Zones that are productive of oil and gas are located in Bone Spring intervals above and below the targeted injection interval and in the deeper Wolfcamp formation. *See* Exhibit A at 79.

14. Reservoir modeling indicates anticipated horizontal movement of injected gas will be approximately 100 feet or less from each injection wellbore within the Bone Spring formation. *See* Exhibit A at 92.

15. The proposed average injection rate for each well is 1.8 MMSCFD with a maximum injection rate of 3.0 MMSCFD during injection. *See* Exhibit A at 54.

16. OXY has prepared calculations estimating the stimulated reservoir volume based on supporting empirical data and a reservoir model to evaluate potential effects on wells adjacent to the pilot project area. *See* Exhibit A at 87-97. OXY's analysis concludes that there will be no change in the oil recovery from each of its proposed injection wells or from any of the offsetting wells. *See id.* at 95.

17. Similarly, OXY has prepared an analysis of the potential effects on the reservoir caused by the proposed injection, including consideration of commingling fluids. Exhibit A at 60-65, 87-97. OXY's analysis concludes that there will be no adverse effect on the reservoir as a result of the injection. *Id.*

18. OXY has also prepared an analysis evaluating the expected gas storage capacity for each proposed injection well relative to the gas injection volumes for an injection scenario lasting twenty days. *See* Exhibit A at 95. The analysis confirms that whether the capacity is estimated based on the fracture volume gas equivalent or the total gas equivalent volumes produced from the

proposed injection zone, the anticipated gas injection volumes will be well below the estimated volume capacity within the project area.

19. The source of gas for injection will be from wells producing in the Bone Spring and Wolfcamp formations within OXY's Mesa Verde Bone Spring Unit and Mesa Verde Wolfcamp Unit that are identified in the list of wells in Exhibit A at page 59. OXY's Mesa Verde Wolfcamp Unit is comprised of the same acreage as the Mesa Verde Bone Spring Unit identified in Paragraph 1, above. The unit interest owners are identical between the units.

20. OXY has prepared an analysis of the composition of the source gas for injection and a corrosion prevention plan. *See* Exhibit A at 60-66.

21. OXY has examined the available geologic and engineering data and found no evidence of open faults or other hydrologic connections between the injection zone and any underground source of drinking water. *See* Exhibit A at 85. OXY has also examined the available geologic and engineering data and determined that the total recoverable volume of hydrocarbons from the reservoir will not be adversely affected by the pilot project. *See* Exhibit A at 97.

AREA OF REVIEW

22. OXY has prepared maps depicting the location of each proposed injection well, the location and lateral of every well within a two-mile radius, leases within two miles, and the half-mile area of review. *See* Exhibit A at 71-73.

23. A tabulation of data for wells that penetrate the proposed injection intervals or the confining layer within the area of review is included in Exhibit A at pages 74-75, along with well-bore schematics for wells that are plugged and abandoned or temporarily abandoned. *See* Exhibit A at 76-77.

OPERATIONS AND SAFETY

24. OXY will monitor each injection well's instantaneous rates and daily injection volumes, along with pressure in the well tubing, casing, and bradenheads using an automated supervisory control and data acquisition (SCADA) system. *See* Exhibit A at 55-56 and 68-69. Each injection well will also include automated safety devices, including automatic shut-in valves among other operational safety measures. *Id.* OXY will also monitor and track various operational parameters at the pilot project's central tank battery and central gas lift compressors. *See* Exhibit A at 68-69.

25. A copy of this application will be provided by certified mail to the surface owner on which each injection well identified herein is located, and to each leasehold operator and other affected persons within any tract wholly or partially contained within one-half mile of the completed interval of the wellbore for each of the proposed injection wells. A copy of the affected parties subject to notice is included in Exhibit A at pages 101-102, along with a map and list identifying each tract and affected persons given notice. *See* Exhibit A at 99-100.

26. Approval of this pilot project is in the best interests of conservation, the prevention of waste, and the protection of correlative rights.

WHEREFORE, OXY USA Inc. requests that this Application be set for hearing before an Examiner of the Oil Conservation Division on August 5, 2021, and that after notice and hearing this Application be approved.

Respectfully submitted,

HOLLAND & HART LLP

By:_____

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ATTORNEYS FOR OXY USA INC.

New Mexico Closed Loop Gas Capture (CLGC)
Oxy- Mesa Verde

EXHIBIT A

Overview
EXHIBIT A

General Project Description: Closed Loop Gas Capture Project
Oxy- Mesa Verde

About the Mesa Verde Units

There are two Resource Development Units in Mesa Verde. One is unitized in the Bone Spring formation and the other is unitized in the Wolfcamp formation. Each one has a Unit Agreement and a Unit Operating Agreement, and they were formed in 2017. Both cover exactly the same geographical area (3461.80 acres) and have identical interests. OXY is the designated operator of both units. All the GLGC wells proposed in this application are Mesa Verde Bone Spring Unit wells, and the source wells are either Mesa Verde Bone Spring Unit wells or Mesa Verde Wolfcamp Unit wells.

Summary of Requested Relief

1. Authority to operate a closed loop gas capture project ("CLGC") consisting of six wells to prevent waste and reduce adverse impacts from temporary interruptions of gas pipeline capacity.
2. A 5-year duration of such authority, with renewal by administrative approval conditioned upon compliance with the stipulations contained in the initial Order and a successful MIT test.
3. An exception for the 100-foot packer setting depth requirement applied to vertical injection wells.

Overview

Oxy USA Inc. (Oxy) is proposing a Closed Loop Gas Capture (CLGC) project in the Mesa Verde Unit area. On occasion, third-party gas purchasers reduce takeaway capacity and cause interruptions that result in flaring or shut in production. During these interruptions, Oxy will utilize CLGC wells to capture gas and reduce flaring.

In 2020, Oxy experienced 67 days of interruptions where the third-party gas purchaser temporarily reduced takeaway capacity from this location, resulting in the flaring of at least 96 MMSCF of gas or the immediate shut-in of at least 10,000 BOPD. Approval of this application will significantly reduce such flaring or shut-in production in the future.

Operations During Interruption	Operations During Interruption With CLGC System	Benefits
• Flare gas • Shut in production	• Store gas • Continue production • No additional surface disturbances	• Reduce greenhouse gas emissions • Improve economic recovery of mineral resources including gas that might have been flared • Utilize existing infrastructure

Proposed Operations

Oxy has an extensive high-pressure gas system in the Mesa Verde Unit area. It is used for gas lift, a type of artificial lift. Oxy plans to utilize the same system for gas storage operations. Very minimal equipment on surface will need to be installed prior to starting storage operations.

Enlink is the third-party gas purchaser for Mesa Verde. If an interruption occurs, Oxy will divert gas from the takeaway line back into the gas lift injection system. Gas will flow from the Central Gas Lift (CGL) Compressor Station through the flow meter, control valve, safety shutdown valve, wellhead and into the wellbore for storage. Gas will be injected down the casing/tubing annulus in some wells and down the tubing without a packer in the hole in others. Simultaneously, the proposed CLGC well will be shut in by closing the electric choke upstream of the production flowline. After the interruption has ended, the electric choke will open and the CLGC well resumes production.

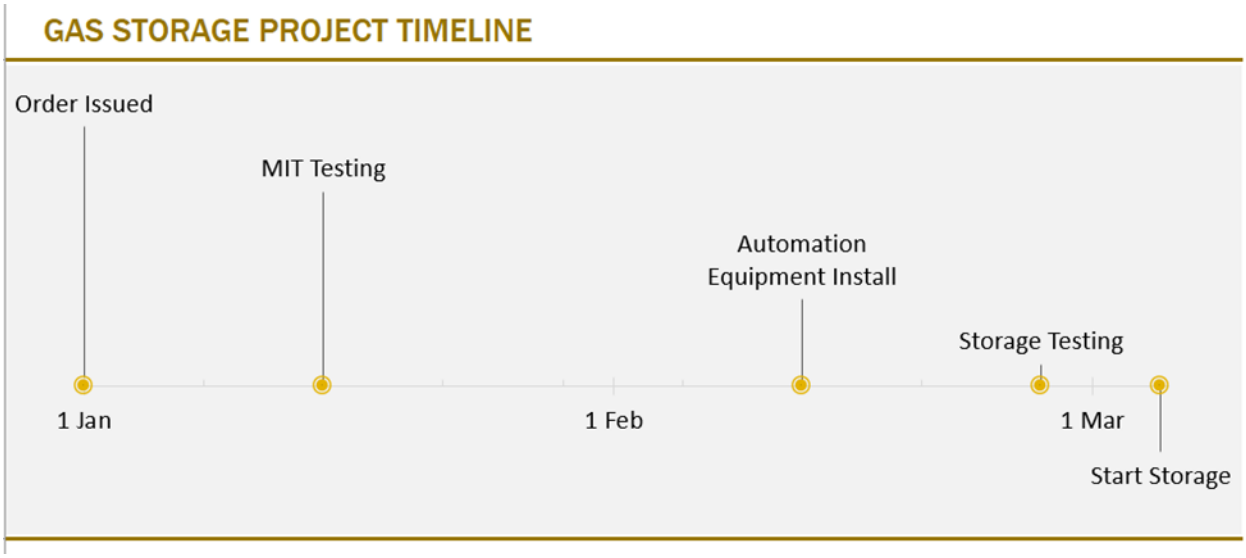
Wells

6 wells are proposed in this application.

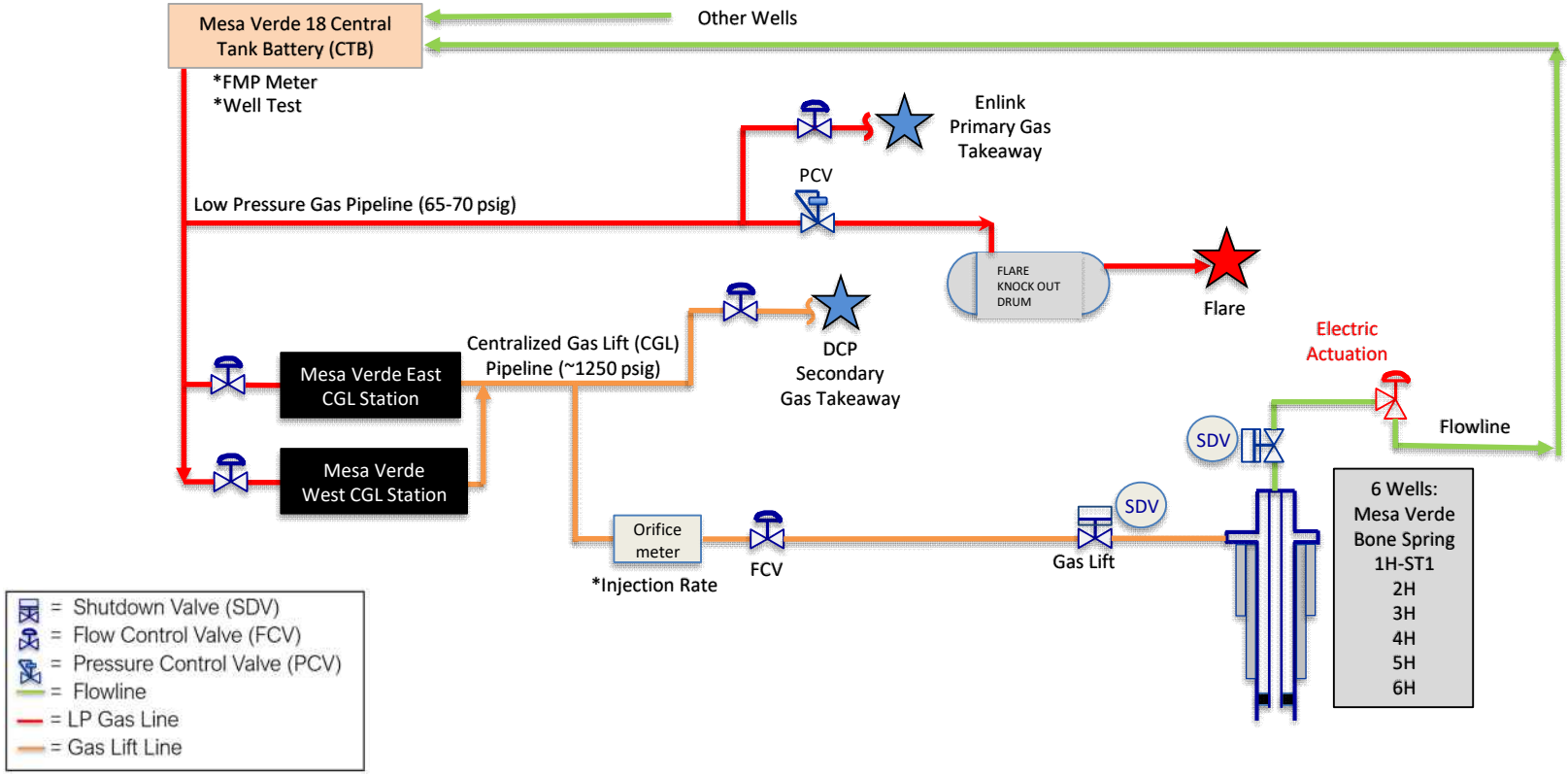
#	API 14	Well Name	Injection Down the…
1	30025441010100	MV-BS-1H-ST1	Casing
2	30025441960000	MV-BS-2H	Tubing
3	30025441830000	MV-BS-3H	Casing
4	30025440640000	Mesa Verde BS Unit 4H	Tubing
5	30025441850000	Mesa Verde BS Unit 5H	Tubing
6	30025440420000	Mesa Verde BS Unit 6H	Tubing

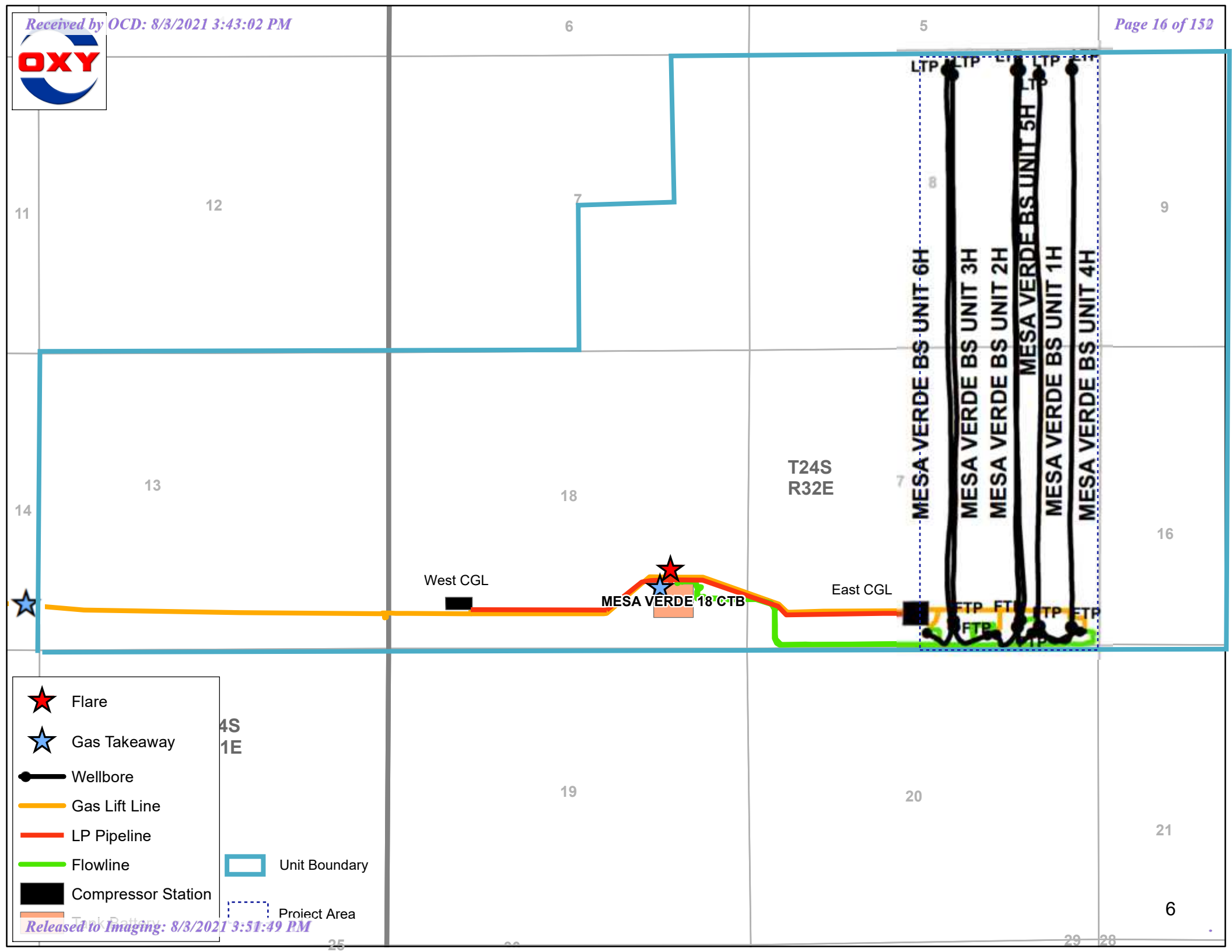
Timeline

Since no new surface disturbances are required, this project can be implemented with minimal facility modifications. The timeline below assumes an order is issued on January 1 for illustration purposes.



Mesa Verde Gas Storage Process Flow Diagram





Injection Wellbores

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

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

☑ AMENDED REPORT
(As-Drilled)

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-025-44101	96229	Mesa Verde Bone Spring

Property Code	Property Name	Well Number
320828	MESA VERDE BS UNIT	1H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3563.6'

Surface Location

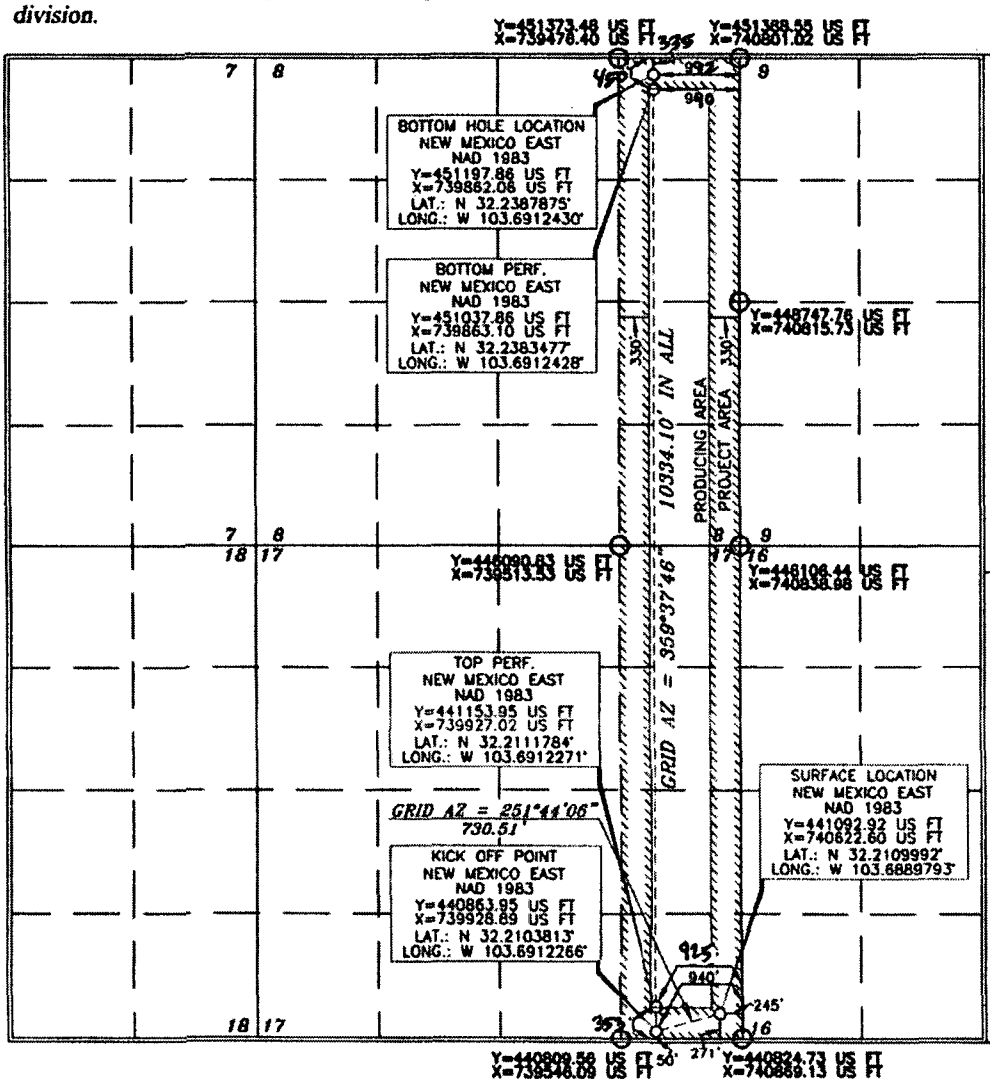
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	17	24 SOUTH	32 EAST, N.M.P.M.		271'	SOUTH	245'	EAST	LEA

Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	8	24 SOUTH	32 EAST, N.M.P.M.		~~190'~~ 335	NORTH	~~940'~~ 992	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320	Y		LTP - 450 FNL 990 FEL FTP - 353 FSL 925 FEL

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



OPERATOR CERTIFICATION

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

Signature 8/16/18 Date

Printed Name: Jana Mendiola

E-mail Address: janalyn_mendiola@oxy.com

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

SEPTEMBER 28, 2016
Date of Survey

Signature and Seal of Professional Surveyor: GARY J. ASHLEY, NEW MEXICO, 15079, REGISTERED PROFESSIONAL LAND SURVEYOR

Certificate Number 15079

WO# 150930WL-b-XY (Rev. C) (KA)

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
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District IV
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Santa Fe, NM 87505

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Revised August 1, 2011
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☑ AMENDED REPORT
(As-Drilled)

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-025-44196	96229	Mesa Verde Bone Spring

Property Code	Property Name	Well Number
320828	MESA VERDE BS UNIT	2H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3557.4'

Surface Location

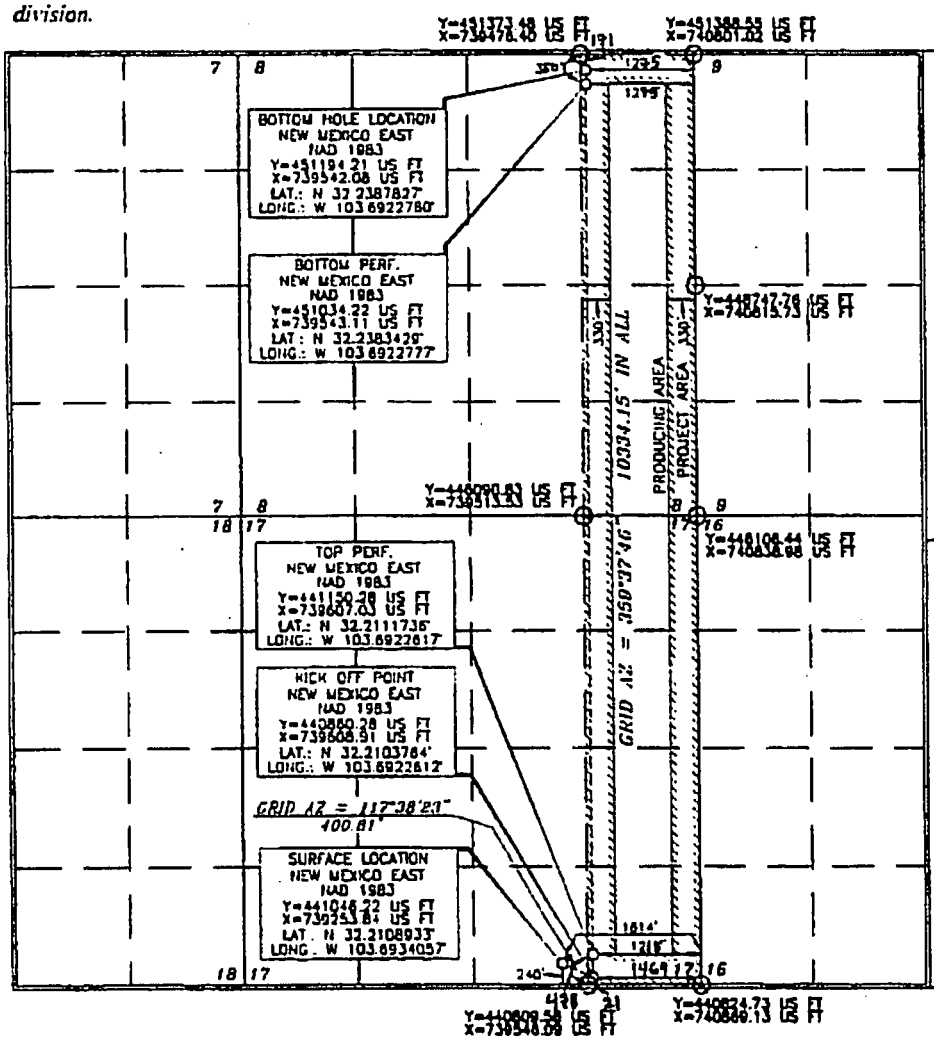
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	17	24 SOUTH	32 EAST, N.M.P.M		240'	SOUTH	1614'	EAST	LEA

Bottom Hole Location If Different From Surface

UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	8	24 SOUTH	32 EAST, N.M.P.M		~~189'~~ 171	NORTH	~~1260'~~ 1275	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320	Y		BP- 350 FNL 1275 FEL TP- 478 FSL 1215 FEL

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



OPERATOR CERTIFICATION

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

Signature 7/26/18 Date

Jana Mendiola
Printed Name

janalyn_mendiola@oxy.com
Email Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

15079

OCTOBER 5, 2018
Date of Survey

Signature and Seal of Professional Surveyor

Certificate Number 15879

WO# 161005WL-b-XY (Rev. A) (KA)

District I
1625 N French Dr., Hobbs, NM 88240
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API Number	Pool Code	Pool Name
30-025-44183	96229	Mesa Verde Bone Spring

Property Code	Property Name	Well Number
320828	MESA VERDE BS UNIT	3H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3557.7'

Surface Location

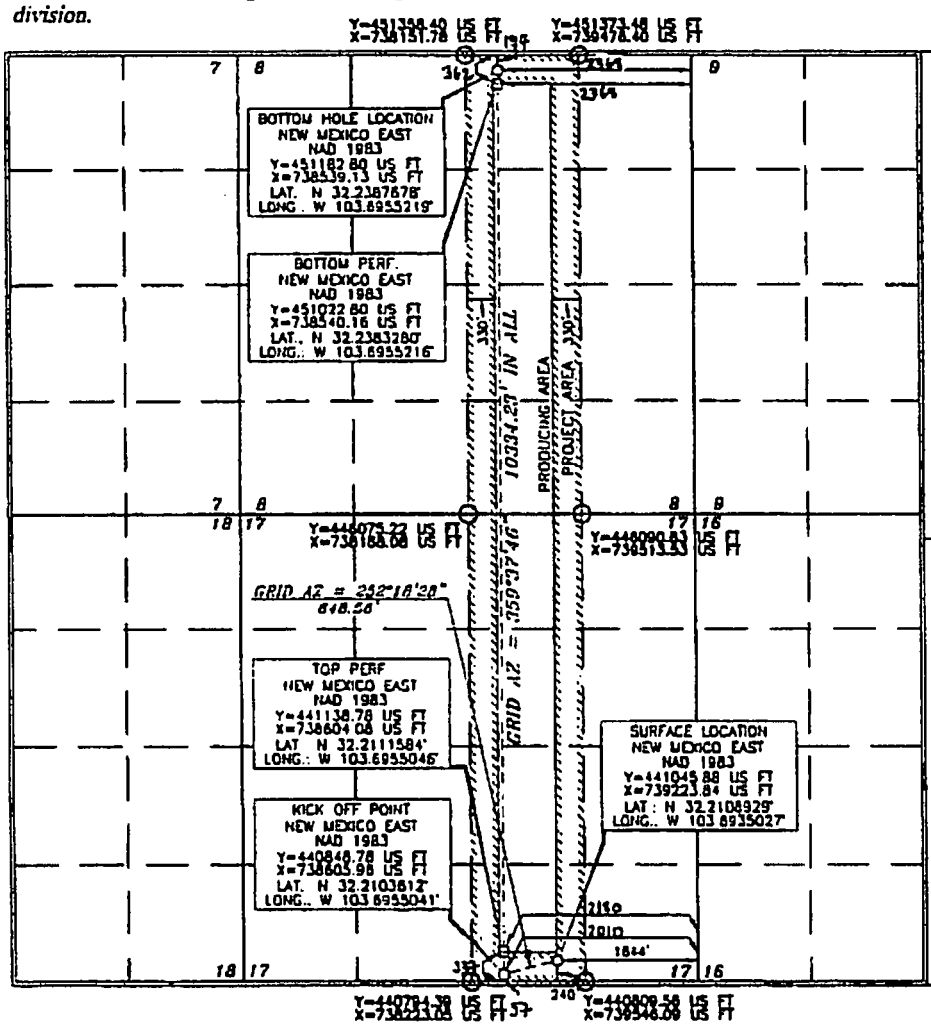
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	17	24 SOUTH	32 EAST, N.M.P.M.		240'	SOUTH	1644'	EAST	LEA

Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	8	24 SOUTH	32 EAST, N.M.P.M.		~~100'~~ 197	NORTH	~~2203'~~ 2368	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	~~Order No.~~
320	Y		BP- 362 FNL 2368 FEL TP- 337 FSL 2180 FEL

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



OPERATOR CERTIFICATION

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

Signature 7/26/18 Date

Jana Mendiola
Printed Name

janalyn_mendiola@oxy.com
E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

NEW MEXICO — JERRY J. ASE — 15079 — REGISTERED PROFESSIONAL LAND SURVEYOR

OCTOBER 6, 2016
Date of Survey

Signature and Seal of Professional Surveyor

Certificate Number 15079

WO# 161005WL-a-XY (Rev 8) (KA)

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WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-025-44064	96229	Mesa Verde Bone Spring

Property Code	Property Name	Well Number
320828	MESA VERDE BS Unit	4H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3560.5'

Surface Location

UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	17	24 SOUTH	32 EAST, N.M.P.M.		280'	SOUTH	965'	EAST	LEA

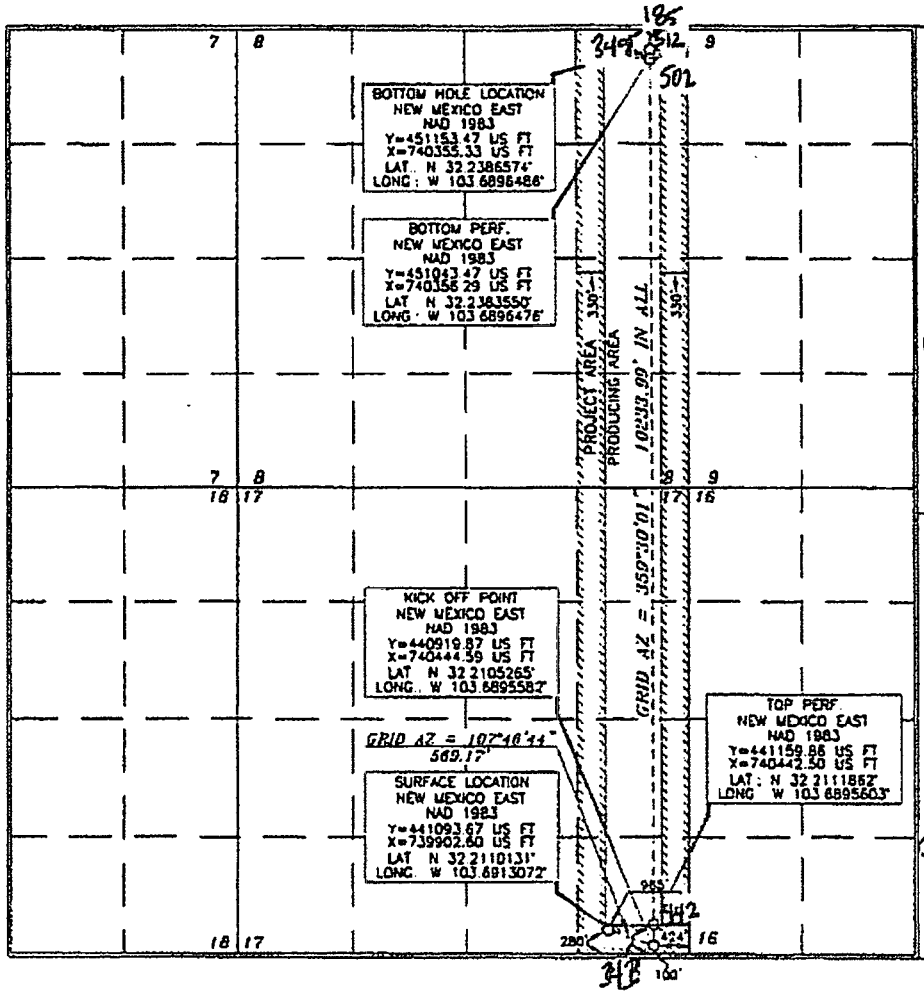
Bottom Hole Location If Different From Surface

UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	8	24 SOUTH	32 EAST, N.M.P.M.		185	NORTH	512	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320	Y		

Bottom Perf: 349' FNL & 502' FEL
Top Perf: 343' FSL & 442' FEL

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



OPERATOR CERTIFICATION

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

Sarah Chapman 5/4/16
Signature Date

Sarah Chapman
Printed Name

sarah_chapman@oxy.com
E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

TERRY J. ASEL
NEW MEXICO
15079
PROFESSIONAL LAND SURVEYOR

SEPTEMBER 28, 2015
Date of Survey

Signature and Seal of Professional Surveyor

Terry J. Asel 9/23/2016
Certificate Number 15079

WO# 150928WL-c (Rev. A) (KA)

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

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

☑ AMENDED REPORT
(As-Drilled)

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-025-44185	96229	Mesa Verde Bone Spring

Property Code	Property Name	Well Number
320828	MESA VERDE BONE SPRING UNIT	5H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3560.5'

Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	17	24 SOUTH	32 EAST, N.M.P.M.		280'	SOUTH	995'	EAST	LEA

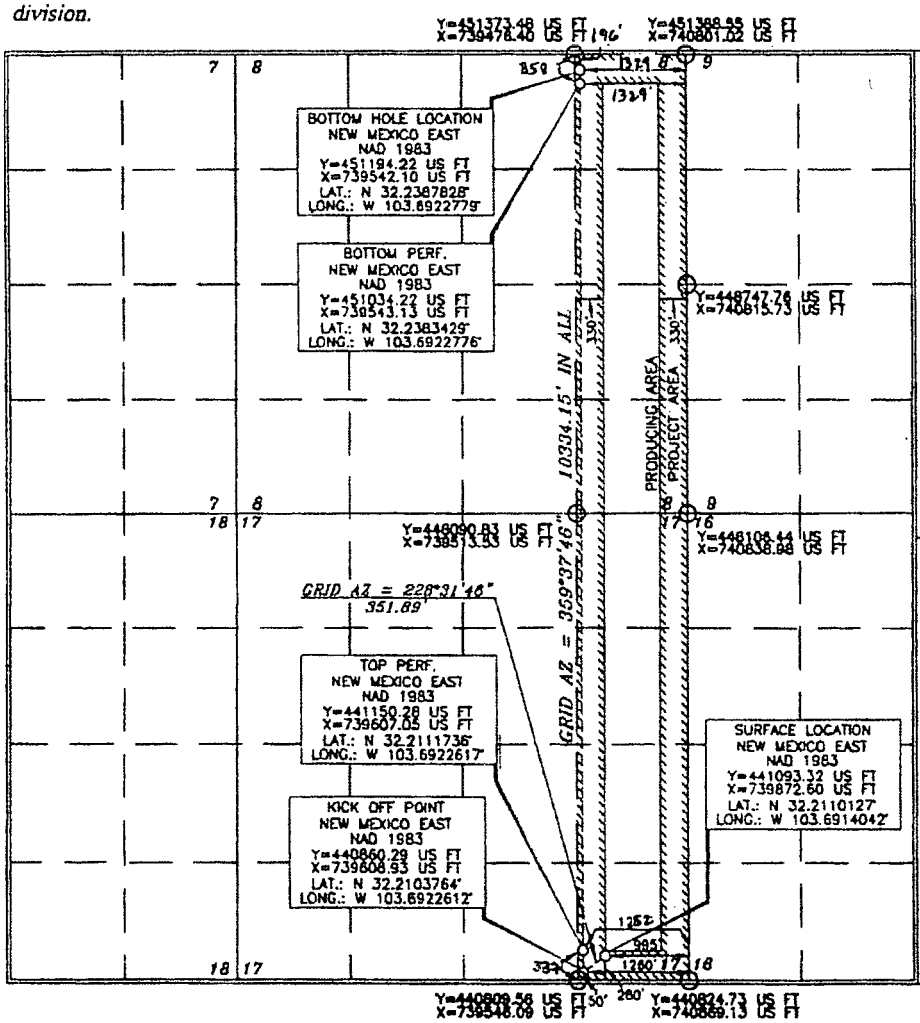
Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	8	24 SOUTH	32 EAST, N.M.P.M.		~~180'~~ 1796	NORTH	~~1860'~~ 1329	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	~~Order No.~~
320	Y		

BP- 358 FNL 1329 FEL (B)
TP- 337 FSL 1252 FEL (P)

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



OPERATOR CERTIFICATION

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

Signature 5/8/18 Date

Jana Mendiola
Printed Name

janalyn_mendiola@oxy.com
E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

SEPTEMBER 28, 2015
Date of Survey

Signature and Seal of Professional Surveyor:

JERRY J. ASEL — NEW MEXICO — 15079 — REGISTERED PROFESSIONAL LAND SURVEYOR

9/23/2016

Certificate Number 15079

WO# 150928WL-b-XY (Rev A) (KA)

District I
1625 N. French Dr., Hobbs, NM 88240
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State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

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

☑ AMENDED REPORT
(As-drilled)

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-025-44042	96229	Mesa Verde ; Bone Spring

Property Code	Property Name	Well Number
319616	MESA VERDE ~~"17_8" FEDERAL COM~~ BS Unit	~~#1~~ 6H

OGRID No.	Operator Name	Elevation
16696	OXY USA INC.	3559.6'

Surface Location

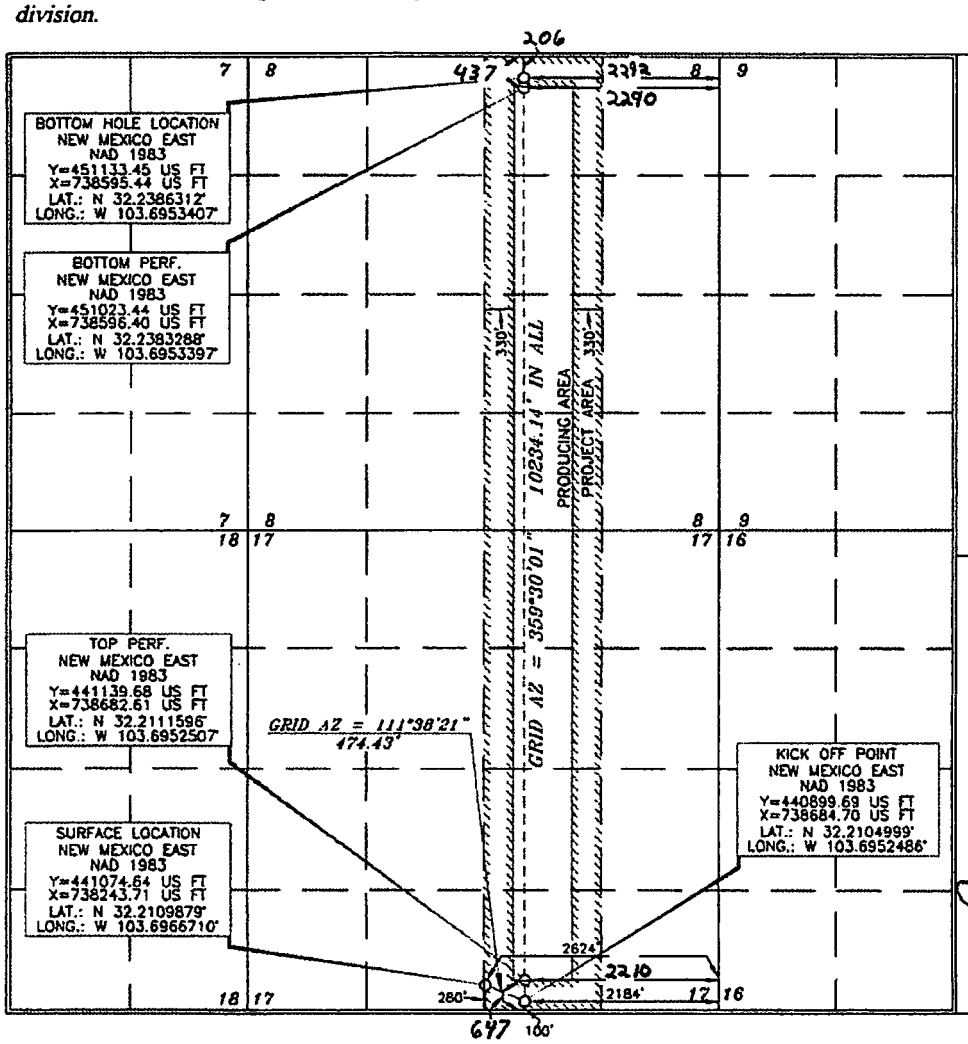
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	17	24 SOUTH	32 EAST, N.M.P.M.		280'	SOUTH	2624'	EAST	LEA

Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	8	24 SOUTH	32 EAST, N.M.P.M.		~~230'~~ 206'	NORTH	~~2207'~~ 2292'	EAST	LEA

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
320	Y		FTP: 647' FSL 2210' FEL LTP: 437' FNL 2290' FEL

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



OPERATOR CERTIFICATION

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

Signature 8/8/18 Date

Justin Morris
Printed Name

Justin_Morris@oxy.com
E-mail Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

15079
SEPTEMBER 28, 2016
Date of Survey

Signature and Seal of Professional Surveyor

11/17/2016

15079
Certificate Number

WO# 150928WL-o (Rev. A) (KA)

Side 1

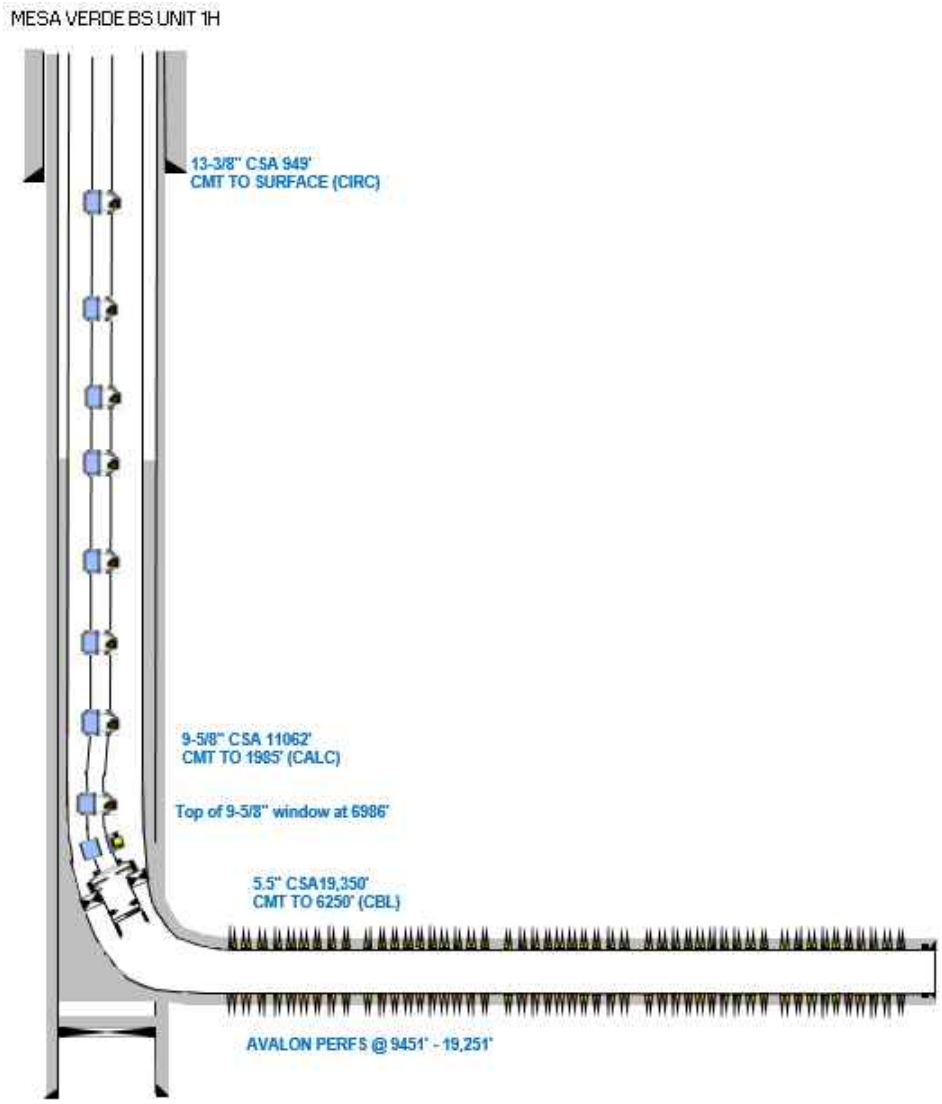
OPERATOR: OXY USA INC

WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 1H

WELL LOCATION: 271' FSL 245' FEL | P | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1264 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 12.25" Casing Size: 9-5/8"

Cemented with: 5905 sx. ***or*** _____ ft^3

Top of Cement: 1985' Method Determined: CALC

Production Casing

Hole Size: 6.75" Casing Size: 5.5"

Cemented with: 2621 sx. ***or*** _____ ft^3

Top of Cement: 6250' Method Determined: CBL

Total Depth: 19,350' MD/9290' TVD

Injection Interval

9451' MD/9247' TVD feet to 19,251' MD/9290' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-7/8" Lining Material: UNLINED

Type of Packer: ARROWSET PACKER 5.5"

Packer Setting Depth: 9065' MD/8970' TVD

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

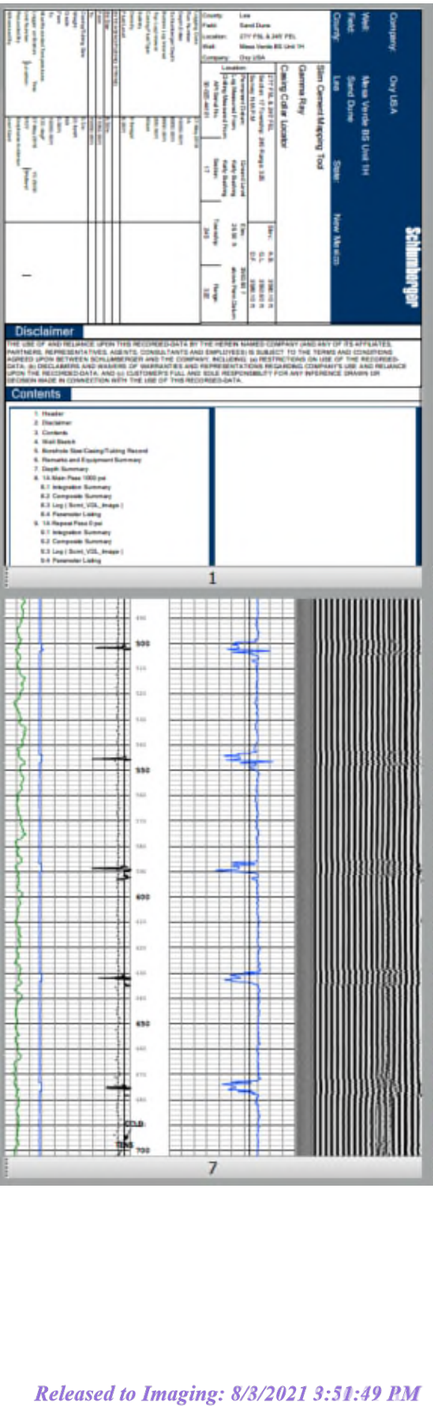
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #1H CBL


Schlumberger
Disclaimer
Contents
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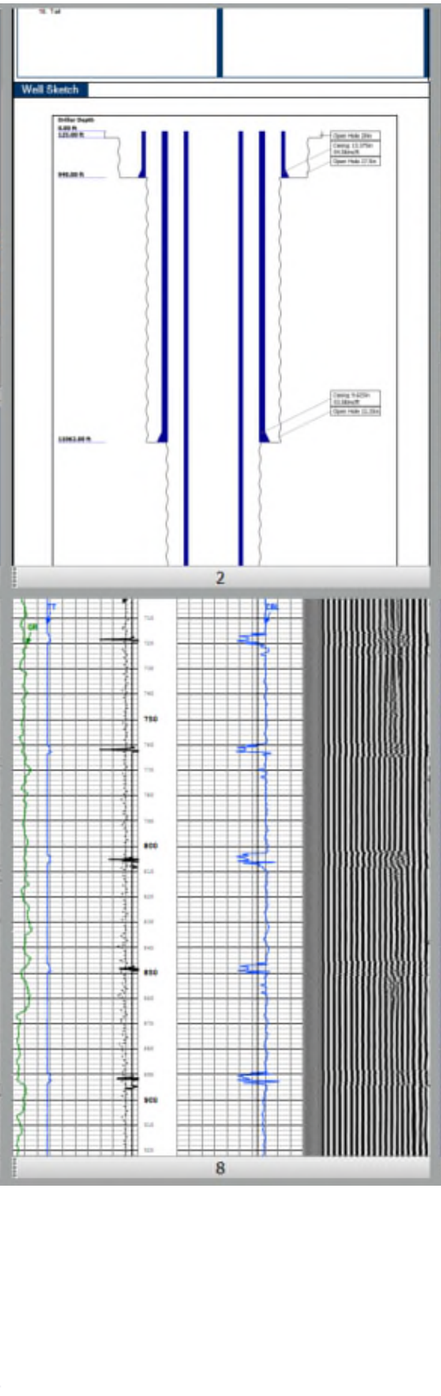
Well Sketch
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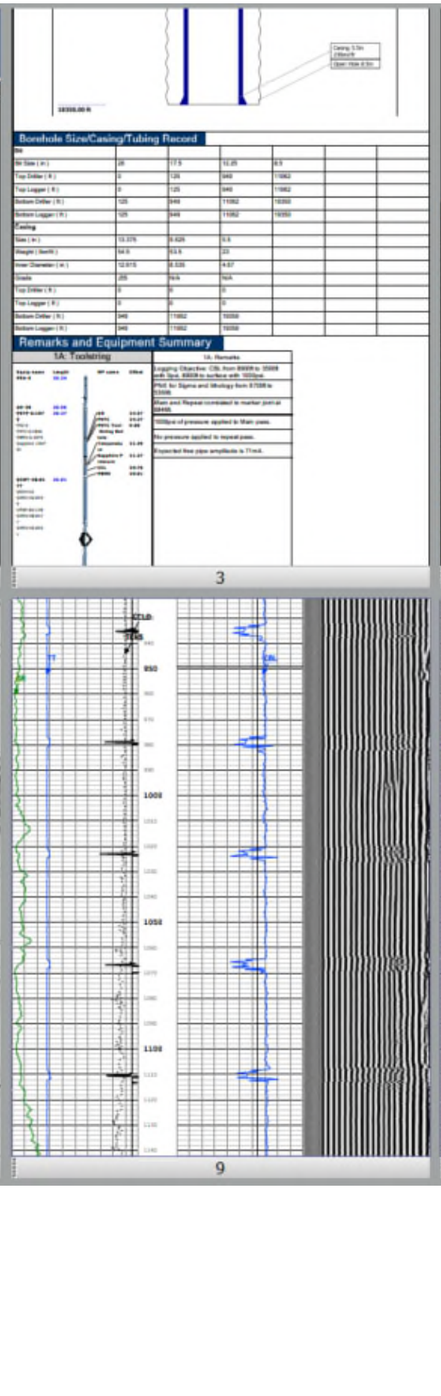
Borehole Size/Casing/Tubing Record
Remarks and Equipment Summary
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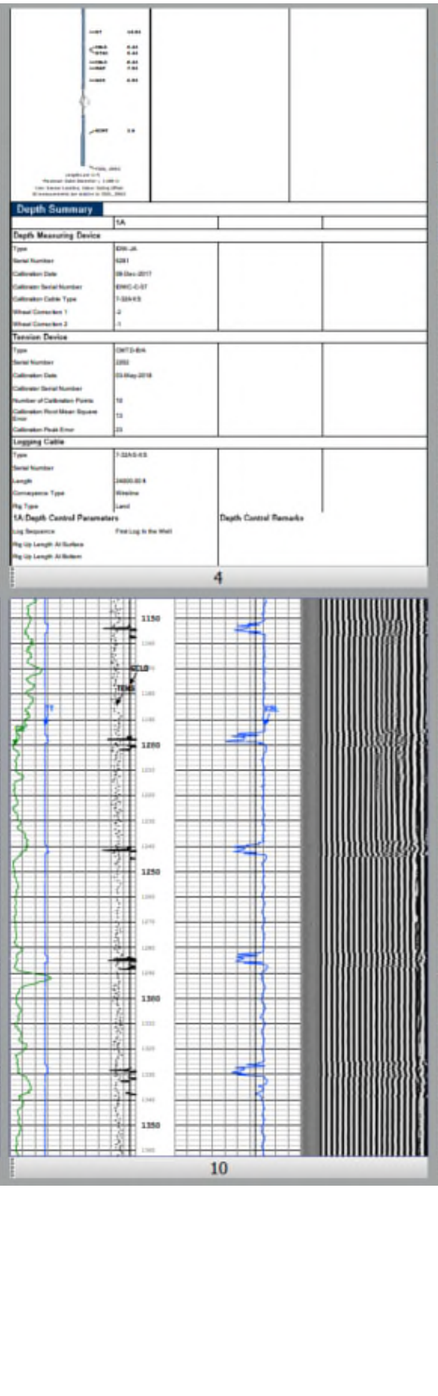
Depth Summary
Depth Measuring Device
Tension Device
Logging Cable
1A Depth Control Parameters
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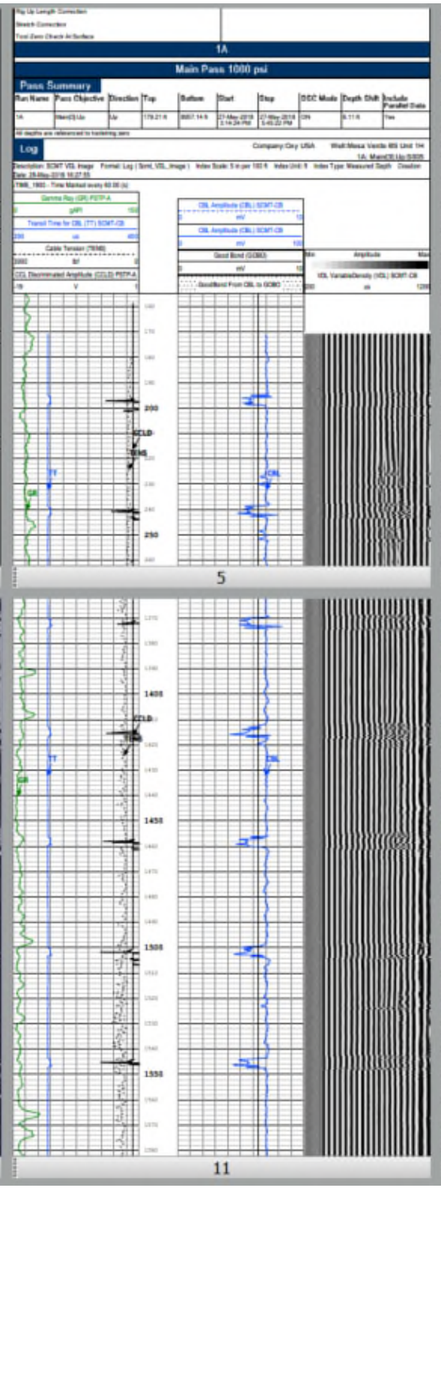
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Main Pass 1000 psi
Pass Summary
Log
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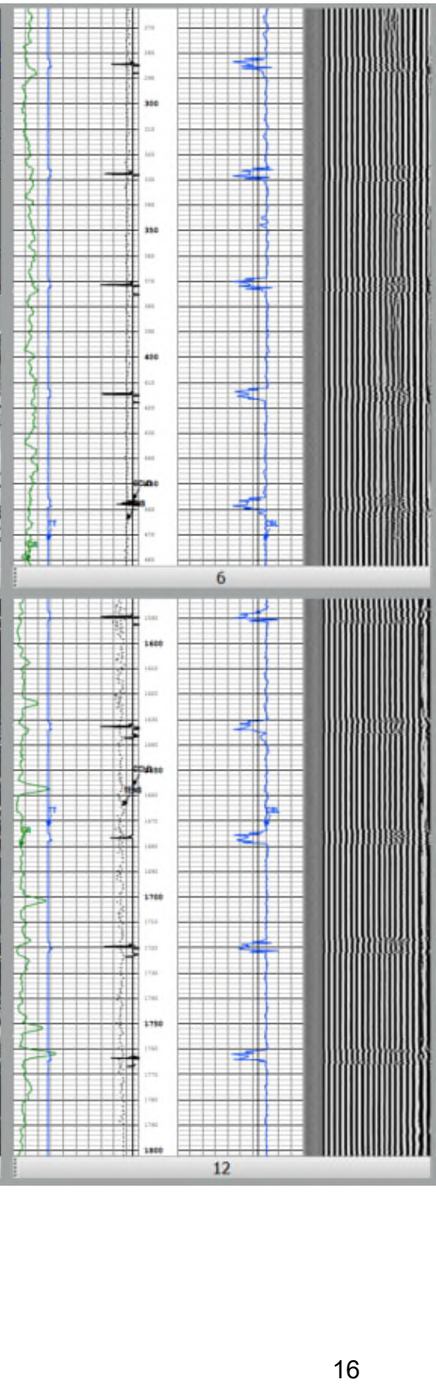
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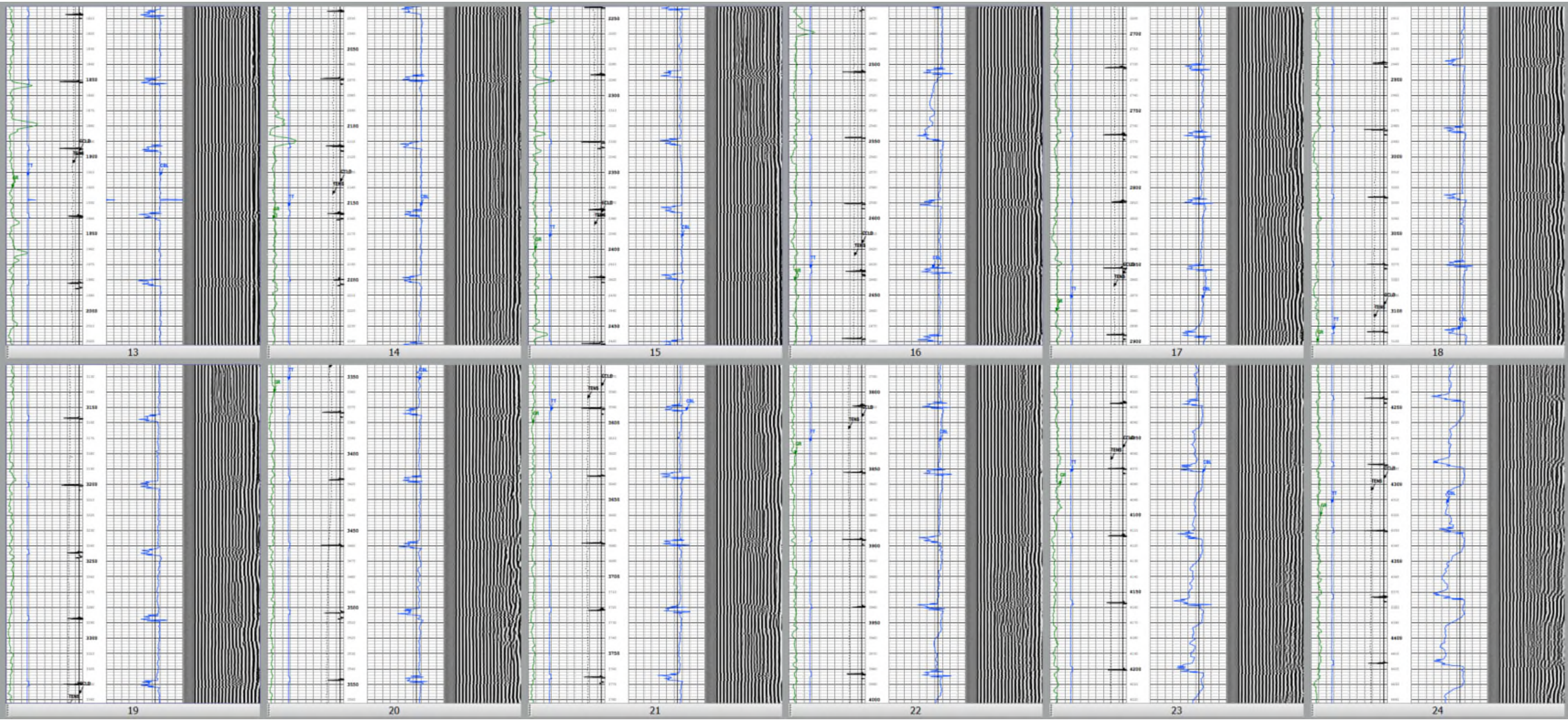
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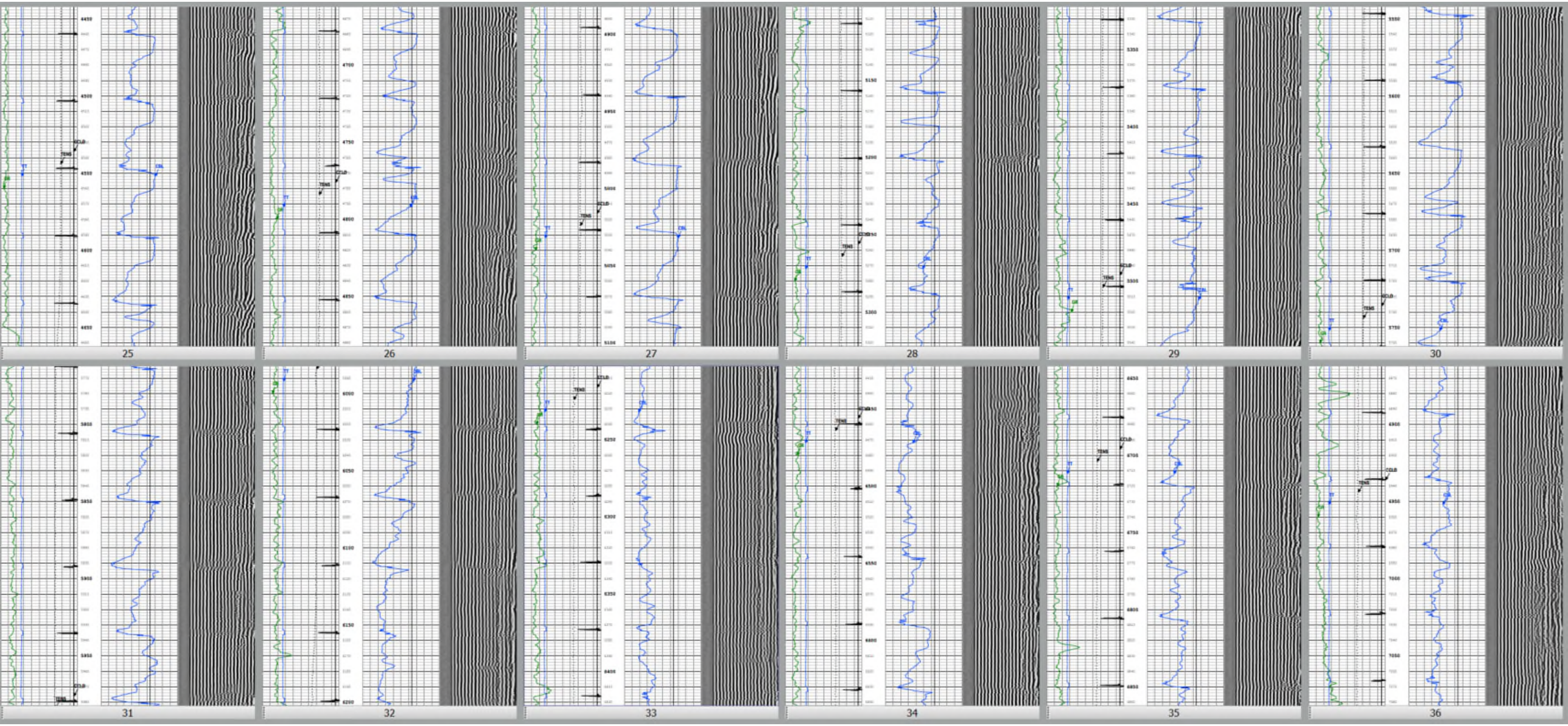
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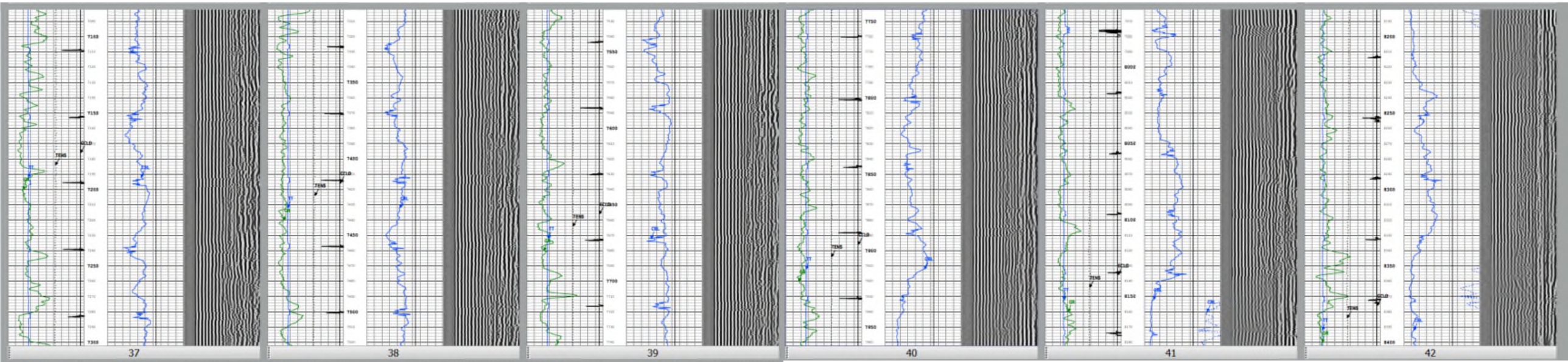
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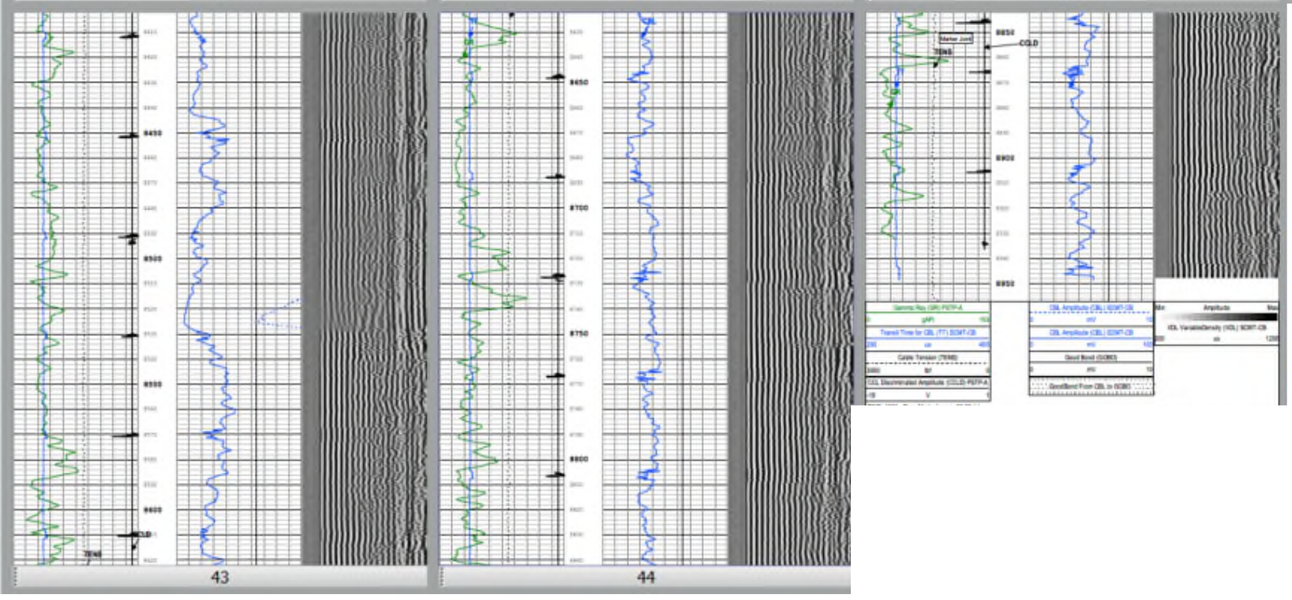
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Side 1

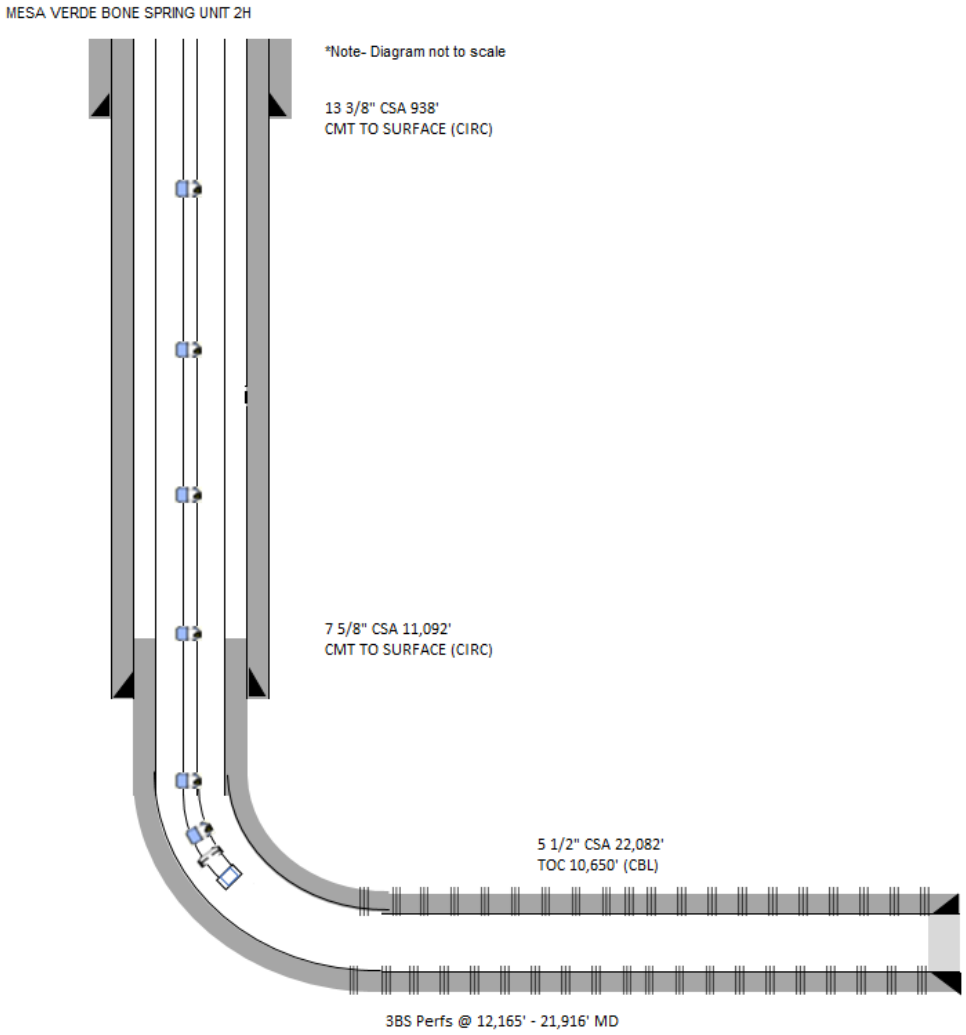
OPERATOR: OXY USA INC

WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 2H

WELL LOCATION: 240' FSL 1614' FEL | O | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1202 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 9.875" Casing Size: 7-5/8"

Cemented with: 2624 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Production Casing

Hole Size: 6.75" Casing Size: 5.5"

Cemented with: 846 sx. ***or*** _____ ft^3

Top of Cement: 10,650' Method Determined: CBL

Total Depth: 22,082' MD/11,860' TVD

Injection Interval

12,165' MD/11,815' TVD feet to 21,916' MD/11,860' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-7/8" SET AT 12033' MD/11800' TVD Lining Material: UNLINED

Type of Packer: N/A

Packer Setting Depth: N/A- FOR MIT, SET NOT GREATER THAN 100' ABOVE THE KOP

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

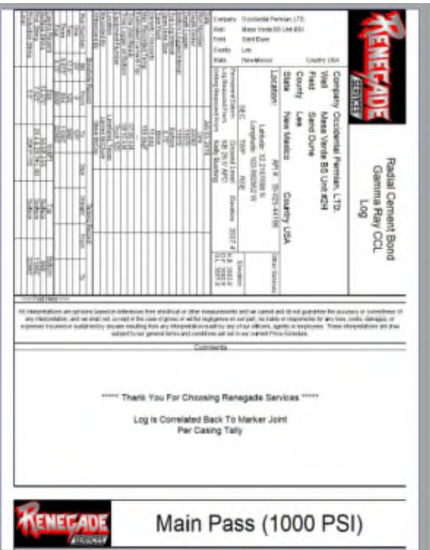
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #2H CBL


Radial Cement Bond
Gamma Ray CCL
Log
***** Thank You For Choosing Renegade Services *****
Log Is Correlated Back To Marker Joint
Per Casing Tally
Main Pass (1000 PSI)
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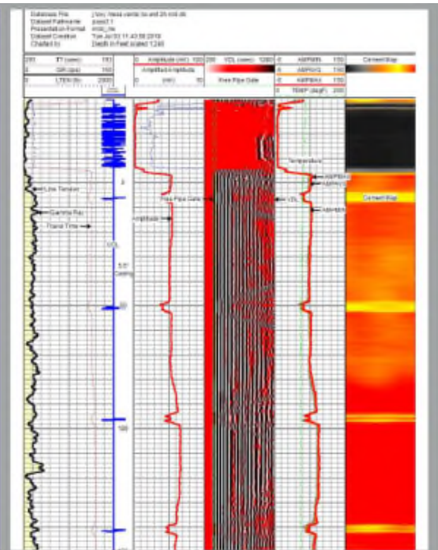
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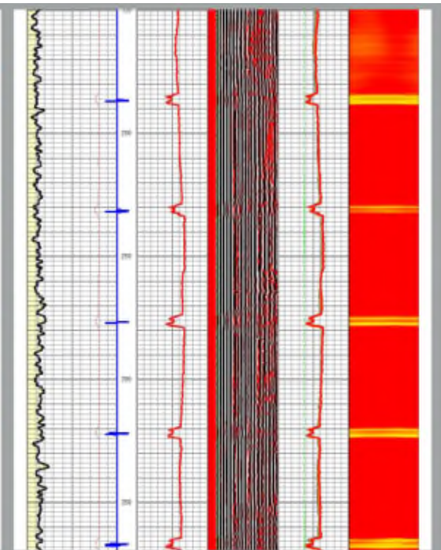
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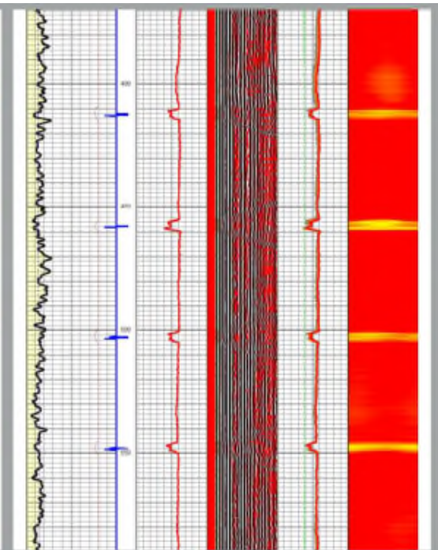
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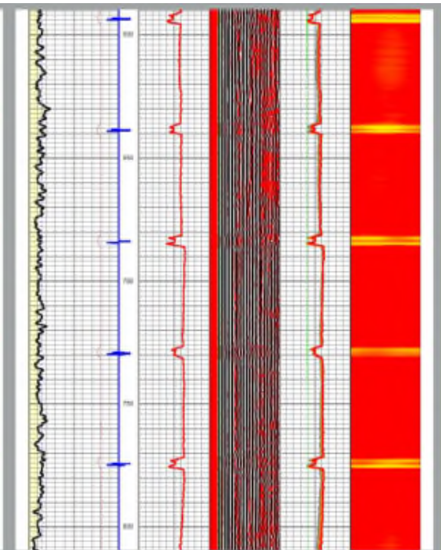
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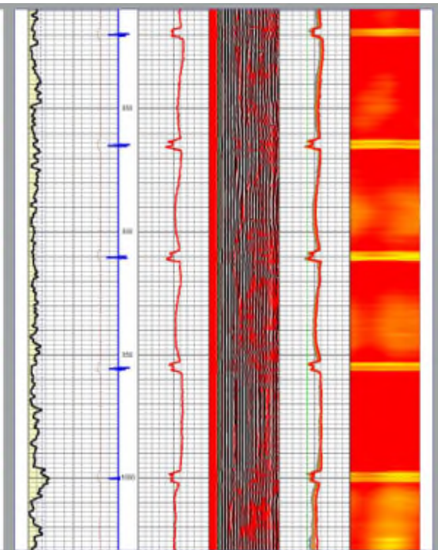
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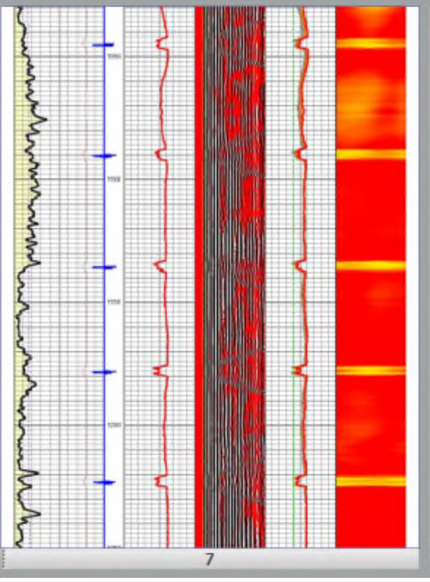
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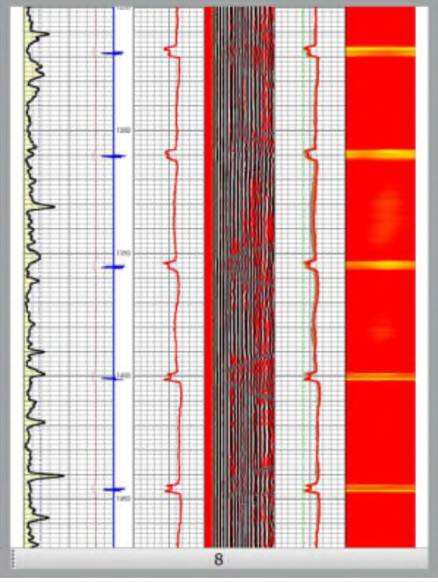
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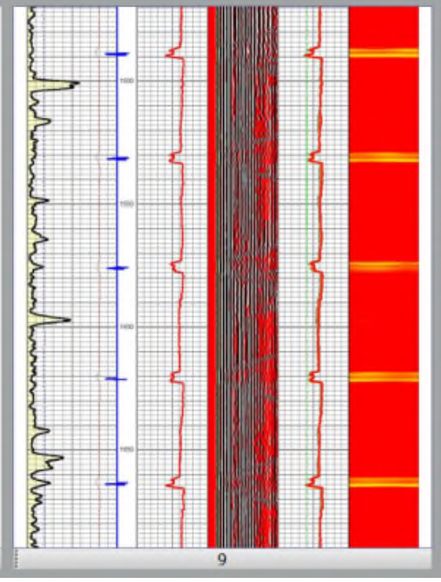
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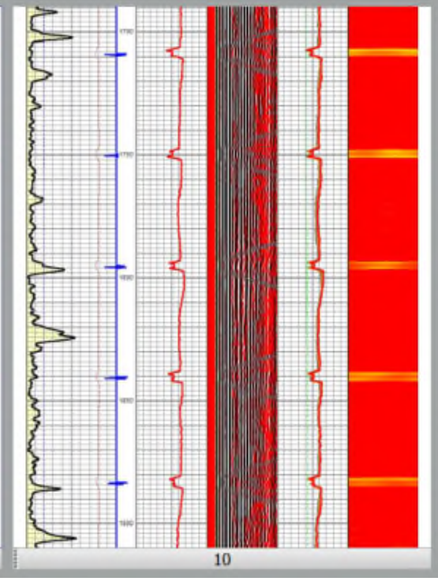
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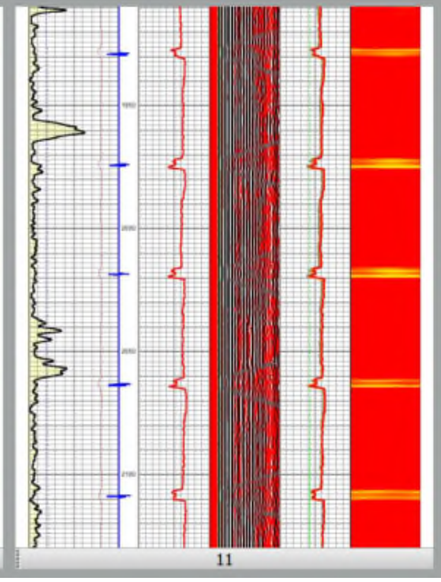
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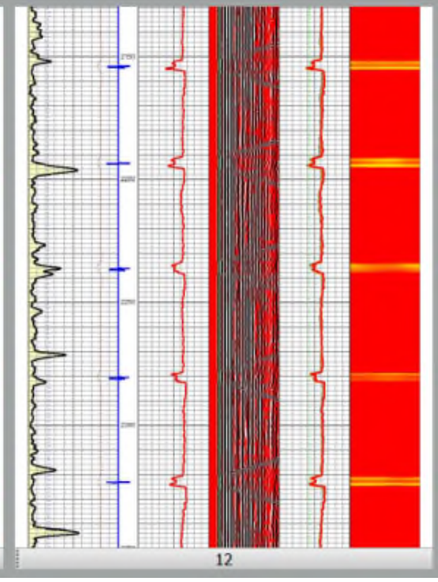
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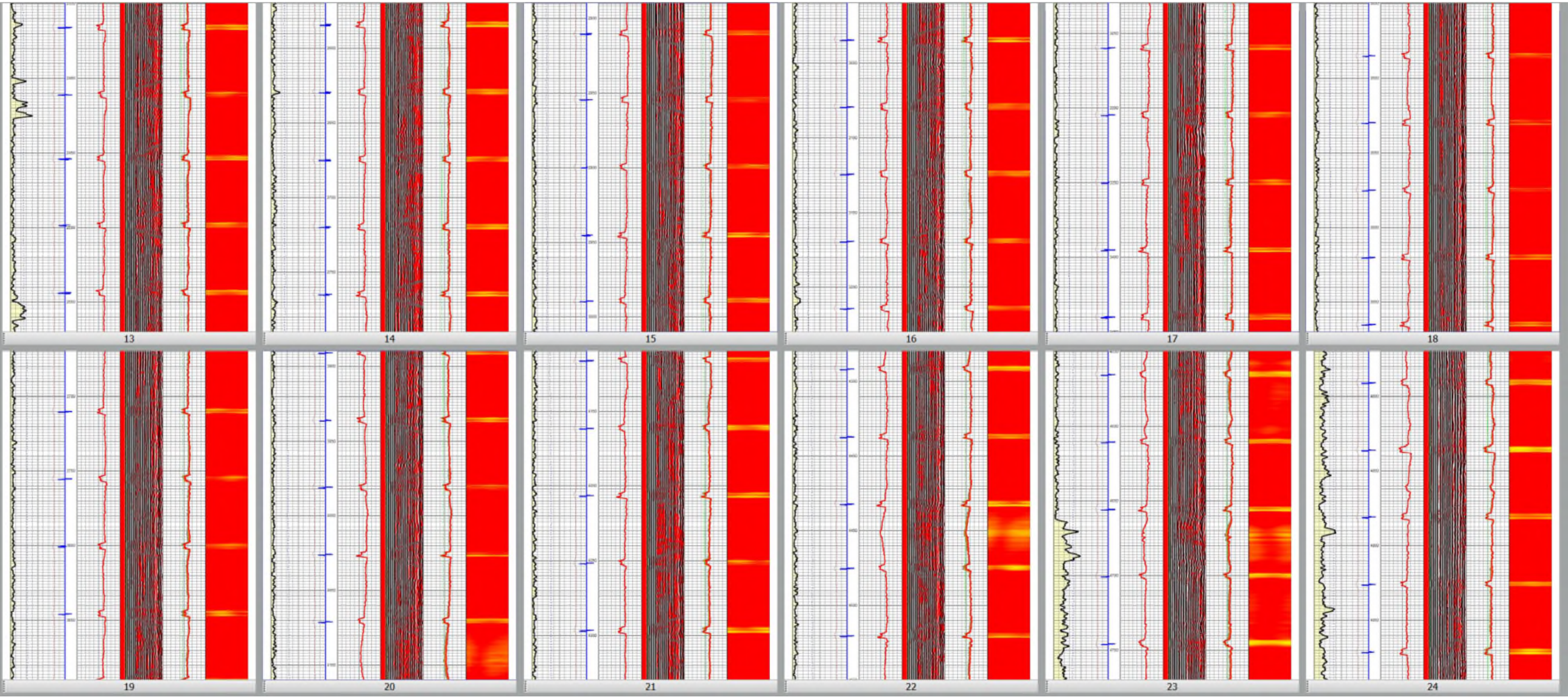
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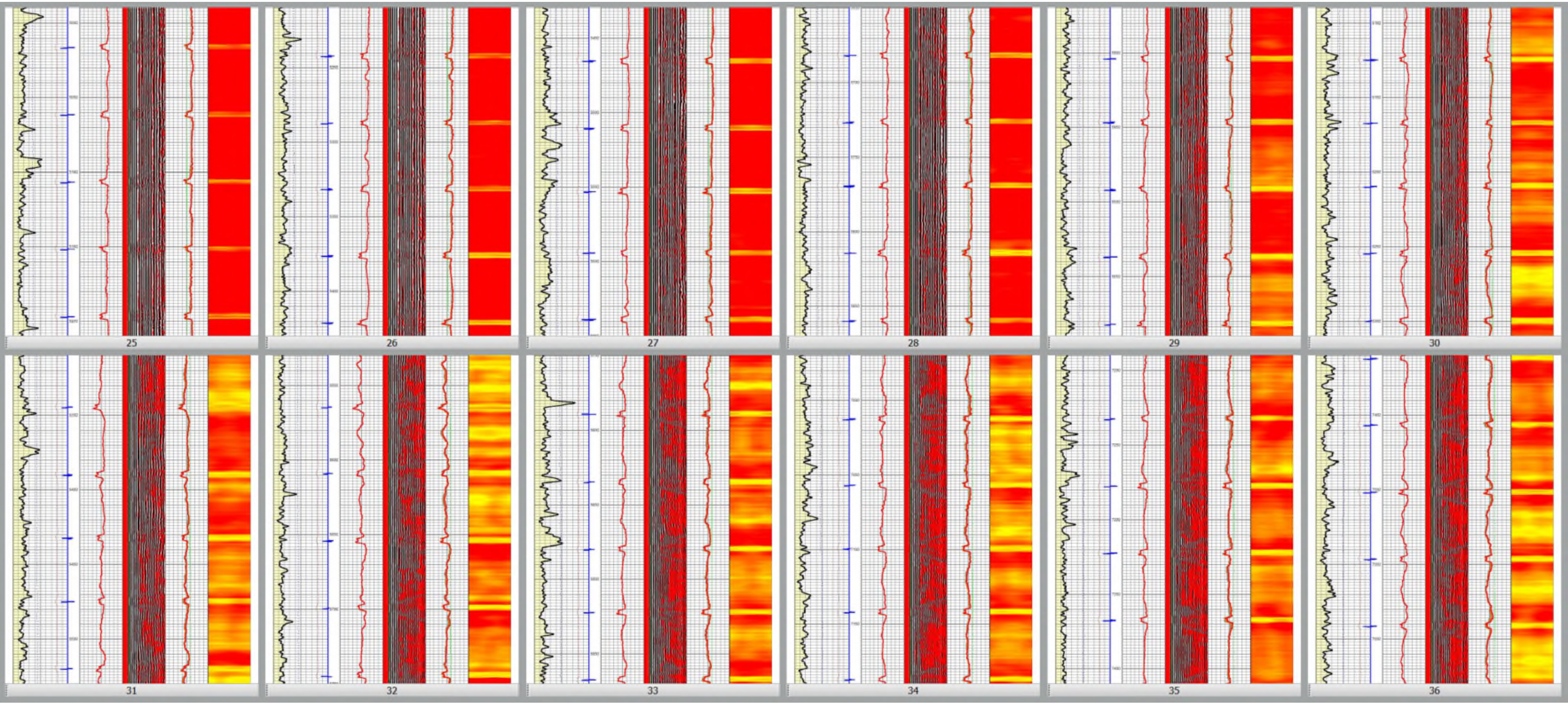
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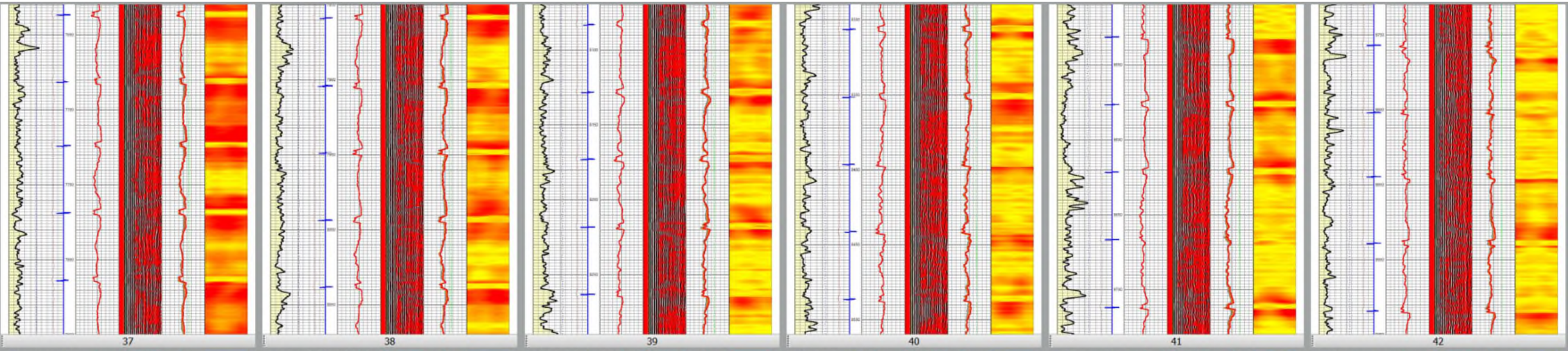
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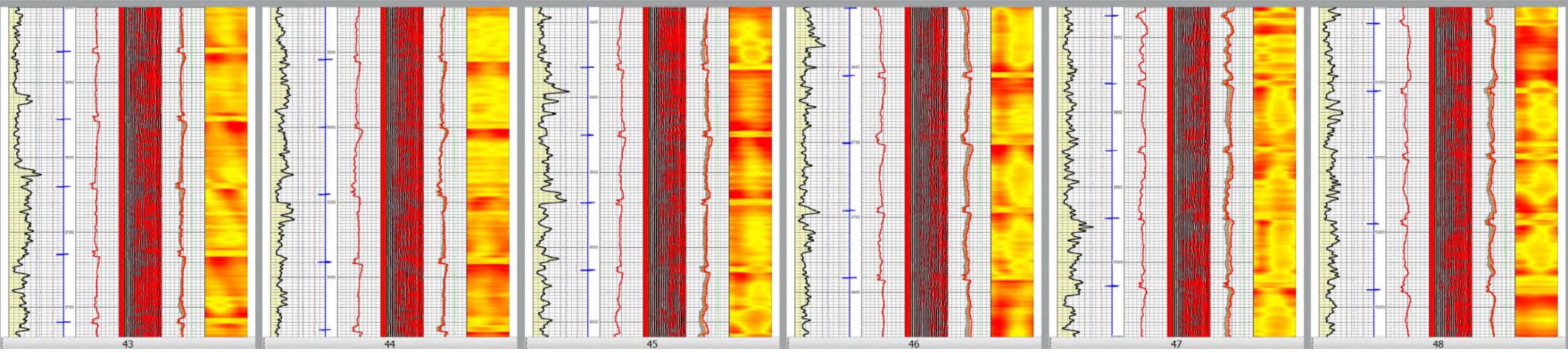
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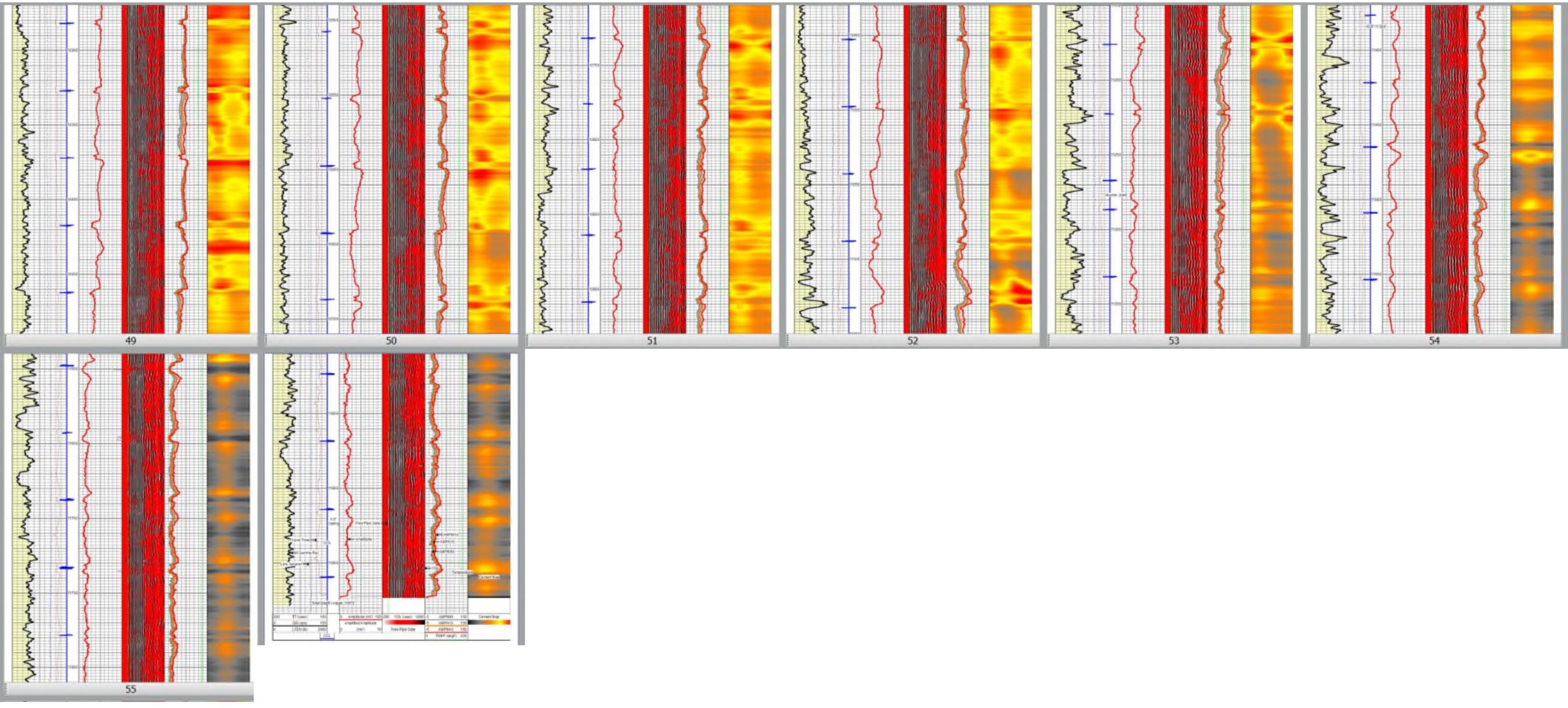
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Side 1

OPERATOR: OXY USA INC

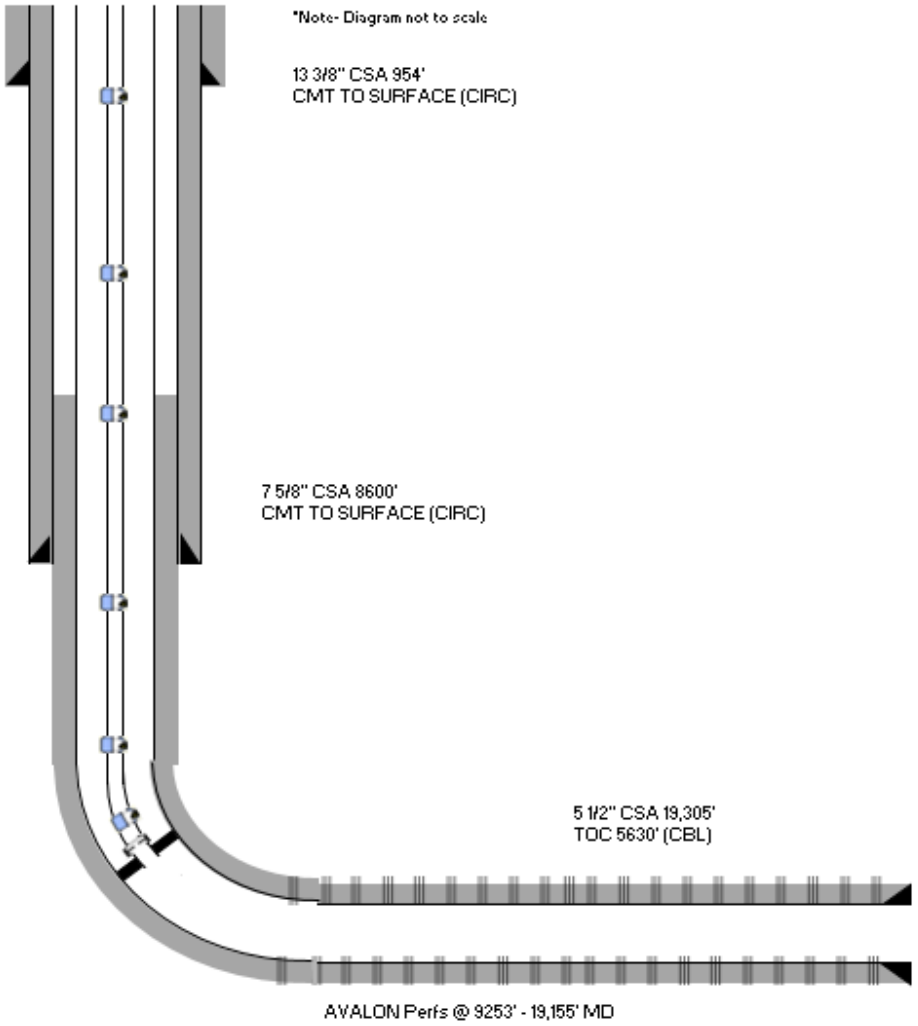
WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 3H

WELL LOCATION: 240' FSL 1644' FEL | O | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC

MESA VERDE BONE SPRING UNIT 3H



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1220 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 9.875" Casing Size: 7-5/8"

Cemented with: 2399 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Production Casing

Hole Size: 6.75" Casing Size: 5.5"

Cemented with: 826 sx. ***or*** _____ ft^3

Top of Cement: 5630' Method Determined: CBL

Total Depth: 19,305' MD/9125' TVD

Injection Interval

9253' MD/9091' TVD feet to 19,155' MD/9126' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-7/8" Lining Material: UNLINED

Type of Packer: WATSON AS1X 10K PACKER 20-23# 5.5"

Packer Setting Depth: 8956' MD/8886' TVD

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

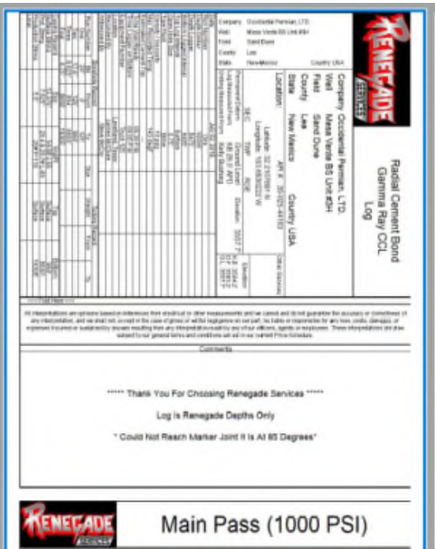
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #3H CBL


Radial Cement Bond
Gamma Ray CCL
Log
***** Thank You For Choosing Renegade Services *****
Log is Renegade Depths Only
" Could Not Reach Marker Joint It Is At 85 Degrees"
Main Pass (1000 PSI)
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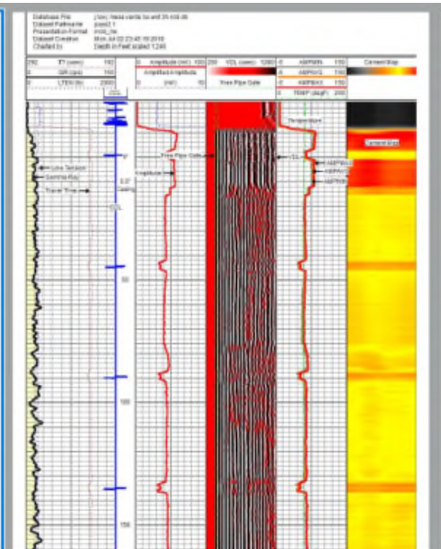
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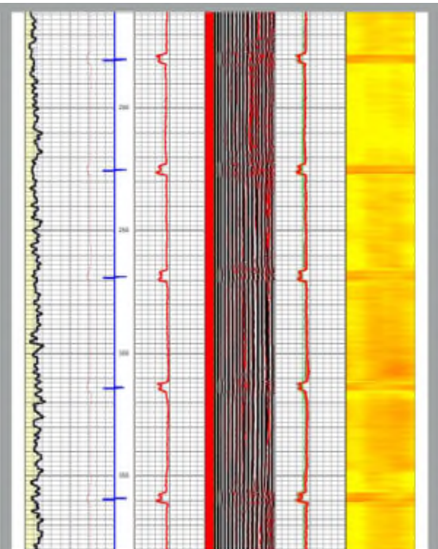
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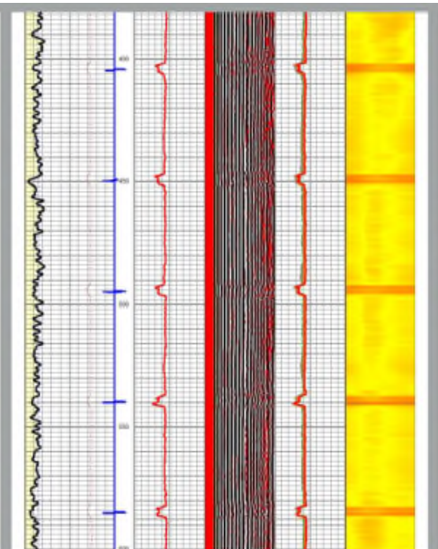
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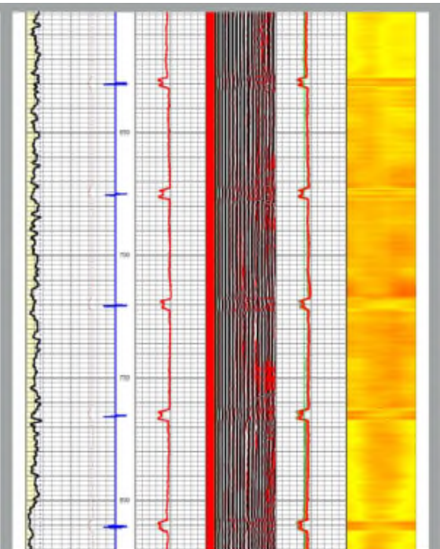
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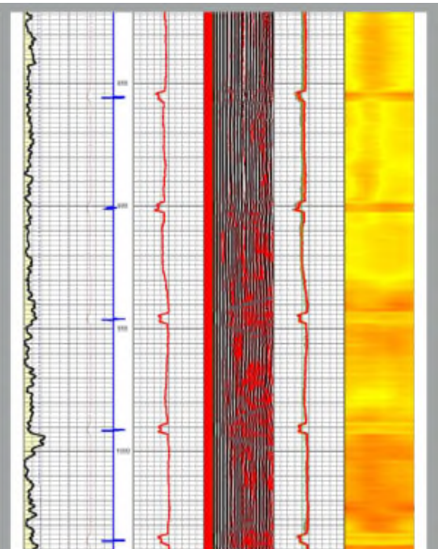
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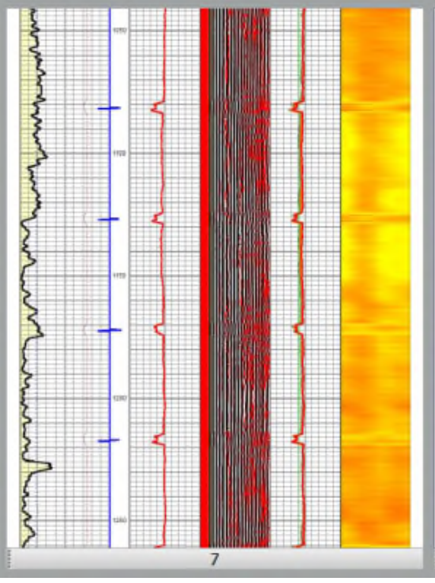
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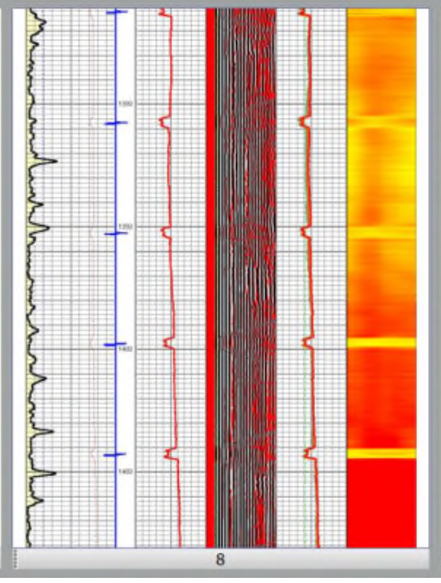
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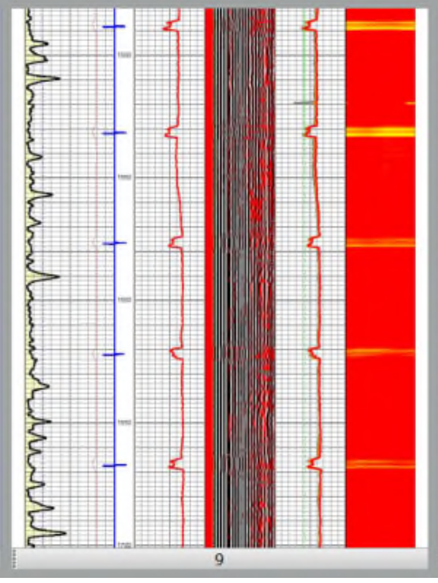
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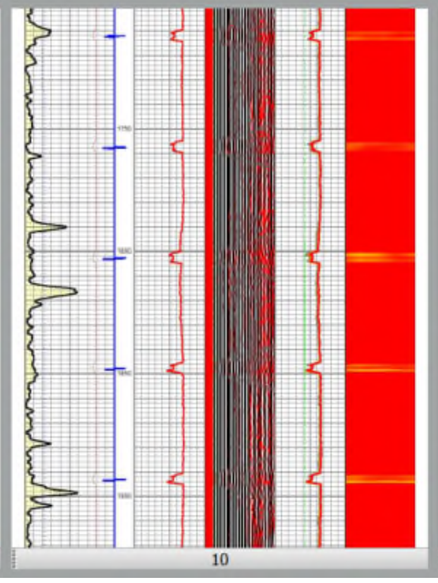
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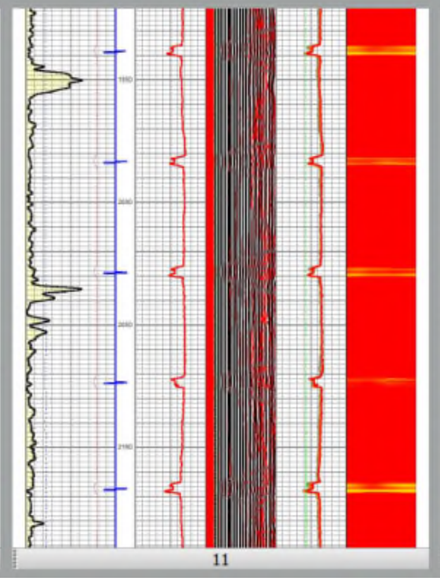
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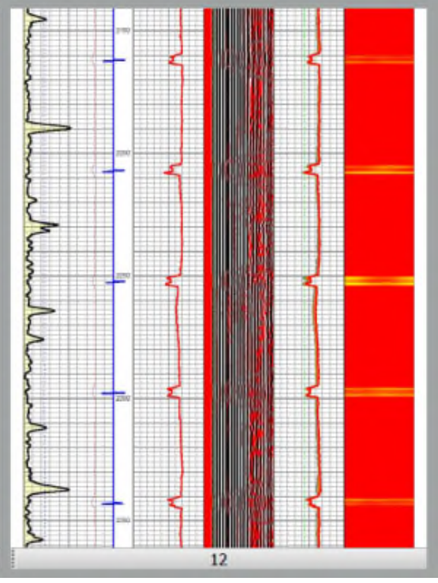
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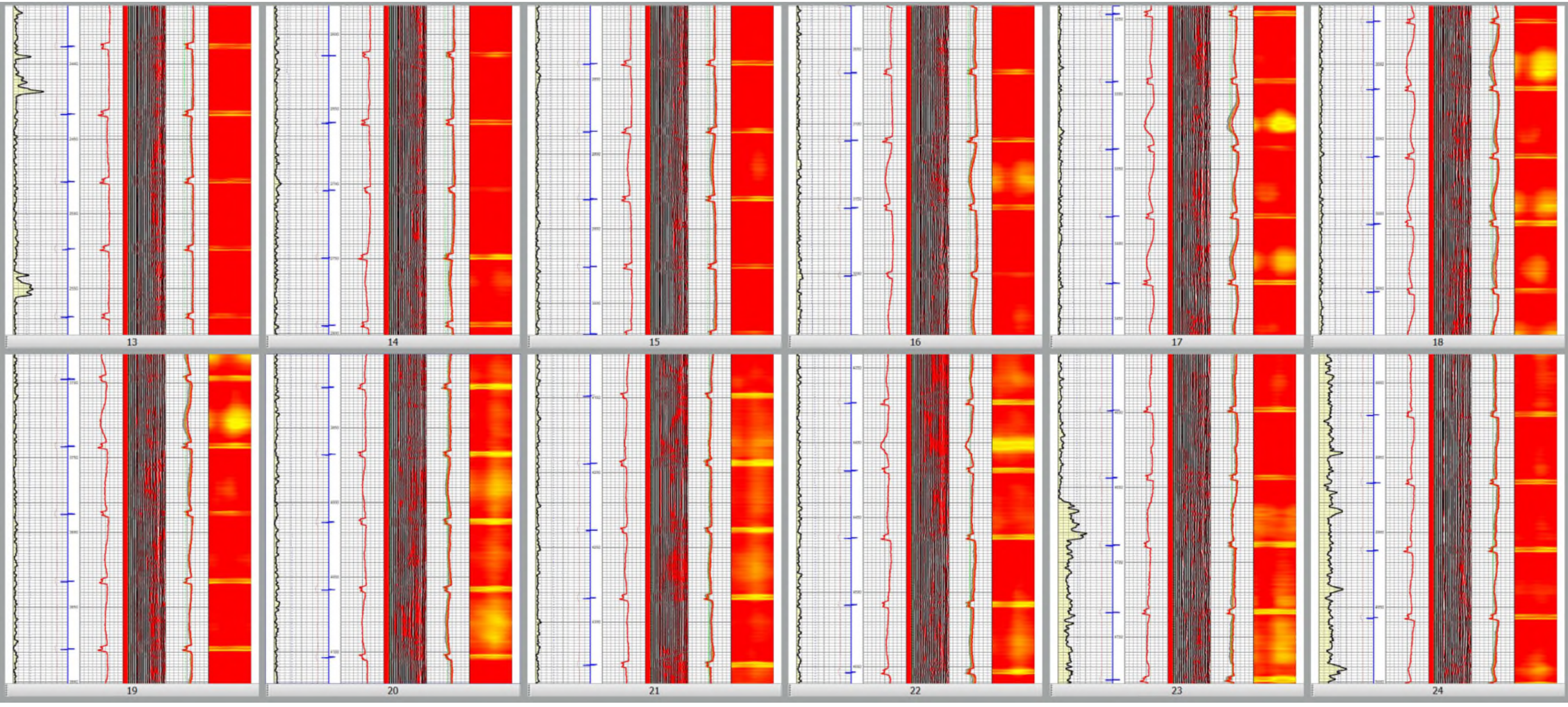
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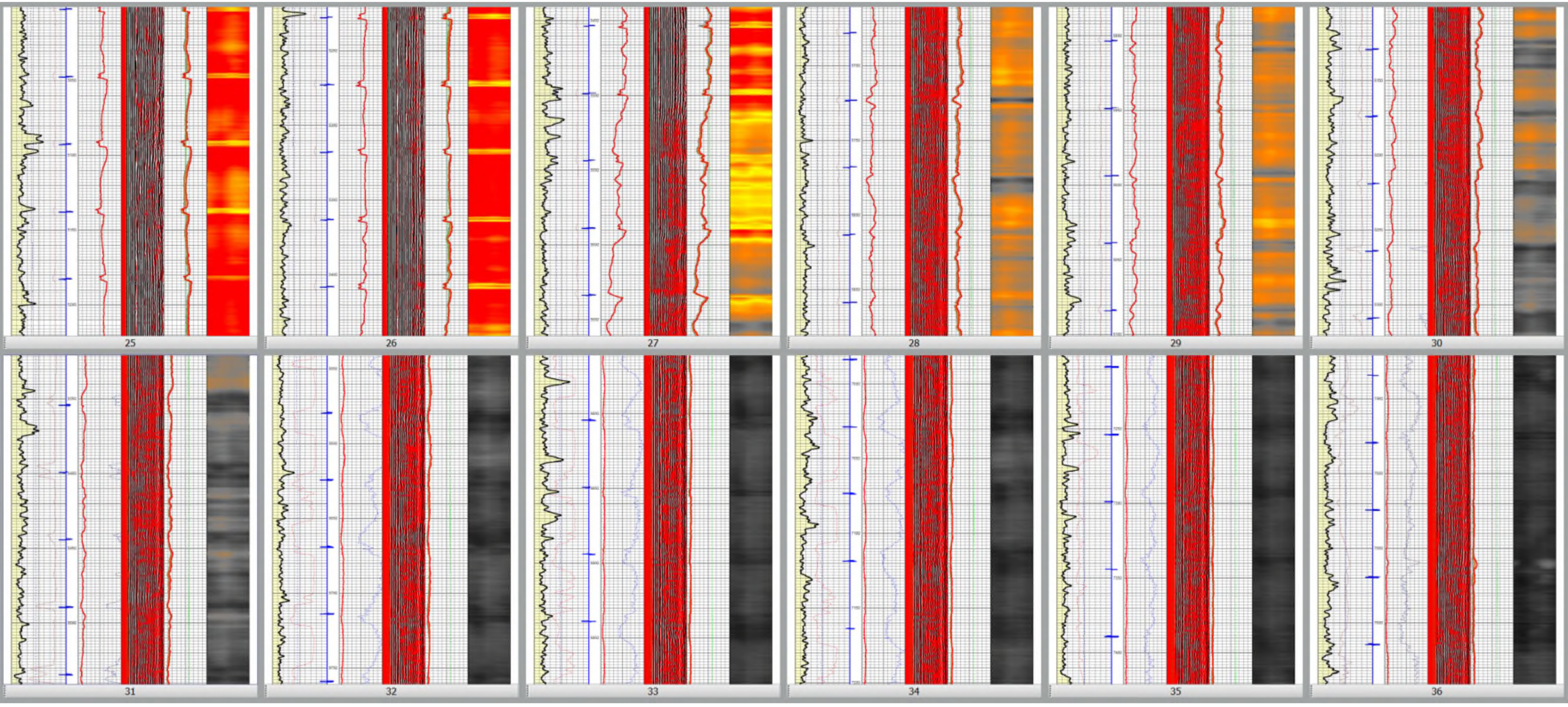
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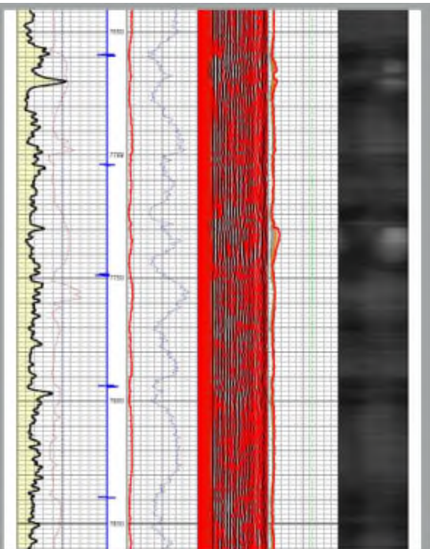
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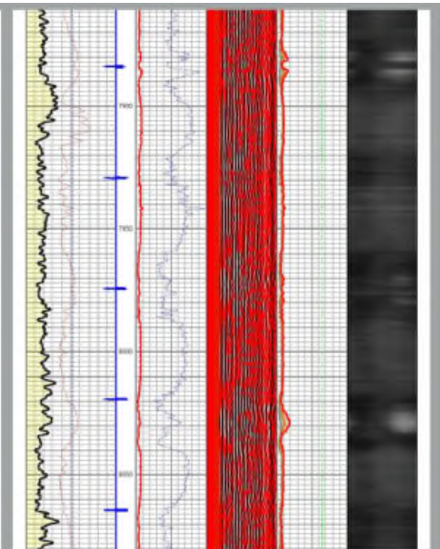
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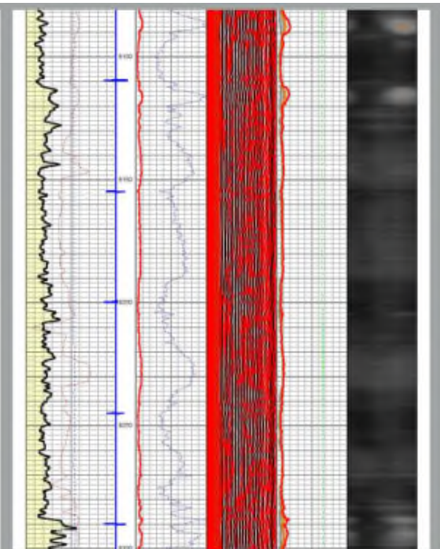
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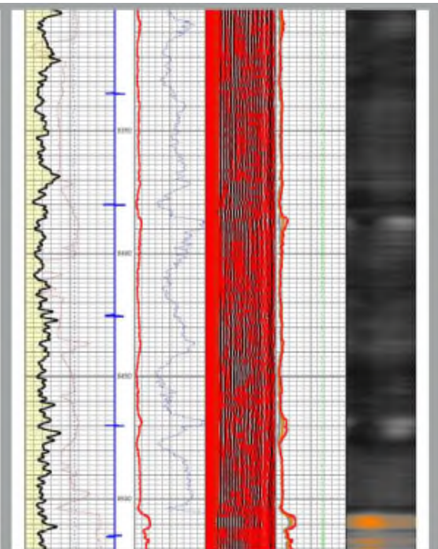
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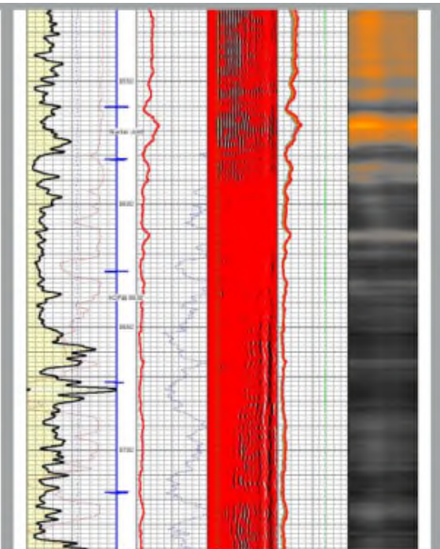
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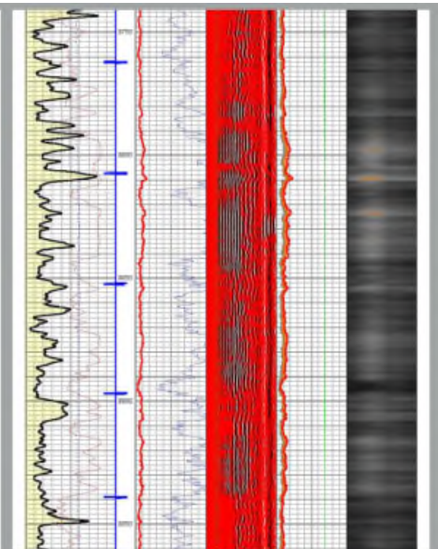
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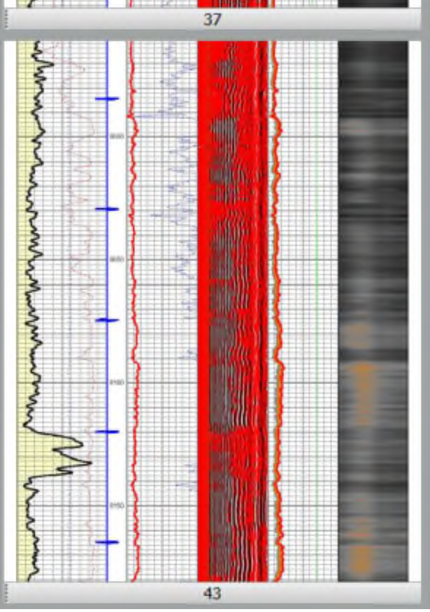
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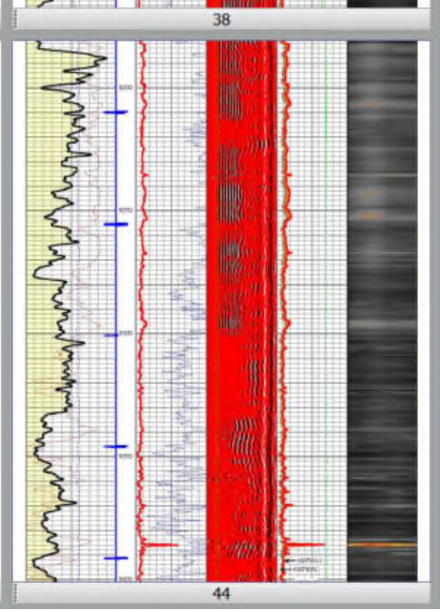
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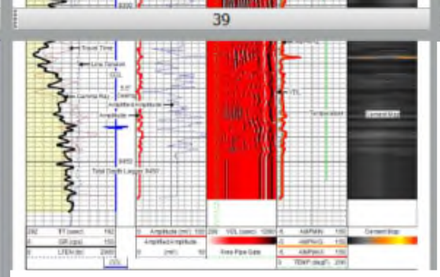


Side 1

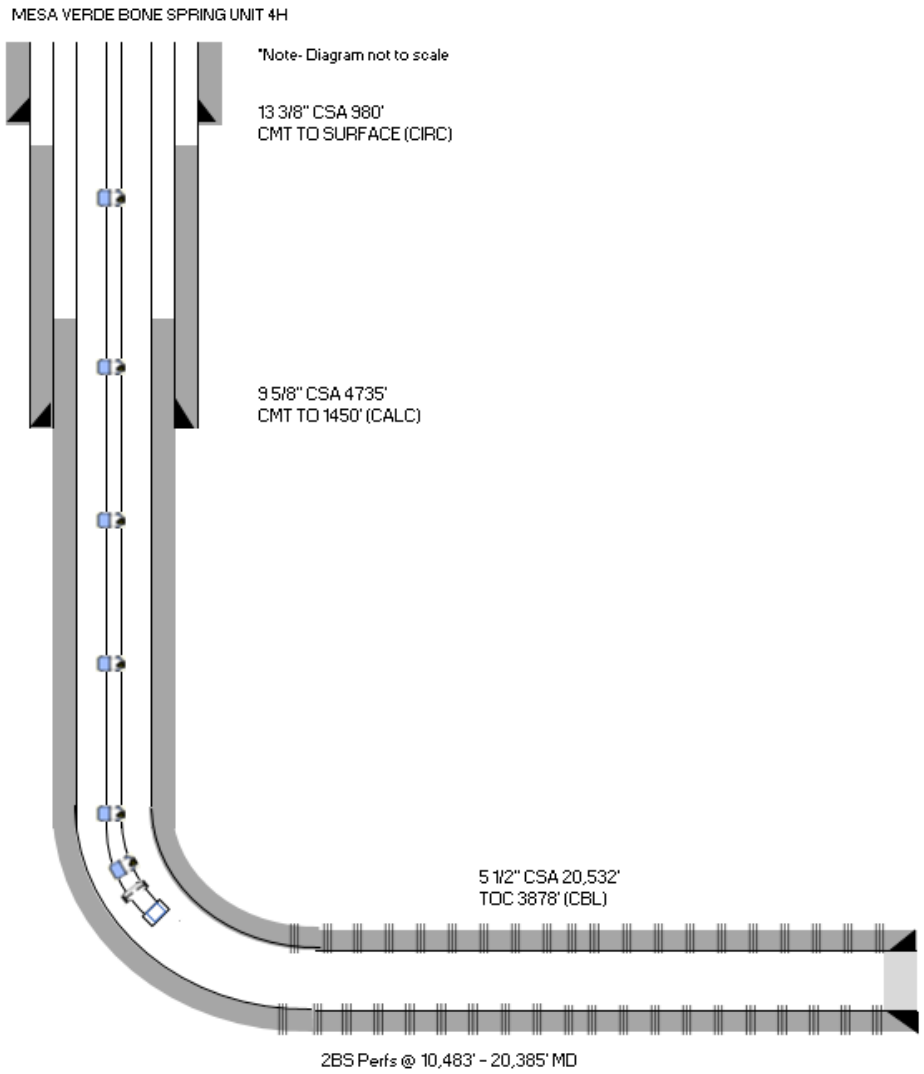
OPERATOR: OXY USA INC

WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 4H

WELL LOCATION: 280' FSL 965' FEL | P | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1712 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 12.25" Casing Size: 9-5/8"

Cemented with: 2060 sx. ***or*** _____ ft^3

Top of Cement: 1450' Method Determined: CALC

Production Casing

Hole Size: 8.5" Casing Size: 5.5"

Cemented with: 3050 sx. ***or*** _____ ft^3

Top of Cement: 3878' Method Determined: CBL

Total Depth: 20,532' MD/10,447' TVD

Injection Interval

10,483' MD/10,339' TVD feet to 20,385' MD/10,448' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-3/8" Lining Material: _____

Type of Packer: _____

Packer Setting Depth: _____

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

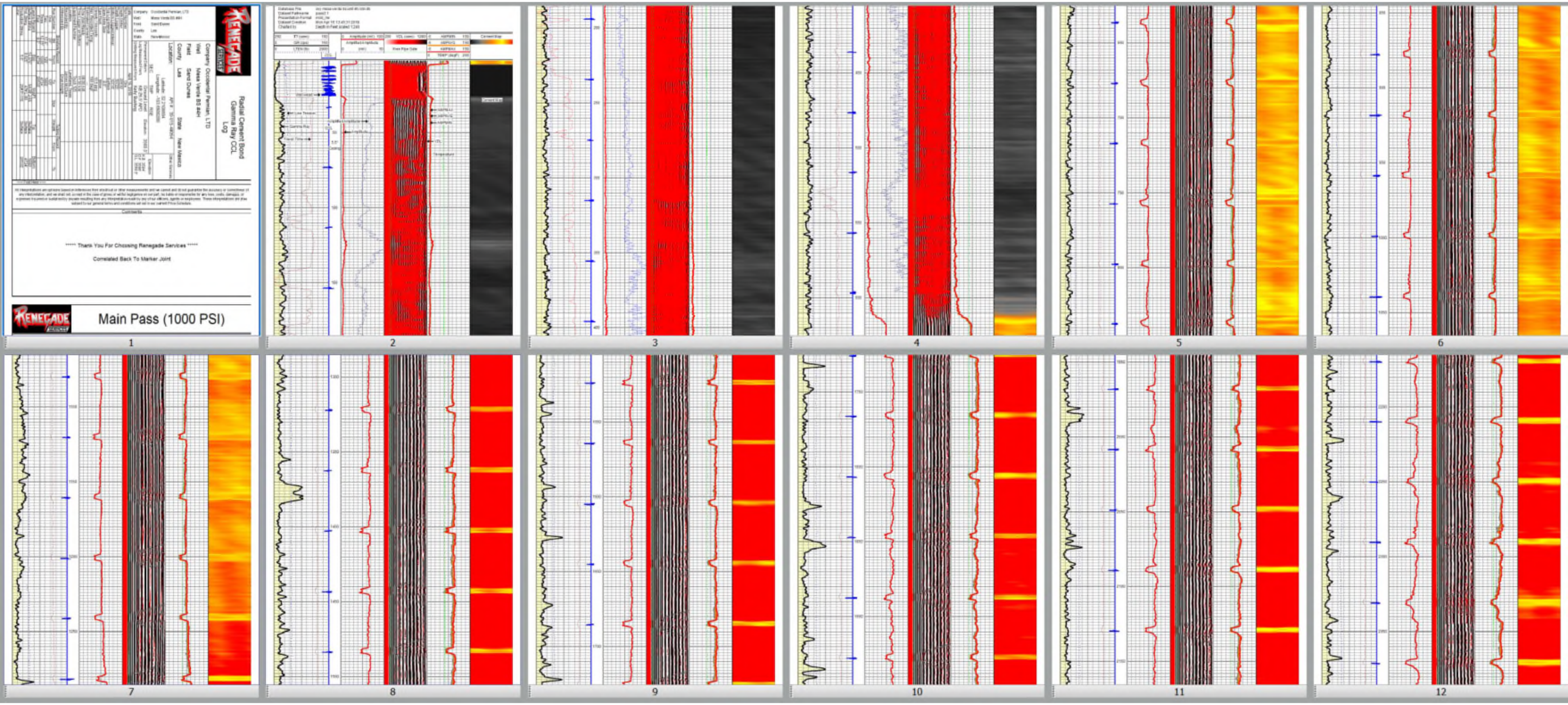
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #4H CBL


Radial Cement Bond
Gamma Ray CCL
Log
Company: Occidental Permian, LTD
Well: Mesa Verde BS #4H
Field: Sand Dunes
County: Lea
State: New Mexico
Comments
***** Thank You For Choosing Renegade Services *****
Correlated Back To Marker Joint
Main Pass (1000 PSI)
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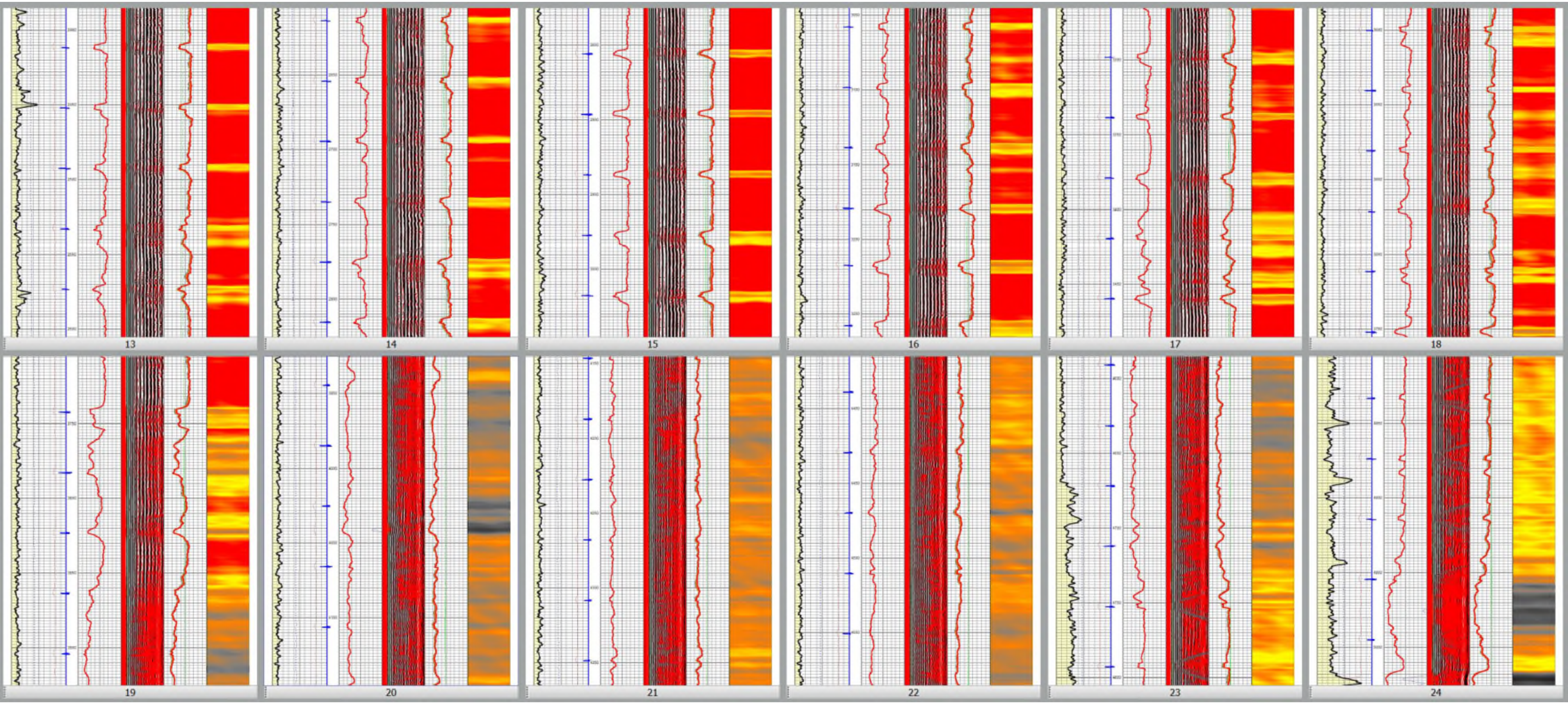
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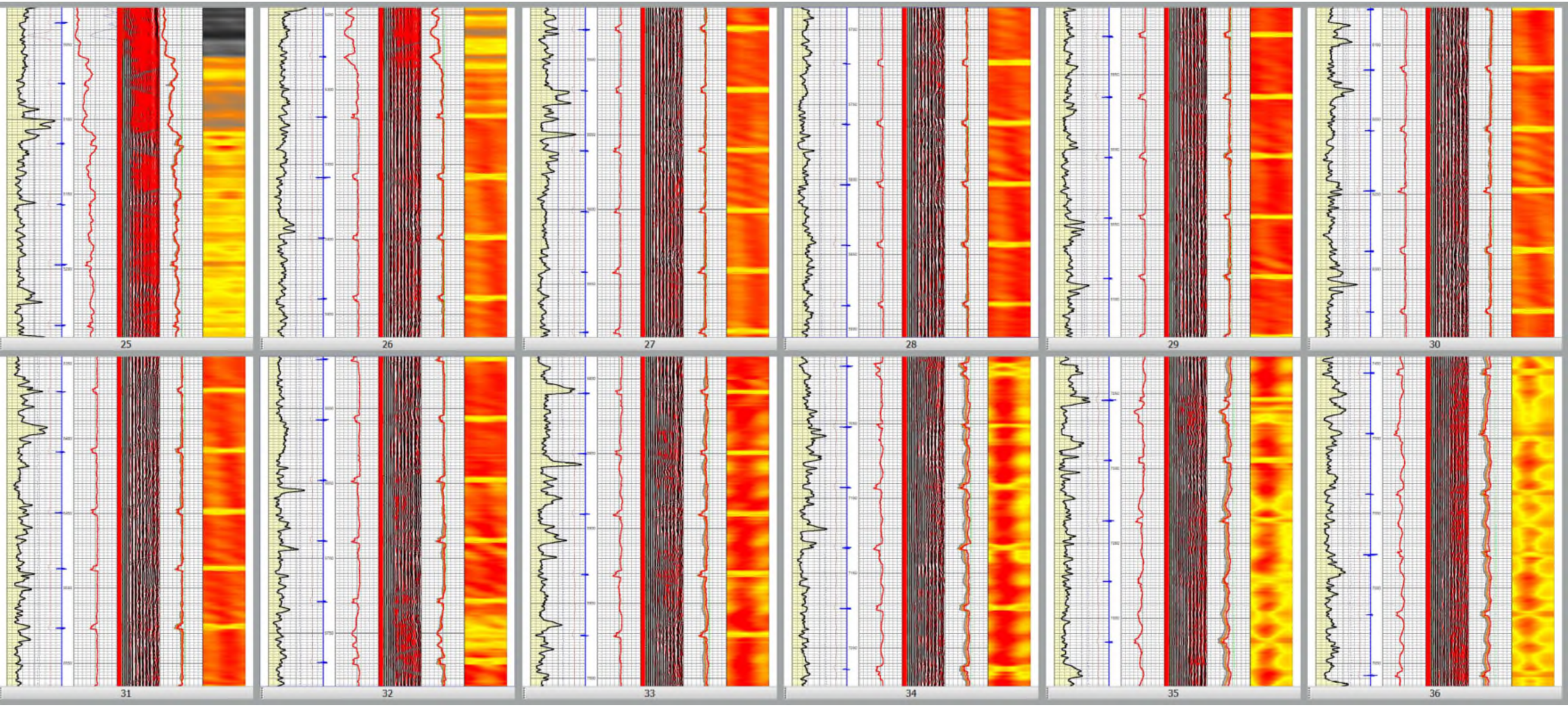
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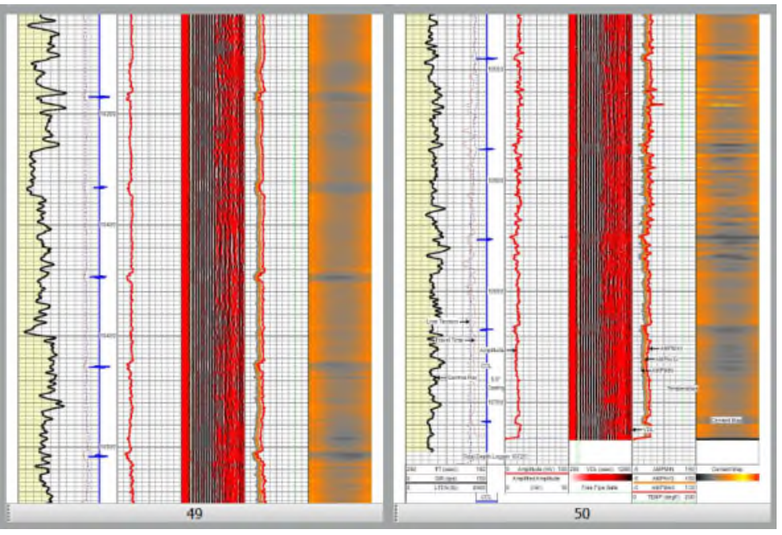


Side 1

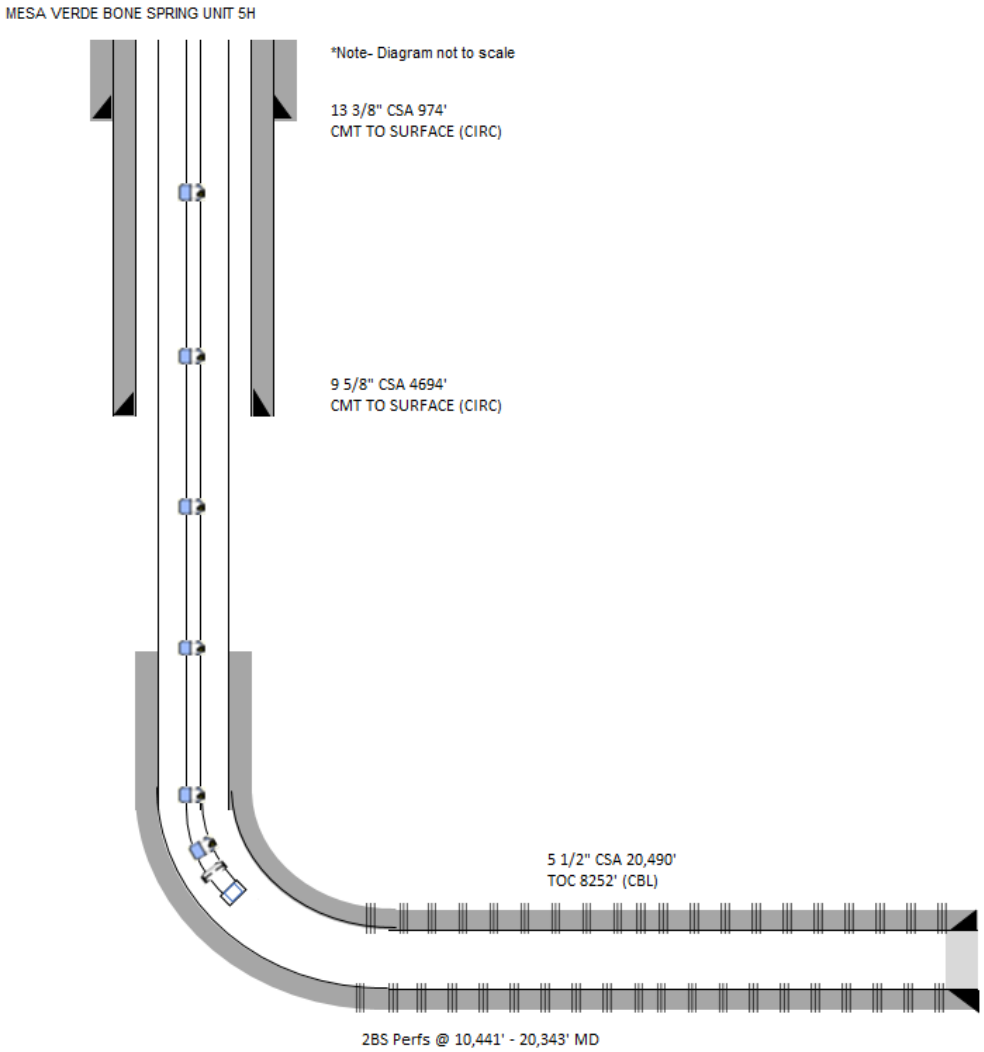
OPERATOR: OXY USA INC

WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 5H

WELL LOCATION: 280' FSL 995' FEL | P | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1245 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 12.25" Casing Size: 9-5/8"

Cemented with: 1290 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Production Casing

Hole Size: 8.5" Casing Size: 5.5"

Cemented with: 2895 sx. ***or*** _____ ft^3

Top of Cement: 8252' Method Determined: CBL

Total Depth: 20,290' MD/10,449' TVD

Injection Interval

10,441' MD/10,339' TVD feet to 20,343' MD/10,449' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-3/8" Lining Material: _____

Type of Packer: _____

Packer Setting Depth: _____

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

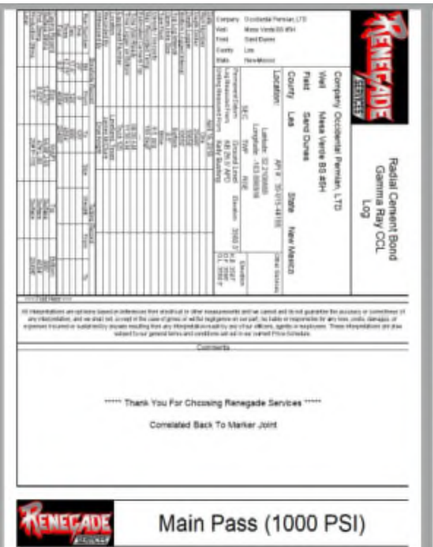
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #5H CBL


Radial Cement Bond
Gamma Ray CCL
Log
***** Thank You For Choosing Renegade Services *****
Correlated Back To Marker Joint
Main Pass (1000 PSI)
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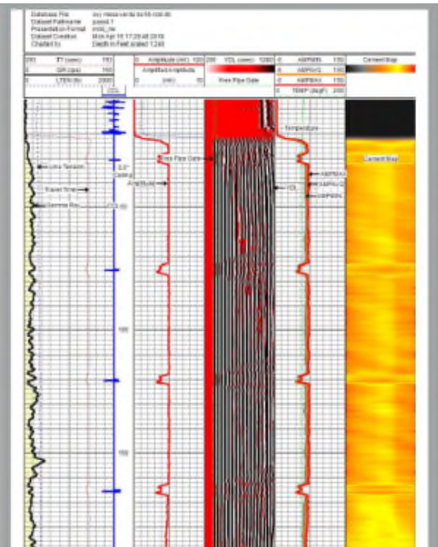
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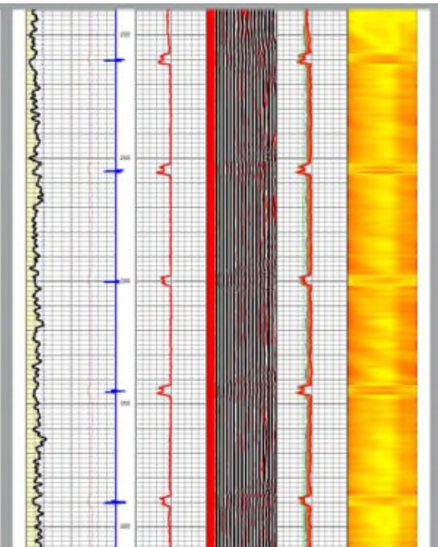
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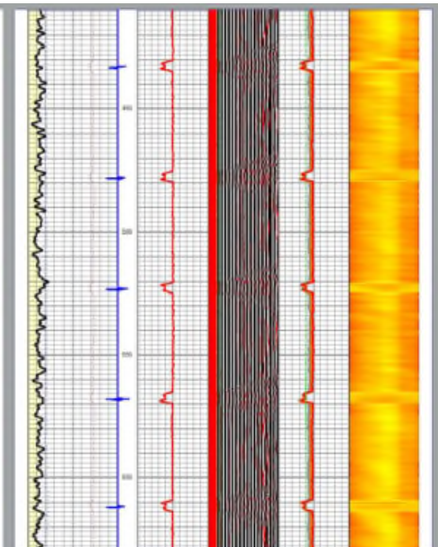
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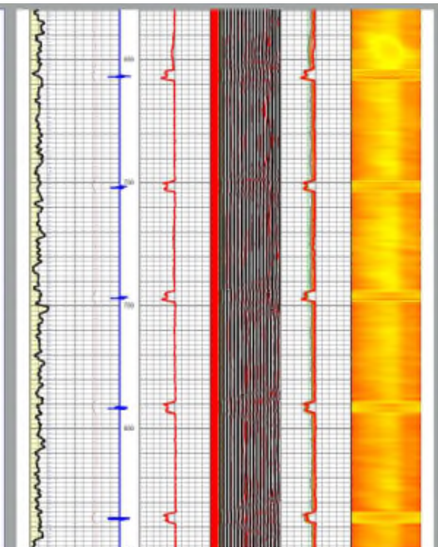
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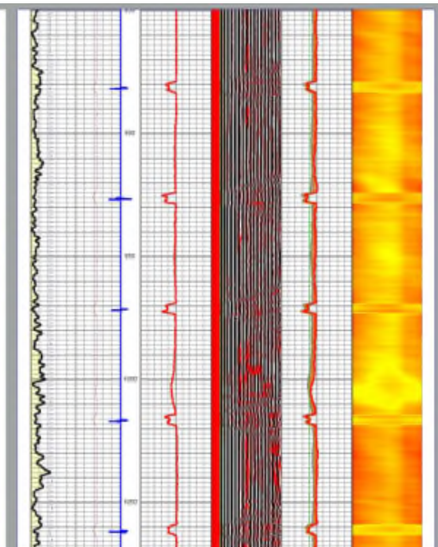
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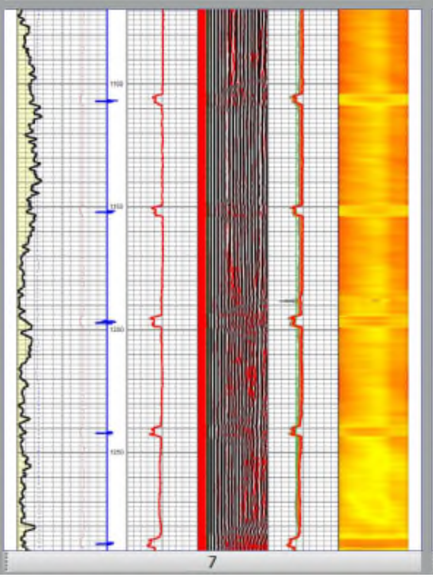
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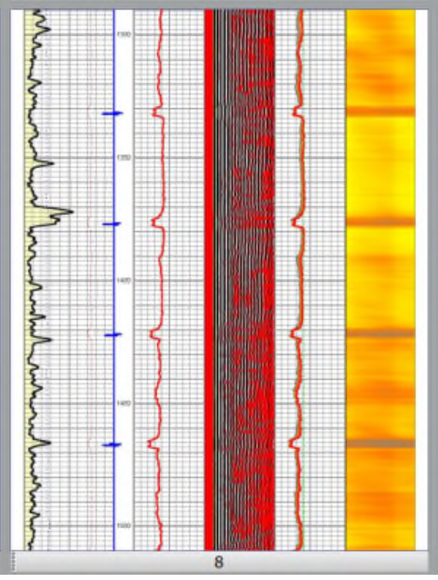
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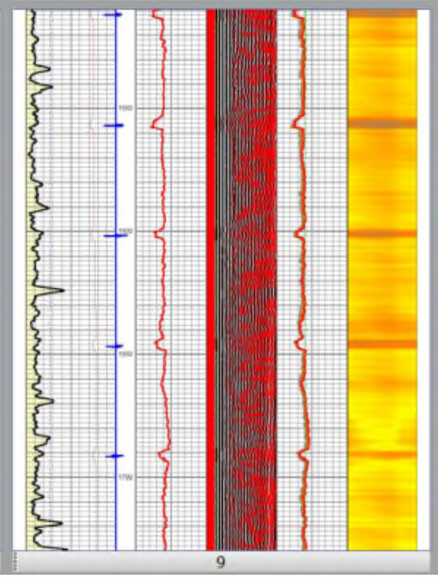
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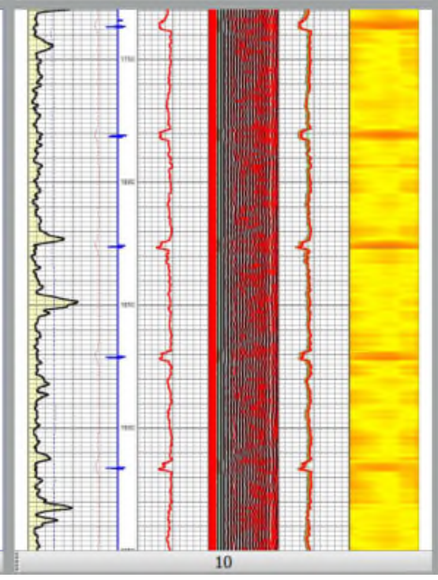
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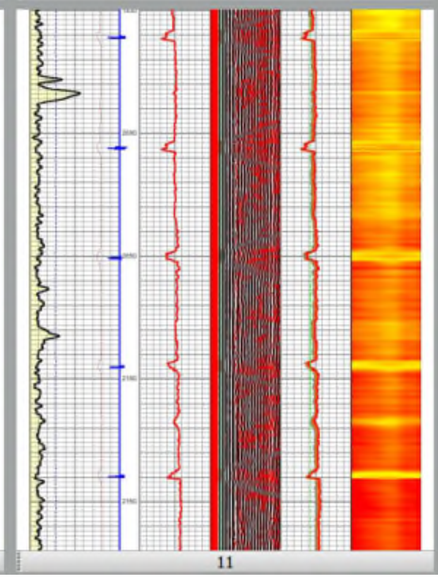
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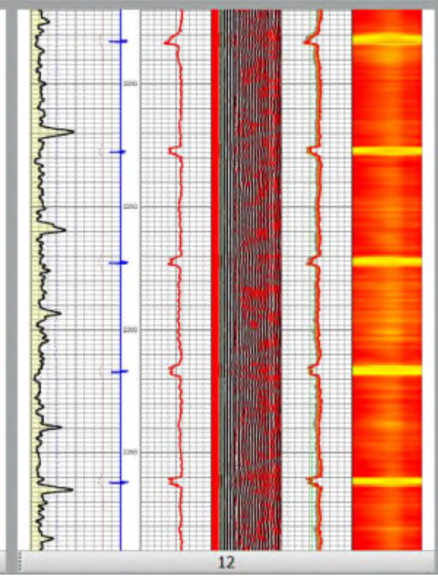
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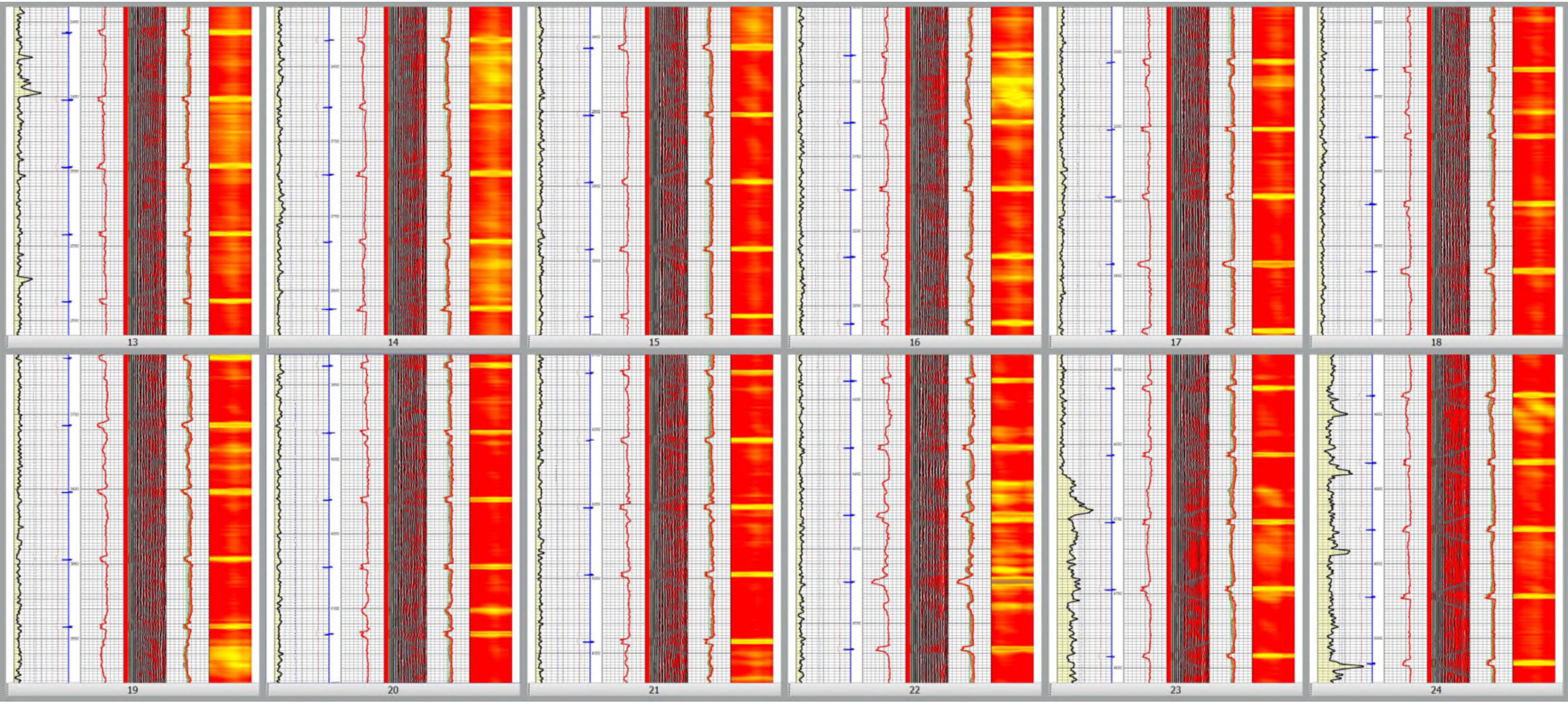
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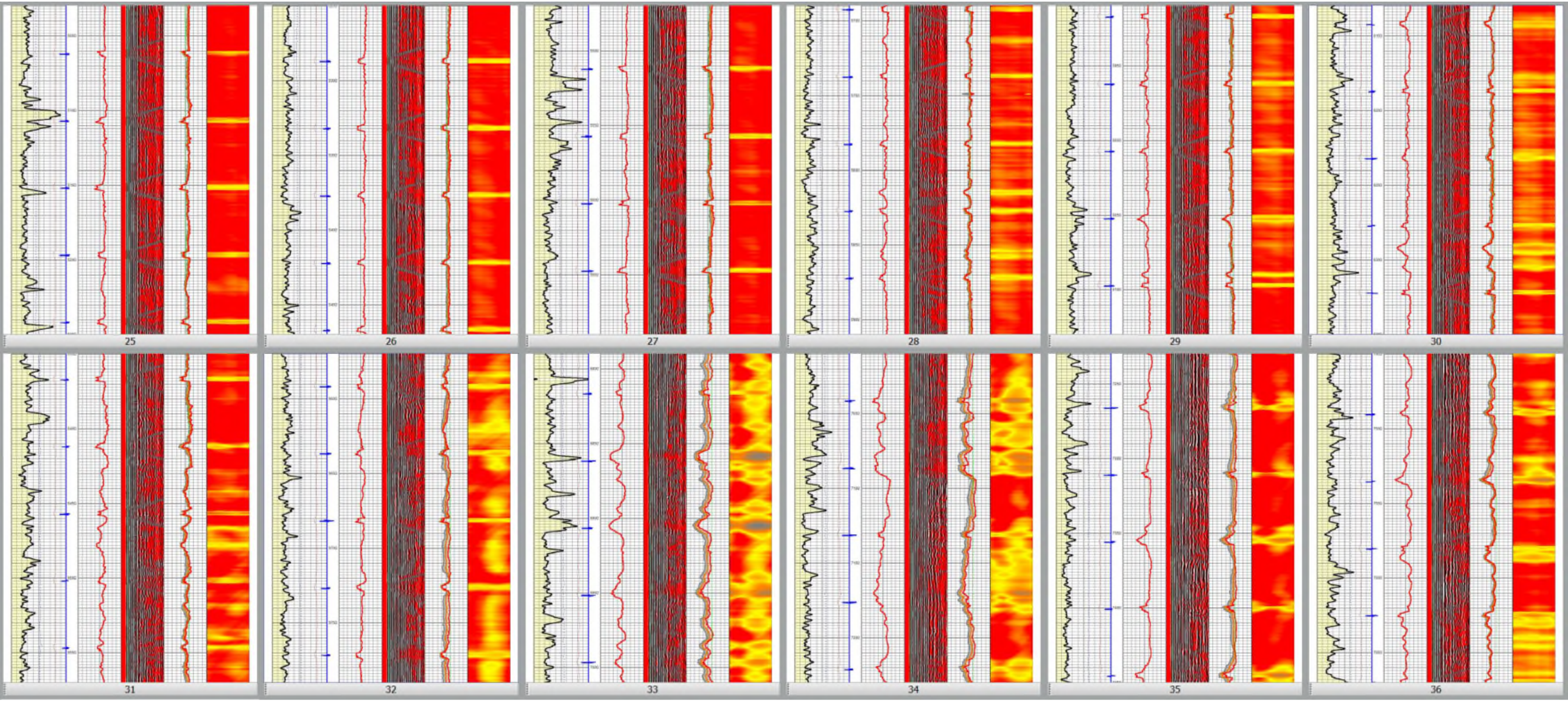
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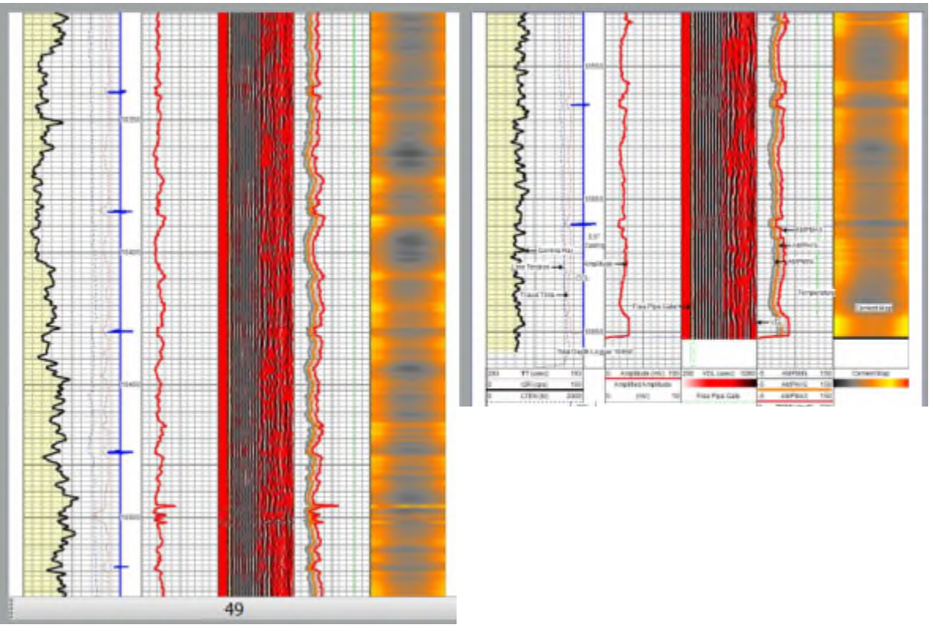


Side 1

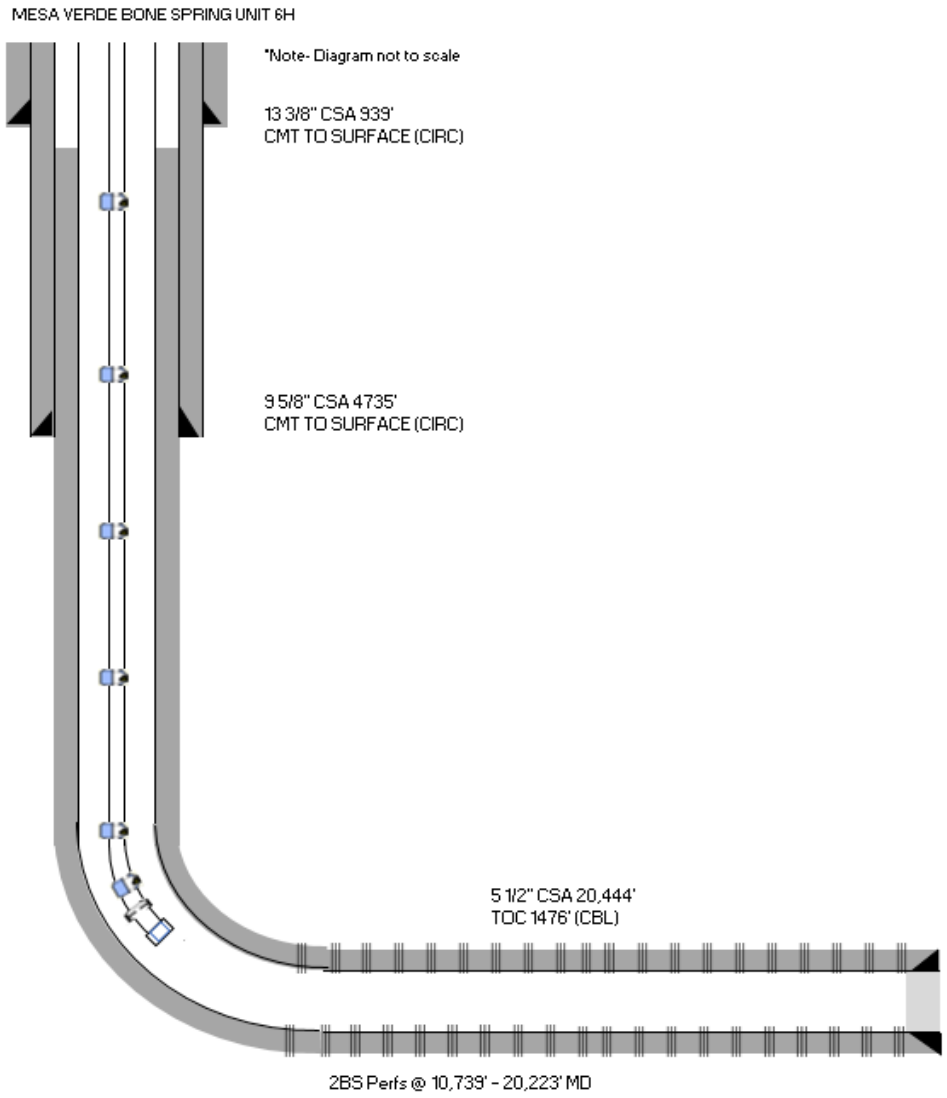
OPERATOR: OXY USA INC

WELL NAME & NUMBER: MESA VERDE BONE SPRING UNIT 6H

WELL LOCATION: 280' FSL 2624' FEL | O | 17 | 24S | 32E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 17.5" Casing Size: 13-3/8"

Cemented with: 1240 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Intermediate Casing

Hole Size: 12.25" Casing Size: 9-5/8"

Cemented with: 1300 sx. ***or*** _____ ft^3

Top of Cement: SURFACE Method Determined: CIRC

Production Casing

Hole Size: 8.5" Casing Size: 5.5"

Cemented with: 2970 sx. ***or*** _____ ft^3

Top of Cement: 1476' Method Determined: CBL

Total Depth: 20,444' MD/10,411' TVD

Injection Interval

10,739' MD/10,385' TVD feet to 20,223' MD/10,409' TVD

(Perforated or Open Hole; indicate which)

Side 2

PERF

Tubing Size: 2-3/8" SET AT 11037' MD/10405' TVD Lining Material: UNLINED

Type of Packer: NA

Packer Setting Depth: NA- FOR MIT, SET PACKER NO GREATER THAN 100' ABOVE TVD OF THE KOP

Other Type of Tubing/Casing Seal (if applicable): _____

Additional Data

1. Is this a new well drilled for injection? _____Yes X No

   If no, for what purpose was the well originally drilled? PRODUCER-OIL

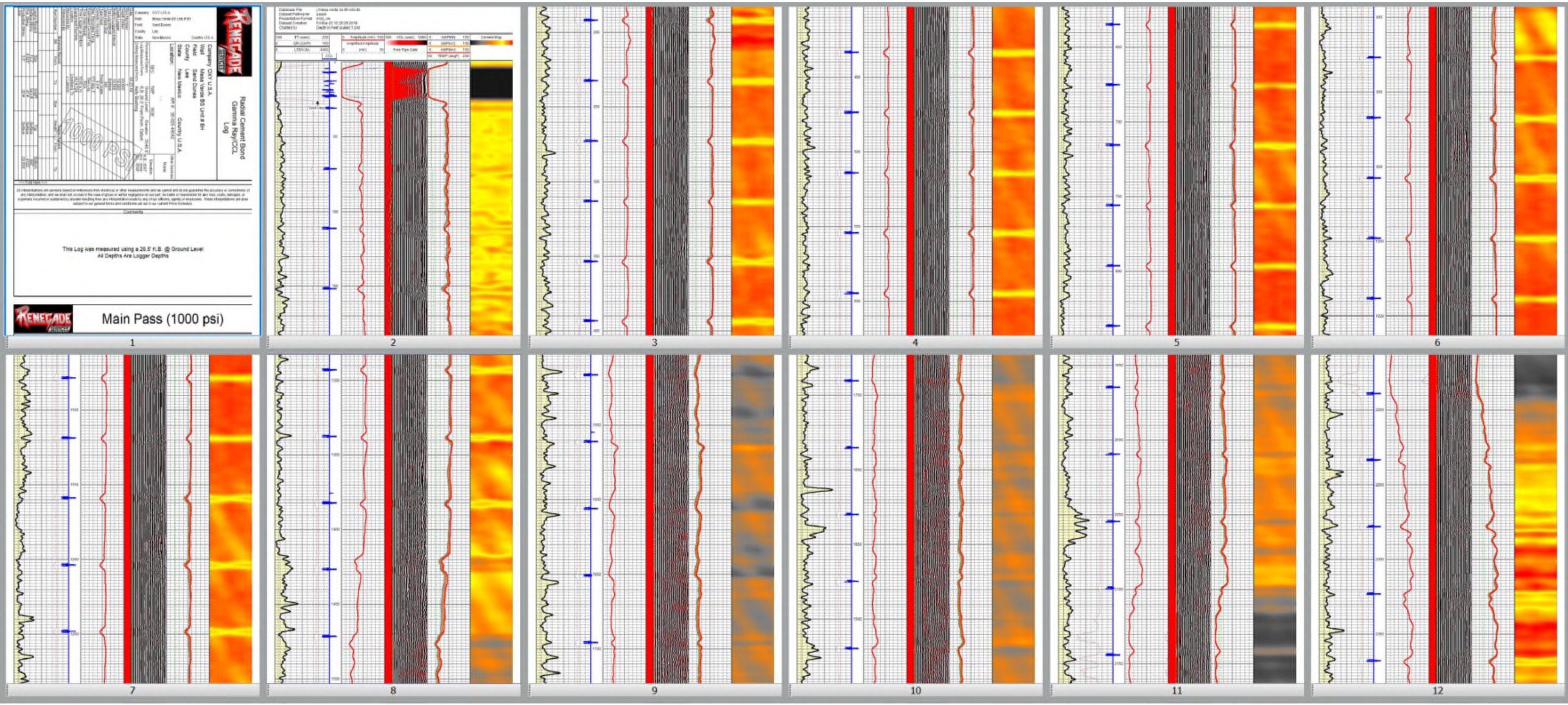
2. Name of the Injection Formation: _____

3. Name of Field or Pool (if applicable): [96229] MESA VERDE; BONE SPRING

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. NO

5. Give the name and depths of any oil or gas zones underlying or overlying the proposed injection zone in this area: _____

MV BS #6H CBL


Radial Cement Bond
Gamma Ray/CCL
Log
Company OXY U.S.A.
Well Mesa Verde BS Unit # 6H
Field Sand Dunes
County Lea
State New Mexico
Country U.S.A.
1000 psi
This Log was measured using a 26.5' K.B. @ Ground Level
All Depths Are Logger Depths
Main Pass (1000 psi)
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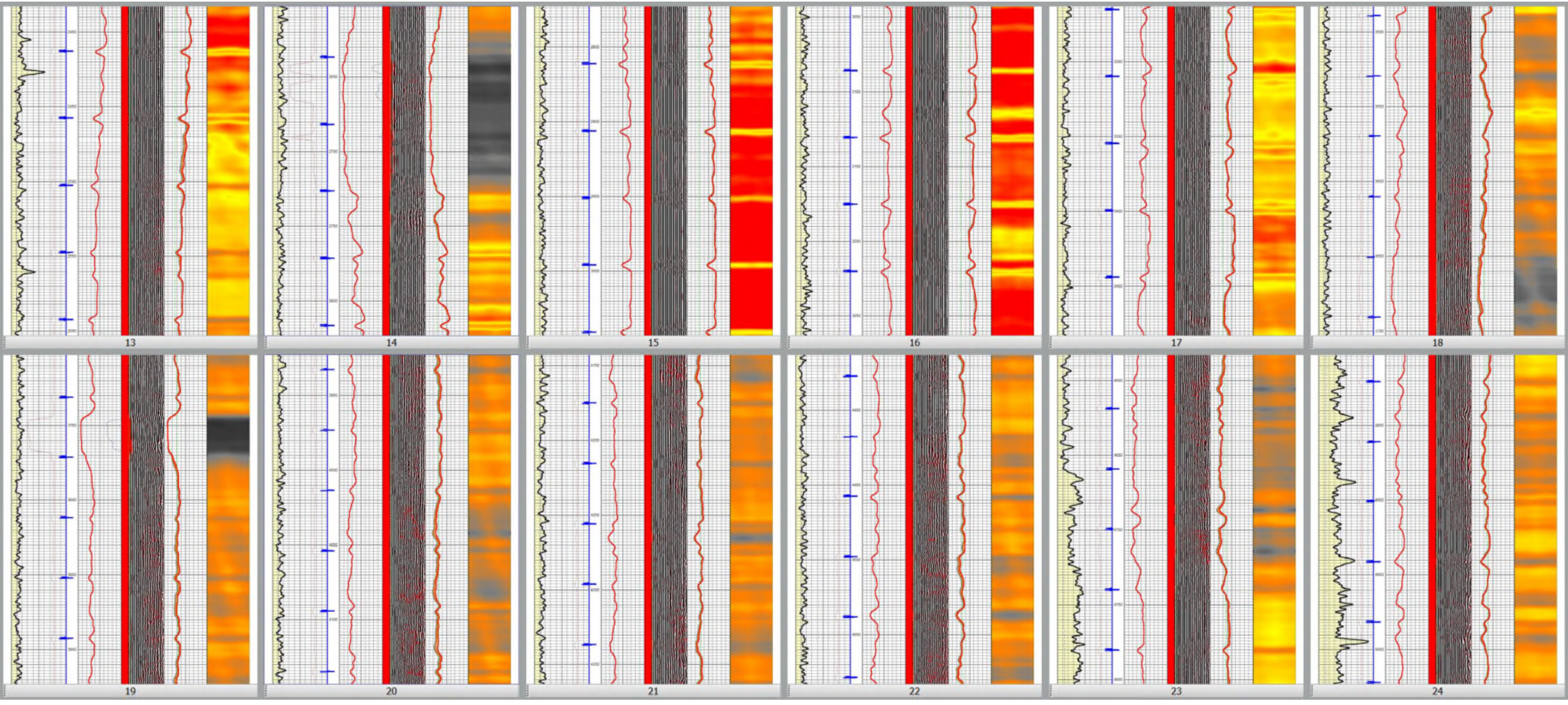
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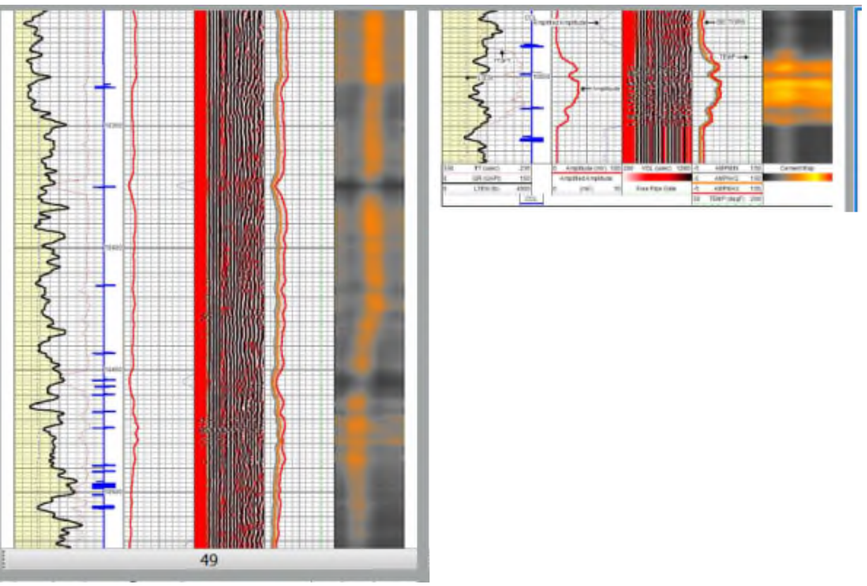
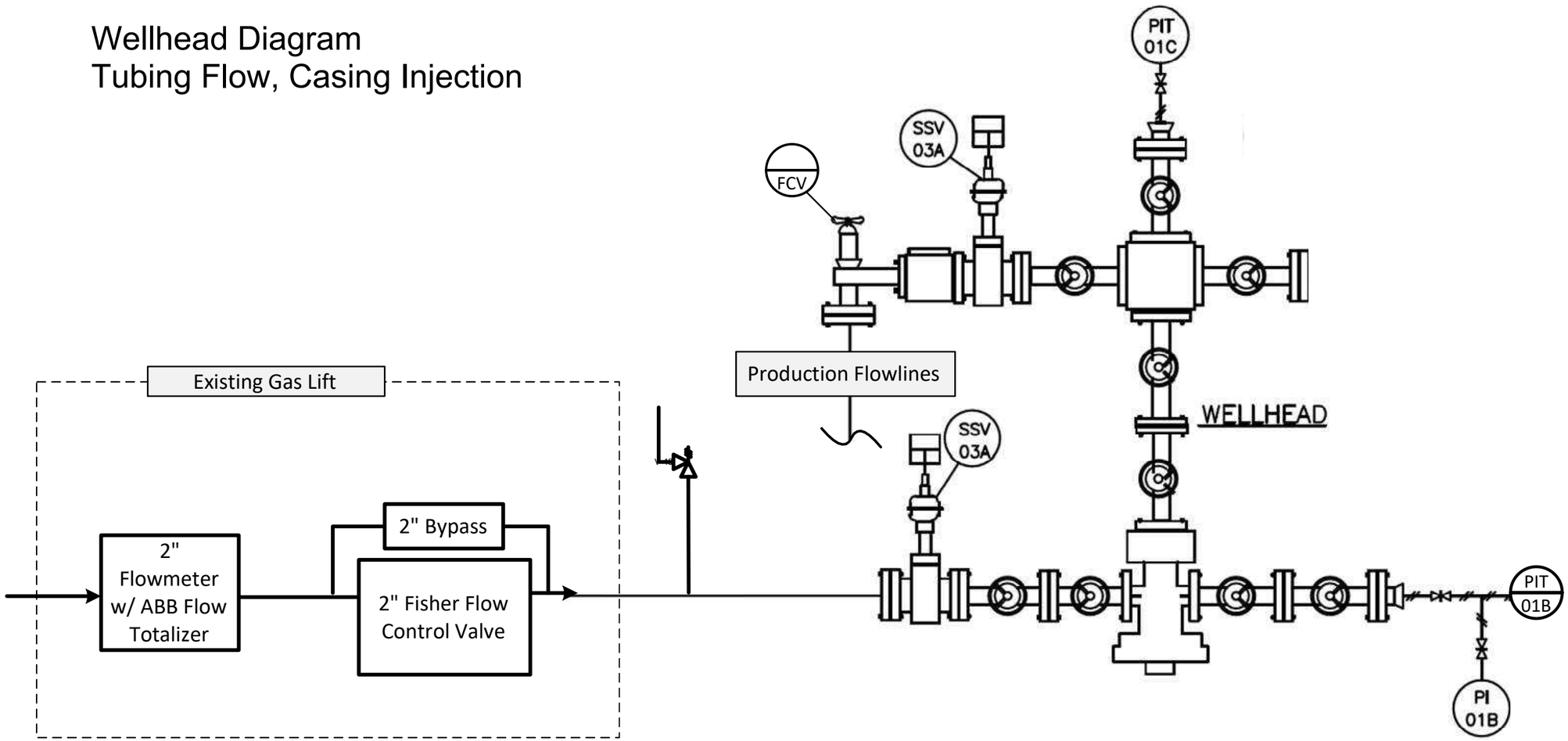


Max Allowable Surface Pressure (MASP) Table

	Column	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Calculation									(1+6*7)/8		1/10				(1+12*13)/(12*14)
API10	Well Name	Proposed Max Allowable Surface Pressure (MASP) (PSI)	Current Average Surface Pressure (PSI)	Max Achievable Surface Pressure, Current Infrastructure (PSI)	Proposed Average Injection Rate (MMSCFD)	Proposed Max Injection Rate (MMSCFD)	Burst Calculation Depth (FT TVD)	Brine Pressure Gradient (PSI/FT)	Casing or Liner Burst (PSI)	MASP + Reservoir Brine Hydrostatic as a percentage of Casing or Liner Burst Pressure (%)	Top Perforation Depth (FT TVD)	MASP Gradient (PSI/FT)	Top Perforation Depth (FT TVD)	Gas Pressure Gradient (PSI/FT)	Formation Parting Pressure Gradient (PSI/FT)	MASP + Gas Hydrostatic as a percentage of Formation Parting Pressure (%)
3002544101	MV-BS-1H-ST1	1,200	680	1,200	1.8	3.0	9,247	0.468	12,360	45%	9,247	0.130	9,247	0.200	0.650	51%
3002544196	MV-BS-2H	1,200	630	1,200	1.8	3.0	11,815	0.468	12,360	54%	11,815	0.102	11,815	0.200	0.650	46%
3002544183	MV-BS-3H	1,200	520	1,200	1.8	3.0	9,091	0.468	12,360	44%	9,091	0.132	9,091	0.200	0.650	51%
3002544064	MV-BS-4H	1,200	1100	1,200	1.8	3.0	10,359	0.468	12,360	49%	10,359	0.116	10,359	0.200	0.650	49%
3002544185	MV-BS-5H	1,200	1000	1,200	1.8	3.0	10,339	0.468	12,360	49%	10,339	0.116	10,339	0.200	0.650	49%
3002544042	MV-BS-6H	1,200	940	1,200	1.8	3.0	10,385	0.468	12,360	49%	10,385	0.116	10,385	0.200	0.650	49%

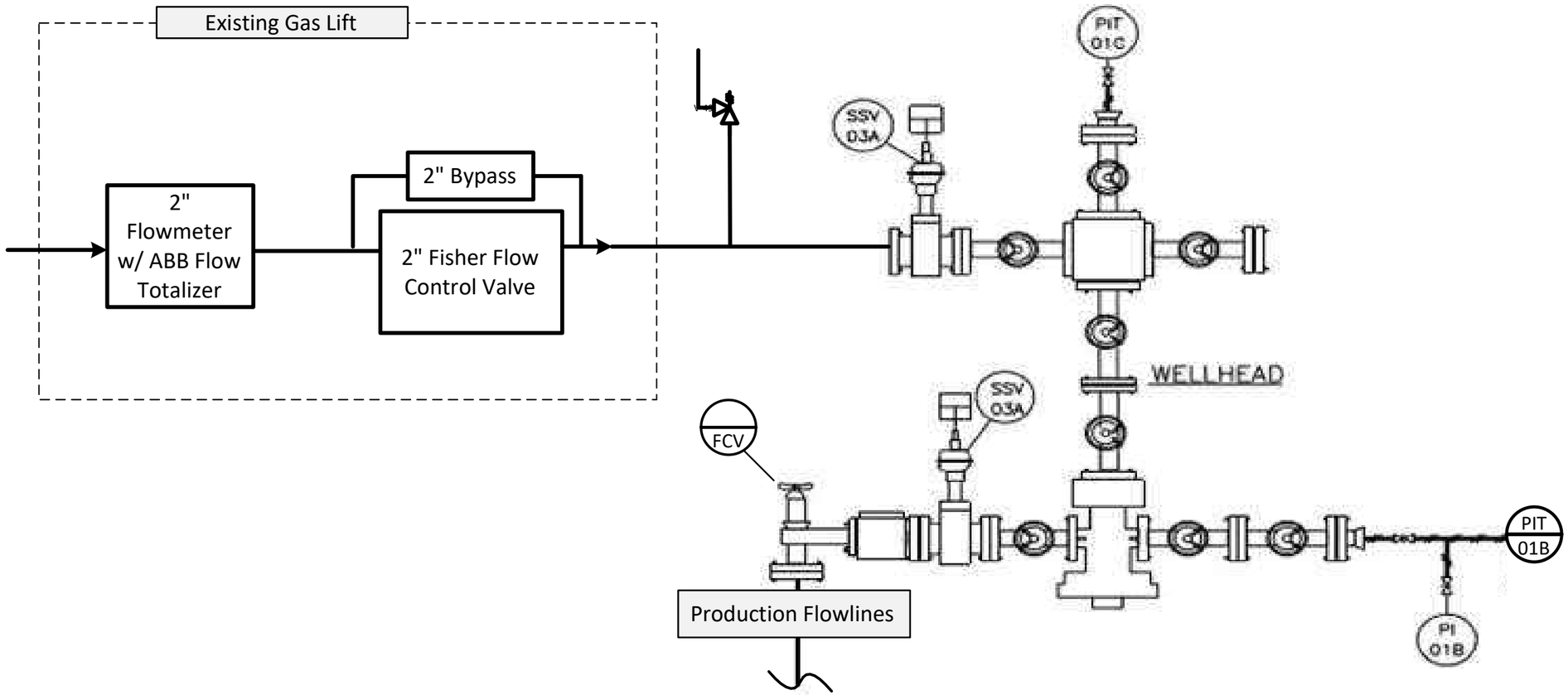
Wellhead Diagram
Tubing Flow, Casing Injection



API 14	Well Name	Injection Down the...
30025441010100	MV-BS-1H-ST1	Casing
30025441830000	MV-BS-3H	Casing

KEY
SSV – Safety Shutdown Valve
PI – Pressure Indicator
PIT – Pressure Indicating Transmitter
FCV- Flow Control Valve

Wellhead Diagram
Casing Flow, Tubing Injection



API 14	Well Name	Injection Down the...
30025441960000	MV-BS-2H	Tubing
30025440640000	Mesa Verde BS Unit 4H	Tubing
30025441850000	Mesa Verde BS Unit 5H	Tubing
30025440420000	Mesa Verde BS Unit 6H	Tubing

KEY
SSV – Safety Shutdown Valve PI – Pressure Indicator PIT – Pressure Indicating Transmitter FCV- Flow Control Valve

Mechanical Integrity Test (MIT) Summary Table

API10	Well Name	MIT #1	
		Date	Details
3002544101	MV-BS-1H-ST1	5/26/2018	9800 psi for 30 mins
3002544196	MV-BS-2H	7/3/2018	9800 psi for 30 mins
3002544183	MV-BS-3H	7/2/2018	9800 psi for 30 mins
3002544064	MV-BS-4H	4/15/2018	9800 psi for 30 mins
3002544185	MV-BS-5H	4/15/2018	9800 psi for 30 mins
3002544042	MV-BS-6H	3/22/2018	9800 psi for 30 mins

Gas Analysis and Operations

Gas Source Well List

Name	Route Name	API 14
MESA VERDE BS UNIT 10H	SE_MESA VERDE ROUTE	30025441880000
MESA VERDE BS UNIT 11H	SE_MESA VERDE ROUTE	30025441870000
MESA VERDE BS UNIT 12H	SE_MESA VERDE ROUTE	30025441860000
MESA VERDE BS UNIT 13H	SE_MESA VERDE ROUTE	30025441920000
MESA VERDE BS UNIT 14H	SE_MESA VERDE ROUTE	30025441910000
MESA VERDE BS UNIT 15H	SE_MESA VERDE ROUTE	30025441900000
MESA VERDE BS UNIT 16H	SE_MESA VERDE ROUTE	30015445510000
MESA VERDE BS UNIT 17H	SE_MESA VERDE ROUTE	30015445500000
MESA VERDE BS UNIT 18H	SE_MESA VERDE ROUTE	30015445490000
MESA VERDE BS UNIT 19H	SE_MESA VERDE ROUTE	30015445480000
MESA VERDE BS UNIT 1H ST1	SE_MESA VERDE ROUTE	30025441010100
MESA VERDE BS UNIT 20H	SE_MESA VERDE ROUTE	30015445470000
MESA VERDE BS UNIT 21H	SE_MESA VERDE ROUTE	30015445460000
MESA VERDE BS UNIT 22H	SE_MESA VERDE ROUTE	30025445590000
MESA VERDE BS UNIT 23H	SE_MESA VERDE ROUTE	30025445600000
MESA VERDE BS UNIT 24H	SE_MESA VERDE ROUTE	30025445610000
MESA VERDE BS UNIT 2H	SE_MESA VERDE ROUTE	30025441960000
MESA VERDE BS UNIT 3H	SE_MESA VERDE ROUTE	30025441830000
MESA VERDE BS UNIT 4H	SE_MESA VERDE ROUTE	30025440640000
MESA VERDE BS UNIT 5H	SE_MESA VERDE ROUTE	30025441850000
MESA VERDE BS UNIT 6H	SE_MESA VERDE ROUTE	30025440420000
MESA VERDE BS UNIT 7H	SE_MESA VERDE ROUTE	30025440650000
MESA VERDE BS UNIT 8H	SE_MESA VERDE ROUTE	30025441840000
MESA VERDE BS UNIT 9H	SE_MESA VERDE ROUTE	30025441940000
MESA VERDE WC UNIT 10H	SE_MESA VERDE ROUTE	30025458720000
MESA VERDE WC UNIT 11H	SE_MESA VERDE ROUTE	30025458730000
MESA VERDE WC UNIT 1H ST1	SE_MESA VERDE ROUTE	30025441950100
MESA VERDE WC UNIT 2H	SE_MESA VERDE ROUTE	30025461100000
MESA VERDE WC UNIT 3H	SE_MESA VERDE ROUTE	30025461110000
MESA VERDE WC UNIT 4H	SE_MESA VERDE ROUTE	30025461120000
MESA VERDE WC UNIT 5H	SE_MESA VERDE ROUTE	30025458620000
MESA VERDE WC UNIT 6H	SE_MESA VERDE ROUTE	30025458630000
MESA VERDE WC UNIT 7H	SE_MESA VERDE ROUTE	30025459200000
MESA VERDE WC UNIT 8H	SE_MESA VERDE ROUTE	30025459210000
MESA VERDE WC UNIT 9H	SE_MESA VERDE ROUTE	30025458710000

Mesa Verde Gas Analysis Summary

- All producing wells go to 1 Central Tank Battery (CTB).
- There are 2 Compressor Gas Lift Stations (CGL's).
    - East CGL
    - West CGL
- The CGL's combine downstream in the same gas lift line to feed wells collectively.
- Gas analysis is provided for:
    1. East CGL injection
    2. West CGL injection
    3. Avalon production
    4. 2nd Bone Spring production
    5. 3rd Bone Spring production

Certificate of Analysis

Number: 6030-20110021-001A

Artesia Laboratory
200 E Main St.
Artesia, NM 88210
Phone 575-746-3481

Chandler Montgomery
Occidental Petroleum
1502 W Commerce Dr.
Carlsbad, NM 88220

Nov. 05, 2020

Field:	Mesa Verde	Sampled By:	Scott Beasley
Station Name:	Mesa Verde East CGL	Sample Of:	Gas Spot
Station Number:	N/A	Sample Date:	10/30/2020 10:00
Sample Point:	Inlet to Dehy	Sample Conditions:	1290 psig, @ 60 °F Ambient: 45 °F
Meter Number:		Effective Date:	10/30/2020 10:00
County:	Lea	Method:	GPA 2286
Type of Sample:	Spot-Cylinder	Cylinder No:	1111-002316
Heat Trace Used:	N/A	Instrument:	6030_GC2 (Agilent GC-7890B)
Sampling Method:	Fill and Purge	Last Inst. Cal.:	08/25/2020 8:12 AM
Sampling Company:	OXY	Analyzed:	11/05/2020 08:47:32 by PGS

Analytical Data

Components	Un-normalized Mol %	Mol. %	Wt. %	GPM at 14.65 psia		
Nitrogen	1.206	1.189	1.495		GPM TOTAL C2+	6.645
Methane	75.248	74.177	53.401		GPM TOTAL C3+	3.314
Carbon Dioxide	1.152	1.136	2.244		GPM TOTAL iC5+	0.562
Ethane	12.654	12.474	16.832	3.331		
Propane	6.662	6.567	12.995	1.806		
Iso-butane	0.889	0.876	2.285	0.286		
n-Butane	2.126	2.096	5.467	0.660		
Iso-pentane	0.443	0.437	1.415	0.159		
n-Pentane	0.488	0.481	1.557	0.174		
Hexanes Plus	0.575	0.567	2.309	0.229		
	101.443	100.000	100.000	6.645		

Calculated Physical Properties	Total	C6+
Relative Density Real Gas	0.7722	3.1348
Calculated Molecular Weight	22.28	90.79
Compressibility Factor	0.9960	
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F		
Real Gas Dry BTU	1298	4897
Water Sat. Gas Base BTU	1275	4811
Ideal, Gross HV - Dry at 14.65 psia	1292.6	4896.9
Ideal, Gross HV - Wet	1270.0	0.000
Net BTU Dry Gas - real gas	1179	
Net BTU Wet Gas - real gas	1158	

Comments: H2S Field Content 0 ppm

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Certificate of Analysis

Number: 6030-20110020-001A

Artesia Laboratory
200 E Main St.
Artesia, NM 88210
Phone 575-746-3481

Chandler Montgomery
Occidental Petroleum
1502 W Commerce Dr.
Carlsbad, NM 88220

Nov. 05, 2020

Field:	Mesa Verde	Sampled By:	Scott Beasley
Station Name:	Mesa Verde West CGL	Sample Of:	Gas Spot
Station Number:	N/A	Sample Date:	10/30/2020 10:26
Sample Point:	Inlet to Dehy	Sample Conditions:	1298 psig, @ 60 °F Ambient: 50 °F
Meter Number:		Effective Date:	10/30/2020 10:26
County:	Lea	Method:	GPA 2286
Type of Sample:	Spot-Cylinder	Cylinder No:	1111-002622
Heat Trace Used:	N/A	Instrument:	6030_GC2 (Agilent GC-7890B)
Sampling Method:	Fill and Purge	Last Inst. Cal.:	08/25/2020 8:12 AM
Sampling Company:	OXY	Analyzed:	11/05/2020 08:47:32 by PGS

Analytical Data

Components	Un-normalized Mol %	Mol. %	Wt. %	GPM at 14.65 psia		
Nitrogen	1.166	1.155	1.435		GPM TOTAL C2+	6.844
Methane	74.265	73.590	52.342		GPM TOTAL C3+	3.505
Carbon Dioxide	1.155	1.145	2.234		GPM TOTAL iC5+	0.642
Ethane	12.617	12.502	16.667	3.339		
Propane	6.809	6.747	13.190	1.856		
Iso-butane	0.931	0.923	2.378	0.302		
n-Butane	2.260	2.239	5.770	0.705		
Iso-pentane	0.483	0.479	1.532	0.174		
n-Pentane	0.540	0.535	1.711	0.193		
Hexanes Plus	0.691	0.685	2.741	0.275		
	100.917	100.000	100.000	6.844		

Calculated Physical Properties	Total	C6+
Relative Density Real Gas	0.7816	3.1056
Calculated Molecular Weight	22.56	89.95
Compressibility Factor	0.9959	
GPA 2172 Calculation:		
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F		
Real Gas Dry BTU	1313	4842
Water Sat. Gas Base BTU	1290	4757
Ideal, Gross HV - Dry at 14.65 psia	1307.1	4841.9
Ideal, Gross HV - Wet	1284.2	0.000
Net BTU Dry Gas - real gas	1193	
Net BTU Wet Gas - real gas	1172	

Comments: H2S Field Content 0 ppm

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Avalon Produced Gas

Atchafalaya Measurement Inc

416 East Main Street, Artesia NM 88210 575-746-3481

Sample Information

	Sample Information
Sample Name	OXY__Mesa Verde BS Unit 3H__GC2-82018-02
Station Number	Flowback
Lease Name	Mesa Verde BS Unit 3H
Analysis For	OXY USA
Producer	OXY USA
Field Name	Buck Jackson
County/State	Lea,NM
Frequency/Spot Sample	Spot
Sampling Method	Fill Empty
Sample Deg F	118
Atmos Deg F	85
Flow Rate	N/A
Line PSIG	319
Date Sampled/Time Sampled	8-17-18
Cylinder Number	N/A
Cylinder Clean Date	N/A
Sampled By	Jesus Escobedo
Analysis By	Pat Silvas
Verified/Calibrated Date	8-20-18
Report Date	2018-08-20 10:39:27

Component Results

Component Name	Ret. Time	Peak Area	Norm%	GPM (Dry) (Gal. / 1000 cu.ft.)	
Nitrogen	22.800	24973.4	1.8396	0.000	
H2S	0.000	0.0	0.0000	0.000	
Methane	23.600	698935.5	68.1431	0.000	
Carbon Dioxide	27.080	209818.6	13.2389	0.000	
Ethane	37.160	163408.0	9.6436	2.574	
Propane	77.960	106434.1	4.7467	1.305	
i-Butane	29.820	45025.0	0.5476	0.179	
n-Butane	32.140	91966.3	1.1101	0.349	
i-Pentane	39.160	21654.3	0.2272	0.083	
n-Pentane	41.980	20315.7	0.2075	0.075	
C6's	50.750	14074.0	0.1264	0.052	
C7's	67.000	12630.0	0.1092	0.050	
C8's	84.000	5490.0	0.0506	0.026	
C9's	102.000	2339.0	0.0078	0.004	
C10 Plus	146.000	453.0	0.0017	0.001	
Total:			100.0000	4.698	

Results Summary

Result	Dry	Sat. (Base)	
Total Raw Mole% (Dry)	101.7267		
Pressure Base (psia)	14.650		
Temperature Base	60.00		
Gross Heating Value (BTU / Ideal cu.ft.)	1062.3	1043.7	
Gross Heating Value (BTU / Real cu.ft.)	1066.2	1048.0	
Relative Density (G), Ideal	0.8228	0.8193	
Relative Density (G), Real	0.8255	0.8223	
Compressibility (Z) Factor	0.9963	0.9959	

2nd Bone Spring Produced Gas

Atchafalaya Measurement, Inc.

416 East Main Street Artesia, NM 88210 575-746-3481

Sample Information

	Sample Information
Sample Name	OXY__Mesa Verde Bone Springs Unit 5__GC1-51518-01
Station Number	TestSkid
Lease Name	Mesa Verde Bone Springs Unit 5
Analysis For	OXY USA
Producer	OXY USA
Field Name	Buck Jackson
County	Lea
State	NM
Frequency	Spot
Sample Deg F	113.4
Atmos Deg F	21
Flow Rate	1042.8
Line PSIG	150
Date Sampled	5-14-18
Sampled By	Chris Myers
Analysis By	Pat Silvas
Report Date	2018-05-15 07:10:56

Component Results

Component Name	Ret. Time	Peak Area	Norm%	PPMV	GPM (Dry) (Gal. / 1000 cu.ft.)	
Nitrogen	22.140	12765.6	2.46691	24669.100	0.271	
H2S	46.000	0.0	0.00000	0.000	0.000	
Methane	22.980	291616.0	72.46222	724622.200	12.262	
Carbon Dioxide	26.760	1153.2	0.18673	1867.300	0.032	
Ethane	37.000	95357.5	14.16976	141697.600	3.783	
Propane	79.160	63791.5	7.06172	70617.200	1.942	
i-butane	28.780	56723.6	0.81633	8163.300	0.267	
n-Butane	30.360	140567.7	1.94913	19491.300	0.613	
i-pentane	35.520	28166.3	0.33133	3313.300	0.121	
n-Pentane	37.620	26425.6	0.30257	3025.700	0.109	
Hexanes Plus	120.000	22572.0	0.25330	2533.000	0.110	
Total:			100.00000	1000000.000	19.510	

Results Summary

Result	Dry	Sat. (Base)	
Total Raw Mole% (Dry)	101.85248		
Total Amount PPM (Mole/Vol.)	1000000.000		
Pressure Base (psia)	14.650		
Temperature Base	60.00		
Gross Heating Value (BTU / Ideal cu.ft.)	1284.8	1262.3	

Carlsbad Springs Produced Gas

Atchafalaya Measurement Inc
416 East Main Street, Artesia NM 88210 575-746-3481

Sample Information

	Sample Information
Sample Name	OXY__Mesa Verde 2H__GC2-41619-10
Station Number	15504T
Lease Name	Mesa Verde 2H
Analysis For	OXY USA
Producer	OXY USA
Field Name	Basin
County/State	Eddy,NM
Frequency/Spot Sample	Quarterly
Sampling Method	Fill Empty
Sample Deg F	86.5
Atmos Deg F	60
Flow Rate	1575.9771
Line PSIG	112.4
Date Sampled/Time Sampled	4-11-19
Cylinder Number	N/A
Cylinder Clean Date	N/A
Sampled By	Victor Urias
Analysis By	Pat Silvas
Verified/Calibrated Date	4-15-19
Report Date	2019-04-16 14:03:56

Component Results

Component Name	Ret. Time	Peak Area	Norm%	GPM (Dry) (Gal. / 1000 cu.ft.)	
Nitrogen	22.960	21911.2	1.6270	0.000	
H2S	0.000	0.0	0.0000	0.000	
Methane	23.740	732471.0	71.9846	0.000	
Carbon Dioxide	27.640	44300.2	2.8176	0.000	
Ethane	36.960	211191.6	12.5633	3.354	
Propane	77.160	149546.1	6.7228	1.849	
i-Butane	29.820	71692.4	0.8789	0.287	
n-Butane	32.080	168721.6	2.0529	0.646	
i-Pentane	39.180	40565.8	0.4290	0.157	
n-Pentane	41.980	44912.8	0.4623	0.167	
C6's	50.750	26514.0	0.2401	0.099	
C7's	67.000	19009.0	0.1657	0.076	
C8's	84.000	5233.0	0.0486	0.025	
C9's	102.000	1531.0	0.0051	0.003	
C10 Plus	146.000	557.0	0.0021	0.001	
Total:			100.0000	6.664	

Results Summary

Result	Dry	Sat. (Base)	
Total Raw Mole% (Dry)	100.9186		
Pressure Base (psia)	14.650		
Temperature Base	60.00		
Gross Heating Value (BTU / Ideal cu.ft.)	1269.9	1247.7	
Gross Heating Value (BTU / Real cu.ft.)	1275.0	1253.2	
Relative Density (G), Ideal	0.7862	0.7833	
Relative Density (G), Real	0.7891	0.7865	
Compressibility (Z) Factor	0.9960	0.9955	

Corrosion Prevention Plan

Existing Corrosion Prevention Plan

- Produced gas is processed through a gas dehydration unit to remove water.
- Corrosion inhibitor is added to the system downstream of the gas dehydration unit.
- Fluid samples are taken regularly and checked for Fe, Mn, and residual corrosion inhibitor in produced fluids.
- Continuously monitor and adjust the chemical treatment over the life of the well.

Oxy will continue the existing corrosion prevention plan in place for the gas lift system due to the similar nature of gas storage operations.

- Fluid samples will be taken prior to injection to establish a baseline for analysis.
- After a storage event, fluid samples will be taken to check for Fe, Mn, and residual corrosion inhibitor in the produced fluids.
- Continuously monitor and adjust the chemical treatment over the life of the project.

NM GAS STORAGE OPERATIONAL PLAN

Operational Plan

WELLSITE CLGC

Oxy USA Inc. (Oxy) will monitor the following items on each Closed Loop Gas Capture (CLGC) well via SCADA system:

- Injection flow rate and volume
  - Instantaneous Rate
  - Total Injected by Day (volume)
- Tubing Pressure
- Casing Pressure
- Bradenhead Pressures
- Safety devices
  - Pressure kills have an automated kill sequence that is initiated by SCADA system readings.
  - Injection pressure kills on production stream for injection
  - Relief Valves for both production and gas storage/injection streams to prevent overpressure (not monitored via SCADA other than pressure trend)
  - Control of injection rate and pressures via control valve at each well injection stream
  - Control of production stream via automated choke valves to ensure controlled production and prevent over pressurization of flowline

CENTRAL TANK BATTERY (CTB)

Oxy will monitor the following items at each CTB via SCADA system:

- Production Rates
  - Oil
  - Gas
  - Water
- Safety devices
  - Flares at CTBs
  - Injection pressure kills on production/gas storage stream for injection
  - Emergency Shutdown (ESD) of wells that are local and remote for automatic shut downs to safe the system
  - Control of injection rate and pressures via control valve at each well injection stream

CENTRAL GAS LIFT (CGL) COMPRESSOR(S)

Oxy will monitor the following items on each Central Gas Lift (CGL) Compressor Station via SCADA system:

- Safety devices
  - Discharge/injection pressure kills of each compressor and for the station
  - Relief Valves on 3rd stage of compressors, to prevent over pressurization (not monitored via SCADA other than pressure trend)
  - Station recycle valves (that recycle discharge pressure back to suction) if the pressure is getting too high for the compressor or station. (not all control valves are capable of

remote monitoring of valve position; but still monitored in some sense of the pressure trend for the station)

SUPERVISORY CONTROL AND DATA ACQUISTION (SCADA)

Oxy SCADA system consists of PLCs at each CTB, Wellsite, and Central Gas Lift compressor or station.

- The Programmable Logic Controller (PLCs) will take action immediately (within seconds or minutes) as programmed to automatically safe the system as required; for the system and certain device shut down(s).
- The High Alarms and High-High Alarms will be logged and registered in the SCADA system. Also the call center will take the High Alarm and make the physical phone call notification to the production techs to acknowledge the alarm & take action.

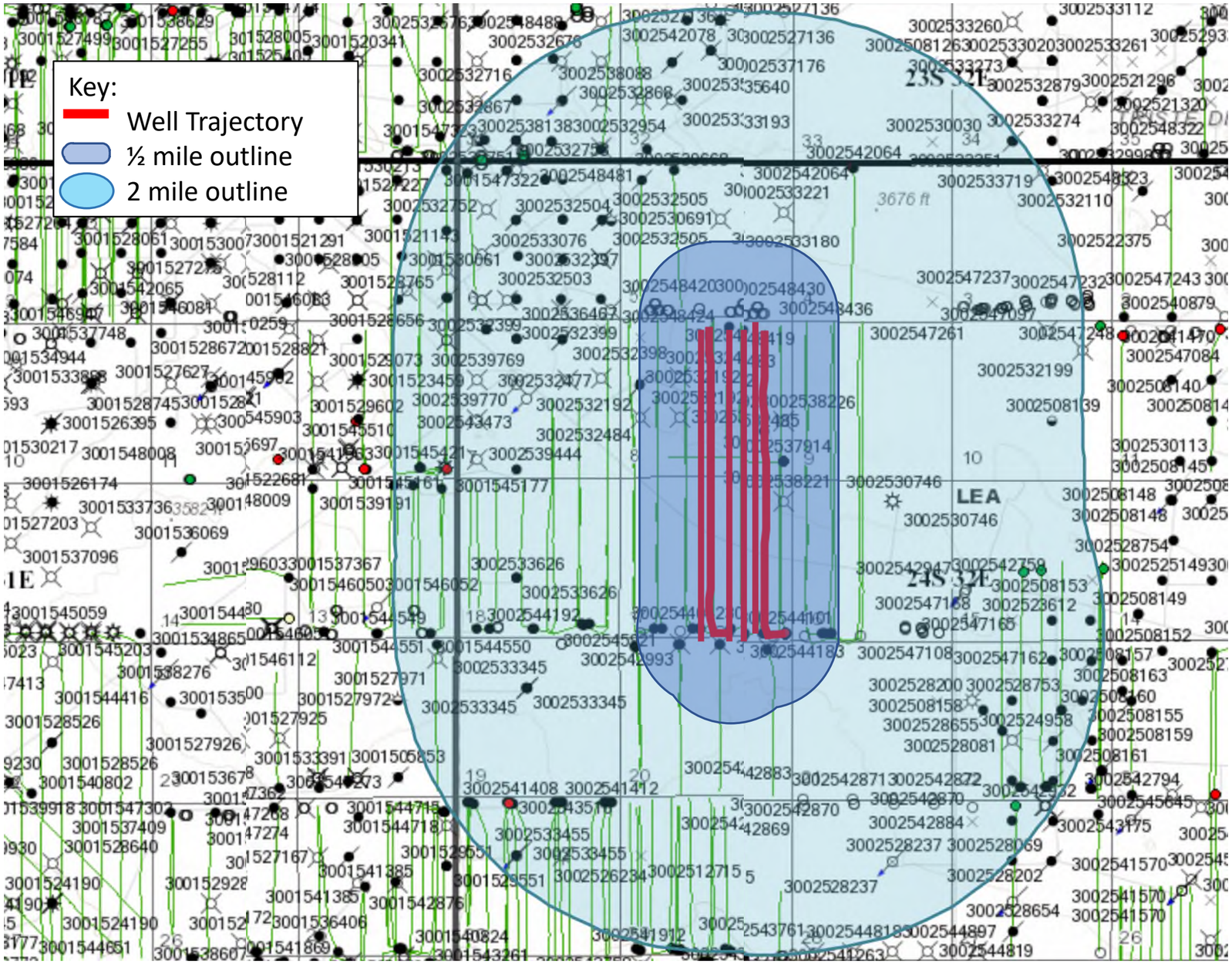
ENVIRONMENTAL/SPILL RESPONSE

Oxy will report and track any spill recordable or non-recordable via our CDR system

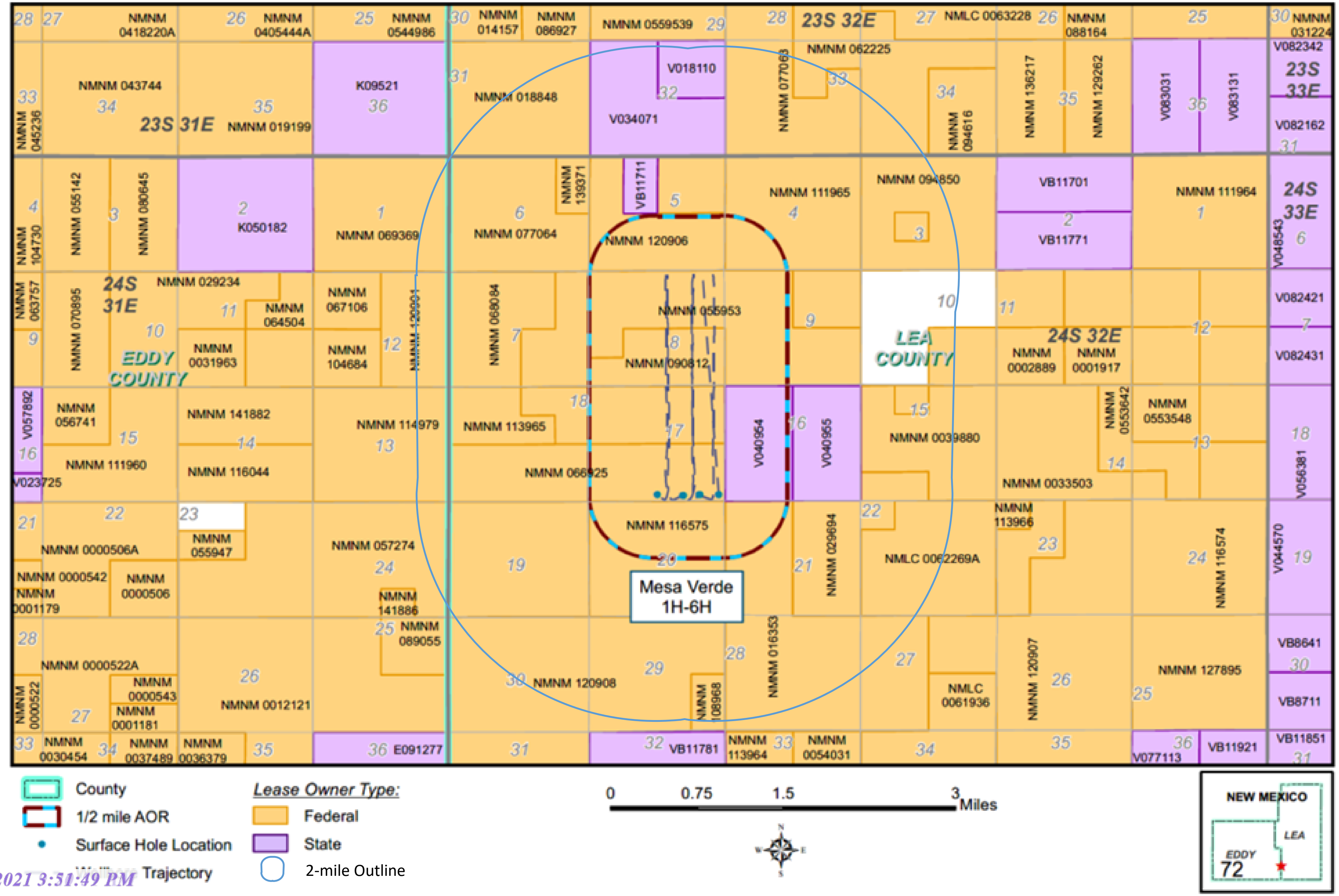
- Any spill or gas release will be reported by operations calling in to our Call Center to make the report of spill/release. The fluid type and release amount will be disclosed along with location details; and if it's a recordable or non-recordable spill.
- Liquids will be contained and isolated and vacuum trucks will be called in to recover the liquid and will also report the amount of liquid recovered on the same CDR spill form.
    - Additional reclamation will be coordinated to ensure proper recovery of contaminated soil and liquid.

Area of Review

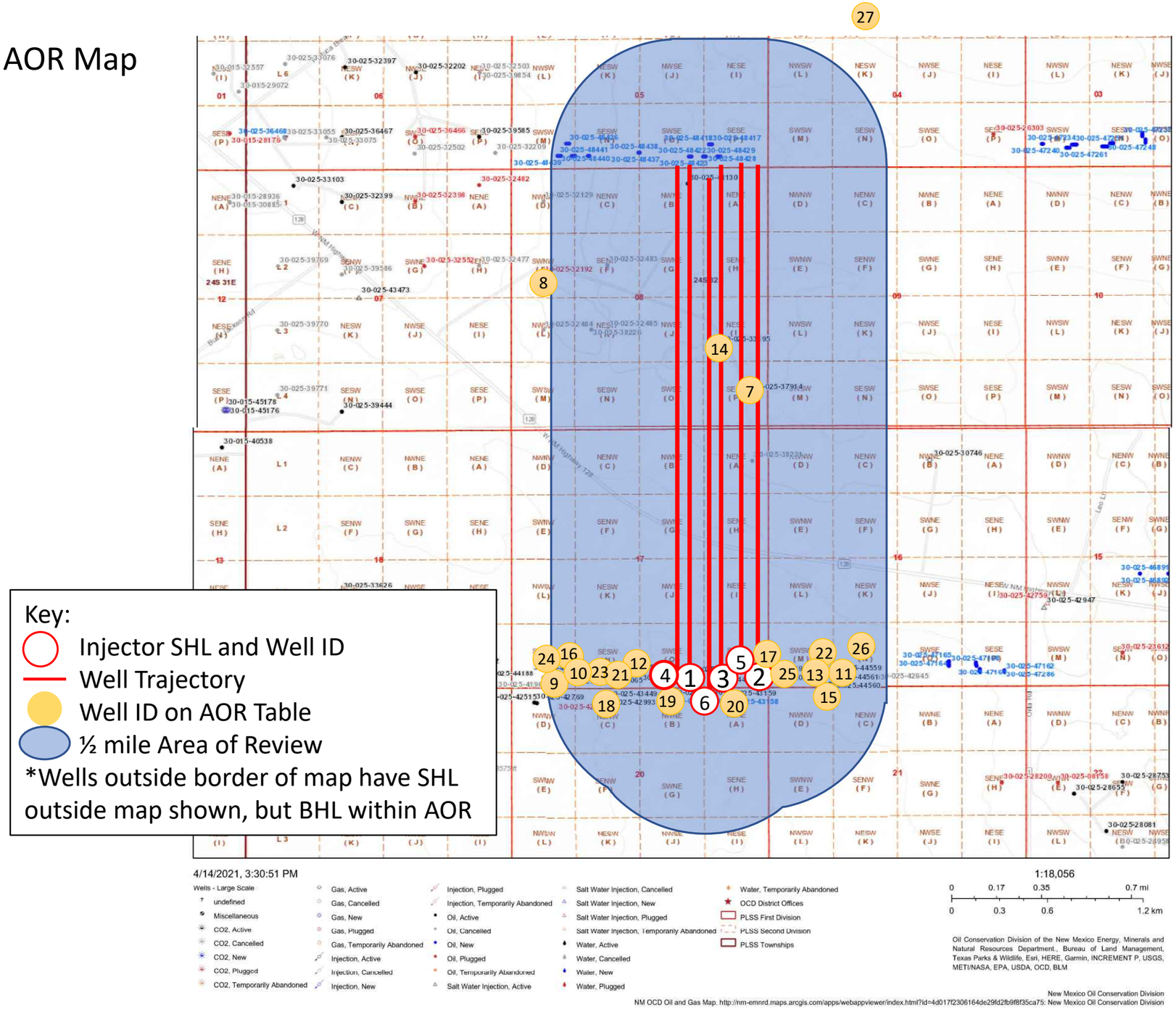
Mesa Verde 2 Mile Map



MESA VERDE
NEW MEXICO



Mesa Verde AOR Map



Mesa Verde AOR Table

Well ID	API NUMBER	Current Operator	LEASE NAME	WELL NUMBER	Well Type:	Status:	Footages N/S	N/S	Footages E/W	E/W	Surface Location Unit	Surface Location Section	Surface Location TShip	Surface Location Range	Spud [date]	True Vertical Depth [ft]	Measured Depth [ft]	HOLE SIZE [in]	CSG SIZE [in]	SET AT	SX CMT	CMT TO [ft]	HOW MEASURED	Current Completion [ft]	Comment	Current Producing Pool
1	30-025-44183	OXY USA INC	MESA VERDE BONE SPRING UNIT	003H	Oil	Active	240	S	1644	E	O	17	24S	32E	2/5/2018	9125	19320	17.5	13.375	954	1220	Surf	Circ	9253-19155		[96229] MESA VERDE; BONE SPRING
																		9.875	7.625	8600	2399	Surf	Circ			
																		6.75	5.500	19305	826	5630	CBL			
2	30-025-44101	OXY USA INC	MESA VERDE BONE SPRING UNIT	001H	Oil	Active	271	S	245	E	P	17	24S	32E	12/27/2017	9291	19366	17.5	13.375	918	1264	Surf	Circ	9451-19251	well is side tracked. Whipstock at 7013' in 9.625" casing.	[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	11062	5905	1985	TS			
																		8.500	5.500	19350	2621	6250	CBL			
3	30-025-44196	OXY USA INC	MESA VERDE BONE SPRING UNIT	002H	Oil	Active	240	S	1614	E	O	17	24S	32E	2/3/2018	11861	22095	17.5	13.375	938	1202	Surf	Circ	12165-21916		[96229] MESA VERDE; BONE SPRING
																		9.875	7.625	11092	2624	Surf	Circ			
																		6.75	5.500	22082	846	10650	CBL			
4	30-025-44042	OXY USA INC	MESA VERDE BONE SPRING UNIT	006H	Oil	Active	280	S	2624	E	O	17	24S	32E	1/6/2018	10411	20454	17.5	13.375	939	1240	Surf	Circ	10739-20223		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4735	1300	Surf	Circ			
																		8.500	5.500	20444	2970	1476	CBL			
5	30-025-44064	OXY USA INC	MESA VERDE BONE SPRING UNIT	004H	Oil	Active	280	S	965	E	P	17	24S	32E	1/25/2018	10447	20545	17.500	13.375	952	1712	Surf	Circ	10483-20385		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4735	2060	Surf	Echometer			
																		8.500	5.500	20532	3050	4738	CBL			
6	30-025-44185	OXY USA INC	MESA VERDE BONE SPRING UNIT	005H	Oil	Active	280	S	995	E	P	17	24S	32E	1/29/2018	10449	20505	17.500	13.375	974	1245	Surf	Circ	10441-20343		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4694	1290	Surf	Circ			
																		8.500	5.500	20290	2895	8252	CBL			
7	30-025-37914	OXY USA INC	MESA VERDE 8 FEDERAL	002H	Oil	Active	660	S	330	E	P	8	24S	32E	8/1/2006	9764	12900	17.500	13.375	850	745	Surf	Circ	10152-12710		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4600	2200	Surf	Circ			
																		8.5 & 7.875	5.5	12900	1350	7290	CBL			
8	30-025-32192	EOG RESOURCES INC	JACK TANK 8 FEDERAL	002	Oil	PA	2180	N	660	W	E	8	24S	32E	9/10/1993	15460	15460	26	20.000	598	932	Surf	Circ	NA		NA
																		17.5	13.375	4521	4500	Surf	Circ			
																		12.25	9.625	12108	3625	4500	TS			
																		8.5	7	11768-14950	750	11768	Circ			
																		6	4.5	14656-15452	200	14656	Circ			
9	30-025-44194	OXY USA INC	MESA VERDE BONE SPRING UNIT	009H	Oil	Active	280	S	1116	W	M	17	24S	32E	1/22/2018	10392	20504	17.5	13.375	952	1230	Surf	Circ	10400-20277		[96229] MESA VERDE; BONE SPRING
																		12.25	9.625	4717	1430	Surf	Circ			
																		8.5	5.5	20489	3048	50	Echometer			
10	30-025-44184	OXY USA INC	MESA VERDE BONE SPRING UNIT	008H	Oil	Active	280	S	1146	W	M	17	24S	32E	1/20/2018	10403	20430	17.5	13.375	957	1235	Surf	Circ	10400-20277		[96229] MESA VERDE; BONE SPRING
																		12.25	9.625	4728	1430	Surf	Circ			
																		8.5	5.5	20415	2970	1330	Echometer			
11	30-025-44561	OXY USA INC	MESA VERDE BONE SPRING UNIT	024H	Oil	Active	250	S	1225	W	M	16	24S	32E	6/10/2018	10426	20812	17.5	13.375	970	1254	Surf	Circ	10338-20691		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4725	1430	900	TS			
																		8.500	5.500	20810	3095	315	Echometer			
12	30-025-44065	OXY USA INC	MESA VERDE BONE SPRING UNIT	007H	Oil	Active	280	S	2626	W	N	17	24S	32E	1/3/2018	10429	20541	17.5	13.375	935	1240	Surf	Circ	10619-20370		[96229] MESA VERDE; BONE SPRING
																		12.250	9.625	4742	1300	Surf	Circ			
																		8.500	5.500	20531	2965	12	Echometer			
13	30-025-44559	OXY USA INC	MESA VERDE BONE SPRING UNIT	022H	Oil	Active	250	S	1285	W	M	16	24S	32E	6/6/2018	10522	20815	17.5	13.375	964	1254	Surf	Circ	10565-20668		[96229] MESA VERDE; BONE SPRING
																		12.25	9.625	4721	1565	Surf	Circ			
																		8.5	5.500	20806	2980	1547	Echometer			
14	30-025-33195	OXY USA INC	NAFTA 8 FEDERAL	001	Oil	PA	1650	S	990	E	I	8	24S	32E	4/16/1997	10000	10000	17.5	13.375	650	725	Surf	Circ	NA		NA
																		11	8.625	4580	1470	Surf	Circ			
																		7.875	5.500	10000	1340	6436	Calc			
15	30-025-44560	OXY USA INC	MESA VERDE BONE SPRING UNIT	023H	Oil	Active	250	S	1255	W	M	16	24S	32E	6/8/2018	10812	21115	17.5	13.375	970	1254	Surf	Circ	10648-21001		[96229] MESA VERDE; BONE SPRING
																		12.25	9.625	4741	1705	Surf	Circ			
																		8.5	5.500	21114	2965	330	Echometer			
16	30-025-45921	OXY USA INC	MESA VERDE WOLFCAMP UNIT	008H	Oil	Active	280	S	1386	W	N	17	24S	32E	5/26/2019	12016	22337	14.75	10.750	950	970	Surf	Circ	12137-22239		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11445	1220	Surf	Circ			
																		6.75	5.500	22327	780	10940	Calc			
17	30-025-44195	OXY USA INC	MESA VERDE WOLFCAMP UNIT	001H	Oil	Active	241	S	245	E	P	17	24S	32E	12/30/2017	12054	22281	17.5	13.375	922	1190	Surf	Circ	12240-22116		[98252] MESA VERDE; WOLFCAMP
																		12.250	9.625	10933	3620	Surf	Circ			
																		8.500	5.500	10764-22271	2193	10764	Circ			
18	30-025-43449	DEVON ENERGY PRODUCTION COMPANY, LP	REBEL 20 FEDERAL	006Y	Oil	Active	250	N	1970	W	C	20	24S	32E	1/17/2018	10411	15347	17.5	13.375	920	1205	Surf	Circ	10656-14961		[96556] COTTON DRAW; BONE SPRING, EAST
																		12.25	9.625	4608	1705	Surf	Circ			
																		8.5	5.500	15102	1560	2600	CBL			
19	30-025-42996	DEVON ENERGY PRODUCTION COMPANY, LP	REBEL 20 FEDERAL	007H	Oil	Active	230	N	1980	E	B	20	24S	32E	5/15/2017	10799	15529	17.5	13.375	911	1040	Surf	Circ	10982-15328		[96556] COTTON DRAW; BONE SPRING, EAST
																		12.25	9.625	4623	1510	Surf	Circ			
																		8.75 & 8.5	5.500	15529	1715	3350	CBL			
20	30-025-43159	DEVON ENERGY PRODUCTION COMPANY, LP	REBEL 20 FEDERAL	008H	Oil	Active	250	N	870	E	A	20	24S	32E	6/9/2017	10787	15630	17.500	13.375	913	960	Surf	Circ	8536-15496		[96556] COTTON DRAW; BONE SPRING, EAST
																		12.250	9.625	4623	2060	Surf	Circ			
																		8.75 & 8.5	5.500	15630	1380	390	CBL			
21	30-025-45863	OXY USA INC	MESA VERDE WOLFCAMP UNIT	006H	Oil	Active	280	S	2401	W	N	17	24S	32E	5/16/2019	12067	22341	14.750	10.750	942	908	Surf	Circ	12157-22218		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11278	1655	Surf	Circ			
																		6.750	5.500	22279	887	10775	Calc			
22	30-025-46111	OXY USA INC	MESA VERDE WOLFCAMP UNIT	003H	Oil	Active	250	S	1000	W	M	16	24S	32E	11/29/2019	12087	22371	14.75	10.750	890	975	Surf	Circ	12270-22288		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11420	2824	Surf	Circ			
																		6.75	5.500	22351	842	Surf	Calc			
23	30-025-45862	OXY USA INC	MESA VERDE WOLFCAMP UNIT	005H	Oil	Active	280	S	2436	W	N	17	24S	32E	5/18/2019	12211	22505	14.75	10.750	942	908	Surf	Circ	12327-22387		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11567	3988	Surf	Circ			
																		6.750	5.500	22445	840	11050	Calc			
24	30-025-45920	OXY USA INC	MESA VERDE WOLFCAMP UNIT	007H	Oil	Active	280	S	1421	W	N	17	24S	32E	5/25/2019	12211	22458	14.75	10.750	934	970	Surf	Circ	12047-22108		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11461	1530	Surf	Circ			
																		6.750	5.500	22433	805	10960	Calc			
25	30-025-46112	OXY USA INC	MESA VERDE WOLFCAMP UNIT	004H	Oil	Active	250	S	965	W	M	16	24S	32E	8/31/2020	12225	22563	14.75	10.750	941	975	Surf	Circ	12668-22488		[98252] MESA VERDE; WOLFCAMP
																		9.875	7.625	11600	2745	75	Calc			
																		6.75	5.5	22534	834	9269	Calc			
26	30-025-46110	OXY USA INC	MESA VERDE WOLFCAMP UNIT	002H	Oil	Active	250	S	1035	W	M	16	24S	32E	11/25/2019	12280	22607	14.75	10.750	959	975	Surf	Circ	12395-22413		[98252] MESA VERDE; WOLFCAMP

Mesa Verde AOR Table

															9.875	7.625	11725	3015	190	Calc					
															6.75	5.500	22585	855	5618	Calc					
27	30-025-42064	COG OPERATING LLC	MASTIFF FEDERAL	003H	Oil	Active	190	N	1980	W	C	4	24S	32E	9/6/2015	10652	15020	17.500	13.375	1263	1000	Surf	Circ	10757-14920	[96229] MESA VERDE; BONE SPRING
															12.250	9.625	4850	1580	Surf	Circ					
															8.750	5.500	15020	2215	2140	CBL					

Well ID #8 in AOR

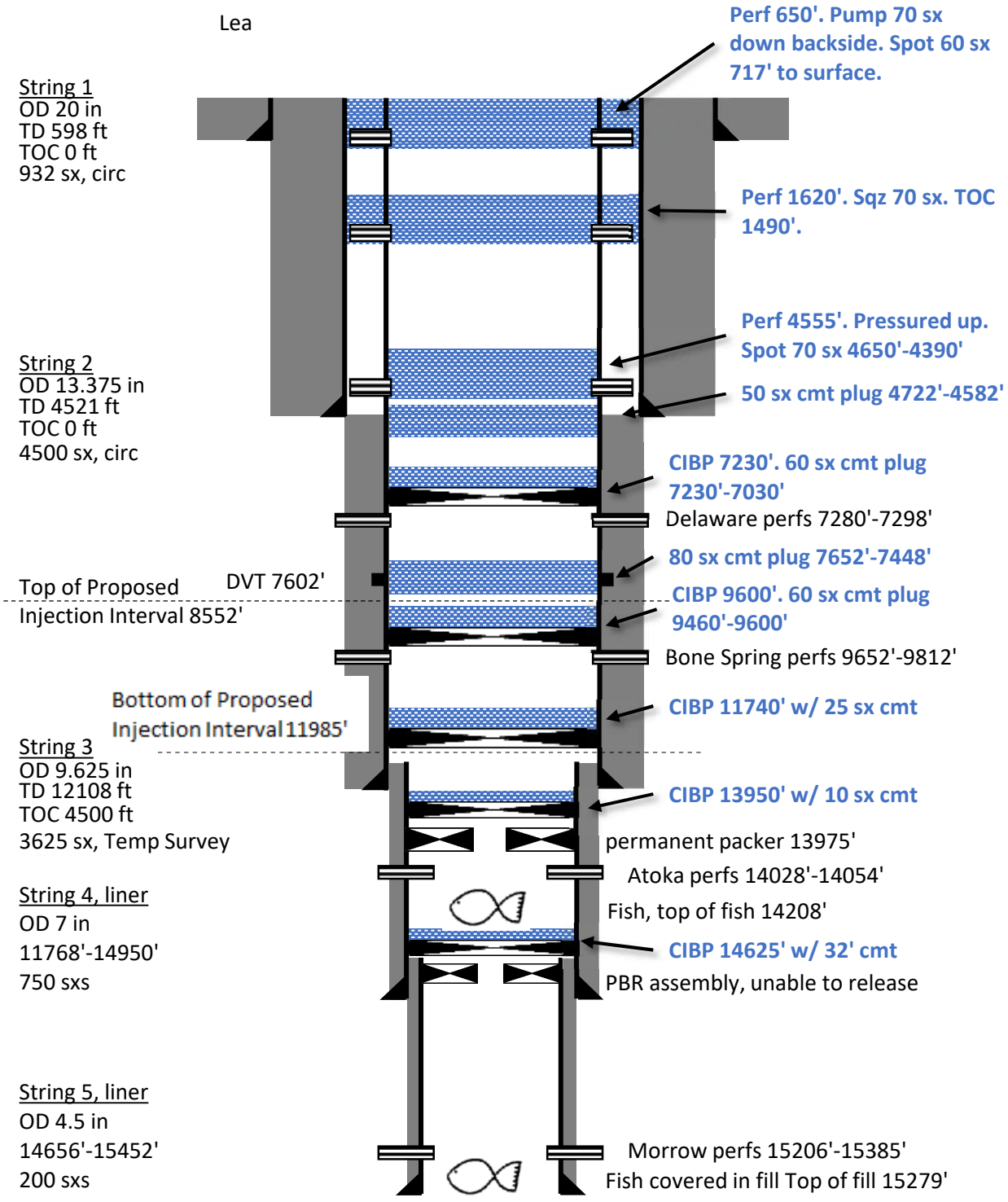
Current Wellbore

1/4/2021

Jack Tank 8 Federal #2

30-025-32192-0000

Lea



WELL ID #14 IN AOR

NAFTA 8 Federal 1

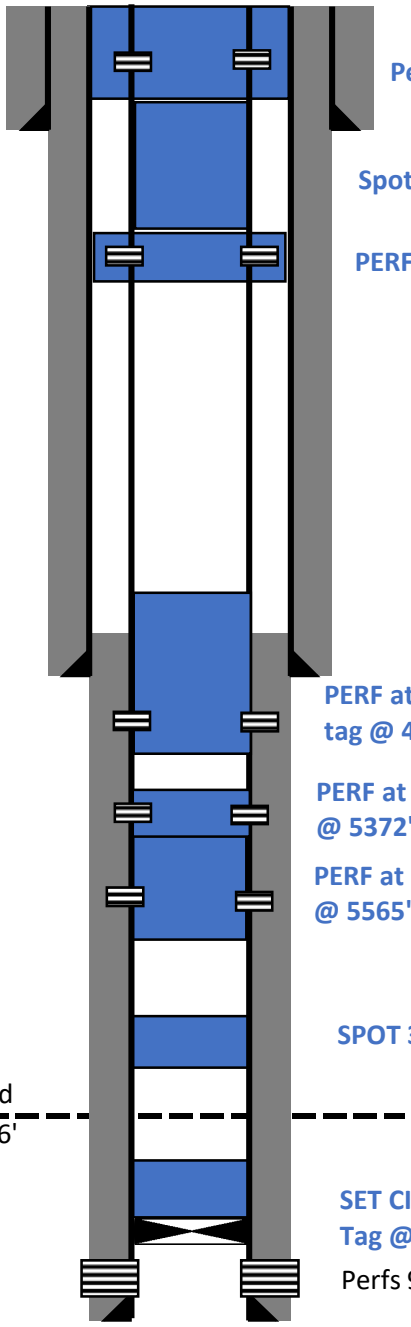
30-025-33195-0000

Lea

String 1
OD 13.375 in
TD 650 ft
TOC 0 ft, Circ

String 2
OD 8.625 in
TD 4578 ft
TOC 0 ft, Circ

String 3
OD 5.5 in
TD 10000 ft
TOC 13 ft , CBL
PBTD 10000 ft



Perf @ 316', spot 90 sx to surface

Spot 100 sx, tag @ 416'

PERF @ 1620', spot 45 sx, tag @ 1498'

PERF at 4762', Spot 120 sx cmt, tag @ 4187'

PERF at 5540', Spot 40 sx cmt, tag @ 5372'

PERF at 5640', Spot 55 sx cmt, tag @ 5565'

SPOT 35 SX CMT 6611-6956'.

Top of Proposed Inj Interval 8576'

SET CIBP @ 9630'. Dump 35 sx cmt. Tag @9296'.

Perfs 9680-9820' (Bone Spring)

Geology

Mesa Verde Type Log

Barriers protecting fresh water

- Rustler
- Salado Salt (~2,000ft thick)
- Castile Formation (~1,400ft thick)
  - > Low permeability anhydrite, gypsum, and calcite
- Delaware Mountain Group (~3,900ft thick)
  - > Low porosity/ low permeability sands

Bone Spring and Wolfcamp Reservoir Characteristics

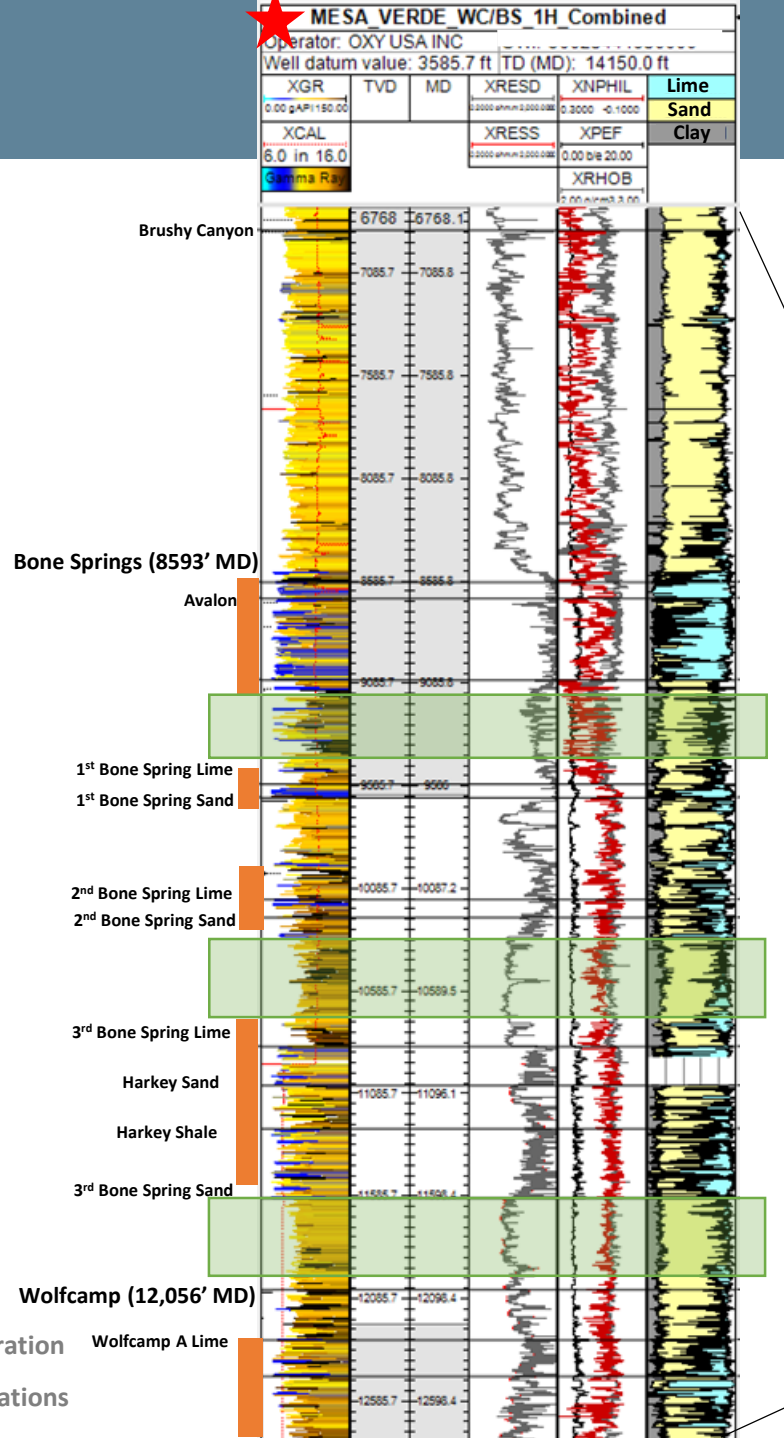
- Composed of large-scale cycles of alternating carbonate and siliclastic-dominated successions
- Siliclastic members are low stand turbidite channel, fans & distal sheets
  - > Very fine-grained sandstones and silts, mudstones, and shales
  - > Porosity 4-9% Permeability 400-800nD
  - > Authigenic clays are present
- Carbonate members are high stand submarine debris flows & sheets and act as internal barriers to flow between the different sandstone members

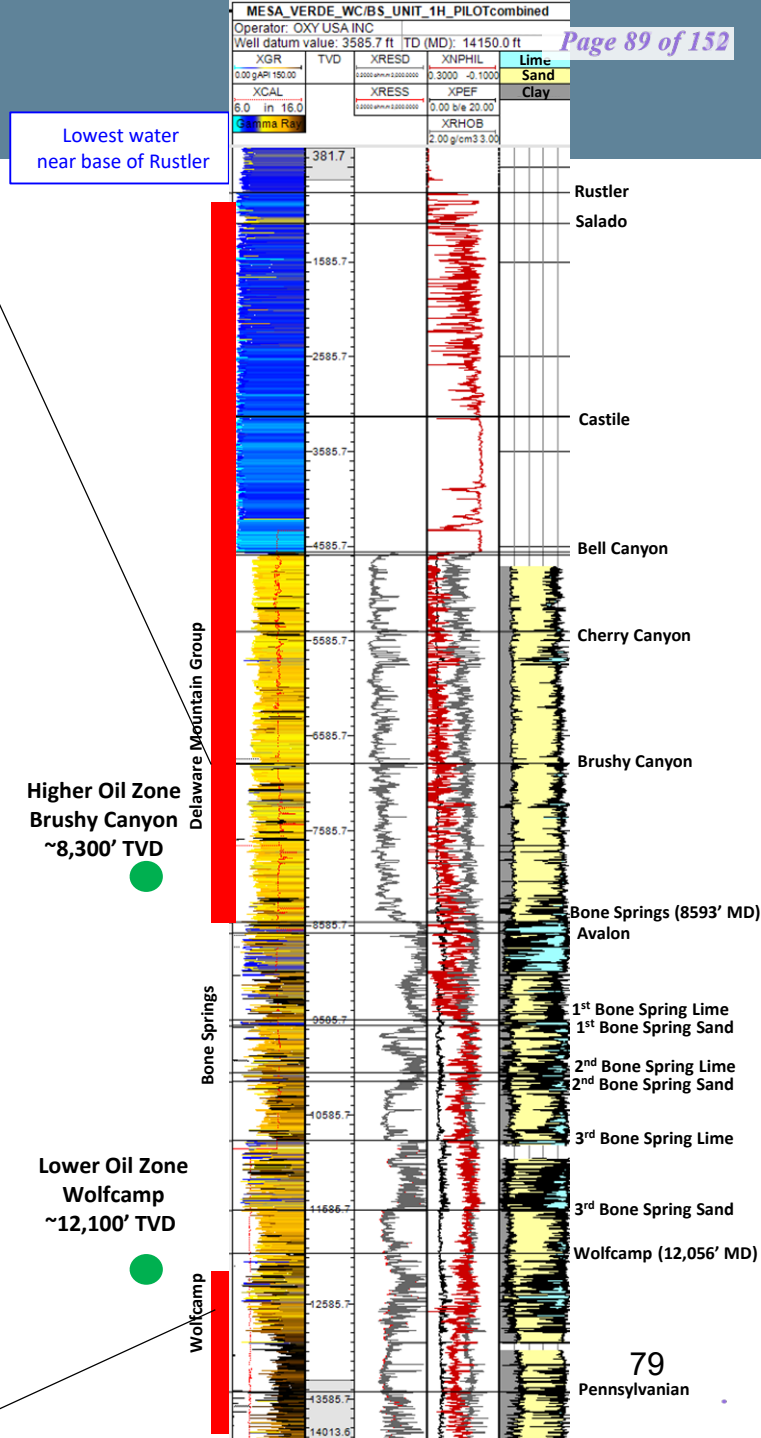
Immediate barriers to flow outside of Bone Spring/ Wolfcamp

- Low permeability & porosity limes and siltstones at the top of the Avalon
- Low permeability & porosity siltstones and shales of the lower Wolfcamp

Surrounding Production

- Delaware Mountain Group
  - > Brushy Canyon oil production: Deepest production ~8,300’ TVD
- Wolfcamp
  - > Oil production: Shallowest production ~12,100’ TVD



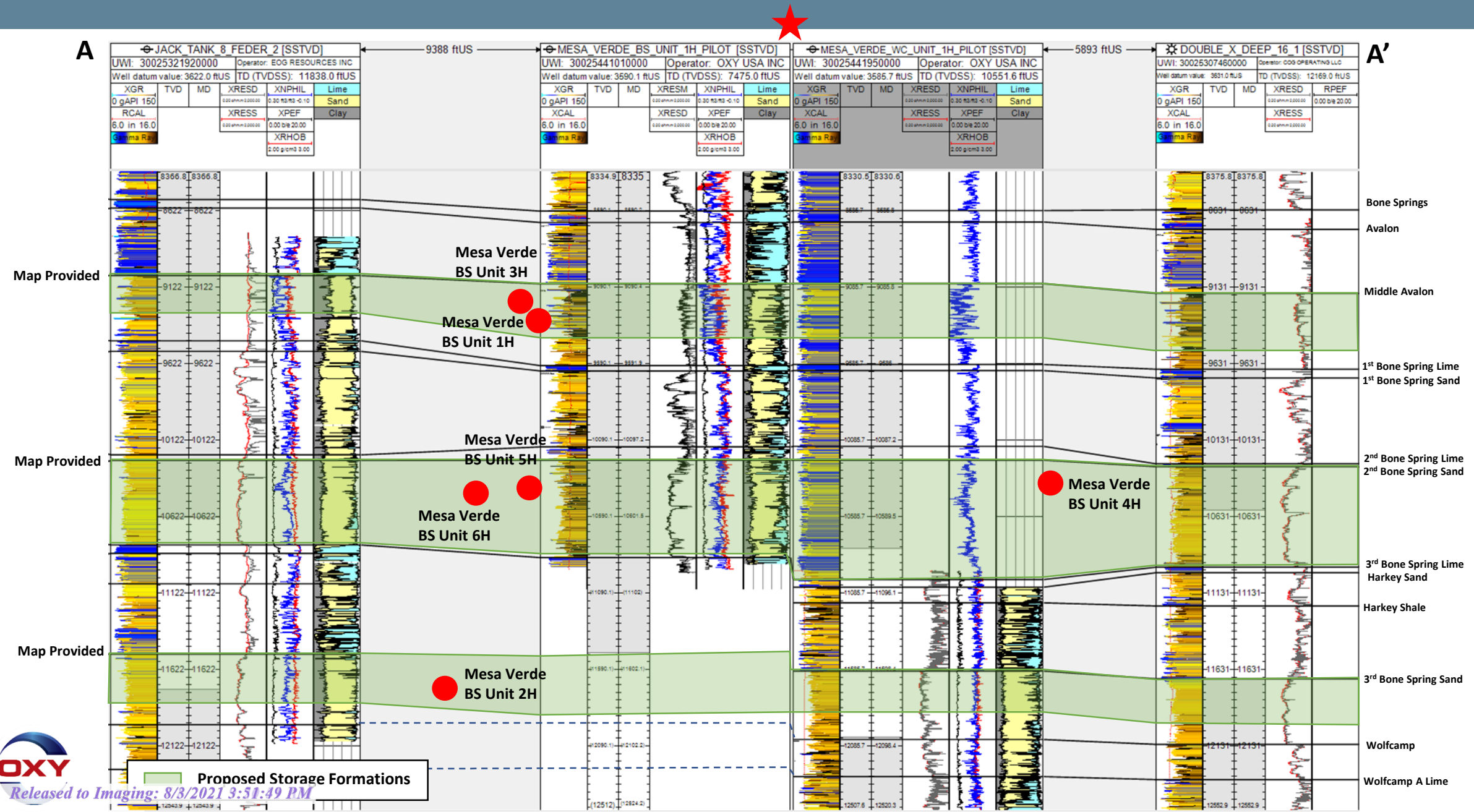


Barriers to migration from gas injected into the Bone Spring or Wolfcamp

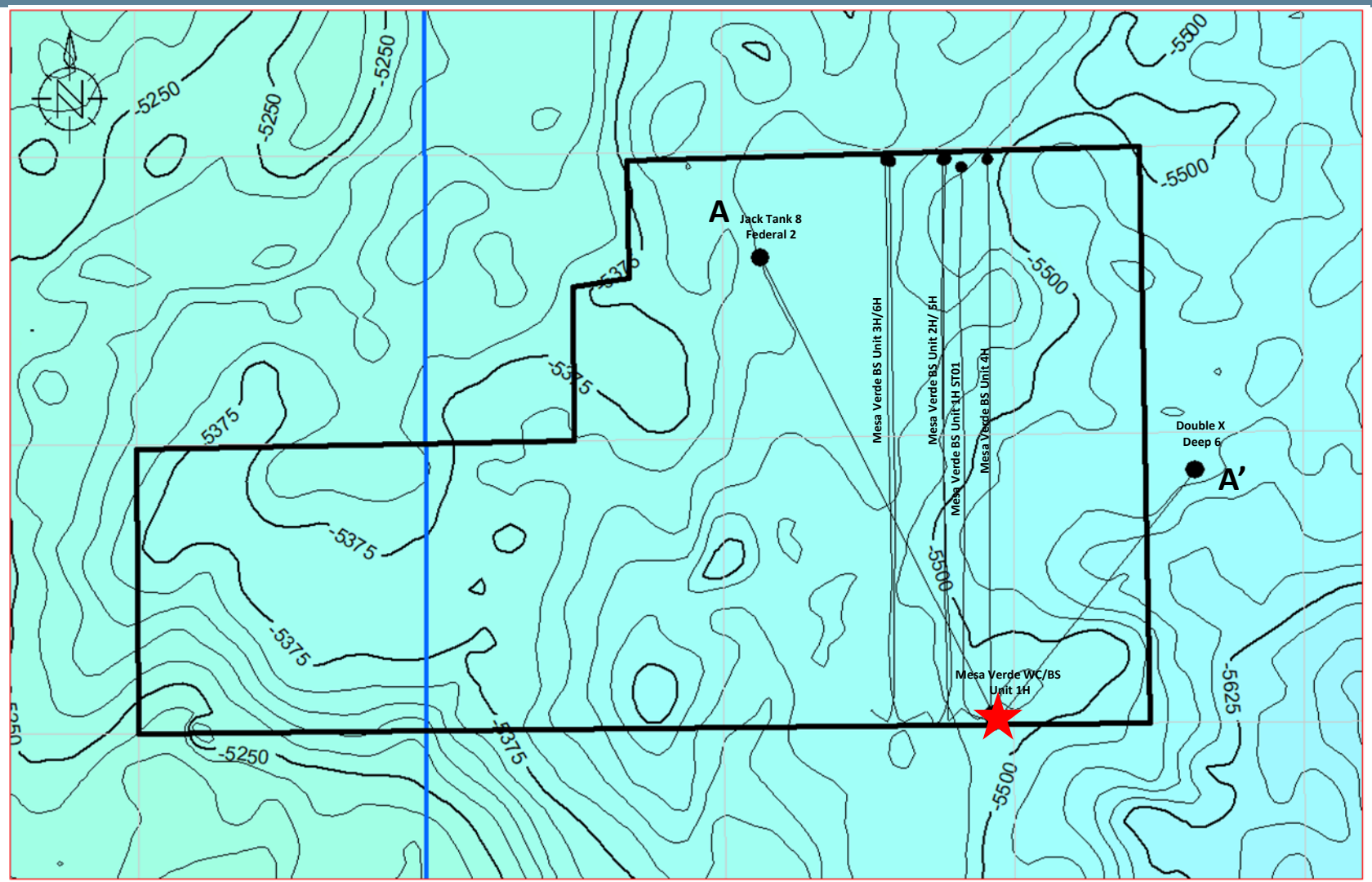
Internal barriers to migration

Proposed Storage Formations

Mesa Verde Cross-section



Mesa Verde Maps- Avalon



Middle Avalon Structure Map	
Scale 1:31627	User name wiechmam
Coordinate [illegible]	Date 05/10/2021

0 1000 2000 3000 4000 5000ftUS

1:31627

Elevation dept
-2250.00
-3000.00
-3750.00
-4500.00
-5250.00
-6000.00

Geologic Information for Wells injecting into the Avalon member of the Bone Spring Formation

Two wells will be injecting into the lower portion of the Avalon member of the Bone Spring Formation. The wells have an average TVD of approximately 9,400 ft. (actual depth varies across the field) with lateral lengths of approximately 10,000ft. The Avalon is a very fine-grained quartz-rich and brittle siltstone with alternating cycles of carbonate rich mudstones deposited by gravity flows. Core data and petrophysical analysis indicates a tight reservoir with an average porosity of 8.4% and an average permeability of 0.000340mD. The reservoir has a clay content of 20–26% including illite and smectite. Cements include Fe-calcite, Fe-dolomite, with some quartz overgrowths. Minor amounts of pyrite (<1%) are present.

Low-permeability barriers within the upper Avalon and the 1st Bone Spring Lime act as barriers directly above and below the reservoir. The upper Avalon consist of fine-grained siltstones, carbonate mudstone and dolomudstone that have very low vertical permeabilities and an average thickness of 450 ft. Underlying is the 1st Bone Spring Lime, a ~ 200ft thick carbonate rich interval that acts as a flow barrier. Laterally the injection will be primarily contained by the reservoir volume that has been previously and partially depleted by the adjacent producing wells. The tight low-permeability reservoir and the production from the adjacent wells will be the primary constraints on the conformance of the injection to the project area and are expected to contain the injected gas.

The top of the Bone Spring Formation is at approximately 8,400 ft. TVD, with over 500 ft. of interbedded carbonate mudstones and shales acting as permeability barriers to upward migration of injected gas. Overlying the Bone Springs is the Delaware Mountain Group, which consists of connate-water bearing and hydrocarbon-bearing low permeability and porosity sands, with minor limestone and shale intervals and is approximately 3,700 ft. thick. Above that is the Castile Formation consisting of very low permeability anhydrite, gypsum, and calcite that acts as another 1,500 ft. thick barrier to upward movement of fluids. The Salado overlies the Castile and forms a 1,000 ft. thick barrier of salt. The top of the Salado is at 1,050 ft. TVD (depending on location within the field) and the deep aquifers found just above the Salado at the base of the Rustler are saline water. The top of Rustler Formation is at approximately 730 ft. The Rustler top is a continuous anhydrite layer that acts as another permeability barrier creating a perched aquifer above it that is the lowest level where fresh water is known in the area, water wells drilled in the area typically have not reached this depth. Due to the thickness of multiple impermeable rock layers above the injection reservoir there is little possibility for migration upward into freshwater aquifers where they exist.

Locate freshwater wells within two miles:
An investigation of existing shallow water wells has not found any freshwater wells within a two mile radius of this injector.

Well List:
Mesa Verde BS Unit 3H
Mesa Verde BS Unit 1H

I hereby certify that the information presented above is true and correct to the best of my knowledge and belief.

Michele Wiechman

6/15/2021

Michele Wiechman, P.G
Geologist

Date

Geologic Information for Wells injecting into the 3rd Bone Spring Sand Member, Bone Spring Formation

One well will be injecting into the 3rd Bone Sandstone of the Bone Spring Formation. The well has an TVD of approximately 11,800 ft. with lateral length of 10,000 ft. The well injects into a reservoir composed of amalgamated sands with high contents of silty shales. Core and petrophysical analysis indicate a tight reservoir with average porosities of 7.5% and permeabilities of 0.003mD. The reservoir has a clay content of 10-20% including illite and smectite. Cements include Fe-calcite, Fe-dolomite, with some quartz overgrowths. Minor amounts of pyrite (≤1%) are present.

Low-permeability siltstones, carbonate mudstones, and dolomudstone barriers of the 3rd Bone Spring Lime and the deeper Wolfcamp shales act as flow barriers above and below the reservoir. Laterally the injection will be primarily contained by the reservoir volume that has been previously and partially depleted by the adjacent producing wells. The tight low-permeability reservoir and the production from the adjacent wells will be the primary constraints on the conformance of the injection to the project area and are expected to contain the low pressure injected gas.

The top of the Bone Spring Formation is at approximately 8,400 ft. TVD, with over 2,000 ft. of interbedded carbonate mudstones and shales acting as permeability barriers to upward migration of injected gas. Overlying the Bone Springs is the Delaware Mountain Group, which consists of connate-water bearing and hydrocarbon-bearing low permeability and porosity sands, with minor limestone and shale intervals and is approximately 3,700 ft. thick. Above that is the Castile Formation consisting of very low permeability anhydrite, gypsum, and calcite that acts as another 1,500 ft. thick barrier to upward movement of fluids. The Salado overlies the Castile and forms a 1,000 ft. thick barrier of salt. The top of the Salado is at 1,050 ft. TVD (depending on location within the field) and the deep aquifers found just above the Salado at the base of the Rustler are saline water. The top of Rustler Formation is at approximately 730 ft. The Rustler top is a continuous anhydrite layer that acts as another permeability barrier creating a perched aquifer above it that is the lowest level where fresh water is known in the area, water wells drilled in the area typically have not reached this depth. Due to the thickness of multiple impermeable rock layers above the injection reservoir there is little possibility for migration upward into freshwater aquifers where they exist.

Locate freshwater wells within two miles:
An investigation of existing shallow water wells has not found any freshwater wells within a two-mile radius of this injector.

Well List:
Mesa Verde BS Unit 2H

I hereby certify that the information presented above is true and correct to the best of my knowledge and belief.

Michele Wiechman

6/15/2021

Michele Wiechman, P.G
Geologist

Date

Geologic Information for Wells injecting into the 2nd Bone Spring Sand Member of the Bone Spring Formation

Three wells will be injecting into the 2nd Bone Spring Sandstone of the Bone Spring Formation. The wells have an average TVD of approximately 10,400 ft. with lateral lengths of approximately 10,000 ft. The wells inject into a reservoir composed of tight siltstone, laminated mudstone, and pelagic shales. Core data and petrophysical analysis indicates a tight reservoir with a 7% average porosity and an average permeability of 0.0016mD. The reservoir has a clay content of 20–26% including illite and smectite. Cements include Fe-calcite, Fe-dolomite, with some quartz overgrowths. Minor amounts of pyrite (<1%) are present.

Low-permeability carbonate mudstones and dolomudstone barriers of the 2nd Bone Spring Lime and 3rd Bone Spring Lime act as flow barriers directly above and below the reservoir. Laterally the injection will be primarily contained by the reservoir volume that has been previously and partially depleted by the adjacent producing wells. The tight low-permeability reservoir and the production from the adjacent wells will be the primary constraints on the conformance of the injection to the project area and are expected to contain the low pressure injected gas.

The top of the Bone Spring Formation is at approximately 8,400 ft. TVD, with over 2,000 ft. of interbedded carbonate mudstones and shales acting as permeability barriers to upward migration of injected gas. Overlying the Bone Springs is the Delaware Mountain Group, which consists of connate-water bearing and hydrocarbon-bearing low permeability and porosity sands, with minor limestone and shale intervals and is approximately 3,700 ft. thick. Above that is the Castile Formation consisting of very low permeability anhydrite, gypsum, and calcite that acts as another 1,500 ft. thick barrier to upward movement of fluids. The Salado overlies the Castile and forms a 1,000 ft. thick barrier of salt. The top of the Salado is at 1,050 ft. TVD (depending on location within the field) and the deep aquifers found just above the Salado at the base of the Rustler are saline water. The top of Rustler Formation is at approximately 730 ft. The Rustler top is a continuous anhydrite layer that acts as another permeability barrier creating a perched aquifer above it that is the lowest level where fresh water is known in the area, water wells drilled in the area typically have not reached this depth. Due to the thickness of multiple impermeable rock layers above the injection reservoir there is little possibility for migration upward into freshwater aquifers where they exist.

Locate freshwater wells within two miles:
An investigation of existing shallow water wells has not found any freshwater wells within a two-mile radius of this injector.

Well List:
Mesa Verde BS Unit 4H
Mesa Verde BS Unit 5H
Mesa Verde BS Unit 6H

I hereby certify that the information presented above is true and correct to the best of my knowledge and belief.

Michele Wiechman

Michele Wiechman, P.G
Geologist

10/15/2021

Date

Closed Loop Gas Capture (CLGC) Project

Affirmative Statement 1

The operator examined the available geologic and engineering data and found no evidence of open faults or other hydrologic connections between the disposal zone and any underground source of drinking water.

Michele Wiechman

Michele Wiechman, Geologist

6/10/2021

Date

Xueying Xie

Xueying Xie, Reservoir Engineer

6/10/2021

Date

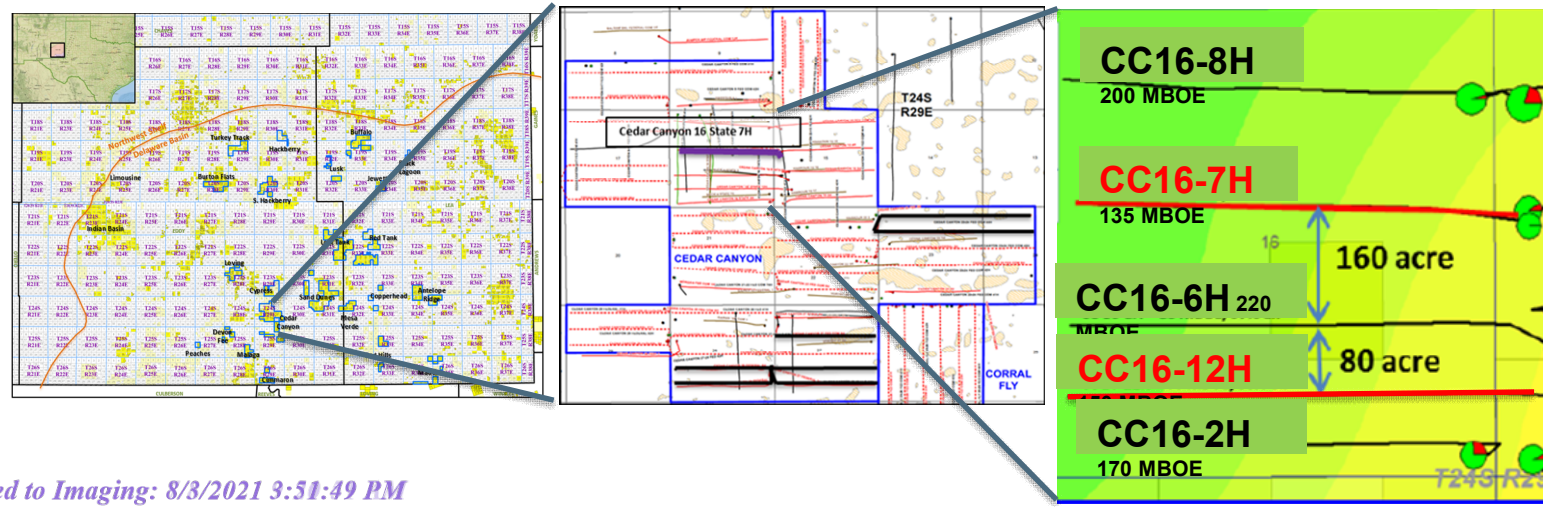
Reservoir Engineering

Project Overview - MV

- Closed loop gas capture project (CLGC) IN Oxy's NM assets
- Produced gas injection into productive formations in NM (Avalon, 2nd Bone Spring Sand, 3rd Bone Spring Sand)
- Gas injection into horizontal wells of 10,000 ft lateral length
- Purpose of Modeling
  - >Review potential effects on wells adjacent to the CLGC area
  - >Quantify movement of the injected gas
  - >Utilize data from Cedar Canyon Huff and Puff Projects

Model Set-up

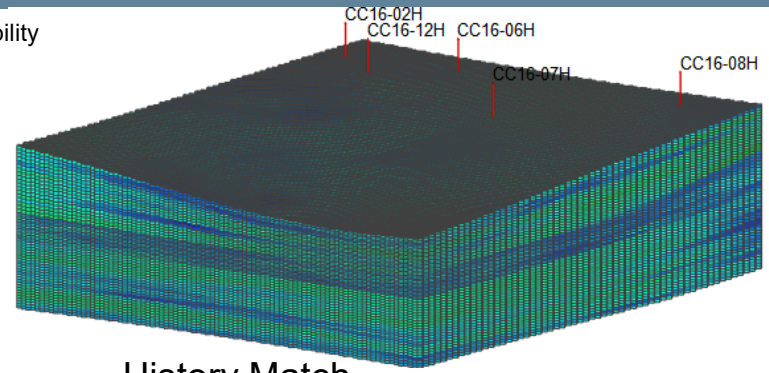
- Uses Cedar Canyon Sec 16 2nd BSS (as shown in layout below)
- Gas Injection pilot (EOR) was implemented in CC16-7H well in 2017
- Reservoir model is history matched for primary production and gas injection pilot
- Model is also tuned to capture injection gas breakthrough in offset wells that was observed during pilot period
- Gas injection pilot wells are 4 wells per section; model is adjusted to simulate the effect of closer wells (6 wps)



~~Cedar Canyon~~ Section-16 Reservoir Model

Location:	Lea County,NM
Model Acreage:	640
Pay Horizon:	2nd Bone Springs Sand
Lithology:	Sandstone interbedded with Limestone
Trap Type:	Stratigraphic
Nominal Depth:	8400 ft
Gas Cap (at discovery):	No
Primary Drive Mechanism:	Solution Gas Drive

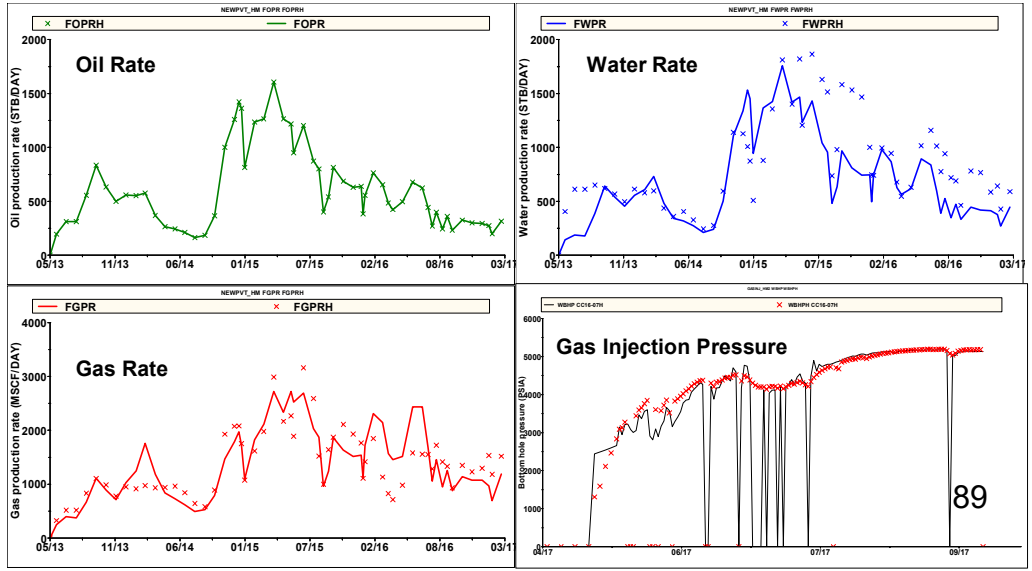
Structure & Permeability
1,177,400 Grids
56 Layers



Model Inputs

Gross Pay:	320 ft
Net Pay:	320 ft
Avg Porosity:	6.8%
Initial Sw:	50%
Permeability:	0.001md (matrix)
Initial Reservoir Pressure:	4500 psi
Reservoir Temperature:	150 F
Oil Gravity:	42 API
Boi:	1.63 RB/STB
Rsi:	1480 SCF/STB
Original Oil in Place:	28 MMSTB

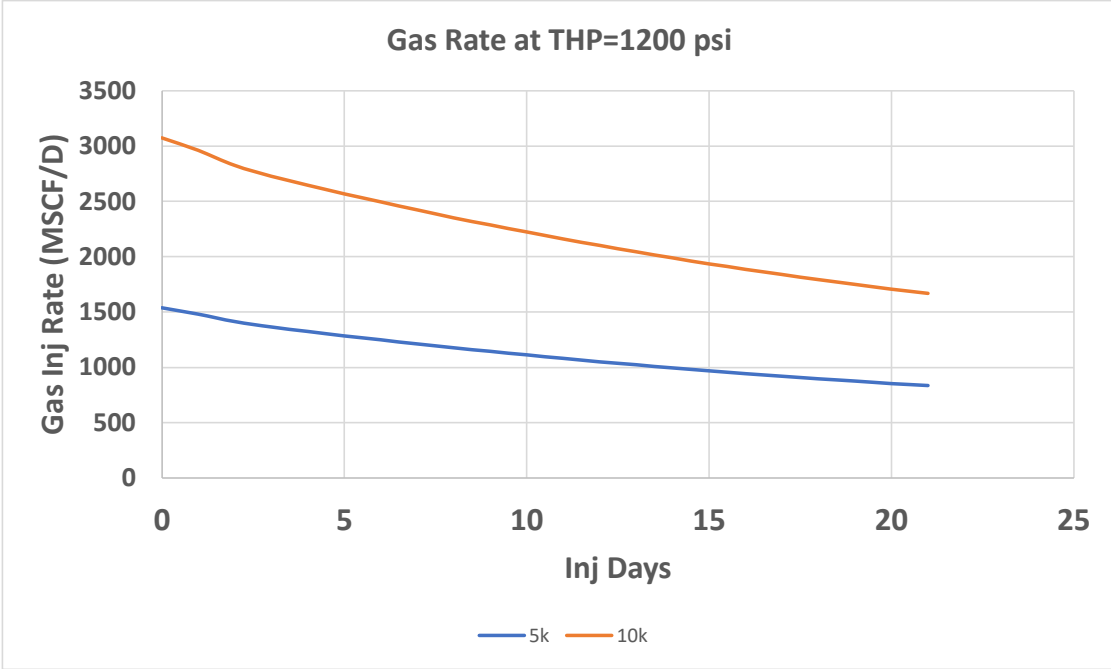
History Match



Gas Storage Simulation Process

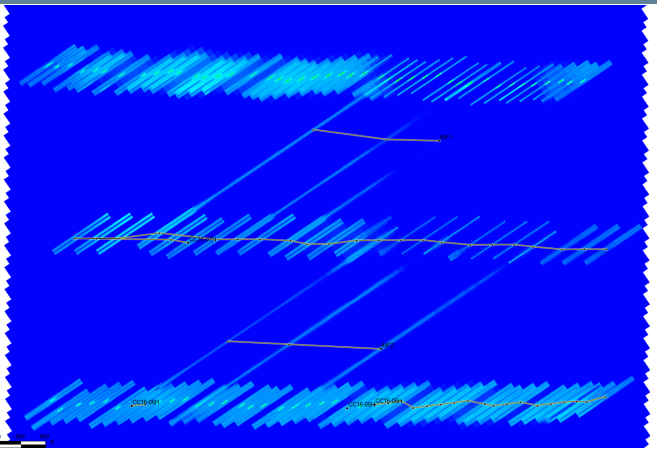
- Run primary production for all wells for additional period (post history match) – Base Case
- Inject gas in injection well at 2MMSCFPD for 7 days
- Produce the injection well post injection – Injection Case
- Observe the effect on oil, gas rate/recovery in injection well and offset wells by comparing Base and Injection cases

Gas injection rates

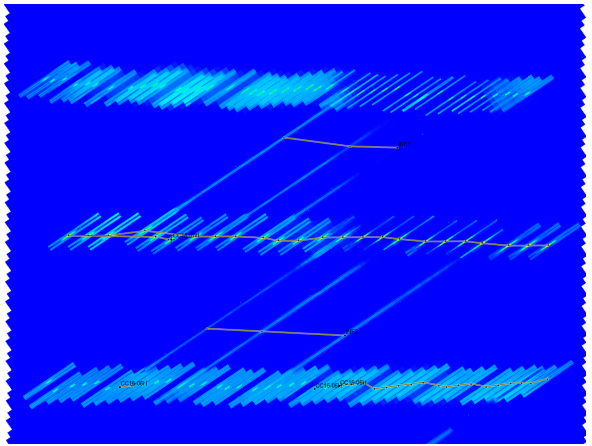


For a 10k well, 3 MMSCFPD is the max injection rate at THP of 1200 psi. Injection rate declines to about 50% of its initial value in 3 weeks. For long injection case a flat injection rate of 3MMSCFPD for 3 weeks is used as worst-case scenario.

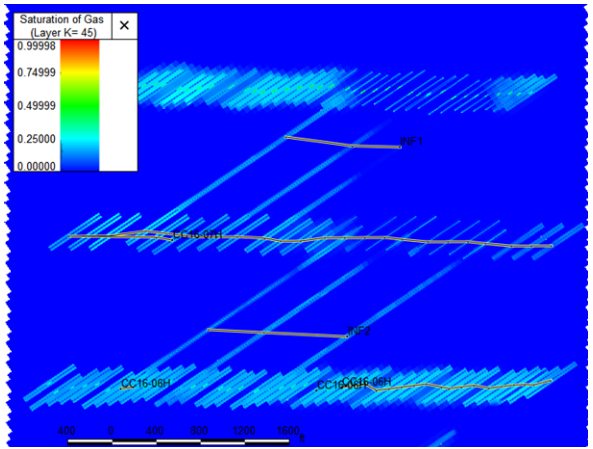
Gas Injection Profile



Before injection



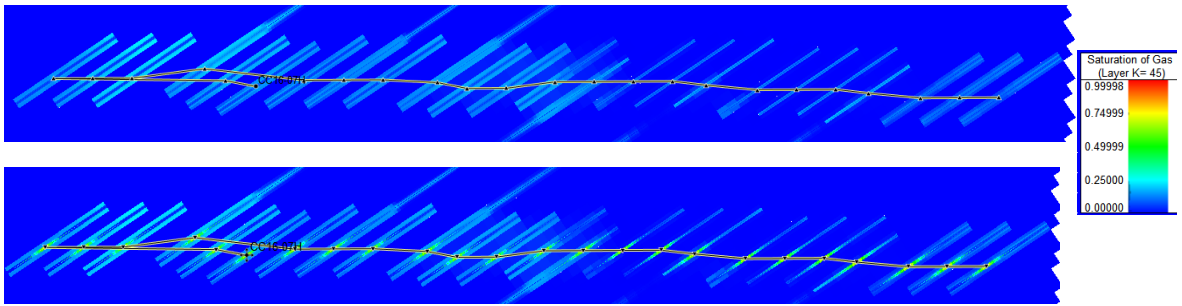
After 1 week of injection (3 MMSCFPD)



After 16 months production

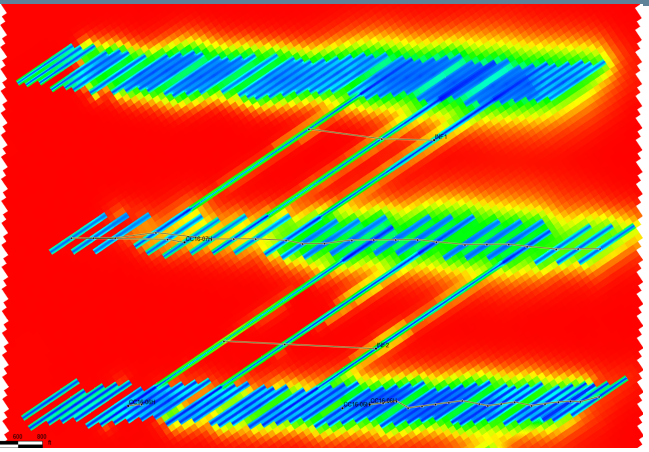
Before Injection CC16-7H Blow-up

After Injection CC16-7H Blow-up

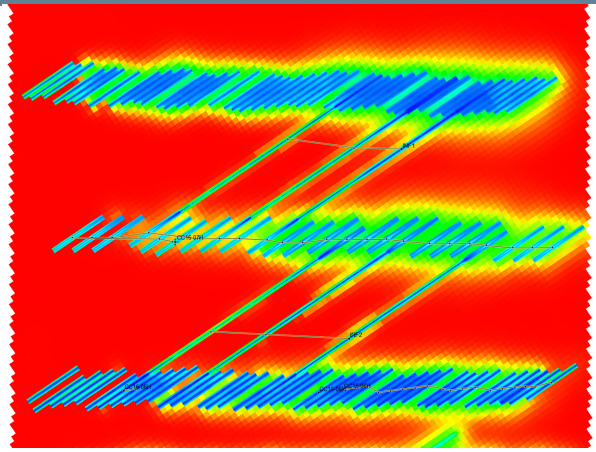


- Gas is stored within fractures.
- All injection cases indicate horizontal gas movement of 100 ft or less into the fractures.

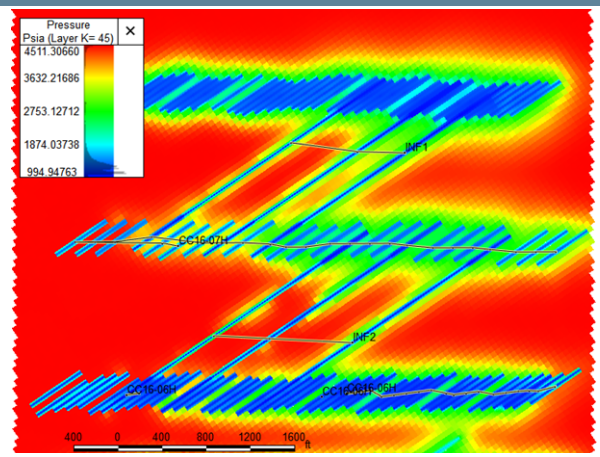
Pressure Profile



Before injection

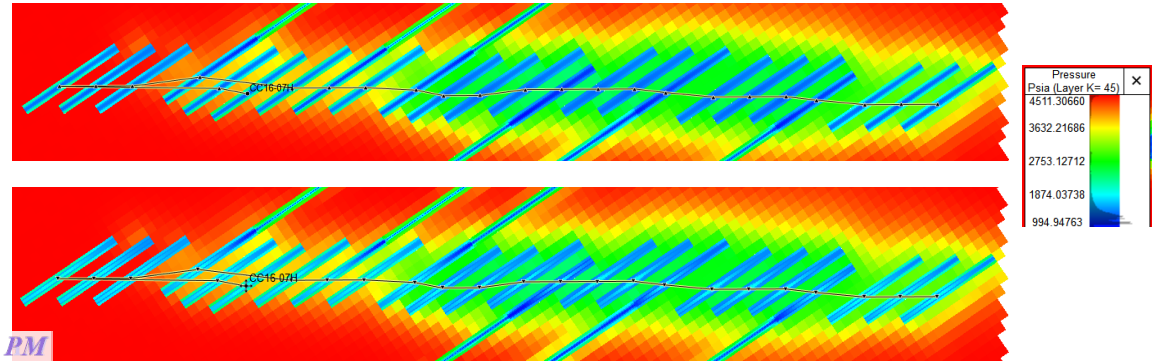


After 1 week of injection (3 MMSCFPD)



After 16 months production

Before Injection CC16-7H Blow-up



After Injection CC16-7H Blow-up

Summary of Cases

Case	Injection Description*	WPS	Oil recovery effect in injected well (MBO)	Oil recovery effect in offset wells (MBO)	Gas breakthrough in Offset well
1	Single Well	4	No change	No change	No
2	Single Well**	6	No change	No change	No
3	Single Well	8	No change	No change	No
4	Single Well (Multiple injection and production cycles)	6	No change	No change	No
5	Single well***	6	No change	No change	No
6	Multiple Adjacent Wells	4	No change	No change	No
7	Multiple Adjacent Wells	6	No change	No change	No
8	Multiple Adjacent Wells	8	No change	No change	No

**All injection at 2MMSCF/DAY for 7 days except cases 2 and 5*

***Injection at 3MMSCF/DAY for 7 days*

****Injection at constant surface pressure of 1200 psi for 21 days*

Gas Storage Capacities - MV

		Gas Storage Capacity with 1200 psi WHP Injection	
API	Well Name	Fracture volume gas equivalent, mmscf	Total prod gas equivalent, mmscf
30025441010100	MESA VERDE BS UNIT 1H ST1	291	1799
30025441960000	MESA VERDE BS UNIT 2H	280	1326
30025441830000	MESA VERDE BS UNIT 3H	289	1463
30025440640000	MESA VERDE BS UNIT 4H	288	1818
30025441850000	MESA VERDE BS UNIT 5H	290	1682
30025440420000	MESA VERDE BS UNIT 6H	278	1633

- Gas storage capacity is high for each well
  - Even just stored gas in fractures, the capacity is over 200 mmscf
- The expected gas injection volume for each well during each event could be up to 60 mmscf, this is way below the storage capacity.

Frac Height and SRV

- Frac height:
  - 3BSS/XYA: Based on Calmon 171H,
    - XH = 350’
    - Xf=400’
  - 2BSS: Based on Nimitz
    - XH = 285’,
    - Xf = 300-400’
  - Avalon: Based on Tanks Avogato
    - XH= 340’
    - Xf = 350’

- SRV
  - SRV= 2*Xf*Xh*Well length

API 14	Well Name	SRV, ft^3
30025441010100	MV-BS-1H-ST1	2,332,400,000
30025441960000	MV-BS-2H	2,730,280,000
30025441830000	MV-BS-3H	2,356,438,000
30025440640000	Mesa Verde BS Unit 4H	1,975,449,000
30025441850000	Mesa Verde BS Unit 5H	1,975,449,000
30025440420000	Mesa Verde BS Unit 6H	1,932,157,500

Closed Loop Gas Capture (CLGC) Project

Affirmative Statement 2

The operator examined the available geologic and engineering data and determined 1) the total recoverable volume of hydrocarbons from the reservoir will not be adversely affected by the project and 2) the gas composition will not damage the reservoir.

Xueying Xie

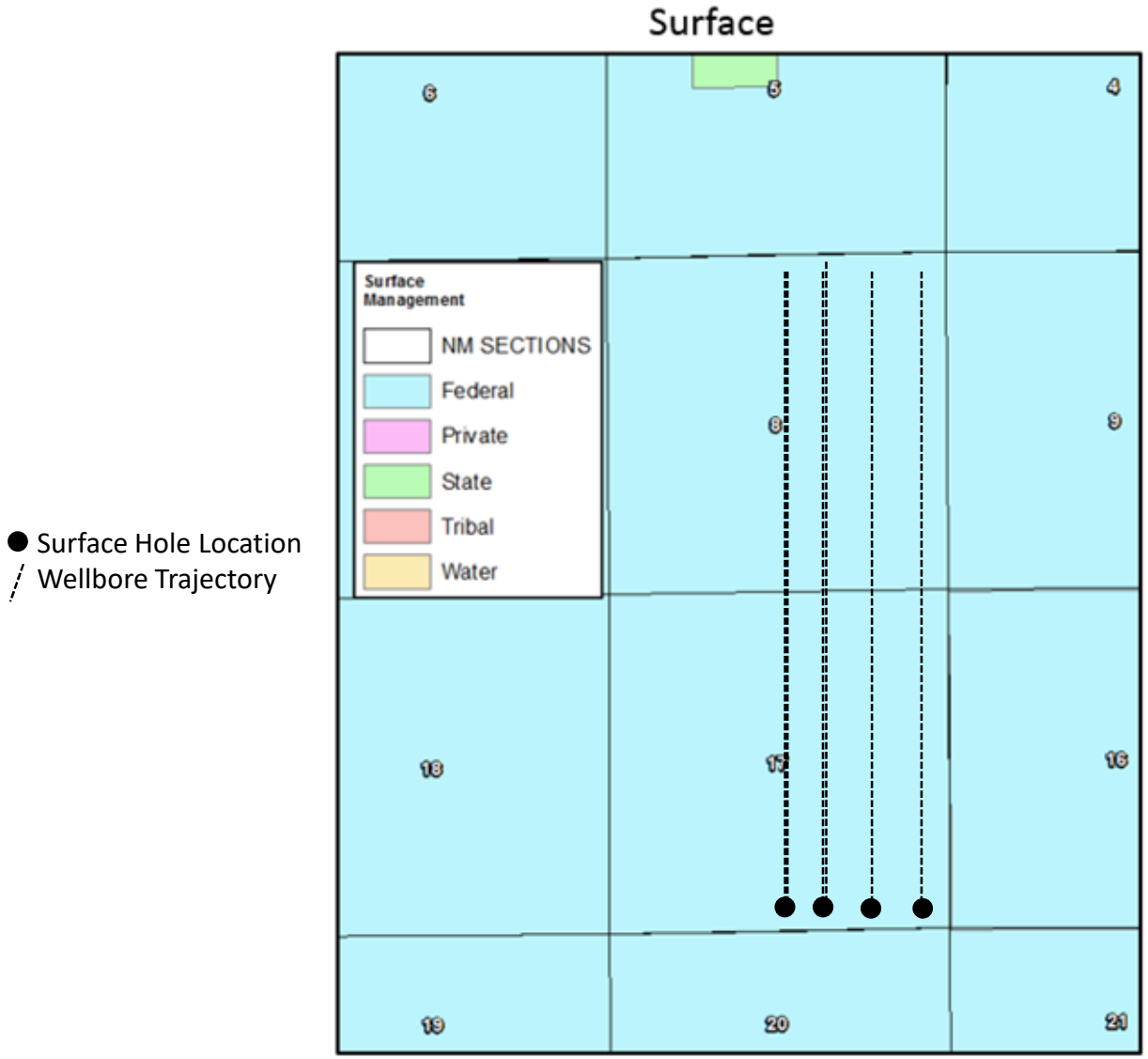
6/9/2021

_____ _____

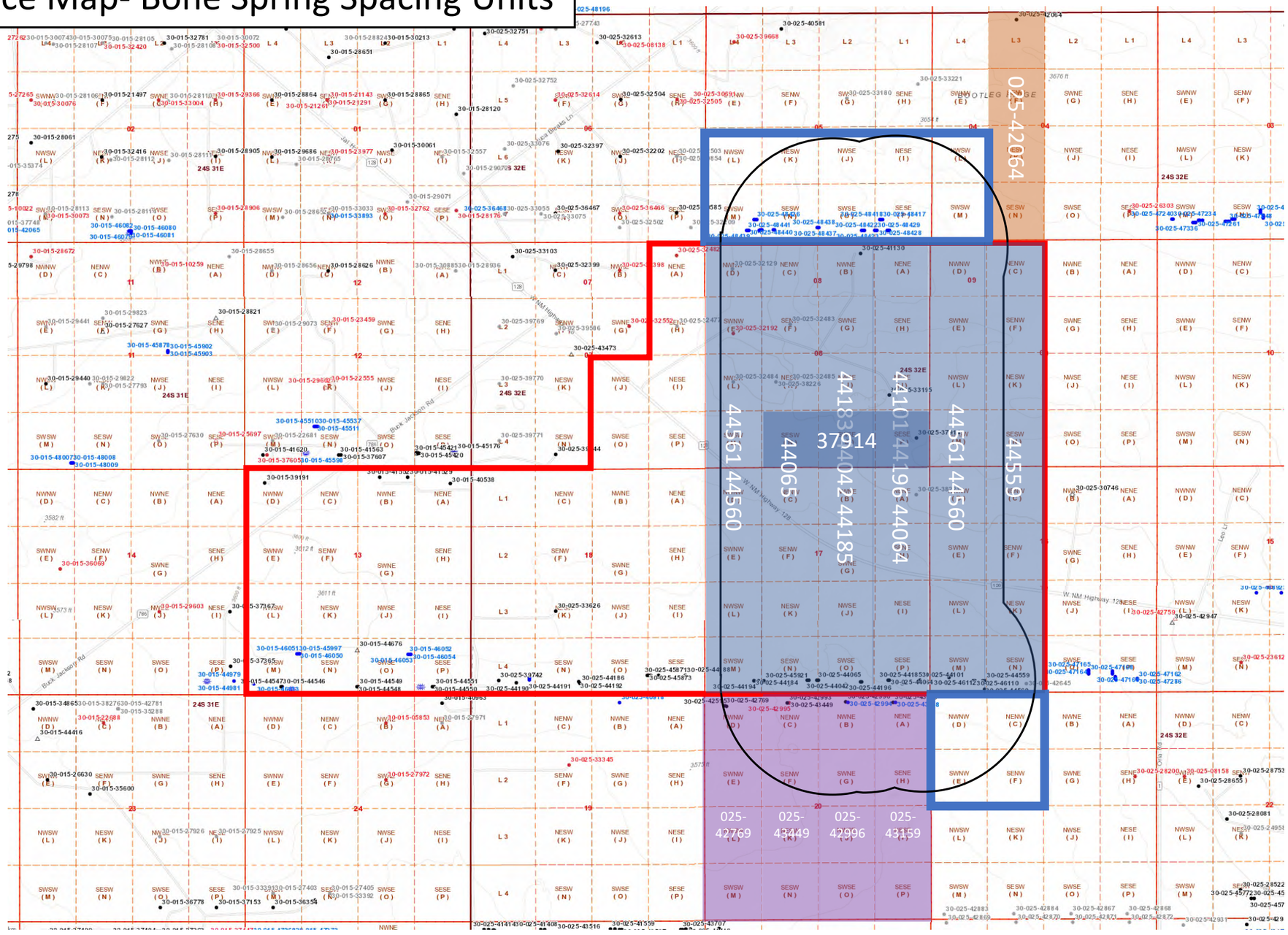
Xueying Xie, Reservoir Engineer Date

Notice

Surface Ownership Map



Notice Map- Bone Spring Spacing Units



Key

- Mesa Verde Unit Outline
- ½ mile AOR
- Oxy HSU
- EOG HSU
- Devon HSU
- Determined Lessee or Unleased MIO

Mesa Verde Notice List

Name	Street	City	State	Zip Code	Full Address
Surface Owner					
BLM	620 E. Greene St.	Carlsbad	NM	88220	BLM 620 E. Greene St. Carlsbad, NM 88220
Leasehold Operators					
DEVON ENERGY PRODUCTION COMPANY, LP	333 West Sheridan Avenue	Oklahoma City	OK	73102	DEVON ENERGY PRODUCTION COMPANY, LP 333 West Sheridan Avenue Oklahoma City, OK 73102
EOG Resources Inc.	P.O. Box 2267	Midland	TX	79702	EOG Resources Inc. P.O. Box 2267 Midland, TX 79702
Affected Persons					
28TwentyEight Energy LLC	5790 Saintsbury Dr	The Colony	TX	75056	28TwentyEight Energy LLC 5790 Saintsbury Dr The Colony, TX 75056
3 Knights Operating LLC	6404 County Road 1440	Lubbock	TX	79407	3 Knights Operating LLC 6404 County Road 1440 Lubbock, TX 79407
3XT Holdings LLC	5325 County Road 7560	Lubbock	TX	79424	3XT Holdings LLC 5325 County Road 7560 Lubbock, TX 79424
ABO Empire LLC	P.O. Box 900	Artesia	NM	88211	ABO Empire LLC P.O. Box 900 Artesia, NM 88211
Bettis Brothers Inc	500 W. Texas Ste #830	Midland	TX	79701	Bettis Brothers Inc 500 W. Texas Ste #830 Midland, TX 79701
Burlington Resources Oil and Gas Co LP	P.O. Box 22295	Chicago	IL	60673	Burlington Resources Oil and Gas Co LP P.O. Box 22295 Chicago, IL 60673
Chesapeake Exploration LLC	6100 N. Western	Oklahoma City	OK	73118	Chesapeake Exploration LLC 6100 N. Western Oklahoma City, OK 73118
CHEVRON USA INC	1400 Smith St.	Houston	TX	77002	CHEVRON USA INC 1400 Smith St. Houston, TX 77002
COG Operating LLC	600 W. Illinois Ave	Midland	TX	79701	COG Operating LLC 600 W. Illinois Ave Midland, TX 79701
COG PRODUCTION LLC	600 W. Illinois Ave	Midland	TX	79701	COG PRODUCTION LLC 600 W. Illinois Ave Midland, TX 79701
EOG Resources Inc.	P.O. Box 840321	Dallas	TX	75284	EOG Resources Inc. P.O. Box 840321 Dallas, TX 75284
EOG Y RESOURCES, INC.	P.O. Box 840321	Dallas	TX	75284	EOG Y RESOURCES, INC. P.O. Box 840321 Dallas, TX 75284
EP Energy E&P Company LP	P.O. Box 4660	Houston	TX	77210	EP Energy E&P Company LP P.O. Box 4660 Houston, TX 77210
Frank Pannell	P.O. Box 3721	Midland	TX	79702	Frank Pannell P.O. Box 3721 Midland, TX 79702
Hillcorp Energy	1000 Louisiana Ste #3760	Houston	TX	77002	Hillcorp Energy 1000 Louisiana Ste #3760 Houston, TX 77002
LMS Limited Liability Co	P.O. Box 621402	Littleton	CO	80162	LMS Limited Liability Co P.O. Box 621402 Littleton, CO 80162
Merit Energy Partners II LP	13727 Noel Rd. Ste 500	Dallas	TX	75240	Merit Energy Partners II LP 13727 Noel Rd. Ste 500 Dallas, TX 75240

Merit Energy Partners	13727 Noel Rd. Ste 500	Dallas	TX	75240	Merit Energy Partners 13727 Noel Rd. Ste 500 Dallas, TX 75240
Merit Energy Partners III LP	13727 Noel Rd. Ste 500	Dallas	TX	75240	Merit Energy Partners III LP 13727 Noel Rd. Ste 500 Dallas, TX 75240
Merit Energy Partners IV LP	13727 Noel Rd. Ste 500	Dallas	TX	75240	Merit Energy Partners IV LP 13727 Noel Rd. Ste 500 Dallas, TX 75240
Mersereau Enterprises LLC	132 Castillo Ave	San Antonio	TX	78210	Mersereau Enterprises LLC 132 Castillo Ave San Antonio, TX 78210
New Mexico State Land Office	P.O. Box 1148	Santa Fe	NM	87504	New Mexico State Land Office P.O. Box 1148 Santa Fe, NM 87504
NGL WATER SOLUTIONS PERMIAN, LLC	1509 W. Wall St Ste 306	Midland	TX	79701	NGL WATER SOLUTIONS PERMIAN, LLC 1509 W. Wall St Ste 306 Midland, TX 79701
Oil Conservation Division	1220 South St. Francis Dr	Santa Fe	NM	87505	Oil Conservation Division 1220 South St. Francis Dr Santa Fe, NM 87505
Panda Pipe and Equipment	P.O. Box 3721	Midland	TX	79702	Panda Pipe and Equipment P.O. Box 3721 Midland, TX 79702
PXP Producing Company LLC	717 Texas St Ste #2100	Houston	TX	77002	PXP Producing Company LLC 717 Texas St Ste #2100 Houston, TX 77002
Robert H. Forrest Jr.	609 Elora Dr.	Carlsbad	NM	88220	Robert H. Forrest Jr. 609 Elora Dr. Carlsbad, NM 88220
Sabine Oil and Gas Corporation	1415 Louisianna St Ste 1600	Houston	TX	77002	Sabine Oil and Gas Corporation 1415 Louisianna St Ste 1600 Houston, TX 77002
TEF Corp	P.O. Box 3721	Midland	TX	79702	TEF Corp P.O. Box 3721 Midland, TX 79702
Tempo Energy Inc.	P.O. Box 1034	Midland	TX	79702	Tempo Energy Inc. P.O. Box 1034 Midland, TX 79702
Thomas E. Jennings	P.O. Box 1797	Roswell	NM	88202	Thomas E. Jennings P.O. Box 1797 Roswell, NM 88202
Timothy Zeph Jennings	P.O. Box 1797	Roswell	NM	88202	Timothy Zeph Jennings P.O. Box 1797 Roswell, NM 88202
Vladin LLC	P.O. Box 4362	Houston	TX	77210	Vladin LLC P.O. Box 4362 Houston, TX 77210
Wilfred F. Garver	2800 Hanover	Dallas	TX	75225	Wilfred F. Garver 2800 Hanover Dallas, TX 75225
XTO ENERGY, INC.	6401 Holiday Hill Rd. Building #5	Midland	TX	79707	XTO ENERGY, INC. 6401 Holiday Hill Rd. Building #5 Midland, TX 79707
XTO Holdings LLC	22777 Springwoods Village Pkwy	Spring	TX	77389	XTO Holdings LLC 22777 Springwoods Village Pkwy Spring, TX 77389

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

AFFIDAVIT OF STEPHEN JANACEK

I, Stephen Janacek, of lawful age and being first duly sworn, declares as follows:

1. My name is Stephen Janacek and I am employed by OXY USA Inc. ("OXY") as a petroleum engineer.

2. I have previously testified before the New Mexico Oil Conservation Division as an expert witness in petroleum engineering.

3. I am familiar with the application filed by OXY in this case, and the Division guidance and requirements regarding closed loop gas capture injection projects (CLGC Project) such as this one. I also prepared exhibits in support of this application from pages 3 through 77 in ***Exhibit A*** to OXY's application, and as **Exhibit A**.

4. In this case, OXY seeks an order approving the proposed 640-acre project area for this pilot project consisting of the E/2 of Sections 8 and 17, all within Township 24 South, Range 32 East, NMPM, Lea County, New Mexico. An overview locator map identifying the general location of OXY's proposed Mesa Verde CLGC Project is include in ***Exhibit A*** at page 6. The project area is located entirely within OXY's Mesa Verde Bone Spring Unit, which is comprised of 3,461 acres, more or less, as follows:

Township 24 South, Range 32 East

Section 7: SE/4, E/2 NE/4

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. B
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

Section 8: All
Section 9: W/2
Section 16: W/2
Section 17: All
Section 18: All

Township 24 South, Range 31 East

Section 13: All

5. OXY requests an initial project duration of five years to coincide with mechanical integrity tests every five years. OXY also requests the ability to administratively extend the project without the need for a hearing.

6. Within the proposed project area, OXY seeks authority to utilize the following producing wells to occasionally inject produced gas into the Bone Spring formation, Mesa Verde Bone Spring Pool (96229):

- The Mesa Verde BS Unit 1H well (API No. 30-025-44101), with a surface location 271 feet FSL and 245 feet FEL (Unit P) in Section 17, and a bottom hole location 335 feet FNL and 992 feet FEL (Unit A) in Section 8;
- The Mesa Verde BS Unit 2H well (API No. 30-025-44196), with a surface location 240 feet FSL and 1,614 feet FEL (Unit O) in Section 17, and a bottom hole location 171 feet FNL and 1,275 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 3H well (API No. 30-025-44183), with a surface location 240 feet FSL and 1,644 feet FEL (Unit O) in Section 17, and a bottom hole location 197 feet FNL and 2,368 feet FEL (Unit B) in Section 8;

- Mesa Verde BS Unit 4H well (API No. 30-025-44064), with a surface location 280 feet FSL and 965 feet FEL (Unit P) in Section 17, and a bottom hole location 185 feet FNL and 512 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 5H well (API No. 30-025-44185), with a surface location 280 feet FSL and 995 feet FEL (Unit P) in Section 17, and a bottom hole location 196 feet FNL and 1,329 feet FEL (Unit B) in Section 8; and
- Mesa Verde BS Unit 6H well (API No. 30-025-44042), with a surface location 280 feet FSL and 2,624 feet FEL (Unit O) in Section 17, and a bottom hole location 206 feet FNL and 2,292 feet FEL (Unit B) in Section 8.

7. Injection along the horizontal portion of the wellbores will be at the following approximate total vertical depths:

- The Mesa Verde BS Unit 1H well: between 9,247 feet and 9,290 feet;
- The Mesa Verde BS Unit 2H well: between 11,815 feet and 11,860 feet;
- Mesa Verde BS Unit 3H well: between 9,901 feet and 9,216 feet;
- Mesa Verde BS Unit 4H well: between 10,339 feet and 10,448 feet;
- Mesa Verde BS Unit 5H well: between 10,339 feet and 10,449 feet; and
- Mesa Verde BS Unit 6H well: between 10,385 feet and 10,409 feet.

See ***Exhibit A*** at 14-15, 20-21, 27-28, 33-34, 40-41, 47-48 and 74.

8. A summary overview of the CLGC Project is located at pages 3-4 of ***Exhibit A***.

9. A process flow diagram of the closed loop gas capture system is in the Attached ***Exhibit A*** at page 5. This diagram reflects the current and proposed system to be used for gas storage. OXY will utilize the existing gas lift infrastructure so no changes are shown. During normal operations, produced fluids flow from the wells down the green flowline to the Mesa Verde 18 Central Tank Battery (CTB). The source wells, which consist of all wells connected to the CTB, produce from the Bone Spring and Wolfcamp formations. Oil, water, and gas are separated out and leave the central tank battery. Oil is sold through the Lease Automatic Custody Transfer (LACT) at the CTB, water is sent to a disposal well, and gas enters the red, Low Pressure Gas Pipeline. Gas can then be sold to the Enlink Primary Gas Takeaway, flared, or flow to the Centralized Gas Lift (CGL) Stations for compression and re-injection as gas lift gas. After the gas goes through the CGL Stations, the pressure increases to a maximum of 1250 psig in the orange Centralized Gas Lift (CGL) Pipeline. It can flow to the Secondary DCP Takeaway, which is used to sell only a fraction of produced gas during Enlink interruptions, or back to the wells with gas lift systems. The flow of fluids is similar yet different during a gas storage event. A gas storage event is initiated when gas cannot be sold to Enlink and the source wells are not shut-in. The major changes are to the Enlink Primary Gas Takeaway (which ceases taking gas) and the CLGC wells (which cease producing and become CLGC wells). Since gas cannot be sold, it will begin to build up in the Low-Pressure Gas Pipeline as wells continue to produce oil, water, and gas. Once the pressure in the Low-Pressure Gas Pipeline increases to a certain point, the CLGC wells will be activated in a cascade fashion. CLGC wells are activated by closing the Shutdown Valve (SDV) at the wellhead. If the pressure in the

Low-Pressure Gas Pipeline does not decrease, an additional CLGC well will be activated. Additional CLGC wells will be activated in this cascade system. When the interruption ends and gas can once again be sold to Enlink, the gas storage event ends. The Shutdown Valves open and the CLGC wells produce down the flowline to a dedicated separator at the CTB for measurement.

10. A map depicting the pipeline that ties the CLGC wells for the pilot project into the gathering system and the affected compressor station is included in the attached ***Exhibit A*** at page 6. The colors and components of the system are the same as the process flow diagram in the attached ***Exhibit A*** at page 5 with some additional items. The black lines represent the wellbore trajectories of the CLGC wells. The First Take Point (FTP) and Last Take Point (LTP) are labeled on the well trajectory. The project area is outlined with a dashed, dark-blue line, which is based on each CLGC well's horizontal spacing unit as shown on the attached ***Exhibit A*** at pages 8-13. The Mesa Verde Bone Spring Unit and Mesa Verde Wolfcamp Unit outlined is noted with a thick, light-blue line. All the gas source wells are in one of these units and are not on this map.

11. Data for each CLGC well, including well diagrams and well construction, casing, tubing, packers, cement, perforations, and other details for each proposed injection well are included in the attached ***Exhibit A*** at pages 14-15, 20-21, 27-28, 33-34, 40-41 and 47-48, respectively. Mesa Verde BS Unit 1H and 3H have gas lift systems which inject down the casing and produce up the tubing with a packer in the hole. Mesa Verde BS Unit 2H, 4H, 5H, and 6H have gas lift systems which inject down the tubing and produce up the casing without a packer in the hole. Before gas storage

injection commences in the 2H, 4H, 5H and 6H wells, gas lift equipment will be removed from the well, a packer or retrievable bridge plug will be set to conduct the MIT, and the gas lift equipment will be run back in the hole.

12. When needed, OXY proposes to place packers as deep as possible but no more than 100 feet above the top of the injection zone.

13. With the exception of Mesa Verde Bone Spring 5H well, cement bond logs for each of the CLGC wells demonstrate the placement of cement in the wells proposed for this pilot project and that there is a good and sufficient cement bond with the production casing and the tie-in of the production casing with the next prior casing in each well. *See* ***Exhibit A*** at 16-19, 22-26, 29-32, 35-39 and 49-53.

14. A cement bond log was submitted with the application for Mesa Verde Bone Spring 5H well on ***Exhibit A*** at 42-46, but the submitted log does not appear to belong to this well. Some of the log header information is not consistent with the well information. OXY drilling reports and drilling sundries filed with the Division indicate a two-stage production cement job was performed with the second stage pumped down the bradenhead. An Echometer shot taken after the second stage indicated an estimated TOC at 1,273 feet, which is above the intermediate casing shoe. The Echometer shot indicates good and sufficient cement bond with the production casing and the tie-in of the production casing with the next prior casing. Nevertheless, before gas storage injection commences in the Mesa Verde Bone Spring 5H, OXY will run a cement bond log and submit it to the Division.

15. The current average surface pressures under normal operations for the CLGC wells range from approximately 520 psi to 1100 psi. *See* ***Exhibit A*** at 54. The

maximum allowable surface pressure (MASP) for the CLGC wells in the pilot project is proposed to be 1,200 psi. *Id.*

16. Assuming a full fluid column of reservoir brine water, the proposed maximum allowable surface pressure will not exert pressure at the top perforation in the wellbore of any CLGC well in excess of 90% of the burst pressure for the production casing or production liner. *See* ***Exhibit A*** at 54. In addition, the proposed maximum allowable surface pressure will not exceed 0.14 psi per foot as measured at the top of the uppermost perforation in any CLGC well and will not exert pressure at the top-most perforation in excess of 90% of the formation parting pressure. *See* ***Exhibit A*** at 54.

17. OXY plans to monitor gas storage injection and operational parameters for the CLGC Project using an automated supervisory control and data acquisition (SCADA) system with pre-set alarms and automatic shut-in safety valves that will prevent injection pressures from exceeding the MASP. *See* Exhibit A at 55-56 and 68-69. The wellhead diagram for casing injection and tubing production wells is found in ***Exhibit A*** at 55. These are Mesa Verde Bone Spring 1H and 3H. Injection starts at the flowmeter where the injection rate is measured and moves through the following components: first, the injection flow control valve which controls the injection pressure, the casing safety shutdown valve (SSV), which can open and close automatically, the casing-tubing annulus, the tubing, the tubing SSV, which can open and close automatically and is also closed when a CLGC well is activated, and finally another flow control valve (FCV), which controls flowline pressure. The wellhead diagram for tubing injection and casing production wells is found in ***Exhibit A*** at 56. These are Mesa Verde Bone Spring 2H, 4H, 5H and 6H. The wellhead has the same components

as the previous wellhead, except the flow path is reversed. Injection is down the casing and production is up the tubing. For all CLGC wells, Pressure Indicating Transmitters (PITs) are located on the casing valve and tubing valves. PITs capture pressure data that is stored in the SCADA system and then used to automatically control the SSVs and FCVs.

18. The proposed average injection rate for each well is 1.8 MMSCFD with a maximum injection rate of 3.0 MMSCFD during injection. *See* ***Exhibit A*** at 54.

19. All the wells proposed for the CLGC Project have previously demonstrated mechanical integrity at a pressure of 9,800 psi for thirty minutes. *See* ***Exhibit A*** at 57. OXY will undertake new tests to demonstrate mechanical integrity for each of the CLGC wells proposed for this pilot project as a condition of approval prior to commencing injection operations.

20. The source of gas for injection will be from wells producing in the Bone Spring and Wolfcamp formations within OXY's Mesa Verde Bone Spring Unit and Mesa Verde Wolfcamp Unit that are identified in the list of wells in ***Exhibit A*** at page 59. OXY's Mesa Verde Wolfcamp Unit is comprised of the same acreage as the Mesa Verde Bone Spring Unit identified in Paragraph 4, above.

21. OXY has prepared an analysis of the composition of the source gas for injection and a corrosion prevention plan. *See* ***Exhibit A*** at 60-66. ***Exhibit A*** at 60 is a summary of the gas analyses included in the application and the components in the system. All source wells flow to the single CTB. From there, gas can flow to two CGL Stations. The CGL Stations combine downstream in the high-pressure CGL Pipeline and feed gas lift wells collectively. Gas analyses have been provided for the two CGL

Stations and the three formations for gas injection. The gas analyses for the CGL Stations are similar to the gas analyses for the three zones for gas injection. H2S is not found in any of the gas analyses. CO2 is found in all the analyses at various amounts.

22. Since CO2 is already present in this system, OXY intends to continue with its existing Corrosion Prevention Plan in these CLGC wells outlined at page 66 of ***Exhibit A***. In the existing Corrosion Prevention Plan, produced gas is processed through a gas dehydration unit to remove water. Then corrosion inhibitor is added to the system of each well downstream of the gas dehydration unit. Fluid samples are taken regularly and checked for iron, manganese, and residual corrosion inhibitor in the produced fluids. The process allows OXY to continuously monitor and adjust the chemical treatment over the life of the well to minimize corrosion. Additionally, fluid samples will be taken prior to gas injection to establish a baseline for analysis. After a CLGC event, fluid samples will be taken to check for iron, manganese, and residual corrosion inhibitor in the produced fluids in the CLGC wells. OXY will continue to monitor and adjust the chemical treatment over the life of the project.

23. Using an automated supervisory control and data acquisition (SCADA) system, OXY will monitor a multitude of rates and pressures to allow for efficient and safe operation, proper allocation and reporting of volumes, and immediate response to unexpected events. *See* ***Exhibit A*** at 55-56 and 68-69. Each CLGC well will also include automated safety devices, including automatic shut-in valves among other operational safety measures. OXY will also monitor and track various operational parameters at the pilot project's central tank battery and central gas lift compressors. *See* ***Exhibit A*** at 68-69.

24. OXY proposes a Data Collection Plan for the Mesa Verde CLGC Project as seen in its Data Collection Plan, attached as **Exhibit B-1**, to collect and report data pertinent to CLGC operations. The plan is similar to the data collection process outlined in the Injection Order R-21747 but proposes some changes. Consistent with Order R-21747, the Data Collection Plan will apply to the wells listed in the table in the Exhibit. The spatial relationship of these wells is illustrated in the Gun Barrel View included in the Exhibit. This diagram shows the proposed Mesa Verde gas storage wells (blue circles) and any offset wells in the same correlative zone (yellow circles). There are two proposed storage wells in the Avalon, three in the Second Bone Spring, and one in the Third Bone Spring. In the OXY Data Collection Plan for Mesa Verde, there are some changes to the reporting requirements. First, to lessen the administrative burden of these requirements, OXY will provide status updates every 12 months. Second, the recovery analysis required for each involved CLGC well and for each well related to each involved CLGC well will be required only if the change in production casing pressure or production volume is related to the CLGC event. These wells are on gas lift most of the time, and changes in casing pressure or production volumes are not unusual for artificially lifted wells. Third, if any of the CLGC wells or the involved CLGC wells are being produced pursuant to an approved commingling permit, OXY will use best efforts to obtain the well production volumes at the frequency required, but measurements necessary for the proper allocation of volumes need to take precedent over these requirements. Lastly, OXY shall not be required to install additional facilities or measurement equipment to collect the data described. These changes create an achievable Data Collection Plan for Mesa Verde. If a data collection plan is required

as outlined in the Injection Order R-21747, additional well testing equipment will be required. If required, it will severely impact OXY's ability to pursue the CLGC Project due to the capital costs associated with installing the additional well testing equipment.

25. I also conducted an analysis of the half-mile area of review and two-mile area surrounding each of the proposed injection wells. A map depicting wells and their trajectories within the half-mile area of review and two-mile radius around the injection wells is located at page 71 of ***Exhibit A***. A map identifying each surface tract by ownership type within the half-mile area of review and two-mile area surrounding each of the proposed injection wells is located at page 72 of ***Exhibit A***. Finally, a map depicting all wells identified with completed laterals all or partially within the half-mile area of review is located at page 73 of ***Exhibit A***. It assigns a well identification number to each well within the area of review that may be cross referenced in the following well data tabulation chart on pages 74-75 of ***Exhibit A***. The well data tabulation chart provides detailed information for identification, location, drilling, casing, cement, current completion, and current producing pool of each well.

26. Wellbore schematics for the two wells that penetrate the proposed injection interval and have been plugged and abandoned are included at pages 76-77 in ***Exhibit A***. Review of the wellbore diagrams indicate adequate casing, cement, and cement plug placement to sufficiently contain gas within the injection interval.

27. To properly determine gas production from each CLGC well, OXY will apply a Percentage Gas Allocation Method. *See* Gas Allocation, attached as **Exhibit B-2**.

Per existing commingling permits,[1] gas sales are allocated by well test.[2] For a period of time after a storage event, the Percentage Gas Allocation Method will be used to differentiate between native gas (owned by the owners of the CLGC well) and recovery of previously stored gas (owned by the owners of the source wells). This method is simple compared to individual GOR forecasting and decline curve analysis for each well. A similar method is in the proposed Unit Agreement for OXY's pending Cedar Canyon Section 23/24 EOR "Juno" Unit. The method allows for native gas production and associated payments to occur each month regardless of the injection gas volumes. I believe it is a fair and reasonable method for allocating gas production after a storage event. We met with the State Land Office on June 2, 2021 and the Bureau of Land Management on June 8, 2021to present and discuss the method. Neither voiced objection to the method. We expect to propose this method to the other owners in the Mesa Verde Units.

28. Working with OXY's in-house land department, I also prepared a list of affected parties required to receive notice of this application. The map on page 99 of ***Exhibit A*** reflects that the BLM is the surface owner with respect to each proposed CLGC well. The following map on page 100 depicts the area of review and identifies the designated operator for each tract that falls within the half-mile area of review for each of the wells within the Bone Spring formation.

29. Pages 101-102 of ***Exhibit A*** identify all leasehold operators and other affected persons within any tract wholly or partially contained within one-half mile of

[1] PLC-1318.

[2] OXY sent notice to affected persons regarding the commingling approvals in place for the Mesa Verde Units on July 22, 2021.

the completed interval of the wellbore for each of the proposed injection wells entitled to notice in accordance with Division regulations, including the BLM as the surface owner where each CLGC well is located.

30. Parties entitled to notice were identified based on a determination of the title of lands and interests as recorded in the records of Lea County or from a review of New Mexico Oil Conservation Division and Bureau of Land Management operator records as of the time the application was filed or from OXY's internal records (division orders).

31. It is my opinion that OXY undertook a good faith effort to locate and identify the correct parties and valid addresses required for notice within the half-mile area of review. To the best of my knowledge the addresses used for notice purposes are valid and correct. There were no unlocatable parties for whom we were unable to locate a valid address.

32. I provided the law firm of Holland & Hart LLP a list of names and addresses of the affected parties identified on pages 101-102 for purposes of providing notice.

33. As reflected on **Exhibit B-3**, notice of this application was provided in accordance with 19.15.26.8(B)(2) NMAC. Notice was also published in the Hobbs Daily News.

34. **OXY Exhibits B-1** through **B-3** were either prepared by me or compiled under my direction and supervision.

FURTHER AFFIANT SAYETH NOT.

Stephen Janacek

STATE OF TEXAS)
)
COUNTY OF Brazos)

SUBSCRIBED and SWORN to before me this 3rd day of August 2021, by STEPHEN JANACEK.

NOTARY PUBLIC

My Commission Expires:
5/21/25

GRAHAM H. LITTLEFIELD
Notary Public, State of Texas
Comm. Expires 05-21-2025
Notary ID 133114333

PROPOSED DATA COLLECTION PLAN FOR MESA VERDE CLGC PROJECT

CLGC Well Name	Completion Reservoir	Involved Well (West Side)	Involved Well (East Side)
MV-BS-1H-ST1	Avalon	None	None
MV-BS-3H			
Mesa Verde BS Unit 6H	2nd Bone Springs	Mesa Verde BS 7H	Mesa Verde BS 24H
Mesa Verde BS Unit 4H			
Mesa Verde BS Unit 5H			
MV-BS-2H	3nd Bone Springs	None	None

A Gunbarrel View and a well list with API's are included after the proposed Data Collection Plan. The Gunbarrel View is a visual representation of the wells in the table above.

Applicant shall provide to the OCD Engineering Bureau at ocd.engineer@state.nm.us, project status updates every twelve (12) months after the approval of this Order and a summary report no later than three (3) months after the cessation of the pilot project or upon request from OCD. Status updates shall include a summary of the actions taken and problems and solutions identified and implemented. The summary report(s) shall include:

a. a summary of all project-related activity;

b. a review regarding any problems and solutions identified and implemented;

c. for each period of injection, a summary of the results, including for each CLGC Well in which injection occurred:

i. average and maximum injection flow rates;

ii. injection duration; and

iii. total injected volume.

d. for each period of injection, the following data graphed and tabulated with a resolution of at least: one (1) data point per hour beginning twenty-four (24) hours before the injection, four (4) data points per hour during the injection, and one (1) data point per hour ending twenty-four (24) hours after the injection:

i. for each involved CLGC Well, the oil and gas production and annulus pressure of all casing strings; and

ii. for each well related to each involved CLGC Well, the oil and gas production and injection flow rates and production casing pressure.

e. for each period of injection, a recovery profile for each involved CLGC Well and for each well related to each involved CLGC Well which experienced a change in production casing

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. B1
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

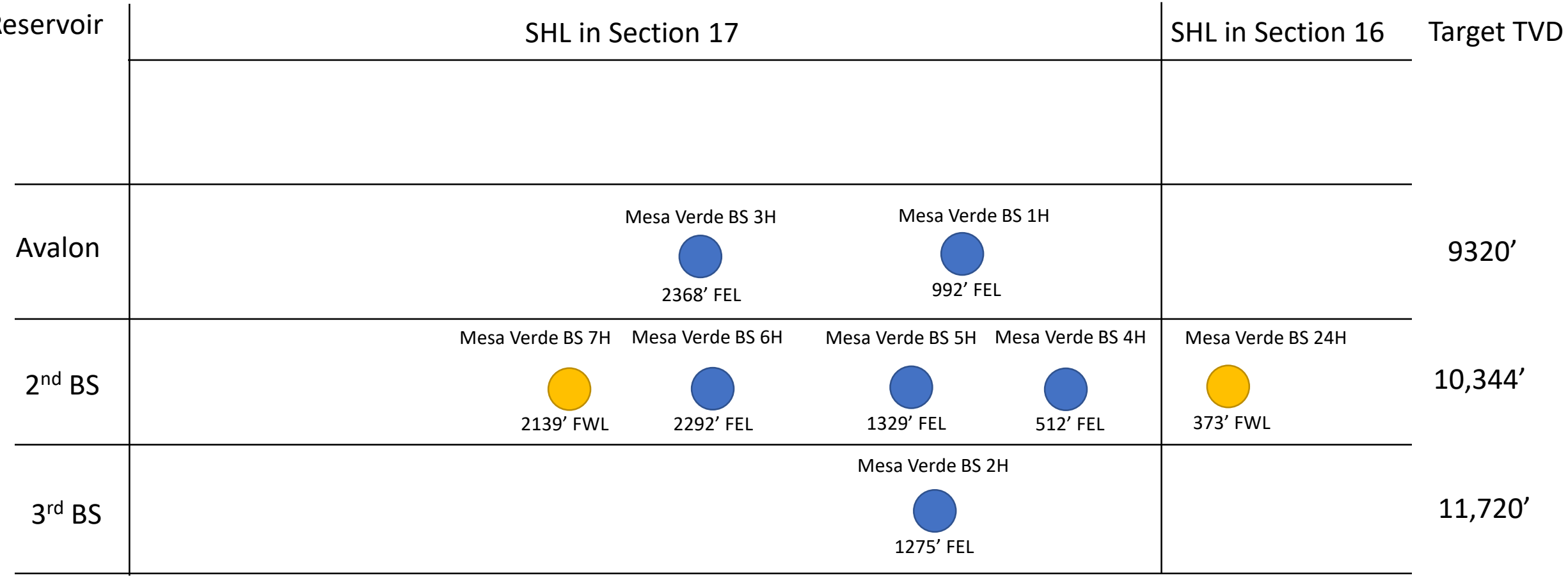
pressure or production volume related to the injection during or immediately following the injection. The volume of recovered gas shall be determined by taking the difference between the gas production following the injection and baseline production. The baseline production shall be determined by using production history to plot a production curve that estimates what the production would have been had injection not occurred. The recovery profile shall include:

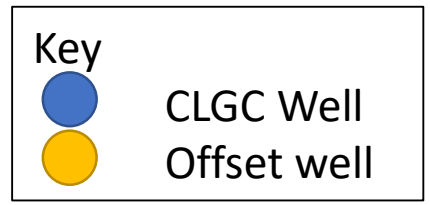
i. a summary of the results, including the volume and percent of total production recovered and the duration of time required to achieve that recovery; and

ii. a tabulation of daily oil and gas production and baseline production totals; beginning a week before the injection and ending when either the gas production is near equal to its baseline production or Applicant conducts another period of injection on an involved CLGC Well.

f. If any of the CLGC wells or the involved CLGC wells are being produced pursuant to an approved commingling permit, Applicant will use best efforts to obtain the well production volumes at the frequency required in subparagraphs (d) or (e) above, but measurements necessary for proper allocation of volumes under the commingling permit shall take precedent over these requirements. Also, Applicant shall not be required to install additional facilities or measurement equipment to collect the data described above in subparagraphs (d) or (e) above.

Mesa Verde CLGC Wells and Offsets: Gunbarrel View





Note-Location info based on BHL.

No nearby Avalon 3BS offsets

Injectors & Offsets

API	Well Name	
3002544183	Mesa Verde BS Unit 3H	Injector
3002544101	Mesa Verde BS Unit 1H	Injector
3002544196	Mesa Verde BS Unit 2H	Injector
3002544064	Mesa Verde BS Unit 4H	Injector
3002544185	Mesa Verde BS Unit 5H	Injector
3002544042	Mesa Verde BS Unit 6H	Injector
3002544561	Mesa Verde BS Unit 24H	East offset
3002544065	Mesa Verde BS Unit 7H	West offset

Gas Production Percentage Allocation Method for CLGC- MV

- Simple compared to a GOR method.
- Similar method utilized in the proposed Unit Agreement for Cedar Canyon Sec 23/24 EOR "Juno" Unit.
- Native gas production and royalty payments occur each month regardless of storage gas volumes.
- Fair and reasonable method for allocating gas production after a storage event.
- SLO (met 6/2/21) and BLM (met 6/8/21) did not voice any objections.

- Method
  - During a storage event, storage gas is metered. The cumulative metered volume equals the stored injection volume.
  - After a storage event, produced gas will be measured and allocated on a monthly basis between gas lift, native gas production and recovered storage injection volume.
  - Total wellhead volume less gas lift injection equals gross production.
  - Until 100% of storage injection volume is recovered, gross production will be apportioned as follows:
    - 70% return of storage injection volume and
    - 30% native gas production.
  - After all stored injection volume is recovered, all gross production will be treated as native gas.

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. B2
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

AFFIDAVIT

STATE OF NEW MEXICO)
) ss.
COUNTY OF SANTA FE)

Adam G. Rankin, attorney in fact and authorized representative of OXY USA Inc, the Applicant herein, being first duly sworn, upon oath, states that the above-referenced Application has been provided under the notice letters and proof of receipts attached hereto.

Adam G. Rankin

SUBSCRIBED AND SWORN to before me this 3rd day of August, 2021 by Adam G. Rankin.

Notary Public

My Commission Expires:
Nov. 12, 2023

OFFICIAL SEAL
Carla Garcia
NOTARY PUBLIC - STATE OF NEW MEXICO
My Commission Expires: Nov. 12, 2023

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. B3
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

HOLLAND&HART LLP

Adam G. Rankin
Phone (505) 988-4421
agrankin@hollandhart.com

July 16, 2021

VIA CERTIFIED MAIL
CERTIFIED RECEIPT REQUESTED

TO: ALL AFFECTED PARTIES

Re: Application of OXY USA Inc. for Closed Loop Gas Capture Injection Pilot Project, Lea County, New Mexico.
Mesa Verde Unit wells

Ladies & Gentlemen:

This letter is to advise you that OXY USA Inc. has filed the enclosed application with the New Mexico Oil Conservation Division.

During the COVID-19 Public Health Emergency, state buildings are closed to the public and hearings will be conducted remotely. The hearing will be conducted on August 5, 2021 beginning at 8:15 a.m., until it is concluded. To participate in the electronic hearing, see the instructions posted on the OCD Hearings website: http://www.emnrd.state.nm.us/OCD/announcements.html.

You are not required to attend this hearing, but as an owner of an interest that may be affected by this application, you may appear and present testimony. Failure to appear at that time and become a party of record will preclude you from challenging the matter at a later date. Parties appearing in cases are required by Division Rule 19.15.4.13.B to file a Pre-hearing Statement four business days in advance of a scheduled hearing. This statement must be filed online or in person at the Division's Santa Fe office and should include: the names of the parties and their attorneys; a concise statement of the case; the names of all witnesses the party will call to testify at the hearing; the approximate time the party will need to present its case; and identification of any procedural matters that are to be resolved prior to the hearing.

If you have any questions about this matter, please contact Stephen Janacek, at (713) 497-2417, or Stephen_Janacek@OXY.com.

Sincerely,

Adam G. Rankin
ATTORNEY FOR OXY USA INC.

OXY_ Application for CLGC Injection Pilot Project Mesa Verde
Case No. 22087 Postal Delivery Report

TrackingNo	ToName	DeliveryAddress	City	State	Zip	USPS_Status
9402811898765804645395	BLM	620 E Greene St	Carlsbad	NM	88220-6292	Your item was delivered to the front desk, reception area, or mail room at 12:34 pm on July 20, 2021 in CARLSBAD, NM 88220.
9402811898765804645005	Chesapeake Exploration LLC	6100 N Western Ave	Oklahoma City	OK	73118-1044	The delivery status of your item has not been updated as of July 20, 2021, 12:10 am. We apologize that it may arrive later than expected.
9402811898765804645098	Chevron U.S.A. Inc.	1400 Smith St	Houston	TX	77002-7327	Your item was delivered at 2:33 pm on July 20, 2021 in HOUSTON, TX 77002.
9402811898765804645043	COG Operating LLC	600 W Illinois Ave	Midland	TX	79701-4882	Your item was picked up at a postal facility at 8:28 am on July 20, 2021 in MIDLAND, TX 79701.
9402811898765804645081	COG Production LLC	600 W Illinois Ave	Midland	TX	79701-4882	Your item was picked up at a postal facility at 8:28 am on July 20, 2021 in MIDLAND, TX 79701.
9402811898765804645036	EOG Resources Inc.	PO Box 840321	Dallas	TX	75284-0321	Your item was delivered at 7:39 pm on July 20, 2021 in DALLAS, TX 75266.
9402811898765804645418	EOG Y Resources, Inc.	PO Box 840321	Dallas	TX	75284-0321	Your item was delivered at 7:39 pm on July 20, 2021 in DALLAS, TX 75266.
9402811898765804645456	EP Energy E&P Company LP	PO Box 4660	Houston	TX	77210-4660	Your item was picked up at a postal facility at 4:34 am on July 23, 2021 in HOUSTON, TX 77002.
9402811898765804645463	Frank Pannell	PO Box 3721	Midland	TX	79702-3721	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804645425	Hillcorp Energy	1000 Louisiana St Ste 3760	Houston	TX	77002-5008	Your item was delivered to the front desk, reception area, or mail room at 1:02 pm on July 19, 2021 in HOUSTON, TX 77002.
9402811898765804645401	LMS Limited Liability Co	PO Box 621402	Littleton	CO	80162-1402	Your item was returned to the sender on July 29, 2021 at 3:01 pm in SANTA FE, NM 87501 because the addressee moved and left no forwarding address.
9402811898765804645340	Devon Energy Production Company, LP	333 W Sheridan Ave	Oklahoma City	OK	73102-5010	Your item was delivered at 9:25 am on July 19, 2021 in OKLAHOMA CITY, OK 73102.
9402811898765804645494	Merit Energy Partners II LP	13727 Noel Rd Ste 500	Dallas	TX	75240-7312	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804645449	Merit Energy Partners	13727 Noel Rd Ste 500	Dallas	TX	75240-7312	Your item was delivered to the front desk, reception area, or mail room at 1:17 pm on July 19, 2021 in DALLAS, TX 75240.
9402811898765804645487	Merit Energy Partners III LP	13727 Noel Rd Ste 500	Dallas	TX	75240-7312	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804645432	Merit Energy Partners IV LP	13727 Noel Rd Ste 500	Dallas	TX	75240-7312	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804645517	Mersereau Enterprises LLC	132 Castillo Ave	San Antonio	TX	78210-2810	Your item was delivered to an individual at the address at 10:30 am on July 19, 2021 in SAN ANTONIO, TX 78210.
9402811898765804645555	New Mexico State Land Office	PO Box 1148	Santa Fe	NM	87504-1148	Your item was delivered at 6:12 am on July 20, 2021 in SANTA FE, NM 87501.
9402811898765804645524	NGL Water Solutions Permian, LLC	1509 W Wall St Ste 306	Midland	TX	79701-6580	Your item arrived at the SANTA FE, NM 87504 post office at 9:10 am on July 31, 2021 and is ready for pickup.
9402811898765804645500	Oil Conservation Division	1220 S St Francis Dr	Santa Fe	NM	87505-4225	Your item was delivered to an individual at the address at 10:48 am on July 19, 2021 in SANTA FE, NM 87505.
9402811898765804645593	Panda Pipe and Equipment	PO Box 3721	Midland	TX	79702-3721	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.

9402811898765804645548	PXP Producing Company LLC	717 Texas St Ste 2100	Houston	TX	77002-2753	Your item was returned to the sender on July 29, 2021 at 3:01 pm in SANTA FE, NM 87501 because the addressee moved and left no forwarding address.
9402811898765804645388	EOG Resources Inc.	PO Box 2267	Midland	TX	79702-2267	Your item was picked up at a postal facility at 7:53 am on July 20, 2021 in MIDLAND, TX 79702.
9402811898765804645586	Robert H. Forrest Jr.	609 Elora Dr	Carlsbad	NM	88220-4657	Your item was delivered to an individual at the address at 11:16 am on July 20, 2021 in CARLSBAD, NM 88220.
9402811898765804645579	Sabine Oil and Gas Corporation	1415 Louisiana St Ste 1600	Houston	TX	77002-7490	Your item was delivered to the front desk, reception area, or mail room at 12:05 pm on July 20, 2021 in HOUSTON, TX 77002.
9402811898765804642219	TEF Corp	PO Box 3721	Midland	TX	79702-3721	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804642257	Tempo Energy Inc.	PO Box 1034	Midland	TX	79702-1034	This is a reminder to arrange for redelivery of your item or your item will be returned to sender.
9402811898765804642226	Thomas E. Jennings	PO Box 1797	Roswell	NM	88202-1797	Your item was delivered at 8:30 am on July 21, 2021 in ROSWELL, NM 88201.
9402811898765804642202	Timothy Zeph Jennings	PO Box 1797	Roswell	NM	88202-1797	Your item was delivered at 8:30 am on July 21, 2021 in ROSWELL, NM 88201.
9402811898765804642295	Vladin LLC	PO Box 4362	Houston	TX	77210-4362	Your item was picked up at a postal facility at 5:12 am on July 21, 2021 in HOUSTON, TX 77210.
9402811898765804642240	Wilfred F. Garver	2800 Hanover St	Dallas	TX	75225-7924	Your item was returned to the sender on July 29, 2021 at 3:01 pm in SANTA FE, NM 87501 because the addressee moved and left no forwarding address.
9402811898765804642288	XTO ENERGY, INC.	6401 Holiday Hill Rd Bldg 5	Midland	TX	79707-2157	Your item was delivered to the front desk, reception area, or mail room at 12:55 pm on July 19, 2021 in MIDLAND, TX 79707.
9402811898765804642233	XTO Holdings LLC	22777 Springwoods Village Pkwy	Spring	TX	77389-1425	Your item has been delivered to an agent for final delivery in SPRING, TX 77389 on July 19, 2021 at 9:39 am.
9402811898765804645333	28TwentyEight Energy LLC	5790 Saintsbury Dr	The Colony	TX	75056-5397	Your item was delivered at 12:49 pm on July 21, 2021 in THE COLONY, TX 75056.
9402811898765804642271	Chevron U.S.A. Inc. attn Land Department	6301 Deauville	Midland	TX	79706-2964	Your item is being held at the MIDLAND, TX 79701 post office at 6:52 pm on July 19, 2021. This is at the request of the customer.
9402811898765804645371	3 Knights Operating LLC	6404 County Road 1440	Lubbock	TX	79407-1106	Your item was returned to the sender on July 29, 2021 at 3:01 pm in SANTA FE, NM 87501 because the addressee moved and left no forwarding address.
9402811898765804645012	3XT Holdings LLC	5325 County Road 7560	Lubbock	TX	79424-6575	Your item was delivered to an individual at the address at 12:41 pm on July 19, 2021 in LUBBOCK, TX 79424.
9402811898765804645050	ABO Empire LLC	PO Box 900	Artesia	NM	88211-0900	Your item was delivered at 10:34 am on July 20, 2021 in ARTESIA, NM 88210.
9402811898765804645067	Bettis Brothers Inc	500 W Texas Ave Ste 830	Midland	TX	79701-4276	Your item was delivered to an individual at the address at 1:05 pm on July 19, 2021 in MIDLAND, TX 79701.
9402811898765804645029	Burlington Resources Oil and Gas Co LP	PO Box 22295	Chicago	IL	60673-0001	Your item was delivered at 1:24 pm on July 19, 2021 in CHICAGO, IL 60680.

Affidavit of Publication

STATE OF NEW MEXICO
COUNTY OF LEA

I, Daniel Russell, Publisher of the Hobbs News-Sun, a newspaper published at Hobbs, New Mexico, solemnly swear that the clipping attached hereto was published in the regular and entire issue of said newspaper, and not a supplement thereof for a period of 1 issue(s).

Beginning with the issue dated
July 23, 2021
and ending with the issue dated
July 23, 2021.

Publisher

Sworn and subscribed to before me this
23rd day of July 2021.

Business Manager

My commission expires
January 29, 2023
(Seal)

OFFICIAL SEAL
GUSSIE BLACK
Notary Public
State of New Mexico
My Commission Expires 1-29-23

This newspaper is duly qualified to publish legal notices or advertisements within the meaning of Section 3, Chapter 167, Laws of 1937 and payment of fees for said

LEGAL NOTICE
July 23, 2021

STATE OF NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT OIL CONSERVATION DIVISION SANTA FE, NEW MEXICO

The State of New Mexico, Energy Minerals and Natural Resources Department, Oil Conservation Division ("Division") hereby gives notice that the Division will hold public hearings before a hearing examiner on the following case. During the COVID-19 Public Health Emergency, state buildings are closed to the public and Division hearings will be conducted remotely. The public hearing for the following case will be electronic and conducted remotely. The hearing will be conducted on **Thursday, August 5, 2021, beginning at 8:15 a.m.** To participate in the electronic hearing, see the instructions posted below. The docket may be viewed at http://www.emnrd.state.nm.us/OCD/hearings.html or obtained from Marlene Salvidrez, at Marlene.Salvidrez@state.nm.us. Documents filed in the case may be viewed at http://ocdimage.emnrd.state.nm.us/imaging/CaseFileCriteria.aspx. If you are an individual with a disability who needs a reader, amplifier, qualified sign language interpreter, or other form of auxiliary aid or service to attend or participate in a hearing, contact Marlene Salvidrez at Marlene.Salvidrez@state.nm.us, or the New Mexico Relay Network at 1-800-659-1779, no later than **July 25, 2021.**

Persons may view and participate in the hearings through the following link:

https://nmemnrd.webex.com/nmemnrd/onstage/g.php?MTID=e12d56bf176d7f280e15d2923570bbb1c
Event number: 146 234 7684
Event password: u47kXsERRb4

Join by video: 1462347684@nmemnrd.webex.com
Numeric Password: 949758
You can also dial 173.243.2.68 and enter your meeting number

Join by audio: 1-844-992-4726 United States Toll Free
Access code: 146 234 7684

STATE OF NEW MEXICO TO:
All named parties and persons having any right, title, interest or claim in the following case and notice to the public.

(NOTE: All land descriptions herein refer to the New Mexico Principal Meridian whether or not so stated.)

To: All affected persons, including: Bureau of Land Management; Devon Energy Production Company, L.P.; EOG Resources, Inc.; 28TwentyEight Energy LLC; 3 Knights Operating LLC; 3XT Holdings LLC; ABO Empire LLC; Bettis Brothers Inc; Burlington Resources Oil and Gas Co LP; Chesapeake Exploration LLC; Chevron U.S.A. Inc.; COG Operating LLC; COG Production LLC; EOG Y Resources, INC.; EP Energy E&P Company LP; Frank Pannell, his heirs and devisees; Hillcorp Energy; LMS Limited Liability Co; Merit Energy Partners II LP; Merit Energy Partners; Merit Energy Partners III LP; Merit Energy Partners IV LP; Mersereau Enterprises LLC; New Mexico State Land Office; NGL Water Solutions Permian, LLC; Oil Conservation Division; Panda Pipe and Equipment; PXP Producing Company LLC, Robert H. Forrest Jr., his heirs and devisees; Sabine Oil and Gas Corporation; TEF Corp; Tempo Energy Inc.; Thomas E. Jennings, his heirs and devisees; Timothy Zeph Jennings, his heirs and devisees; Vladin LLC; Wilfred F. Garver, his heirs and devisees; XTO Energy, Inc.; and XTO Holdings LLC.

Case No. 22087: Application of OXY USA Inc. for Closed Loop Gas Capture Injection Pilot Project, Lea County, New Mexico. Applicant in the above-styled cause seeks an order authorizing it to engage in a closed loop gas capture injection pilot project ("pilot project") in the Bone Spring formation Mesa Verde Bone Spring Pool (96229) within a 640-acre project area consisting of the E/2 of Sections 8 and 17, all within Township 24 South, Range 32 East, NMPM, Lea County, New Mexico, by occasionally injecting into the following wells, each of which are located in the Bone Spring formation in Lea County, New Mexico:

- The Mesa Verde BS Unit 1H well (API No. 30-025-44101), with a surface location 271 feet FSL and 245 feet FEL (Unit P) in Section 17, and a bottom hole location 335 feet FNL and 992 feet FEL (Unit A) in Section 8;
- The Mesa Verde BS Unit 2H well (API No. 30-025-44196), with a surface location 240 feet FSL and 1,614 feet FEL (Unit O) in Section 17, and a bottom hole location 171 feet FNL and 1,275 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 3H well (API No. 30-025-44183), with a surface location 240 feet FSL and 1,644 feet FEL (Unit O) in Section 17, and a bottom hole location 197 feet FNL and 2,368 feet FEL (Unit B) in Section 8;
- Mesa Verde BS Unit 4H well (API No. 30-025-44064), with a surface location 280 feet FSL and 965 feet FEL (Unit P) in Section 17, and a bottom hole location 185 feet FNL and 512 feet FEL (Unit A) in Section 8;
- Mesa Verde BS Unit 5H well (API No. 30-025-44185), with a surface location 280 feet FSL and 995 feet FEL (Unit P) in Section 17, and a bottom hole location 196 feet FNL and 1,329 feet FEL (Unit B) in Section 8; and
- Mesa Verde BS Unit 6H well (API No. 30-025-44042), with a surface location 280 feet FSL and 2,624 feet FEL (Unit O) in Section 17, and a bottom hole location 206 feet FNL and 2,292 feet FEL (Unit B) in Section 8.

OXY seeks authority to utilize these producing wells to occasionally inject produced gas into the Bone Spring formation at total vertical depths between approximately 9,240 feet to 11,860 feet along the horizontal portion of each wellbore at surface injection pressures of no more than 1,200 psi. The source of the produced gas will be the Bone Spring and Wolfcamp formations. The subject acreage is located approximately 30 miles west, northwest of Jal, New Mexico.
#36676

SANTA FE,, NM 87504-2208

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

AFFIDAVIT OF MICHELE WIECHMAN

I, Michele Wiechman, of lawful age and being first duly sworn, declares as follows:

1. My name is Michele Wiechman. I work for OXY USA Inc. ("OXY") as a petroleum geologist.

2. I have not previously testified before the New Mexico Oil Conservation Division as an expert witness in petroleum geology matters. My relevant work experience and educational background are summarized in the attached **Exhibit C-1**.

3. I am familiar with the application filed by OXY in this case and I have conducted a geologic study of the lands in the subject area that is in included in ***Exhibit A*** to OXY's application. My analysis and conclusions are summarized at pages 78 to 85 of the Exhibit.

4. A general characterization of the geology of the Bone Spring formation and its suitability for the proposed injection, including identification of confining layers and their ability to prevent vertical movement of the injected gas is included in my analysis. *See* ***Exhibit A*** at 79-85.

5. Page 79 of ***Exhibit A*** depicts a type log for the Mesa Verde field. This type log is composed of well logs from two pilot wells which have been drilled in close proximity to each other, and the logs combine to provide coverage from the surface intervals through TD. Well logs displayed are the gamma ray log, resistivity logs, porosity logs, density logs, and spontaneous

potential logs. These logs can be utilized to interpret reservoir quality and lithology. The interpreted lithology is also provided as a separate log. The left most well section represents the geological interval from the surface through the Pennsylvanian section. Highlighted with a red box to the left of this well section are the geological intervals that act as permeability barriers to upward migration of injected gas. Directly overlying the Bone Spring is the Delaware Mountain Group, which consists of Connate-water bearing and hydrocarbon-bearing, low- permeability and porosity sands, with minor limestone and shale intervals and is approximately 3,700 feet thick. Above that is the Castile Formation, consisting of very low permeability anhydrite, gypsum, and calcite that acts as a significant barrier to upward migration of hydrocarbons. The Salado overlies the Castile and forms a 1,000-foot thick barrier of salt. The top of the Salado is at 1,050 feet TVD and the deep aquifers found just above the formation are saline water. The overlying Rustler is a continuous anhydrite layer that acts as another permeability barrier. Low- permeability and porosity hydrocarbon bearing shales of the Wolfcamp Formation act as an underlying barrier to migration. Also highlighted on the right section are the immediate hydrocarbon-bearing intervals of the Brushy Canyon (approximately 8,300ft TVD) and the Wolfcamp (approximately 12,100ft TVD). The well section to the left is a zoomed-in section that focuses on the Bone Spring Formation, where injection will occur. The Bone Spring reservoir is composed of large-scale cycles of alternating carbonate and siliclastic-dominated successions. The injection intervals are the Siliclastic reservoir members that are deposited in low-stand turbiditic channels, fans, and distal sheets. These are very fine-grained sandstones and silts, mudstones, and shales that have porosities in the 4-9% range and permeabilities in the 400-800nD range (as measured via core plugs). The uppermost injection interval is the middle Avalon shale, which is a tight reservoir with low average porosity and permeability consisting of very fine-grained quartz-rich and brittle

siltstone with alternating cycles of carbonate rich mudstones deposited by gravity flows. Low-permeability barriers within the upper Avalon and the First Bone Spring Lime act as barriers directly above and below the reservoir. Deeper in the section is the Second Bone Spring Sandstone, which is a tight reservoir with low average porosity and permeability that is composed of tight siltstone, laminated mudstone, and pelagic shales. Low-permeability carbonate mudstones and dolomudstone of the Second Bone Spring Lime and Third Bone Spring Lime act as flow barriers directly above and below the Second Bone Spring Sandstone. The final injection interval is the Third Bone Spring Sand reservoir, which is composed of amalgamated sands with high contents of silty shales. Core and petrophysical analysis indicate a tight reservoir with low average porosities and permeabilities. Low-permeability siltstones, carbonate mudstones, and dolomudstone barriers of the Third Bone Spring Lime and the deeper Wolfcamp shales act as flow barriers above and below the reservoir. All of these reservoirs have authigenic clays (illite and smectite) and cements (Fe-calcite, Fe-dolomite, and quartz overgrowths). Minor amounts of pyrite are also present in these reservoirs.

6. Page 80 is a cross-section across the pilot project area depicting three wells representative of the geology in the area. Page 81 is a structure map on the top of the middle Avalon member of the Bone Spring formation showing that the structure dips gently to the east. There is no evidence of faulting or other geologic impediments that would allow injected fluid to migrate out of the Bone Spring Formation into shallower aquifers. Also included on the map is the line of cross-section from A to A' depicting the location of the three representative wells used to construct the cross-section. This cross section focuses on the proposed injection intervals of the Bone Spring Formation and the internal barriers to vertical migration of the injected fluid. Each of the wells has a log suite consisting of a gamma ray log and resistivity log. Additionally, some of the wells have

a porosity and interpreted lithology logs. While there is lateral heterogeneity within the Bone Spring depositional system, the low permeability, low porosity barriers are present across the Mesa Verde field with relatively consistent thicknesses, which is highlighted by the consistent character in the gamma ray and resistivity log. Overlying the Bone Spring formation is a thick package of interbedded carbonate mudstones and shales acting as permeability barriers to upward migration of injected gas to overlying formations.

7. In this CLGC Project, the Mesa Verde BS Unit 3H and 1H wells will inject into the Avalon Shale at an average total vertical depth of approximately 9,400 feet across the length of the horizontal wellbores, which have a lateral length of approximately 10,000 feet. The Avalon is a tight reservoir with low average porosity and permeability consisting of very fine-grained quartz-rich and brittle siltstone with alternating cycles of carbonate rich mudstones deposited by gravity flows. Low-permeability barriers within the upper Avalon and the First Bone Spring Lime act as barriers directly above and below the reservoir. The upper Avalon consist of fine-grained siltstones, carbonate mudstone and dolomudstone that have very low vertical permeabilities and an average thickness of 450 feet. Underlying is the First Bone Spring Lime, approximately 200-foot-thick carbonate rich interval that acts as a flow barrier. *See* ***Exhibit A*** at 82.

8. The Mesa Verde BS Unit 4H, 5H and 6H wells will inject into the Second Bone Spring Sandstone member of the Bone Spring formation at an average total vertical depth of approximately 10,400 feet across the length of the horizontal wellbores, which have a lateral length of approximately 10,000 feet. The Second Bone Spring Sandstone is a tight reservoir with low average porosity and permeability that is composed of tight siltstone, laminated mudstone, and pelagic shales. Low-permeability carbonate mudstones and dolomudstone of the Second Bone

Spring Lime and Third Bone Spring Lime act as flow barriers directly above and below the Second Bone Spring Sandstone. *See* ***Exhibit A*** at 84.

9. The Mesa Verde BS Unit 2H well will inject into the Third Bone Spring Sandstone member of the Bone Spring formation at an average total vertical depth of approximately 11,800 feet across the length of the horizontal wellbores, which have a lateral length of approximately 10,000 feet. The well will inject into a reservoir composed of amalgamated sands with high contents of silty shales. Core and petrophysical analysis indicate a tight reservoir with low average porosities and permeabilities. Low-permeability siltstones, carbonate mudstones, and dolomudstone barriers of the Third Bone Spring Lime and the deeper Wolfcamp shales act as flow barriers above and below the reservoir. *See* ***Exhibit A*** at 83.

10. The top of the Bone Spring Formation is at approximately 8,400 feet total vertical depth, with over 2,000 feet of interbedded carbonate mudstones and shales acting as permeability barriers to upward migration of injected gas. Due to the thickness of multiple impermeable rock layers above the injection reservoir there is little possibility for migration upward into freshwater aquifers where they exist. *See* ***Exhibit A*** at 82-84.

11. For all injection zones, lateral movement of the injected gas will be primarily contained by the reservoir volume that has been previously and partially depleted by the adjacent producing wells. The tight, low-permeability reservoir and the production from the adjacent wells will be the primary constraints on the conformance of the injection to the project area and are expected to contain the injected gas. *See* ***Exhibit A*** at 82-84.

12. My analysis concludes that the Bone Spring formation in this area is suitable for the proposed pilot project and that there are geologic barriers that will contain the proposed injection within the Bone Spring formation. *See* ***Exhibit A*** at 79-85.

13. I have examined the available geologic and engineering data and found no evidence of open faults or other hydrologic connections between the injection zone and any underground source of drinking water. *See* ***Exhibit A*** at 85.

14. In my opinion, the granting of OXY's application in this case is in the best interest of conservation, the prevention of waste, and protection of correlative rights.

15. **OXY Exhibit C-1** and pages 78 through 85 of ***Exhibit A*** were either prepared by me or compiled under my direction and supervision.

FURTHER AFFIANT SAYETH NOT.

Michele Wiechman

Michele Wiechman

STATE OF TEXAS)
)
COUNTY OF HARRIS)

SUBSCRIBED and SWORN to before me this 29th day of JULY, 2021 by MICHELE WIECHMAN.

KIM HOFFMAN
My Notary ID # 132081423
Expires July 10, 2023

NOTARY PUBLIC

My Commission Expires:

JULY 10, 2023

Michele Wiechman

Education:

- Colorado School of Mines
  - > B.S. Geological Engineering -2011
  - > M.S. Geology- 2013

Experience:

- Oxy, Inc- 2013-Present
  - > Production Geologist in Texas (2013-2018)
  - > Appraisal Geologist in Texas (2018-2019)
  - > Development Geologist in New Mexico (2019-Present)

Licenses:

- Texas Board of Professional Geoscientist
  - > Professional Geologist 12955

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. C1
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

APPLICATION OF OXY USA INC. FOR A CLOSED LOOP GAS CAPTURE INJECTION PILOT PROJECT, LEA COUNTY, NEW MEXICO.

CASE NO. 22087

AFFIDAVIT OF XUEYING XIE

I, Xueying Xie, of lawful age and being first duly sworn, declares as follows:

1. My name is Xueying Xie and I am employed by Oxy USA Inc. ("OXY") as a reservoir engineer.

2. I have not previously testified before the New Mexico Oil Conservation Division as an expert witness. My relevant work experience and educational background are summarized in the curriculum vitae, attached as **Exhibit D-1**.

3. I am familiar with the application filed by OXY in this case and the Division guidance regarding closed loop gas capture injection (CLGC) projects such as this one. I have conducted an engineering study of the reservoir to evaluate the potential effects of the proposed temporary injection on the reservoir and future production. The conclusions I have drawn from my analysis are summarized in pages 85 to 97 in ***Exhibit A*** attached to OXY's application.

4. I have examined the available geologic and engineering data and found no evidence of open faults or other hydrologic connections between the injection zone and any underground source of drinking water. *See* ***Exhibit A*** at 85.

5. The CLGC project will inject produced gas into horizontal wells with 10,000 ft laterals and into the following productive zones of the Bone Spring formation: Avalon, Second Bone Spring Sand, and Third Bone Spring Sand. We applied simulation modeling techniques to

investigate gas movement in the injection zones and any potential impacts on production performance of CLGC wells and direct offset wells. The model utilized data from our Cedar Canyon Section 16 Gas EOR Project ("CC 16 EOR Project") for verification. The CC 16 EOR Project began in 2017. It is located 15 miles away from the Mesa Verde CLGC project area as shown on the maps on page 88. The bottom left box of page 89 shows the reservoir properties and conditions of the Bone Spring formation at the CC 16 EOR Project. In general, the Cedar Canyon and Mesa Verde areas have very similar reservoir properties, except the Avalon Shale in Mesa Verde has a permeability less than 0.001mD. The section, location, and well layout for the CC 16 EOR Project are shown on page 88. In this EOR project, Cedar Canyon 16-7H injected produced gas for five months in 2017 at a rate of 7 mmscf/d. After the five months of EOR gas injection, the final surface tubing head pressure was 4100 psi and bottom hole pressure was about 5000 psi. The simulation model incorporated both the primary production history of wells in the CC 16 EOR Project area and the EOR gas injection history with gas communication occurring between the EOR injection well and offset producing wells. During the first three months of EOR gas injection, there was no observed gas communication. However, after three months of EOR gas injection, there was gas communication in offset producers and the model was able to predict it. This gives us confidence in the ability of the model to predict impacts on offset wells resulting from CLGC operations.

6. The reservoir model is a full section model with five wells. The top right of page 89 shows the 3D model grid. It has 56 layers and over a million cells. The four plots in the bottom right show history match results of all five wells in the CC 16 EOR project area. The dots represent historical field data and the curves are modeling results. The first three plots show the primary production match from 2013 to 2017 for all five wells in the section. The green plot

shows oil rate match, the blue plot shows water rate match, and the red plot shows gas rate match. The bottom right plot shows gas injection bottom hole pressure match of EOR gas injection in 2017. The model shows a good match for all rates and pressure.

7. With the high EOR gas injection rates and injection pressures in the CC 16 EOR Project, the reservoir simulation model was created to capture the gas communication between injection wells and the offset producers. This modeling improved our understanding of the complexity of connected fractures based on actual field response. The model was used to simulate the effects of CLGC operations in the Mesa Verde and other areas, since the reservoirs have similar properties. We believe the model should be able to predict communication caused by CLGC operations because it was "tuned" based on actual gas communication between wells. First, we created a base case for normal production without any gas injection. Then we ran numerous gas injection cases to simulate CLGC operations and compared those with the base case to determine the impact on well production rate and recovery in both CLGC wells and offset wells. To further validate our injection rate assumptions, we integrated the reservoir model with a Prosper wellbore model to predict the injection rate at a wellhead injection pressure of 1200 psi. The results are shown on the plot of page 91. For a 10,000 ft lateral length well (representative of our proposed Mesa Verde CLGC wells), 3 mmscf/day is the predicted max injection rate. It declines to about 50% of the initial value after three weeks. Despite the injection rate decline over time, Oxy ran all cases in the model with flat injection rates to simulate worst-case scenarios. The results of these model runs are shown on page 94 and discussed more fully below.

8. Reservoir modeling indicates the horizontal movement of injected gas is anticipated to be approximately 100 feet or less from each CLGC wellbore within the

Bone Spring formation. *See* ***Exhibit A*** at 92. This is illustrated by comparing gas saturation pre-injection and post-injection. The top left plot on page 92 shows pre-injection gas saturation. The wellbores are depicted as east-west lines, and the numerous hydraulic fractures created in each wellbore are shown as NE-SW angled lines. The blue color shows no gas while the cyan color shows gas exists in the fractures. A warmer color indicates a higher gas saturation. The middle plot shows gas saturation after one week of injection. The gas injected into the middle well and the fractures near wellbore show a warmer color. The bottom plots have a magnified view of the CLGC well gas saturation for a clearer comparison. We can clearly see that the fractures near wellbore in the injection case have a warmer color than those of the pre-injection case. Additionally, further away from the CLGC wellbore, there is no gas saturation change in the factures even though there are connected fractures between wells. This is because the injected gas volume during CLGC operations is too small to move very far away from the CLGC wellbore. And even when we have fracture communication between wells, there is not very high conductivity for immediate gas communication as was observed in our CC 16 EOR project which had a much higher injection rate and pressure. The gas storage injection in Mesa Verde will inject at a much lower rate (<3 mmscf/d) for a shorter period of time with much lower tubing head pressure (1200psi) compared with the CC Sec 16 gas EOR pilot in 2017, so it is not unexpected that the model shows no gas communication. Finally, after a long period of production following a gas storage event, the gas saturation in the near wellbore of CLGC wells is restored to pre-injection values as shown in the plot on the upper right of page 92. This is because the majority of injected gas has been recovered.

9. The pressure map plots of page 93 tell the same story as the gas saturation map plots. With gas injection, the pressure increases only in the fractures nearest the wellbore within 100 feet of the CLGC well.

10. We modeled all possible CLGC scenarios including different well spacing (from 4-8 Wells Per Section, or "WPS"), single well injection, multi-well injection, and a worst case with a higher injection rate and a longer injection period than historical upsets. The modeling results are summarized in the table on page 94 and in each case show no impact. Mesa Verde wells have well spacing of 1-6 WPS depending on the completion reservoir, and the model scenarios even tested narrower spacing of 8 WPS which still shows no impact. For the injection parameters, all possible scenarios—including the worst-case gas storage scenario—have much lower injection volumes and injection pressures compared to CC 16 EOR project. In conclusion, the analysis indicates that there will be no change in the oil recovery from each of its proposed injection wells or from any of the offsetting wells because of CLGC operations. *See id.* at 94.

11. As a cross-check of the model results, I prepared an analysis of the expected gas storage capacity in the fracture network of the CLGC well relative to the gas injection volumes for the worst-case injection scenario lasting twenty days. *See* ***Exhibit A*** at 95. My analysis confirms that whether the capacity is estimated based on the fracture volume gas equivalent, or the total gas equivalent volumes produced from the proposed injection zone, the anticipated gas injection volumes will be considerably less than the estimated volume capacity for gas storage within the project area.

12. Fracture dimensions are predicted by a fracture model software package called Gohfer, which is based on reservoir geo-mechanical properties and actual well hydraulic fracturing procedure history matching. The dimensions for different zones are shown at page 96. The table on the right shows Stimulated Reservoir Volume (SRV) for each individual CLGC well, which is in the range of 2-3 billion cubic feet.

13. In my analysis, examining the available geologic and engineering data, I have determined that the total recoverable volume of hydrocarbons from the reservoir will not be adversely affected by the pilot project and that the gas composition of the injected gas will not damage the reservoir. *See* ***Exhibit A*** at 97.

14. **OXY Exhibit D-1** and pages 85 through 97 of **Exhibit A** were either prepared by me or compiled under my direction and supervision.

FURTHER AFFIANT SAYETH NOT.

Xueying Xie

Xueying Xie

STATE OF TEXAS)
)
COUNTY OF HARRIS)

SUBSCRIBED and SWORN to before me this 22nd day of JULY, 2021, by XUEYING XIE.

KIM HOFFMAN
My Notary ID # 132081423
Expires July 10, 2023

NOTARY PUBLIC Kim Hoffman

My Commission Expires:

JULY 10, 2023

Xueying Xie

Rice University, Graduate 2005

- Chemical Engineering PhD

Shell, 2005 – 2016

- Reservoir Engineer for multiple geographic areas/reservoirs and drive mechanisms for a full value chain from exploration to development to production

Oxy, 2016 - Present

- Unconventional Technical Manager in New Mexico

BEFORE THE OIL CONSERVATION DIVISION
Santa Fe, New Mexico
Exhibit No. D1
Submitted by: OXY USA INC.
Hearing Date: August 05, 2021
Case No. 22087