



**LOGOS OPERATING, LLC  
EXHIBITS  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**

**DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES  
OIL CONSERVATION DIVISION**

**IN THE MATTER OF THE APPLICATION OF  
LOGOS OPERATING, LLC FOR  
AUTHORIZATION TO INJECT AND  
APPROVAL OF AN ENHANCED RECOVERY  
PILOT PROJECT,  
SAN JUAN COUNTY, NEW MEXICO.**

**CASE NO. 22155 (9/9/2021)**

**APPLICANT'S EXHIBITS**

- Ex. 1 C-108 and attachments
- Ex. 2 September 1, 2021 correspondence from Dr. Robert S. Balch
- Ex. 3 Type-log – Quinn 338S
- Ex. 4 Half-Mile AOR
- Ex. 5 Isopach and Cross Section
- Ex. 6 Structure Map and Cross Section
- Ex. 7 Cross Section-Structural
- Ex. 8 Cumulative Production Bubble Map
- Ex. 9 Pump Canyon Leasehold Map
- Ex. 10 Notice Affidavit and attachments

**EXHIBIT 1**

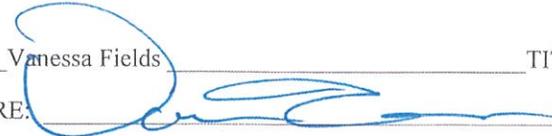
**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**

STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL  
RESOURCES DEPARTMENT

Oil Conservation Division  
1220 South St. Francis Dr.  
Santa Fe, New Mexico 87505

FORM C-108  
Revised June 10, 2003

**APPLICATION FOR AUTHORIZATION TO INJECT**

- I. PURPOSE:  Secondary Recovery  Pressure Maintenance  Disposal  Storage  
Application qualifies for administrative approval.  Yes  No
- II. OPERATOR: Logos Operating, LLC  
ADDRESS: 2010 Afton Place Farmington, NM 87401  
CONTACT PARTY: Marcia Brueggenjohann PHONE: 505-787-2220
- III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection.  
Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project?  Yes  No  
If yes, give the Division order number authorizing the project: \_\_\_\_\_
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.
- VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.
- VII. Attach data on the proposed operation, including:
  1. Proposed average and maximum daily rate and volume of fluids to be injected.
  2. Whether the system is open or closed.
  3. Proposed average and maximum injection pressure.
  4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,
  5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).
- \*VIII. Attach appropriate geologic data on the injection zone including appropriate lithologic detail, geologic name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such sources known to be immediately underlying the injection interval.
- IX. Describe the proposed stimulation program, if any.
- \*X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).
- \*XI. Attach a chemical analysis of fresh water from two or more freshwater wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.
- XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the disposal zone and any underground sources of drinking water.
- XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.
- XIV. Certification: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.  
NAME: Vanessa Fields TITLE: Regulatory Compliance Manager Walsh Engineering  
SIGNATURE:  DATE: September 1, 2021  
E-MAIL ADDRESS: vanessa@walsheng.net
- \* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, please show the date and circumstances of the earlier submittal: \_\_\_\_\_

DISTRIBUTION: Original and one copy to Santa Fe with one copy to the appropriate District Office

Case No. 22155  
Ex. 1

Side 2

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District Offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and the name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) The intended purpose of the injection well; with the exact location of single wells or the Section, Township, and Range location of multiple wells;
- (3) The formation name and depth with expected maximum injection rates and pressures; and,
- (4) A notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, 1220 South St. Francis Dr., Santa Fe, New Mexico 87505, within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

INJECTION WELL DATA SHEET

Side 1

OPERATOR: Logos Operating, LLC

WELL NAME & NUMBER: Quinn #338S API# 30-045-32527

WELL LOCATION: 1690 FSL 1045 FWL  
FOOTAGE LOCATION

K UNIT LETTER SECTION 07 TOWNSHIP 31N RANGE 08W

WELLBORE SCHEMATIC

WELL CONSTRUCTION DATA  
Surface Casing

Hole Size: 12 1/4" Casing Size: 9 5/8" J-55  
Cemented with: 135 sx. or ft<sup>3</sup>  
Top of Cement: 181" Method Determined:

Intermediate Casing

Hole Size: 8 3/4" Casing Size: 7" J-55  
Cemented with: 460 sx. or ft<sup>3</sup>  
Top of Cement: Surface Method Determined:

Production Casing

Hole Size: Casing Size:  
Cemented with: sx. or ft<sup>3</sup>  
Top of Cement: Method Determined:

Total Depth: 3066'  
Injection Interval  
2675' to 3008'

(Perforated or Open Hole; indicate which)  
Pre-perforated line

See Attached

INJECTION WELL DATA SHEET

Tubing Size: 2 3/8" J-55 Lining Material: \_\_\_\_\_

Type of Packer: To be installed Weatherford Arrow 7"X2 7/8" nickel coated packer

Packer Setting Depth: 2550'-2570'

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? Producing Well

2. Name of the Injection Formation: Basin Fruitland Coal

3. Name of Field or Pool (if applicable): Basin Fruitland Coal Gas Pool (71629)

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. \_\_\_\_\_

The Quinn #338S was underreamed from 2675-3008', no perforation was made, just a perforated liner.

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

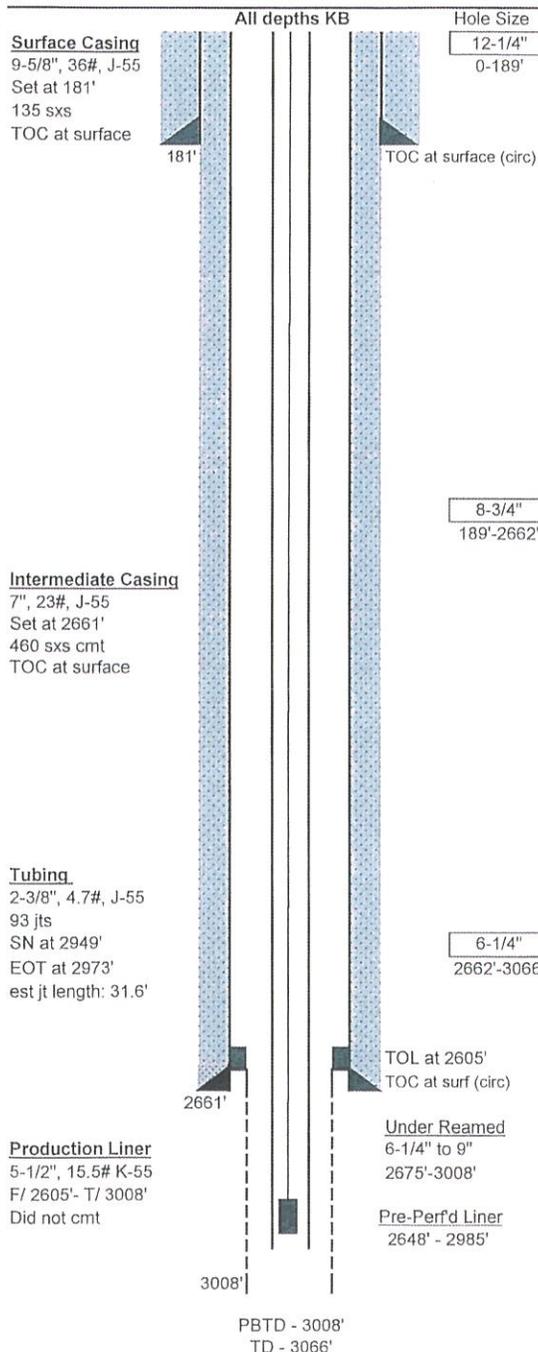
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



Wellbore Schematic

Well Name: Quinn 338S  
 Location: Sec 7, T-31N, R-08W 1690' FSL & 1045' FWL  
 County: San Juan  
 API #: 30-045-32527  
 Co-ordinates: Lat 36.9097176, Long -107.7195969 NAD83  
 Elevations: GROUND: 6112'  
 KB: 6125'  
 Depths (KB): PBTD: 3008'  
 TD: 3066'

Date Prepared: 9/28/2016  
 Last Updated: 9/24/2020 Moss  
 Reviewed By: 10/22/2020 Gomez  
 Spud Date: 5/13/2006  
 Completion Date: 7/6/2006  
 Last Workover Date: 8/18/2008



**Surface Casing: (5/14/06)**  
 Drilled a 12-1/4" surface hole to 189'. Set 9-5/8", 36#, J-55 casing at 181'.  
 Cmt'd with 135 sxs Type III + 3% CaCl + 1/4#/sk Celloflake , circ 11 bbls cmt to surface

**Intermediate Casing: (5/18/06)**  
 Drilled a 8-3/4" intermediate hole to 2662'. Set 7", 23#, J-55 csg at 2661'  
 Cmt lead w/ 360 sxs Prem lite + 3% CaCl + 1/4#/sk Celloflake + 5#/sk LCM-1  
 + 0.4% FL-52 + 8% bentonite + 0.4% sodium metasilicate  
 Cmt tail w/ 100 sxs Type III + 1% CaCl + 1/4#/sk Celloflake + 0.2% FL-52  
 Circ 33 bbls cmt to surface

**Production Casing Liner: (7/06/06)**  
 Drilled a 6-1/4" production hole to 3066'. Under reamed 6-1/4" to 9" F/ 2675' - T/ 3008'.  
 Set 10 jnts, 5-1/2", 15.5#, K-55. From top to bottom: blank, 8 pre-perfd, blank.  
 Liner set F/ 2605' - T/ 3008'. Did not cmt

Tubing: (08/02/07)	Length (ft)
KB	13
(93) 2-3/8", 4.7#, J-55	2935.73
(1) SN (1.78" ID)	1.1
(1) 2-3/8" x 23' muleshoe	23

Set at: 2973 ft

**Rods: (08/18/08)**

1-1/4" x 22' polish rod	22
(114) 3/4" rods	2850
(3) 1-1/4" sinker bars	75
2" x 1-1/2" x 14' pump w/ FARR plunger	14

**Pumping Unit:**  
 Luffkin 114D-143-64, 3rd crank hole, 40" stroke

**Perforations: (07/06/06)**  
 Perforated liner: 2648-2985, 2SPF, 674 holes, 0.5".  
 Liner jnts top to bottom: 1 blank, 8 pre-perfd, 1 blank.

**Formations:**

Ojo Alamo-	1675'
Kirtland-	1736'
Fruitland Coal-	2448'

**Workover History:**

(05/17/07) Replaced pump  
 (07/10/07) Pump was found stuck with coal fines. Tagged fill at 2993', C/O to PBTD.  
 Ran a 24' muleshoe BHA landed EOT at 2988' w/ SN at 2963'. Replaced pump.  
 (07/31/07) Tbg jt #74 had a collar leak and was replaced, as well as 8 plugged  
 tbg joints and 23' Mud Anchor. Landed EOT at 2972' w/ SN at 2948'.  
 (08/18/08) Replaced pump w/ 2"x1-1/2"x14' top hold down pump dressed w/ 4' Farr plunger

**\*\*Max deviation 1.25 degrees at 662'**

6

**Project Scope:**

The Quinn No. 338S is drilled to the Fruitland Coal Formation to a total depth (PBSD) of 3,008 and with an open hole completion from 2,675' to 3,008'. LOGOS proposes to convert and equip the well as a Class II injection well for the injection of carbon dioxide through the open hole interval to support a CO<sub>2</sub> and enhanced gas recovery pilot project.

The proposed injection zones are permeable coal intervals within the Upper Cretaceous Fruitland Formation (**Basin Fruitland Coal Pool**). The proposed test is expected to encounter multiple separate coal bearing packages between depths of 2708' to 2990' as seen on the mud log. The test is expected to penetrate approximately 65' of net coal with an average bulk density of 1.63 g/cc (based on Symour 6B 30-045-29892-000, the closest offset with good density log). Estimated formation tops:

<u>Formation</u>	<u>MD</u>	<u>SSTVD</u>
Ojo Alamo	1675	4437
Kirtland	1736	4376
Fruitland Coal	2448	3664
Pictured Cliffs	2998	3114
TD	3066	3046

Injection operations through the well will be conducted at an anticipated average daily injection pressure of 200 psi, and at a maximum of 1,200 psi. Applicant proposes injection of carbon dioxide at average daily rates of approximately 250 Mcf/day and at maximum daily rates of approximately 3,500 Mcf/day. The source of the injected carbon dioxide gas will be from area production wells. During the initial course of pilot project operations, LOGOS reasonably expects that injection gas volumes will be contained in formation and within the half-mile radius from the Quinn No. 338S.

	<b>Quinn 338S</b>	<b>Jacquez 331S</b>	<b>Nordhaus 714S</b>	<b>Oxnard 332S</b>
	3004532527	3004532508	3004532591	3004533511
Well type	Shut In	Producer	Producer	Producer
Construction				
Date drilled (spud)	5/13/2006	10/22/2005	5/17/2006	5/4/2006
Date completed (1st prod)	7/1/2006	10/28/2005	8/5/2006	9/1/2006
Location	31N 08W 07K NE SW	31N 08W 07C NE NW	31N 09W 12O SW SE	31N 08W 07P SE SE
Lat	36.9097176	36.9171486	36.9077835	36.9080238
Long	-107.7195969	-107.7208023	-107.7285995	-107.7100677
Depth	3066	3118	3429	3472
Record of completion	7/6/2006	10/28/2005	8/9/2006	8/17/2006
Schematic of plugging	N/A	N/A	N/A	N/A

Only after a sufficient period to allow for the analysis of the injection process and the effect on reservoir performance will Applicant be able to determine whether the subject lands and adjacent tracts "can best be developed and operated as a unit" in accordance with NMSA Section 70-7-4 C of the Statutory Unitization Act.

320-acre spacing units are specified for development within the Basin-Fruitland Coal Gas Pool. (Order No. R-8768 B). Accordingly) under the provisions of Division Rule 'KMAC 19.15.26 8. F (2), a project area consisting of the spacing unit for the Quin No. 338S and the adjoining and cornering 320-acre units comprising a total pilot project area of 2,609 acres+ would be indicated. However, before the results of the pilot project are known, including the up-front costs and efforts that would be associated with re-dedicating the currently developed acreage within the 2,609 acres to a statutory unit are not warranted.

In lieu of designating a 2,609-project area, LOGOS proposes that a pilot project study area limited to those lands within a half-mile area of review from the Quinn No. 338S located on portions of the following:

**Township 31 North. Range 8 West**

Section 7  
Section 18

**Township 31 North, Range 9 West**

Section 12  
Section 13

It is reasonably expected that the analysis of data resulting from the conduct of the injection pilot project will lead to the development and production of additional coalbed methane reserves that would otherwise remain unrecovered and would yield additional environmental benefits. Logos Resources LLC proposed injection operations can also be conducted in a safe and responsible manner without causing waste, impairing correlative rights, or endangering fresh water, public health, or the environment.

### Geologic Review

The San Jose Formation of Eocene age occurs in New Mexico and Colorado, and its outcrop forms the land surface over much of the eastern half of the central basin. It overlies the Nacimiento Formation in the area generally south of the Colorado-New Mexico State line and overlies the Animas Formation in the area generally north of the State line. The San Jose Formation was deposited in various fluvial-type environments. In general, the unit consists of an interbedded sequence of sandstone, siltstone, and variegated shale. Thickness of the San Jose Formation generally increases from west to east (200 feet in the west and south to almost 2,700 feet in the center of the structural basin). Ground water is associated with alluvial and fluvial sandstone aquifers. Thus, the occurrence of ground water is mainly controlled by the distribution of sandstone in the formation. The distribution of such sandstone is the result of original depositional extent plus any post-depositional modifications, namely erosion and structural deformation. Transmissivity data for San Jose Formation are minimal. Values of 40 and 120 feet squared per day were determined from two aquifer tests (Stone et al, 1983, table 5). The reported or measured discharge from 46 water wells completed in San Jose Formation ranges from 0.15 to 61 gallons per minute and the median is 5 gallons per minute. Most of the wells provide water for livestock and domestic use. The San Jose Formation is very suitable unit for recharge from precipitation because soils that form on the unit are sandy and highly permeable and therefore readily absorb precipitation. However, low annual precipitation, relatively high transpiration and evaporation rates, and deep dissection of the San Jose Formation by the San Juan River and its tributaries all tend to reduce the effective recharge to the unit.

Stone et al., 1983, Hydrogeology and Water Resources of the San Juan Basin, New Mexico: Socorro, New Mexico Bureau of Mines and Mineral Resources Hydrologic Report 6, 70 p.

**Water Sources:**

Two water wells have been drilled within a 2-mile radius of the proposed test according to review of records from the New Mexico Office of the State Engineer. SJ 04122 POD1, located in NE/4 of Section 12-T31N-R9W was drilled by Bailey Drilling Company in March 2015 to a depth of 650' and reportedly encountered water bearing sand between depths of 560' to 650'. Casing was set to 650', slotted from 550'-650'. No water sample analysis data is available, but the water is being used for livestock watering and is considered a shallow water source. SJ 03769 POD1, located in NE/4 of Section 14-T31N-R9W was drilled by Terry Hood in November 2006 to a depth of 485' and reportedly encountered water bearing sands between depths of 395' to 455'. Casing was set to 485' and perforated from 385' to 485'. No water sample analysis data is available, but the water is being used for livestock watering and is considered a shallow water source. Approximately 4 miles away, the Pump Mesa Water Well #1, located in SW/4 of Section 32-T31N-R8W, was drilled by El Paso Natural Gas in 1975 for use as a water supply well for drilling and workover operations. It was drilled and cased to a total depth of 2003'. Casing is believed to be perforated in sand intervals between depths of 546' to 1934'. Those perforations from 1862' to 2034' are placed in Ojo Alamo sand. All perforations higher in the wellbore are placed in Tertiary age sands. All water samples from the Pump Mesa Water Well #1 have total dissolved solid concentrations greater than 10,000 mg/l. There are no existing drinking water source wells located within a 2-mile radius of the proposed test. No existing underground drinking water sources are located below the Fruitland Formation within a 2-mile radius of the proposed location. This information was verified through New Mexico's Water Rights Reporting System verifying records in the following areas.

07 31N 08W

06 31N 08W

0732N 08W

9/3/2021 10 nmwrrs.ose.state.nm.us/ReportProxy?queryData=%7B"report"%3A"waterColumn"%2C%0A"BasinDiv"%3A"true"%2C%0A"Basin"%3A""%...



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

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

No records found.

**PLSS Search:**

**Section(s):** 07      **Township:** 31N      **Range:** 08W

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

9/3/21 3:39 PM

WATER COLUMN/ AVERAGE  
DEPTH TO WATER

9/3/2021 11 nmwrrs.ose.state.nm.us/ReportProxy?queryData=%7B"report"%3A"waterColumn"%2C%0A"BasinDiv"%3A>true"%2C%0A"Basin"%3A""%...



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

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

No records found.

**PLSS Search:**

**Section(s):** 06      **Township:** 31N      **Range:** 08W

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

9/3/21 3:39 PM

WATER COLUMN/ AVERAGE  
DEPTH TO WATER

9/3/2021 12 nmwrrs.ose.state.nm.us/ReportProxy?queryData=%7B"report"%3A"waterColumn"%2C%0A"BasinDiv"%3A>true"%2C%0A"Basin"%3A""%...



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

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

No records found.

**PLSS Search:**

**Section(s):** 07      **Township:** 32N      **Range:** 08W

The data is furnished by the NMOSE/ISC and is accepted by the recipient with the expressed understanding that the OSE/ISC make no warranties, expressed or implied, concerning the accuracy, completeness, reliability, usability, or suitability for any particular purpose of the data.

9/3/21 3:39 PM

WATER COLUMN/ AVERAGE  
DEPTH TO WATER

13

XII. Affirmative Statement of Examination of Geologic and Engineering Data

Based on the available engineering and geologic data we find no evidence of open faults or any other hydrologic connection between the disposal zone (in the Quinn #338S) and any subsurface sources of drinking water.

Name: Marcia Brueggenjohann

Title: Vice President of Reservoir Engineering

Signature: Marcia Brueggenjohann

Date: 8.31.2021

DISTRICT I 15  
1625 N. French Dr., Hobbs, N.M. 88240

State of New Mexico  
Energy, Minerals & Natural Resources Department

**RECEIVED**

Form C-102  
August 16, 2000

DISTRICT II  
911 South First, Artesia, N.M. 88210

**OIL CONSERVATION DIVISION**

Submit to Appropriate District Office  
State Lease - 4 Copies  
Fee Lease - 3 Copies

DISTRICT III  
1000 Rio Brazos Rd., Artesia, N.M. 87410

2040 South Pacheco  
Santa Fe, NM 87505

Bureau of Land Management  
Farmington Field Office

DISTRICT IV  
2040 South Pacheco, Santa Fe, NM 87505

**AMENDED REPORT**

**WELL LOCATION AND ACREAGE DEDICATION PLAT**

*API Number 30-039-045-32527		*Pool Code 71629	*Pool Name Basin Fruitland Coal
*Property Code 7407 ✓	*Property Name QUINN		*Well Number 338S ✓
*OGRID No. 14538 ✓	*Operator Name BURLINGTON RESOURCES OIL AND GAS, INC.		*Elevation 6112' ✓

**10 Surface Location**

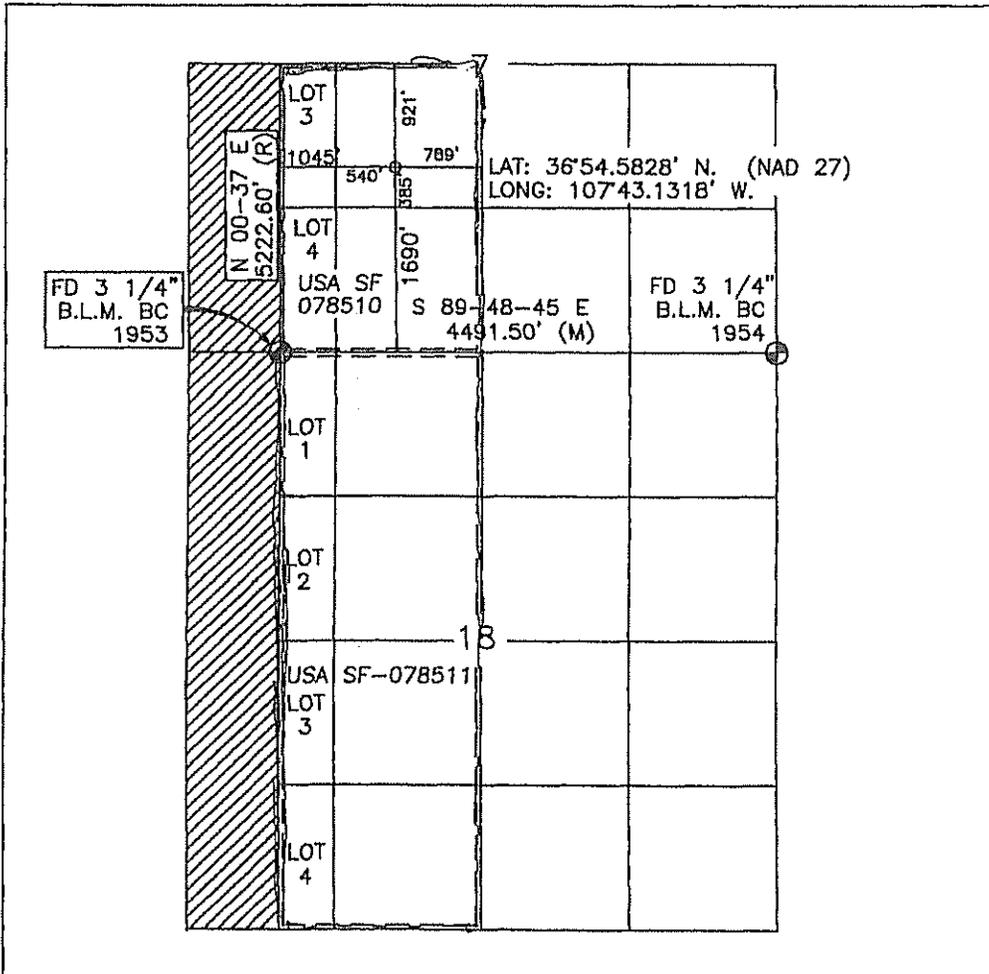
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
K	7	31-N	8-W		1690'	SOUTH	1045'	WEST	SAN JUAN

**11 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
Dedicated Acres 330.16		Joint or Infill		Consolidation Code		Order No. R-9315 tract Sec. 7, Lots 3, 4, E/2 SW/4 #3 Sec. 18, Lots 1-4, E/2 W/2			

**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**

18



**17 OPERATOR CERTIFICATION**

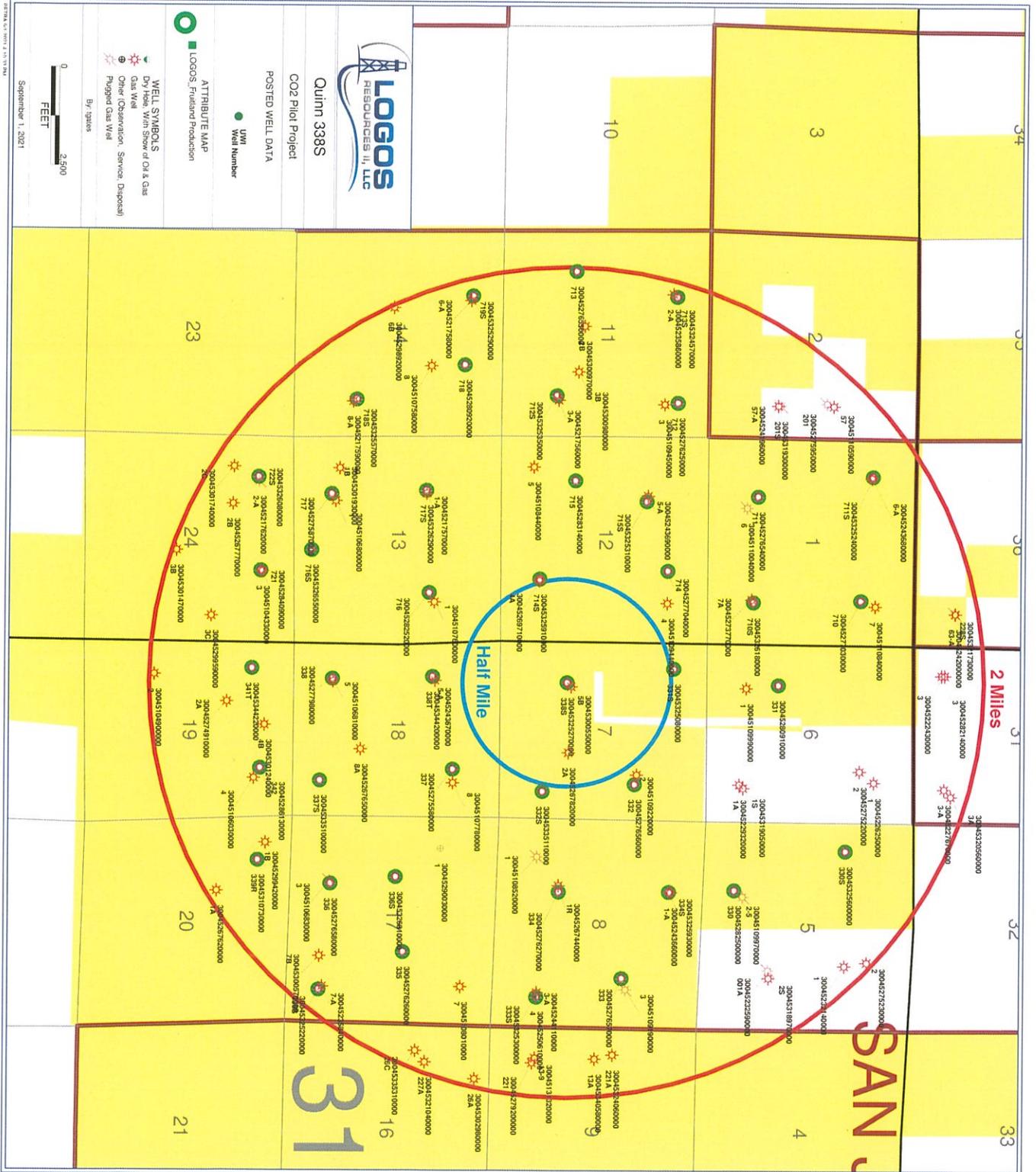
I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief

*Joni Clark*  
Signature  
Joni Clark  
Printed Name  
Regulatory Specialist  
Title  
8-4-04  
Date

**18 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.

SEP 16 2002  
Date of Survey  
Signature and Seal of Professional Surveyor:  
*[Signature]*  
REGISTERED PROFESSIONAL SURVEYOR  
14827  
Certificate Number



## Half Mile to One Mile Area

#	API	Well Name	Well Type	Well Status	Operator Name
1	30-045-32527	Quinn #338S	Gas	Active	Logos Operating, LLC
2	30-045-26782	Oxnard #002A	Gas	Active	Hilcorp Energy Company
3	30-045-30055	Quinn #005B	Gas	Active	Hilcorp Energy Company
4	30-045-10760	Teel #001	Gas	Active	Hilcorp Energy Company
5	30-045-10852	Oxnard #001/Pre-Ongard Well #001	Gas	Plugged (site released)	Pre-Ongard Well Operator
6	30-045-10999	Jacquez #001	Gas	Active	Hilcorp Energy Company
7	30-045-10922	Oxnard #002A	Gas	Active	Hilcorp Energy Company
8	30-045-10944	Nordhaus #004	Gas	Active	Hilcorp Energy Company
9	30-045-10778	Quinn #008	Gas	Active	Hilcorp Energy Company
10	30-045-26971	Nordhaus #004A	Gas	Active	Hilcorp Energy Company
11	30-045-24367	Quinn #005A	Gas	Active	Hilcorp Energy Company
12	30-04524369	Nordhaus #005A	Gas	Active	Hilcorp Energy Company
13	30-045-27377	Nordhaus #007A	Gas	Active	Hilcorp Energy Company
14	30-045-27656	Oxnard #332	Gas	Active	Logos Operating, LLC
15	30-045-27558	Quinn #337	Gas	Active	Logos Operating, LLC
16	30-045-27704	Nordhaus #714	Gas	Active	Logos Operating, LLC
17	30-045-28314	Nordhaus #715	Gas	Active	Logos Operating, LLC
18	30-045-28252	Nordhaus #716	Gas	Active	Logos Operating, LLC
19	30-045-22932	Jacquez #001A	Gas	Active	Simcoe LLC
20	30-045-31905	Jacquez #002S	Gas	Active	Simcoe LLC
21	30-045-32508	Jacquez #331S	Gas	Active	Logos Operating, LLC
22	30-045-33511	Oxnard #332S	Gas	Active	Logos Operating, LLC
23	30-045-34420	Quinn #338T	Gas	Active	Logos Operating, LLC
24	30-045-32618	Nordhaus #710S	Gas	Active	Logos Operating, LLC
25	30-045-32591	Nordhaus #714S	Gas	Active	Logos Operating, LLC
26	30-045-32531	Nordhaus #715S	Gas	Active	Logos Operating, LLC



#	API	2 Mile Area Well Name	Well Type	Well Status	Operator Name
27	30-045-10680	Nordhaus #001	Gas	Active	Hilcorp Energy Company
28	30-045-22625	Jacquez #001	Gas	Active	Simcoe LLC
29	30-045-23214	Blanco #001	Gas	Plugged (site released)	BP American Production Co.
30	30-045-29003	Quinn Pow #001	Miscellaneous	Approved Temporary Abandonment	Hilcorp Energy Company
31	30-045-10490	Quinn #002	Gas	Active	Hilcorp Energy Company
32	30-045-27522	Jacquez #002S	Gas	Active	Simcoe LLC
33	30-045-27523	Blanco #002	Gas	Active	Simcoe LLC
34	30-045-10433	Seymour #003	Gas	Active	Hilcorp Energy Company
35	30-045-10683	Quinn #003	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
36	30-045-10919	Oxnard #003	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
37	30-045-10945	Nordhaus #003	Gas	Active	Hilcorp Energy Company
38	30-045-22243	Gardner #003	Gas	Active	Hilcorp Energy Company
39	30-045-28214	Gardner C #003	Gas	Active	Hilcorp Energy Company
40	30-045-10603	Quinn #004	Gas	Active	Hilcorp Energy Company
41	30-045-25061	Oxnard #004/Pre-Ongard Well #004	Gas	Plugged (site released)	Pre-Ongard Well Operator
42	30-045-10681	Quinn #005	Gas	Active	Hilcorp Energy Company
43	30-045-10844	Nordhaus #005A	Gas	Active	Hilcorp Energy Company
44	30-045-11004	Nordhaus #006	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
45	30-045-10801	Quinn #007	Gas	Active	Hilcorp Energy Company
46	30-045-11084	Nordhaus #007A	Gas	Active	Hilcorp Energy Company
47	30-045-10758	Seymour #008	Gas	Active	Hilcorp Energy Company
48	30-045-11059	San Juan 32-9 Unit #057	Gas	Active	Hilcorp Energy Company
49	30-045-27595	San Juan 32-9 Unit #201	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP

#	API	Well Name	Well Type	Well Status	Operator Name
50	30-045-27920	San Juan 32 8 Unit #221	Gas	Active	Hilcorp Energy Company
51	30-045-28250	Blanco #330	Gas	Active	Logos Operating, LLC
52	30-045-28091	Jaquez #331	Gas	Active	Logos Operating, LLC
53	30-045-27657	Oxnard #333	Gas	Active	Logos Operating, LLC
55	30-045-27626	Quinn #335	Gas	Active	Logos Operating, LLC
56	30-045-27658	Quinn #336	Gas	Active	Logos Operating, LLC
57	30-045-27798	Quinn #338	Gas	Active	Logos Operating, LLC
58	30-045-28613	Quinn #342	Gas	Active	Logos Operating, LLC
59	30-045-27703	Nordhaus #710S	Gas	Active	Logos Operating, LLC
60	30-045-27654	Nordhaus #711	Gas	Active	Logos Operating, LLC
61	30-045-27625	Nordhaus #712	Gas	Active	Logos Operating, LLC
62	30-045-27655	Nordhaus #713	Gas	Active	Logos Operating, LLC
63	30-045-27587	Nordhaus #717	Gas	Active	Logos Operating, LLC
64	30-045-28092	Seymour #718	Gas	Active	Logos Operating, LLC
65	30-045-28409	Seymour #721	Gas	Active	Logos Operating, LLC
67	30-045-23259	Bianco #001A	Gas	Plugged (site released)	BP American Production Co.
68	30-045-13132	San Juan 32 8 Unit #013	Gas	Active	Hilcorp Energy Company
69	30-045-34058	San Juan 32 8 Unit #013A	Gas	Active	Hilcorp Energy Company
70	30-045-26762	Quinn #001A	Gas	Active	Hilcorp Energy Company
71	30-045-21757	Nordhaus #001A	Gas	Active	Hilcorp Energy Company
72	30-045-24366	Oxnard #001A	Gas	Active	Hilcorp Energy Company
73	30-045-29942	Quinn #001B	Gas	Active	Hilcorp Energy Company
74	30-045-30193	Nordhaus #001B	Gas	Active	Hilcorp Energy Company
75	30-045-26744	Oxnard #001R	Gas	Active	Hilcorp Energy Company
76	30-045-31930	San Juan 32 9 Unit #201S	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
77	30-045-32406	San Juan 32 8 Unit #221A	Gas	Active	Hilcorp Energy Company
78	30-045-32104	San Juan 32 8 Unit #227A	Gas	Active	Hilcorp Energy Company
79	30-045-32173	San Juan 32 9 Unit #228S	Gas	Active	Hilcorp Energy Company
80	30-045-30298	San Juan 32 8 Unit #026A	Gas	Active	Hilcorp Energy Company

#	API	Well Name	Well Type	Well Status	Operator Name
81	30-045-33531	San Juan 32 8 Unit #026C	Gas	Active	Hilcorp Energy Company
82	30-045-27491	Quinn #002A	Gas	Active	Hilcorp Energy Company
83	30-045-21762	Seymour #002A	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
85	30-045-26777	Seymour #002B	Gas	Active	Hilcorp Energy Company
86	30-045-30097	Nordhaus #002B	Gas	Active	Hilcorp Energy Company
87	30-045-30174	Seymour #002C	Gas	Active	Hilcorp Energy Company
88	30-045-31897	Blanco #002S	Gas	Active	Simcoe LLC
89	30-045-32560	Blanco #330S	Gas	Active	Logos Operating, LLC
90	30-045-32530	Oxnard #333S	Gas	Active	Logos Operating, LLC
91	30-045-32593	Oxnard #334S	Gas	Active	Logos Operating, LLC
92	30-045-32522	Quinn #335S	Gas	Active	Logos Operating, LLC
93	30-045-32681	Quinn #336S	Gas	Active	Logos Operating, LLC
94	30-045-33510	Quinn #337S	Gas	Active	Logos Operating, LLC
95	30-045-31073	Quinn #339R	Gas	Active	Logos Operating, LLC
96	30-045-34422	Quinn #341T	Gas	Active	Logos Operating, LLC
97	30-045-32056	Gardner C #003A	Gas	Active	Hilcorp Energy Company
98	30-045-21756	Nordhaus #003A	Gas	Active	Hilcorp Energy Company
99	30-045-22767	Gardner #003A	Gas	Active	Hilcorp Energy Company
100	30-045-24411	Oxnard #003A	Gas	Active	Hilcorp Energy Company
101	30-045-30098	Nordhaus #003B	Gas	Active	Hilcorp Energy Company
102	30-045-30147	Seymour #003B	Gas	Active	Hilcorp Energy Company
103	30-045-29959	Seymour #003C	Gas	Active	Hilcorp Energy Company
104	30-045-30124	Quinn #004B	Gas	Active	Hilcorp Energy Company
105	30-045-24196	San Juan 32 9 Unit #057A	Gas	Active	Hilcorp Energy Company
106	30-045-24200	San Juan 32 9 Unit #063A	Gas	Plugged (site released)	Burlington Resources Oil&Gas Company LP
107	30-045-21758	Seymour #006A	Gas	Active	Hilcorp Energy Company
108	30-045-24368	Nordhaus #006A	Gas	Active	Hilcorp Energy Company
109	30-045-29892	Seymour #006B	Gas	Active	Hilcorp Energy Company



23

#	API	Well Name	Well Type	Well Status	Operator Name	ph	hrs mgl	sodium mgl	calcium mgl	iron mgl	magnesium mgl	manganese mgl	chloride mgl	bicarbonate mgl	sulfate mgl
1	30-045-32527	Quinn #338S	Gas	Active	Logos Operating, LLC	7.7	8373	2044.54	119.62	449.33	7.96	1.7	1552.71	4099	50.55
2	30-045-26782	Oxnard #002A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
3	30-045-30055	Quinn #005B	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
4	30-045-10760	Teal #001	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
5	30-045-10852	Oxnard #001/Pre-Oxnard Well #001	Gas	Plugged (site released)	Pre-Oxnard Well Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
6	30-045-10899	Jacquez #001	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
7	30-045-10822	Oxnard #002A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
8	30-045-10944	Northhaus #004	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
9	30-045-10778	Quinn #008	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
10	30-045-26871	Northhaus #004A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
11	30-045-24367	Quinn #005A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
12	30-04524369	Northhaus #005A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
13	30-045-27377	Northhaus #007A	Gas	Active	Hilcorp Energy Company	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator	Unable to obtain analytical results from Operator
14	30-045-27656	Oxnard #332	Gas	Active	Logos Operating, LLC	7.8	12381	3840.13	73.5	46.15	18.99	0.26	2609.12	5685	38.36
15	30-045-27558	Quinn #337	Gas	Active	Logos Operating, LLC	8.1	10557	2907.1	14.09	28.15	8.57	0.25	2029.51	5490	20.2
16	30-045-27704	Northhaus #714	Gas	Active	Logos Operating, LLC	8.18	9253	3147.8	14.7	0.8	6.2	0.5	4000	2080	1
17	30-045-28314	Northhaus #715	Gas	Active	Logos Operating, LLC	7.36	13,417	4471.8	21	1.2	8.8	1.5	5000	3910	0
18	30-045-28252	Northhaus #716	Gas	Active	Logos Operating, LLC	8.13	11,998	3865.7	29.4	1.2	12.3	2	4000	4070	0
19	30-045-22932	Jacquez #001A	Gas	Active	Simcoe LLC	no water	8,990	4,040	7.17	ND	6.65	NA	2,030		ND
20	30-045-31905	Jacquez #002	Gas	Active	Simcoe LLC	8.2	6660	2750	5.02	ND	8.63	NA	1660	NA	ND
21	30-045-31905	Jacquez #002S	Gas	Active	Simcoe LLC	7.68	6660	2750	5.02	ND	8.63	NA	1660	NA	ND
22	30-045-32508	Jacquez #331S	Gas	Active	Logos Operating, LLC	6.68	6371	2177.8	33.6	43.2	14.4	0	3500	600	2
23	30-045-33511	Oxnard #332S	Gas	Active	Logos Operating, LLC	8	12127	3264.12	21.93	162.73	16.61	1.98	2397.94	6173	37.54
24	30-045-34420	Quinn #338T	Gas	Active	Logos Operating, LLC	7.9	11608	3782.22	26.51	6.04	16.25	0	3020.34	4514	34.26
25	30-045-32618	Northhaus #710S	Gas	Active	Logos Operating, LLC	no water	14075	4634.3	29.4	2	12.3	1	5000	4390	0
26	30-045-32591	Northhaus #714S	Gas	Active	Logos Operating, LLC	8.4	14075	4634.3	29.4	2	12.3	1	5000	4390	0
27	30-045-32531	Northhaus #715S	Gas	Active	Logos Operating, LLC	8.29	14594	4810.4	10.5	2.4	4.4	0	5000	4760	0



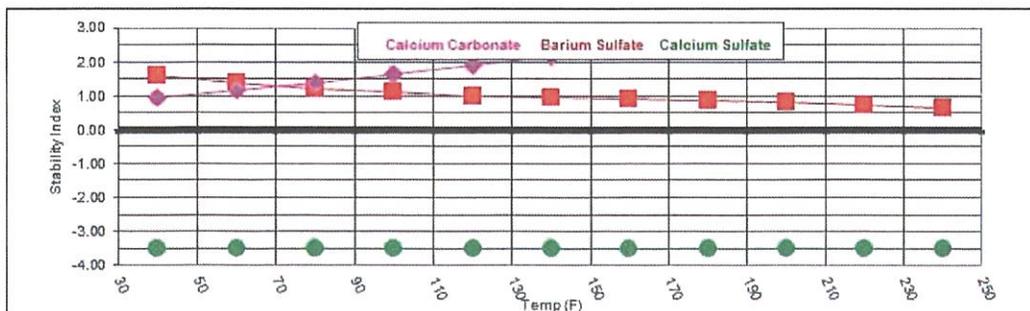
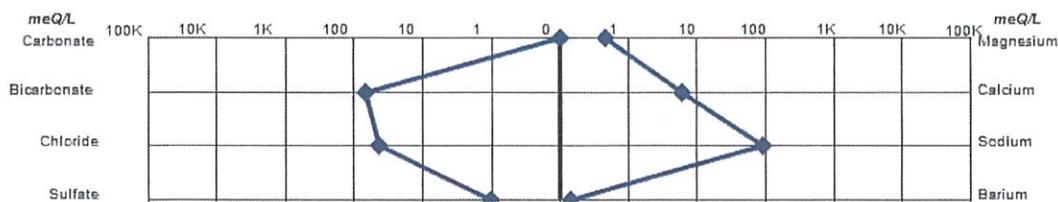
To: Smart Chemical Services	Lab #: 45751
Lease: Logos	Sample Date: 07/13/16
Well No.: Quinn 338S	Sample Analyzed: 07/20/16-07/22/16
Location: Wellhead	Analyzed By: V.W./G.R.

<u>Analysis</u>	
Specific Gravity (74°F)	1.0011
pH, Field Determined	7.7
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	1.40
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	2.18
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<u>Dissolved Gases</u>	
	<u>mg/l</u>
Hydrogen Sulfide (H <sub>2</sub> S), Field	0
Carbon Dioxide (CO <sub>2</sub> ), Field	88
CO % in Gas, Field	9

<u>Probable Mineral Comp.</u>	<u>mg/l</u>
Ca(HCO <sub>3</sub> ) <sub>2</sub>	483.73
CaSO <sub>4</sub>	16.23
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	47.93
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	5086.53
NaSO <sub>4</sub>	64.87
NaCl	2560.33

<u>Cations</u>	<u>mg/l</u>	<u>meq/l</u>	<u>Anions</u>	<u>mg/l</u>	<u>meq/l</u>
Sodium (Na)	2044.54	88.93	Chloride (Cl)	1552.71	43.69
Calcium (Ca)	119.62	5.95	Bicarbonate (HCO <sub>3</sub> ), Field	4099.00	67.17
Magnesium (Mg)	7.96	0.66	Carbonate (CO <sub>3</sub> ), Field	0.00	0.00
Potassium (K)	39.35	1.01	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	448.33	16.06	Sulfate (SO <sub>4</sub> )	50.55	1.05
Barium (Ba)	9.55	0.14			
Manganese (Mn)	1.70	0.06			
Strontium (Sr)	4.90	0.11			

Total Dissolved Solids, Calculated (mg/l)	8373
Total Hardness as mg/l CaCO <sub>3</sub>	332
Resistivity (Ω/m) @ 75°F	0.791



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 Certified QA/QC Geochemist, Neil Ray



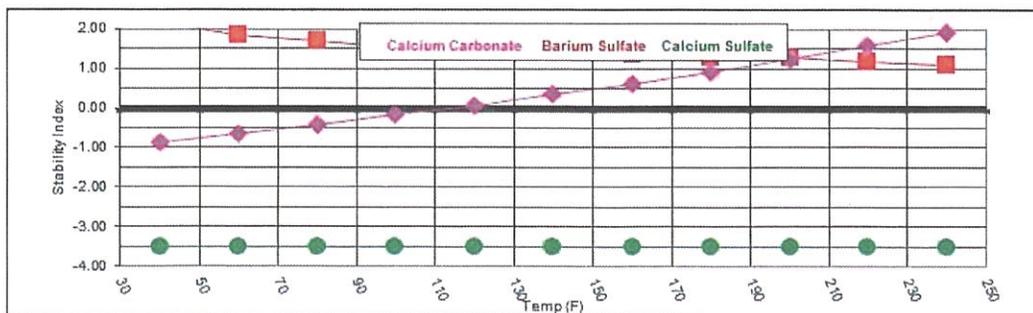
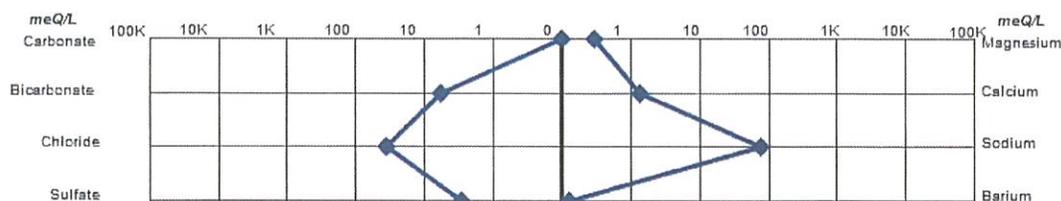
To: Smart Chemical Services	Lab #: 42984
Lease: Logos	Sample Date: 4/18/16
Well No.: Quinn 338S	Sample Analyzed: 4/27/16
Location: Wellhead	Analyzed By: V.W./D.M./G.R.

<u>Analysis</u>	
Specific Gravity (74°F)	1.0000
pH, Lab Measured	7.38
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	-0.42
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	0.35
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<u>Dissolved Gases</u>	
	<u>mg/l</u>
Hydrogen Sulfide (H <sub>2</sub> S), Field	N/A
Carbon Dioxide (CO <sub>2</sub> ), Calculated	24.89
Dissolved Oxygen (O <sub>2</sub> )	N.D.

<u>Probable Mineral Comp.</u>	<u>mg/l</u>
Ca(HCO <sub>3</sub> ) <sub>2</sub>	108.01
CaSO <sub>4</sub>	11.74
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	34.38
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	345.71
NaSO <sub>4</sub>	202.23
NaCl	2069.31

<u>Cations</u>	<u>mg/l</u>	<u>meq/l</u>	<u>Anions</u>	<u>mg/l</u>	<u>meq/l</u>
Sodium (Na)	1718.89	74.77	Chloride (Cl)	1254.93	35.31
Calcium (Ca)	26.71	1.33	Bicarbonate (HCO <sub>3</sub> )	361.12	5.92
Magnesium (Mg)	5.71	0.47	Carbonate (CO <sub>3</sub> )	0.00	0.00
Potassium (K)	13.41	0.34	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	322.40	11.55	Sulfate (SO <sub>4</sub> )	141.58	2.95
Barium (Ba)	6.91	0.10			
Manganese (Mn)	3.99	0.15			
Strontium (Sr)	4.86	0.11			

Total Dissolved Solids, Calculated (mg/l)	3856
Total Hardness as mg/l CaCO <sub>3</sub>	90
Resistivity (Ω/m) @ 75°F	1.783



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26



DownHole SAT(tm)  
SURFACE WATER DEPOSITION POTENTIAL INDICATORS

Temp. 77F  
Pressure 14.70 psi  
Corrosion Rate (CO2-H2S rate) 0.141 mpy

SATURATION LEVEL		FREE ION MOMENTARY EXCESS (ppm)	
Calcite (CaCO3)	0.188	Calcite (CaCO3)	-5.02
Aragonite (CaCO3)	0.164	Aragonite (CaCO3)	-5.84
Witherite (BaCO3)	0.0342	Witherite (BaCO3)	-21.69
Strontianite (SrCO3)	0.196	Strontianite (SrCO3)	-4.54
Magnesite (MgCO3)	0.0330	Magnesite (MgCO3)	-14.78
Anhydrite (CaSO4)	0.0272	Anhydrite (CaSO4)	-1344
Gypsum (CaSO4*2H2O)	0.0449	Gypsum (CaSO4*2H2O)	-1013
Barite (BaSO4)	1290	Barite (BaSO4)	11.73
Celestite (SrSO4)	0.662	Celestite (SrSO4)	-5.18
Fluorite (CaF2)	0.00	Fluorite (CaF2)	-68.90
Calcium phosphate	0.00	Calcium phosphate	-0.00333
Hydroxyapatite	0.00	Hydroxyapatite	-646.62
Silica (SiO2)	0.00	Silica (SiO2)	-119.24
Brucite (Mg(OH)2)	< 0.001	Brucite (Mg(OH)2)	0.0171
Magnesium silicate	0.00	Magnesium silicate	-245.47
Iron hydroxide (Fe(OH)3)	40017	Iron hydroxide (Fe(OH)3)	< 0.001
Strengite (FePO4*2H2O)	0.00	Strengite (FePO4*2H2O)	>-0.001
Siderite (FeCO3)	4226	Siderite (FeCO3)	1.56
Halite (NaCl)	< 0.001	Halite (NaCl)	-463617
Thenardite (Na2SO4)	< 0.001	Thenardite (Na2SO4)	-130658
Iron sulfide (FeS)	0.00	Iron sulfide (FeS)	-0.00100

SIMPLE INDICES		BOUND IONS	TOTAL	FREE
Langelier	-0.510	Calcium	26.71	16.57
Ryznar	8.40	Barium	6.91	6.91
Puckorius	7.62	Carbonate	1.35	0.806
Larson-Skold Index	13.96	Phosphate	0.00	0.00
Stiff Davis Index	-0.615	Sulfate	2264	1972
Oddo-Tomson	-0.698			

FRENCH CREEK SOFTWARE, INC.  
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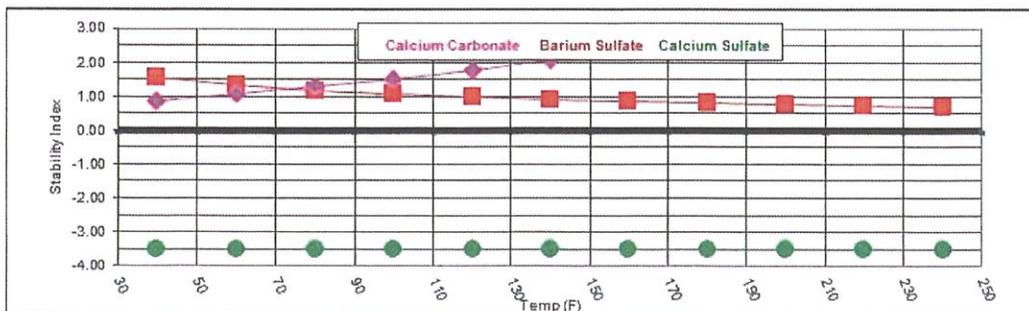
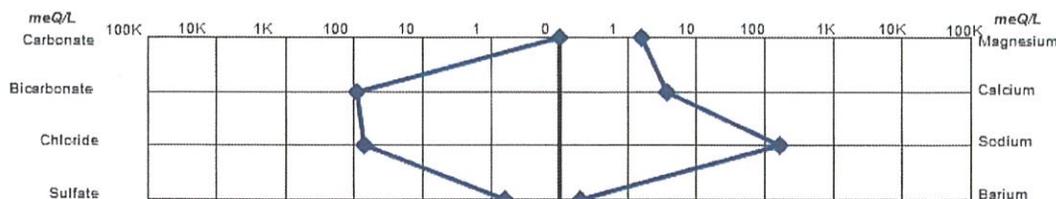
To: Smart Chemical Services	Lab #: 45750
Lease: Logos	Sample Date: 07/13/16
Well No.: Oxnard 332	Sample Analyzed: 07/20/16-07/22/16
Location: Wellhead	Analyzed By: V.W./G.R.

Analysis	
Specific Gravity (74°F)	1.0126
pH, Field Determined	7.8
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	1.29
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	2.08
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<b>Dissolved Gases</b>	
	<b>mg/l</b>
Hydrogen Sulfide (H <sub>2</sub> S), Field	0
Carbon Dioxide (CO <sub>2</sub> ), Field	76
CO% in Gas, Field	19

Probable Mineral Comp.	mg/l
Ca(HCO <sub>3</sub> ) <sub>2</sub>	297.23
CaSO <sub>4</sub>	34.58
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	114.34
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	7387.00
NaSO <sub>4</sub>	35.68
NaCl	4302.29

Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium (Na)	3840.13	167.03	Chloride (Cl)	2609.12	73.41
Calcium (Ca)	73.50	3.66	Bicarbonate (HCO <sub>3</sub> ), Field	5685.00	93.17
Magnesium (Mg)	18.99	1.56	Carbonate (CO <sub>3</sub> ), Field	0.00	0.00
Potassium (K)	49.34	1.26	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	46.15	1.65	Sulfate (SO <sub>4</sub> )	38.36	0.80
Barium (Ba)	20.35	0.30			
Manganese (Mn)	0.26	0.01			
Strontium (Sr)	9.16	0.21			

Total Dissolved Solids, Calculated (mg/l)	12381
Total Hardness as mg/l CaCO <sub>3</sub>	262
Resistivity (Ω/m) @ 75°F	0.515



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 Certified QA/QC Geochemist, Neil Ray



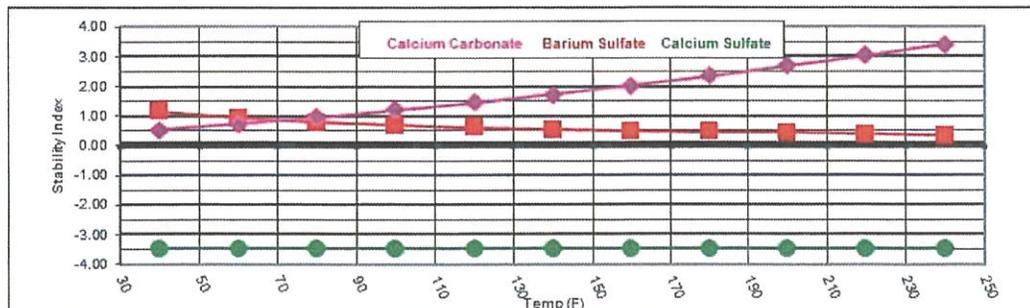
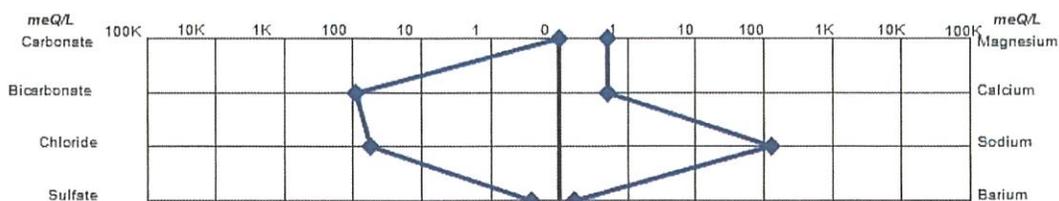
To: Smart Chemical Services	Lab #: 48526
Lease: Logos	Sample Date: 09/20/16
Well No.: Quinn 337	Sample Analyzed: 09/26/16-09/27/16
Location: Wellhead	Analyzed By: V.W./G.R.

Analysis	
Specific Gravity (74°F)	1.0049
pH, Field Determined	8.1
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	0.95
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	1.73
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<b>Dissolved Gases</b>	
	<b>mg/l</b>
Hydrogen Sulfide (H <sub>2</sub> S), Field	3.4
Carbon Dioxide (CO <sub>2</sub> ), Field	62
Oxygen, Field	N.D.

Probable Mineral Comp.	mg/l
Ca(HCO <sub>3</sub> ) <sub>2</sub>	56.98
CaSO <sub>4</sub>	23.88
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	51.60
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	7439.60
NaSO <sub>4</sub>	15.34
NaCl	3346.55

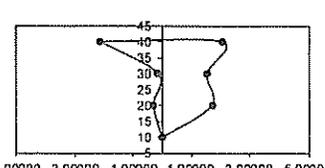
Cations	mg/l	meq/l	Anions	mg/l	meq/l
Sodium (Na)	2907.10	126.45	Chloride (Cl)	2029.51	57.10
Calcium (Ca)	14.09	0.70	Bicarbonate (HCO <sub>3</sub> ), Field	5490.00	89.97
Magnesium (Mg)	8.57	0.71	Carbonate (CO <sub>3</sub> ), Field	0.00	0.00
Potassium (K)	45.31	1.16	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	28.15	1.01	Sulfate (SO <sub>4</sub> )	20.20	0.42
Barium (Ba)	14.05	0.20			
Manganese (Mn)	0.25	0.01			
Strontium (Sr)	5.17	0.12			

Total Dissolved Solids, Calculated (mg/l)	10557
Total Hardness as mg/l CaCO <sub>3</sub>	70
Resistivity (Ω/m) @ 75°F	0.676



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 Certified QA/QC Geochemist, Neil Ray

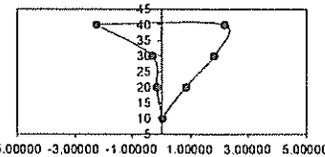
Logos Resources					
County:	San Juan		Field:	Pump Canyon	
State:	NM		Location:	Nordhaus 714	
Sampled at:	WH		Formation:		
Date:	August 18, 2016		Depth:	0	
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	1.0	0.02
Sodium	3,147.8	136.92	Chloride	4,000.0	112.83
Calcium	14.7	0.73	Carbonate	nd	nd
Magnesium	6.2	0.51	Bicarbonate	2,080.0	34.09
Iron	0.8	0.04	Hydroxide	nd	nd
Barium	3.0	0.04			
Strontium	nd	nd			
CATIONS	3,172.5	138.24	ANIONS	6,081.0	146.94
<b>System Parameters</b>					
Total Dissolved Solids @180C			9,253	mg/L	
Sample Temperature, °F			70	F	
Sample pH, standard units			8.18	Units	
Dissolved Oxygen			nd	ppm	
Carbon Dioxide			nd	mg/L	
Total Sulfide, (TS)			nd	mg/L	
Sulfide Ion, (S)			nd	mg/L	
Dissolved Hydrogen Sulfide, (TS-S)			nd	mg/L	
Specific Gravity			1.0064		
Resistivity, measured			nd	ohm/m <sup>3</sup>	
Ionic strength			0.143		
Sulfate Reducing Bacteria			nd		
Aerobic Bacteria			nd		
Manganese Level			0.5	mg/L	
<b>Scaling Tendency</b>					
CACO3		A		CASO4	
Temp F	Stiff Davis Index	index	Temp F	SOLUBILITY Actual	Calculated
32	0.15	4	50	0.02	39.06
50	0.33	7	68	0.02	39.55
68	0.53	9	86	0.02	40.04
77	0.63	10	104	0.02	40.34
86	0.74	10	122	0.02	40.45
104	0.96	11	140	0.02	39.55
122	1.20	12	158	0.02	38.64
140	1.44	12	176	0.02	37.70
158	1.70	13			
176	1.97	13			
Chemical Residuals: 6.5 PPM      Amine Residuals: 0.10 PPM BASO4 SCALE POSSIBLE <span style="border: 1px solid black; padding: 2px;">NO</span> <b>Water Analysis Pattern</b>					
NOTE:Stiff Davis Index -indicates undersaturation. Scale formation negative. 0indicates the water is at saturation point. Scale unlikely. +indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S Index' -indicates undersaturation. Scale formation negative. 0indicates the water is at saturation point. Scale unlikely. +indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation. -Units = pounds of scale produced / 1000 bbls. of water. -A Index <= 0Scale formation negative. -A Index > 0Scale formation positive.					
				Approved: Zech Schaff 08/24/16      v4.01	



Logos									
County:	San Juan		Field:	Pump Canyon					
State:	NM		Location:	Nordhaus 714					
Sampled at:	WH		Formation:						
Date:	August 11, 2016		Depth:	0					
<b>H &amp; M Precision Water Analysis Report</b>									
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L				
Potassium	0.0	0.00	Sulfate	0.0	0.00				
Sodium	2,833.5	123.25	Chloride	3,500.0	98.72				
Calcium	18.9	0.94	Carbonate	0.0	0.00				
Magnesium	7.9	0.65	Bicarbonate	2,140.0	35.07				
Iron	4.4	0.24	Hydroxide	0.0	0.00				
Barium	1.0	0.01	-	0.0	0.00				
Strontium	0.0	0.00	-	0.0	0.00				
CATIONS	2,865.7	125.09	ANIONS	5,640.0	133.79				
<b>System Parameters</b>									
Total Dissolved Solids @180C					8,506 mg/L				
Sample Temperature, °F					70 F				
Sample pH, standard units					7.89 Units				
Dissolved Oxygen					0.0 ppm				
Carbon Dioxide					0.0 mg/L				
Total Sulfide, (TS)					0.0 mg/L				
Sulfide Ion, (S)					0 mg/L				
Dissolved Hydrogen Sulfide, (TS-S)					0 mg/L				
Specific Gravity					1.0058				
Resistivity, measured					0 ohm/m^3				
Ionic strength					0.130				
Sulfate Reducing Bacteria					nd				
Aerobic Bacteria					nd				
Manganese Level					0.5 mg/L				
<b>Scaling Tendency</b>									
CACO3		A		SOLUBILITY		CASO4			
Temp F	Stiff Davis Index	A Index	Temp F	Actual	Calculated	S Index	A Index		
32	0.01	0	50	0.00	37.64	-37.64	-897		
50	0.20	6	68	0.00	38.16	-38.16	-909		
68	0.40	10	86	0.00	38.66	-38.66	-922		
77	0.50	11	104	0.00	38.96	-38.96	-929		
86	0.61	12	122	0.00	39.06	-39.06	-931		
104	0.83	14	140	0.00	38.16	-38.16	-910		
122	1.06	15	158	0.00	37.25	-37.25	-888		
140	1.30	16	176	0.00	36.30	-36.30	-865		
158	1.55	16							
176	1.81	16							
Chemical Residuals: 9.1 PPM		Amine Residuals: 1.00 PPM							
BASO4 SCALE POSSIBLE		<b>NO</b>		<u>Water Analysis Pattern</u>					
NOTE:Stiff Davis Index		40 30 20 10 10 20 30 40							
-indicates undersaturation. Scale formation negative.									
0indicates the water is at saturation point. Scale unlikely.									
+indicates supersaturation. A positive scaling condition exists.									
NOTE:Skillman Method Calcium Sulfate 'S' Index									
-indicates undersaturation. Scale formation negative.									
0indicates the water is at saturation point. Scale unlikely.									
+indicates supersaturation. A positive scaling condition exists.									
NOTE:A Index; worst possible case. Assumes 100% precipitation.									
-Units = pounds of scale produced / 1000 bbls. of water.									
-A Index <= 0Scale formation negative.									
-A Index > 0Scale formation positive.									
				Approved: Zech Schaff					
				08/15/16		v4.01			

Logos Resources					
County:	San Juan		Field:	Pump Canyon	
State:	NM		Location:	Nordhaus 715	
Sampled at:	WH		Formation:		
Date:	August 18, 2016		Depth:	0	
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	0.0	0.00
Sodium	4,471.8	194.51	Chloride	5,000.0	141.03
Calcium	21.0	1.05	Carbonate	nd	nd
Magnesium	8.8	0.73	Bicarbonate	3,910.0	64.08
Iron	1.2	0.06	Hydroxide	nd	nd
Barium	4.0	0.06			
Strontium	nd	nd			
<b>Analysis:</b>					
<b>Balanced</b>					
CATIONS	4,506.8	196.41	ANIONS	8,910.0	205.11
<b>System Parameters</b>					
Total Dissolved Solids @180C			13,417	mg/L	
Sample Temperature, 'F			70	F	
Sample pH, standard units			7.36	Units	
Dissolved Oxygen			nd	ppm	
Carbon Dioxide			nd	mg/L	
Total Sulfide, (TS)			nd	mg/L	
Sulfide Ion, (S)			nd	mg/L	
Dissolved Hydrogen Sulfide, (TS-S)			nd	mg/L	
Specific Gravity			1.0087		
Resistivity, measured			nd	ohm/m*3	
Ionic strength			0.202		
Sulfate Reducing Bacteria			nd		
Aerobic Bacteria			nd		
Manganese Level			1.5	mg/L	
<b>Scaling Tendency</b>					
CACO3			CASO4		
Temp F	Stiff Davis Index	A index	Temp F	SOLUBILITY Actual	Calculated
32	-0.36	-24	50	0.00	44.30
50	-0.19	-10	88	0.00	44.72
68	0.01	0	86	0.00	45.15
77	0.11	4	104	0.00	45.43
86	0.21	7	122	0.00	45.57
104	0.44	12	140	0.00	44.68
122	0.68	14	158	0.00	43.77
140	0.94	16	176	0.00	42.84
158	1.21	17			
176	1.50	18			
<b>Water Analysis Pattern</b>					
40 30 20 10 10 20 30 40					
Chemical Residuals:	na	PPM	Amine Residuals:	na	PPM
BASO4 SCALE POSSIBLE	<b>NO</b>				
NOTE:Stiff Davis Index					
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' Index					
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index, worst possible case. Assumes 100% precipitation.					
-Units = pounds of scale produced / 1000 bbbls. of water.					
-A Index =< 0Scale formation negative.					
-A Index > 0Scale formation positive.					
Approved: Zech Schalf					
08/24/16					
				v4.01	

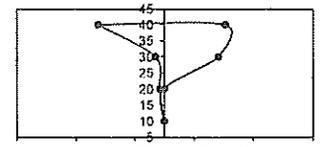
Logos						
County:	San Juan		Field:	Pump Canyon		
State:	NM		Location:	Nordhaus 715		
Sampled at:	WH		Formation:			
Date:	August 11, 2016		Depth:	0		
<b>H &amp; M Precision Water Analysis Report</b>						
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L	
Potassium	0.0	0.00	Sulfate	7.0	0.15	
Sodium	4,425.8	192.51	Chloride	5,000.0	141.03	
Calcium	44.1	2.20	Carbonate	0.0	0.00	
Magnesium	18.5	1.52	Bicarbonate	3,900.0	63.92	
Iron	2.4	0.13	Hydroxide	0.0	0.00	
Barium	3.0	0.04	-	0.0	0.00	
Strontium	0.0	0.00	-	0.0	0.00	
CATIONS	4,493.8	196.40	ANIONS	8,907.0	205.10	
<b>System Parameters</b>						
Total Dissolved Solids @180C					13,401 mg/L	
Sample Temperature, °F					70 F	
Sample pH, standard units					7.48 Units	
Dissolved Oxygen					0.0 ppm	
Carbon Dioxide					0.0 mg/L	
Total Sulfide, (TS)					0.0 mg/L	
Sulfide ion, (S)					0 mg/L	
Dissolved Hydrogen Sulfide, (TS-S)					0 mg/L	
Specific Gravity					1.0087	
Resistivity, measured					0 ohm/m <sup>3</sup>	
Ionic strength					0.203	
Sulfate Reducing Bacteria					nd	
Aerobic Bacteria					nd	
Manganese Level					3 mg/L	
<b>Scaling Tendency</b>						
CACO3 Stiff Davis		A Index	SOLUBILITY		CASO4 S Index	
Temp F	Index		Temp F	Actual	Calculated	A Index
32	0.08	6	50	0.15	43.89	-1043
50	0.25	17	68	0.15	44.32	-1053
68	0.44	24	86	0.15	44.74	-1063
77	0.54	27	104	0.15	45.02	-1070
86	0.65	30	122	0.15	45.16	-1073
104	0.88	33	140	0.15	44.27	-1052
122	1.12	36	158	0.15	43.36	-1030
140	1.38	37	176	0.15	42.43	-1008
158	1.65	38				
176	1.94	38				
Chemical Residuals:	na	PPM	Amine Residuals:	na	PPM	
BASO4 SCALE POSSIBLE	<b>NO</b>		<b>Water Analysis Pattern</b>			
NOTE:Stiff Davis Index						
-Indicates undersaturation. Scale formation negative.						
0Indicates the water is at saturation point. Scale unlikely.						
+Indicates supersaturation. A positive scaling condition exists.						
NOTE:Skillman Method Calcium Sulfate 'S' Index						
-Indicates undersaturation. Scale formation negative.						
0Indicates the water is at saturation point. Scale unlikely.						
+Indicates supersaturation. A positive scaling condition exists.						
NOTE:A Index; worst possible case. Assumes 100% precipitation.						
-Units = pounds of scale produced / 1000 bbls. of water.						
-A Index =< 0Scale formation negative.						
-A Index > 0Scale formation positive.						
				Approved: Zech Schaff 08/15/16		
				v4.01		



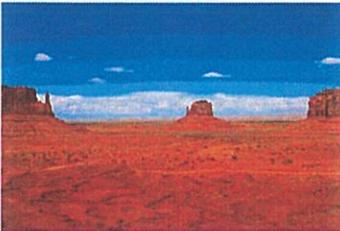
33

Logos Resources					
County:	San Juan	Field:	Pump Canyon		
State:	NM	Location:	Nordhaus 716		
Sampled at:	WH	Formation:			
Date:	August 18, 2016	Depth:	0		
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	0.0	0.00
Sodium	3,865.7	168.15	Chloride	4,000.0	112.83
Calcium	29.4	1.47	Carbonate	nd	nd
Magnesium	12.3	1.02	Bicarbonate	4,070.0	66.70
Iron	1.2	0.06	Hydroxide	nd	nd
Barium	9.0	0.13			
Strontium	nd	nd			
Analysis Balanced					
CATIONS	3,917.6	170.83	ANIONS	8,070.0	179.53
<b>System Parameters</b>					
Total Dissolved Solids @180C			11,988	mg/L	
Sample Temperature, °F			70	F	
Sample pH, standard units			8.13	Units	
Dissolved Oxygen			nd	ppm	
Carbon Dioxide			nd	mg/L	
Total Sulfide, (TS)			nd	mg/L	
Sulfide Ion, (S)			nd	mg/L	
Dissolved Hydrogen Sulfide, (TS-S)			nd	mg/L	
Specific Gravity			1.0076		
Resistivity, measured			nd	ohm/m^3	
Ionic strength			0.176		
Sulfate Reducing Bacteria			nd		
Aerobic Bacteria			nd		
Manganese Level			2	mg/L	
<b>Scaling Tendency</b>					
CACO3 Stiff Davis			CASO4		
Temp F	Index	A Index	Temp F	SOLUBILITY Actual	Calculated S Index A Index
32	0.62	19	50	0.00	41.85 -41.85 -997
50	0.80	22	68	0.00	42.30 -42.30 -1008
68	0.99	23	86	0.00	42.75 -42.75 -1019
77	1.09	24	104	0.00	43.04 -43.04 -1026
86	1.20	24	122	0.00	43.17 -43.17 -1029
104	1.42	25	140	0.00	42.28 -42.28 -1008
122	1.66	25	158	0.00	41.36 -41.36 -986
140	1.91	25	176	0.00	40.43 -40.43 -964
158	2.18	26			
176	2.47	26			
Chemical Residuals:	na	PPM	Amine Residuals:	0.05	PPM
BASO4 SCALE POSSIBLE	<input type="checkbox"/> NO		<b>Water Analysis Pattern</b>		
NOTE:Stiff Davis Index			40 30 20 10 0 20 30 40		
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' Index					
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation.					
-Units = pounds of scale produced / 1000 bbls. of water.					
-A Index =< 0Scale formation negative.			Approved: Zech Schaff 08/24/16 v4.01		
-A Index > 0Scale formation positive.					

34

Logos					
County: San Juan			Field: Pump Canyon		
State: NM			Location: Nordhaus 716		
Sampled at: WIH			Formation:		
Date: May 18, 2016			Depth: 0		
<b>H &amp; M Precision</b>			<b>Water Analysis Report</b>		
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	0.0	0.00	Sulfate	0.0	0.00
Sodium	3,847.6	167.36	Chloride	4,000.0	112.83
Calcium	39.9	1.99	Carbonate	0.0	0.00
Magnesium	16.8	1.38	Bicarbonate	4,090.0	67.03
Iron	6.4	0.34	Hydroxide	0.0	0.00
Barium	6.0	0.09	-	0.0	0.00
Strontium	0.0	0.00	-	0.0	0.00
CATIONS	3,916.7	171.16	ANIONS	8,090.0	179.86
<b>Analysis</b>					
<b>Balanced</b>					
<b>System Parameters</b>					
Total Dissolved Solids @180C	12,007 mg/L				
Sample Temperature, °F	70 F				
Sample pH, standard units	7.91 Units				
Dissolved Oxygen	0.0 ppm				
Carbon Dioxide	0.0 mg/L				
Total Sulfide, (TS)	0.0 mg/L				
Sulfide Ion, (S)	0 mg/L				
Dissolved Hydrogen Sulfide, (TS-S)	0 mg/L				
Specific Gravity	1.0076				
Resistivity, measured	0 ohm/m <sup>3</sup>				
Ionic strength	0.177				
Sulfate Reducing Bacteria	nd				
Aerobic Bacteria	nd				
Manganese Level	2 mg/L				
<b>Scaling Tendency</b>					
CACO <sub>3</sub>			CASO <sub>4</sub>		
Temp F	Stiff Davis Index	A index	Temp F	SOLUBILITY Actual	SOLUBILITY Calculated
32	0.52	24	50	0.00	41.66
50	0.70	28	68	0.00	42.12
68	0.90	30	86	0.00	42.56
77	1.00	31	104	0.00	42.85
86	1.11	32	122	0.00	42.98
104	1.33	33	140	0.00	42.09
122	1.57	34	158	0.00	41.18
140	1.82	34	176	0.00	40.25
158	2.09	35			
176	2.37	35			
<b>BASO<sub>4</sub> SCALE POSSIBLE</b>					
<b>NO</b>					
<b>Water Analysis Patern</b>					
40 30 20 10 10 20 30 40					
NOTE: Stiff Davis Index					
- indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+ indicates supersaturation. A positive scaling condition exists.					
NOTE: Skillman Method Calcium Sulfate 'S' Index					
- indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+ indicates supersaturation. A positive scaling condition exists.					
NOTE: A Index; worst possible case. Assumes 100% precipitation.					
- Units = pounds of scale produced / 1000 bbbs. of water.					
- A Index <= 0 Scale formation negative.					
- A Index > 0 Scale formation positive.					
Approved: Zech Schaff					
05/24/16				v4.01	

Report to:  
Vanessa Fields



5796 U.S. Hwy 64  
Farmington, NM 87401

Phone: (505) 632-1881  
Envirotech-inc.com



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*Practical Solutions for a Better Tomorrow*

## Analytical Report

### Logos Resources

Project Name: Jacquez  
Work Order: E108013  
Job Number: 12035-0114  
Received: 8/6/2021

Revision: 2

Report Reviewed By:

Walter Hinchman  
Laboratory Director  
8/16/21

Envirotech Inc. certifies the test results meet all requirements of TNi unless noted otherwise.  
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Envirotech Inc, holds the Utah TNi certification NM00979 for data reported.  
Envirotech Inc, holds the Texas TNi certification T104704557 for data reported.

36

Date Reported: 8/16/21

Vanessa Fields  
2010 Afton Place  
Farmington, NM 87401

Project Name: Jacquez  
Workorder: E108013  
Date Received: 8/6/2021 11:13:00AM

Vanessa Fields,

Thank you for choosing Envirotech, Inc. as your analytical testing laboratory for the sample(s) received on, 8/6/2021 11:13:00AM, under the Project Name: Jacquez.

The analytical test results summarized in this report with the Project Name: Jacquez apply to the individual samples collected, identified and submitted bearing the project name on the enclosed chain-of-custody. Subcontracted sample analyses not conducted by Envirotech, Inc., are attached in full as issued by the subcontract laboratory.

Please review the Chain-of-Custody (COC) and Sample Receipt Checklist (SRC) for any issues regarding sample receipt temperature, containers, preservation etc. To best understand your test results, review the entire report summarizing your sample data and the associated quality control batch data.

All reported data in this analytical report were analyzed according to the referenced method(s) and are in compliance with the latest NELAC/TNI standards, unless otherwise noted. Samples or analytical quality control parameters not meeting specific QC criteria are qualified with a data flag. Data flag definitions are located in the Notes and Definitions section of this analytical report.

If you have any questions concerning this report, please feel free to contact Envirotech, Inc.

Respectfully,

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[whinchman@envirotech-inc.com](mailto:whinchman@envirotech-inc.com)

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## Table of Contents

Title Page	1
Cover Page	2
Table of Contents	3
Sample Summary	4
Sample Data	5
Jacquez #002	5
Jacquez #0025	6
QC Summary Data	7
QC - Wet Chem/Gravimetric by SM2540C	7
QC - Wet Chemistry by 9040C/4500H+B	8
QC - Wet Chemistry by SM2320B	9
QC - Wet Chemistry by 9050A/2510B	10
QC - Dissolved Metals by EPA 6010C	11
QC - Anions by EPA 300.0/9056A	12
Definitions and Notes	13
Chain of Custody etc.	14

### Sample Summary

Logos Resources 2010 Alton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 08/16/21 10:42
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Client Sample ID	Lab Sample ID	Matrix	Sampled	Received	Container
Jacquez #002	E108013-01A	Water	08/06/21	08/06/21	Poly 500mL
Jacquez #0025	E108013-02A	Water	08/06/21	08/06/21	Poly 500mL

### Sample Data

Logos Resources 2010 Afton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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**Jacquez #002**  
**E108013-01**

Analyte	Result	Reporting Limit	Dilution	Prepared	Analyzed	Notes
<b>Wet Chem/Gravimetric by SM2540C</b>						
Total Dissolved Solids	8990	25.0	1	08/11/21	08/13/21	Batch: 2133007
<b>Wet Chemistry by 9040C/4500H+B</b>						
pH @25°C	8.20		1	08/09/21 12:41	08/09/21 14:03	Batch: 2133005
<b>Wet Chemistry by SM2320B</b>						
Total Alkalinity (as CaCO3 at pH 4.5)	5510	10.0	1	08/09/21	08/09/21	Batch: 2133006
<b>Wet Chemistry by 9050A/2510B</b>						
Specific Conductance (@ 25 C)	13200	10.0	1	08/06/21	08/06/21	Batch: 2132027
<b>Dissolved Metals by EPA 6010C</b>						
Calcium	7.17	3.00	3	08/06/21	08/12/21	Batch: 2132016
Iron	ND	6.00	3	08/06/21	08/12/21	
Magnesium	6.65	3.00	3	08/06/21	08/12/21	
Potassium	18.4	3.00	3	08/06/21	08/12/21	
Sodium	4040	120	60	08/06/21	08/13/21	
Sodium Absorption Ratio	261		1	08/13/21	08/13/21	
<b>Anions by EPA 300.0/9056A</b>						
Fluoride	ND	25.0	100	08/06/21	08/06/21	Batch: 2132029
Chloride	2030	200	100	08/06/21	08/06/21	
Nitrite-N	ND	25.0	100	08/06/21 12:44	08/06/21 15:25	
Nitrate-N	ND	25.0	100	08/06/21 12:44	08/06/21 15:25	
o-Phosphate-P	ND	25.0	100	08/06/21 12:44	08/06/21 15:25	
Sulfate	ND	200	100	08/06/21	08/06/21	

40

## Sample Data

Logos Resources 2010 Afton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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Jacquez #0025

E108013-02

Analyte	Result	Reporting Limit	Dilution	Prepared	Analyzed	Notes
<b>Wet Chem/Gravimetric by SM2540C</b>						
Total Dissolved Solids	6660	25.0	1	08/11/21	08/13/21	Batch: 2133007
<b>Wet Chemistry by 9040C/4500H+B</b>						
pH @25°C	7.68		1	08/09/21 12:41	08/09/21 14:03	Batch: 2133005 115
<b>Wet Chemistry by SM2320B</b>						
Total Alkalinity (as CaCO3 at pH 4.5)	3930	10.0	1	08/09/21	08/09/21	Batch: 2133006
<b>Wet Chemistry by 9050A/2510B</b>						
Specific Conductance (@ 25 C)	10700	10.0	1	08/06/21	08/06/21	Batch: 2132027
<b>Dissolved Metals by EPA 6010C</b>						
Calcium	5.02	2.00	2	08/06/21	08/13/21	
Iron	ND	4.00	2	08/06/21	08/13/21	
Magnesium	8.63	2.00	2	08/06/21	08/13/21	
Potassium	15.7	2.00	2	08/06/21	08/13/21	
Sodium	2750	200	100	08/06/21	08/12/21	
Sodium Absorption Ratio	173		1	08/13/21	08/13/21	
<b>Anions by EPA 300.0/9056A</b>						
Fluoride	ND	25.0	100	08/06/21	08/06/21	
Chloride	1660	200	100	08/06/21	08/06/21	
Nitrite-N	ND	25.0	100	08/06/21 12:44	08/06/21 15:49	
Nitrate-N	ND	25.0	100	08/06/21 12:44	08/06/21 15:49	
o-Phosphate-P	ND	25.0	100	08/06/21 12:44	08/06/21 15:49	
Sulfate	ND	200	100	08/06/21	08/06/21	



41

### QC Summary Data

Logos Resources 2010 Aflon Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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#### Wet Chem/Gravimetric by SM2540C

Analyst: RAS

Analyte	Result mg/L	Reporting Limit mg/L	Spike Level mg/L	Source Result mg/L	Rec % %	Rec Limits %	RPD %	RPD Limit %	Notes
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**Blank (2133007-BLK1)**

Prepared: 08/11/21 Analyzed: 08/13/21

Total Dissolved Solids ND 10.0

**LCS (2133007-BS1)**

Prepared: 08/11/21 Analyzed: 08/13/21

Total Dissolved Solids 89.0 10.0 100 89.0 55-134

**LCS Dup (2133007-BSD1)**

Prepared: 08/11/21 Analyzed: 08/13/21

Total Dissolved Solids 86.0 10.0 100 86.0 55-134 1.43 5

42

### QC Summary Data

Logos Resources	Project Name: Jacquez	Reported:
2010 Afton Place	Project Number: 12035-0114	
Farmington NM, 87401	Project Manager: Vanessa Fields	8/16/2021 10:42:08AM

#### Wet Chemistry by 9040C/4500H+B

Analyst: JL

Analyte	Result pH Units	Reporting Limit pH Units	Spike Level pH Units	Source Result pH Units	Rec %	Rec Limits %	RPD %	RPD Limit %	Notes
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LCS (2133005-BS1)

Prepared: 08/09/21 Analyzed: 08/09/21

pH	7.97		8.00		99.8	98.75-101.25			
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Duplicate (2133005-DUP1)

Source: E108013-01 Prepared: 08/09/21 Analyzed: 08/09/21

pH	8.23			8.20			0.365	20	
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43

### QC Summary Data

Logos Resources 2010 Afton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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### Wet Chemistry by SM2320B

Analyst: JL

Analyte	Result mg/L	Reporting Limit mg/L	Spike Level mg/L	Source Result mg/L	Rec % %	Rec Limits %	RPD %	RPD Limit %	Notes
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**LCS (2133006-BS1)**

Prepared: 08/09/21 Analyzed: 08/09/21

Total Alkalinity (as CaCO3 at pH 4.5)	261	10.0	250	104	78-130				
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**Duplicate (2133006-DUP1)**

Source: E108013-02 Prepared: 08/09/21 Analyzed: 08/09/21

Total Alkalinity (as CaCO3 at pH 4.5)	3900	10.0	3930	0.894	20				
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44

### QC Summary Data

Logos Resources 2010 Aflon Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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#### Wet Chemistry by 9050A/2510B

Analyst: RAS

Analyte	Result	Reporting Limit	Spike Level	Source Result	Rec	Rec Limits	RPD	RPD Limit	Notes
	uS/cm	uS/cm	uS/cm	uS/cm	%	%	%	%	

**Blank (2132027-BLK1)** Prepared: 08/06/21 Analyzed: 08/06/21

Specific Conductance (@ 25 C) ND 10.0

**LCS (2132027-BS1)** Prepared: 08/06/21 Analyzed: 08/06/21

Specific Conductance (@ 25 C) 1410 10.0 1410 100 98-102

**Duplicate (2132027-DUPI)** Source: E107062-01 Prepared: 08/06/21 Analyzed: 08/06/21

Specific Conductance (@ 25 C) 44800 10.0 44200 1.35 20

45

### QC Summary Data

Logos Resources	Project Name:	Jacquez	Reported:
2010 Afion Place	Project Number:	12035-0114	
Farmington NM, 87401	Project Manager:	Vanessa Fields	8/16/2021 10:42:08AM

#### Dissolved Metals by EPA 6010C

Analyst: AC

Analyte	Result mg/L	Reporting Limit mg/L	Spike Level mg/L	Source Result mg/L	Rec % %	Rec Limits %	RPD %	RPD Limit %	Notes
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**Blank (2132016-BLK1)**

Prepared: 08/05/21 Analyzed: 08/05/21

Calcium	ND	1.00							
Iron	ND	2.00							
Magnesium	ND	1.00							
Potassium	ND	1.00							
Sodium	ND	2.00							

**LCS (2132016-BS1)**

Prepared: 08/05/21 Analyzed: 08/05/21

Calcium	50.3	1.00	50.0		101	80-120			
Iron	102	2.00	100		102	80-120			
Magnesium	50.5	1.00	50.0		101	80-120			
Potassium	5.40	1.00	5.00		108	80-120			
Sodium	18.9	2.00	20.0		94.5	80-120			

**LCS Dup (2132016-BSD1)**

Prepared: 08/05/21 Analyzed: 08/05/21

Calcium	50.5	1.00	50.0		101	80-120	0.437	20	
Iron	102	2.00	100		102	80-120	0.0978	20	
Magnesium	50.1	1.00	50.0		100	80-120	0.795	20	
Potassium	5.47	1.00	5.00		109	80-120	1.16	20	
Sodium	18.6	2.00	20.0		92.9	80-120	1.76	20	



46

### QC Summary Data

Logos Resources 2010 Afton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 8/16/2021 10:42:08AM
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#### Anions by EPA 300.0/9056A

Analyst: IY

Analyte	Result mg/L	Reporting Limit mg/L	Spike Level mg/L	Source Result mg/L	Rec %	Rec Limits %	RPD %	RPD Limit %	Notes
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#### Blank (2132029-BLK1)

Prepared: 08/06/21 Analyzed: 08/06/21

Fluoride	ND	0.250							
Chloride	ND	2.00							
Nitrite-N	ND	0.250							
Nitrate-N	ND	0.250							
o-Phosphate-P	ND	0.250							
Sulfate	ND	2.00							

#### LCS (2132029-BS1)

Prepared: 08/06/21 Analyzed: 08/06/21

Fluoride	2.61	0.250	2.50		104	90-110			
Chloride	25.0	2.00	25.0		99.9	90-110			
Nitrite-N	2.55	0.250	2.50		102	90-110			
Nitrate-N	2.61	0.250	2.50		105	90-110			
o-Phosphate-P	12.7	0.250	12.5		102	90-110			
Sulfate	24.7	2.00	25.0		98.9	90-110			

#### LCS Dup (2132029-BSD1)

Prepared: 08/06/21 Analyzed: 08/06/21

Fluoride	2.63	0.250	2.50		105	90-110	0.725	20	
Chloride	25.2	2.00	25.0		101	90-110	0.909	20	
Nitrite-N	2.59	0.250	2.50		103	90-110	1.21	20	
Nitrate-N	2.64	0.250	2.50		106	90-110	0.990	20	
o-Phosphate-P	12.8	0.250	12.5		103	90-110	0.964	20	
Sulfate	25.0	2.00	25.0		99.8	90-110	0.926	20	

**QC Summary Report Comment:**

Calculations are based off of the raw (non-rounded) data. However, for reporting purposes all QC data is rounded to three significant figures. Therefore, hand calculated values may differ slightly.

### Definitions and Notes

Logos Resources 2010 Afton Place Farmington NM, 87401	Project Name: Jacquez Project Number: 12035-0114 Project Manager: Vanessa Fields	Reported: 08/16/21 10:42
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H5 pH is specified to be performed in the field within 15 minutes of sampling. The sample was performed as quickly as possible.

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

RPD Relative Percent Difference

DNI Did Not Ignite

Note (1): Methods marked with \*\* are non-accredited methods.

Note (2): Soil data is reported on an "as received" weight basis, unless reported otherwise.



Envirotech Analytical Laboratory

Printed: 8/6/2021 11:43:19AM

Sample Receipt Checklist (SRC)

Instructions: Please take note of any NO checkmarks.

If we receive no response concerning these items within 24 hours of the date of this notice, all the samples will be analyzed as requested.

Client:	Logos Resources	Date Received:	08/06/21 11:13	Work Order ID:	E108013
Phone:	(505) 787-9100	Date Logged In:	08/06/21 11:31	Logged In By:	Alanna Chce
Email:	vancouver@walsheng.net	Due Date:	08/13/21 17:00 (5 day TAT)		

Chain of Custody (COC)

- 1. Does the sample ID match the COC? Yes
  - 2. Does the number of samples per sampling site location match the COC? Yes
  - 3. Were samples dropped off by client or carrier? Yes
  - 4. Was the COC complete, i.e., signatures, dates/times, requested analyses? Yes
  - 5. Were all samples received within holding time? Yes
- Note: Analysis, such as pH which should be conducted in the field, i.e., 15 minute hold time, are not included in this discussion.

Carrier: Vanessa Fields

Comments/Resolution

Sample Turn Around Time (TAT)

- 6. Did the COC indicate standard TAT, or Expedited TAT? Yes

Sample Cooler

- 7. Was a sample cooler received? Yes
  - 8. If yes, was cooler received in good condition? Yes
  - 9. Was the sample(s) received intact, i.e., not broken? Yes
  - 10. Were custody/security seals present? Yes
  - 11. If yes, were custody/security seals intact? Yes
  - 12. Was the sample received on ice? If yes, the recorded temp is 4°C, i.e., 6±2°C Yes
- Note: Thermal preservation is not required, if samples are received w/ 15 minutes of sampling
- 13. If no visible ice, record the temperature. Actual sample temperature: 4°C

Sample Container

- 14. Are aqueous VOC samples present? No
- 15. Are VOC samples collected in VOA Vials? NA
- 16. Is the head space less than 6-8 mm (pea sized or less)? NA
- 17. Was a trip blank (TB) included for VOC analyses? NA
- 18. Are non-VOC samples collected in the correct containers? Yes
- 19. Is the appropriate volume/weight or number of sample containers collected? Yes

Field Label

- 20. Were field sample labels filled out with the minimum information:
  - Sample ID? Yes
  - Date/Time Collected? Yes
  - Collectors name? No

Sample Preservation

- 21. Does the COC or field labels indicate the samples were preserved? No
- 22. Are sample(s) correctly preserved? NA
- 24. Is lab filtration required and/or requested for dissolved metals? Yes

Multiphase Sample Matrix

- 26. Does the sample have more than one phase, i.e., multiphase? No
- 27. If yes, does the COC specify which phase(s) is to be analyzed? NA

Subcontract Laboratory

- 28. Are samples required to get sent to a subcontract laboratory? No
- 29. Was a subcontract laboratory specified by the client and if so who? NA Subcontract Lab: NA

Client Instruction

Signature of client authorizing changes to the COC or sample disposition.

Date



envirotech Inc.

Chain of Custody

Project Information

Client: <u>LDOS Pasos, Coas</u> Project: <u>Sacquez</u> Project Manager: <u>Vanessa Fields</u> Address: <u>Walsh Lane</u> City, State, Zip: <u>505-767-2220</u> Phone: <u>505-767-2220</u> Email: <u>vanessa@ldos.com</u> Report due by: <u>Standard</u>		Bill To Attention: <u>LDOS Pasos, Coas</u> Address: City, State, Zip Phone: <u>505-767-2220</u> Email: <u>vanessa@ldos.com</u> <u>ldosresources@ic.com</u>		Lab Use Only Lab WO# <u>E108013</u> Job Number <u>12035-0114</u> Analysis and Method		TAT 1D <input type="checkbox"/> 2D <input type="checkbox"/> 3D <input checked="" type="checkbox"/> Standard		EPA Program CWA <input type="checkbox"/> SDWA <input checked="" type="checkbox"/> RCRA <input type="checkbox"/>							
Time Sampled	Date Sampled	Matrix	No. of Containers	Sample ID	Lab Number	DRO/DRO by 8015	GRO/DRO by 8015	BTEX by 8021	VOC by 8260	Metals 6010	Chloride 300.0	State	Remarks		
9:17	8/16/21	aqueous	2	Sacquez #1002	1							NM	500 mL poly		
9:31	8/16/21	aqueous	2	Sacquez #0025	2							CO			
												UT			
												AZ			
												TX			
Additional Instructions: <u>Vis ICE in Cooler</u>															
I, (field sampler), attest to the validity and authenticity of this sample. I am aware that tampering with or intentionally mislabeling the sample location, date or time of collection is considered fraud and may be grounds for legal action.															
Relinquished by: (Signature)						Date		Time		Received by: (Signature)		Date		Time	
						8/16/21		11:13				8-6-21		11:13	
Relinquished by: (Signature)						Date		Time		Received by: (Signature)		Date		Time	
Relinquished by: (Signature)						Date		Time		Received by: (Signature)		Date		Time	
Samples requiring thermal preservation must be received on ice the day they are sampled or received packed in ice at an avg temp above 0 but less than 6 °C on subsequent days.															
Received on ice: <input checked="" type="checkbox"/> N T1 _____ T2 _____ T3 _____ AVG Temp °C <u>4</u>															
Container Type: <u>g - glass, p - poly/plastic, ag - amber glass, v - VOA</u>															
Note: Samples are discarded 30 days after results are reported unless other arrangements are made. Hazardous samples will be returned to client or disposed of at the client expense. The report for the analysis of the above samples is applicable only to those samples received by the laboratory with this COC. The liability of the laboratory is limited to the amount paid for on the report.															



Envirotech Analytical Laboratory

Printed: 8/6/2021 11:43:19AM

Sample Receipt Checklist (SRC)

Instructions: Please take note of any NO checkmarks.

If we receive no response concerning these items within 24 hours of the date of this notice, all the samples will be analyzed as requested.

Client: Logos Resources	Date Received: 08/06/21 11:13	Work Order ID: E108013
Phone: (505) 787-9100	Date Logged In: 08/06/21 11:31	Logged In By: Alanna Chee
Email: vanessa@walsheng.net	Due Date: 08/13/21 17:00 (5 day TAT)	

Chain of Custody (COC)

- 1. Does the sample ID match the COC? Yes
  - 2. Does the number of samples per sampling site location match the COC? Yes
  - 3. Were samples dropped off by client or carrier? Yes
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  - 5. Were all samples received within holding time? Yes
- Note: Analysis, such as pH which should be conducted in the field, i.e., 15 minute hold time, are not included in this discussion.

Carrier: Vanessa Fields

Comments/Resolution

Sample Turn Around Time (TAT)

- 6. Did the COC indicate standard TAT, or Expedited TAT? Yes

Sample Cooler

- 7. Was a sample cooler received? Yes
  - 8. If yes, was cooler received in good condition? Yes
  - 9. Was the sample(s) received intact, i.e., not broken? Yes
  - 10. Were custody/security seals present? Yes
  - 11. If yes, were custody/security seals intact? Yes
  - 12. Was the sample received on ice? If yes, the recorded temp is 4°C, i.e., 6°±2°C Yes
- Note: Thermal preservation is not required, if samples are received w/i 15 minutes of sampling
- 13. If no visible ice, record the temperature. Actual sample temperature: 4°C

Sample Container

- 14. Are aqueous VOC samples present? No
- 15. Are VOC samples collected in VOA Vials? NA
- 16. Is the head space less than 6-8 mm (pea sized or less)? NA
- 17. Was a trip blank (TB) included for VOC analyses? NA
- 18. Are non-VOC samples collected in the correct containers? Yes
- 19. Is the appropriate volume/weight or number of sample containers collected? Yes

Field Label

- 20. Were field sample labels filled out with the minimum information:
  - Sample ID? Yes
  - Date/Time Collected? Yes
  - Collectors name? No

Sample Preservation

- 21. Does the COC or field labels indicate the samples were preserved? No
- 22. Are sample(s) correctly preserved? NA
- 24. Is lab filtration required and/or requested for dissolved metals? Yes

Multiphase Sample Matrix

- 26. Does the sample have more than one phase, i.e., multiphase? No
- 27. If yes, does the COC specify which phase(s) is to be analyzed? NA

Subcontract Laboratory

- 28. Are samples required to get sent to a subcontract laboratory? No
- 29. Was a subcontract laboratory specified by the client and if so who? NA Subcontract Lab: NA

Client Instruction

Signature of client authorizing changes to the COC or sample disposition.

Date

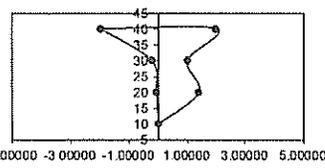


envirotech Inc.

52

Logos					
County: San Juan			Field: Pump Canyon		
State: NM			Location: Jaquez 331S		
Sampled at: WH			Formation:		
Date: May 18, 2016			Depth: 0		
<b>H &amp; M Precision</b>			<b>Water Analysis Report</b>		
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	0.0	0.00	Sulfate	0.0	0.00
Sodium	803.7	34.96	Chloride	1,500.0	42.31
Calcium	25.2	1.26	Carbonate	0.0	0.00
Magnesium	10.6	0.87	Bicarbonate	330.0	5.41
Iron	36.0	1.93	Hydroxide	0.0	0.00
Barium	0.0	0.00	-	0.0	0.00
Strontium	0.0	0.00	-	0.0	0.00
CATIONS	875.5	39.02	ANIONS	1,830.0	47.72
<b>Analysis</b>					
<b>Balanced</b>					
<b>System Parameters</b>					
Total Dissolved Solids @180C					2,705 mg/L
Sample Temperature, °F					70 F
Sample pH, standard units					6.42 Units
Dissolved Oxygen					0.0 ppm
Carbon Dioxide					0.0 mg/L
Total Sulfide, (TS)					0.0 mg/L
Sulfide Ion, (S)					0 mg/L
Dissolved Hydrogen Sulfide, (TS-S)					0 mg/L
Specific Gravity					1.0021
Resistivity, measured					0 ohm/m^3
Ionic strength					0.045
Sulfate Reducing Bacteria					nd
Aerobic Bacteria					nd
Manganese Level					0 mg/L
<b>Scaling Tendency</b>					
CACO3			CASO4		
Temp F	Stiff Davis Index	A index	Temp F	SOLUBILITY Actual	SOLUBILITY Calculated
32	-1.86	-453	50	0.00	27.12
50	-1.66	-337	68	0.00	27.83
68	-1.45	-247	86	0.00	28.53
77	-1.35	-209	104	0.00	28.86
86	-1.24	-177	122	0.00	28.85
104	-1.04	-123	140	0.00	27.89
122	-0.83	-83	158	0.00	26.90
140	-0.63	-52	176	0.00	25.86
158	-0.43	-29			
176	-0.23	-13			
<b>BASO4 SCALE POSSIBLE</b>					
<b>NO</b>					
<b>Water Analysis Patern</b>					
40 30 20 10 10 20 30 40					
<p>NOTE: Stiff Davis Index</p> <ul style="list-style-type: none"> <li>- indicates undersaturation. Scale formation negative.</li> <li>0 indicates the water is at saturation point. Scale unlikely.</li> <li>+ indicates supersaturation. A positive scaling condition exists.</li> </ul> <p>NOTE: Skillman Method Calcium Sulfate 'S Index'</p> <ul style="list-style-type: none"> <li>- indicates undersaturation. Scale formation negative.</li> <li>0 indicates the water is at saturation point. Scale unlikely.</li> <li>+ indicates supersaturation. A positive scaling condition exists.</li> </ul> <p>NOTE: A Index; worst possible case. Assumes 100% precipitation.</p> <ul style="list-style-type: none"> <li>- Units = pounds of scale produced / 1000 bbis. of water.</li> <li>- A Index &lt;= 0 Scale formation negative.</li> <li>- A Index &gt; 0 Scale formation positive.</li> </ul>					
				Approved: Zech Schaff 05/24/16 v4.01	

Logos Resources					
County:	San Juan	Field:	Pump Canyon		
State:	NM	Location:	Jaquez 331S		
Sampled at:	SEP	Formation:	.		
Date:	August 18, 2016	Depth:	0		
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	2.0	0.04
Sodium	2,177.8	94.73	Chloride	3,500.0	98.72
Calcium	33.6	1.68	Carbonate	nd	nd
Magnesium	14.1	1.16	Bicarbonate	600.0	9.83
Iron	43.2	2.32	Hydroxide	nd	nd
Barium	0.0	0.00			
Strontium	nd	nd			
Analysis Balanced					
CATIONS	2,268.7	99.89	ANIONS	4,102.0	108.59
<b>System Parameters</b>					
Total Dissolved Solids @180C		6,371	mg/L		
Sample Temperature, °F		70	F		
Sample pH, standard units		6.68	Units		
Dissolved Oxygen		nd	ppm		
Carbon Dioxide		nd	mg/L		
Total Sulfide, (TS)		nd	mg/L		
Sulfide Ion, (S)		nd	mg/L		
Dissolved Hydrogen Sulfide, (TS-S)		nd	mg/L		
Specific Gravity		1.0048			
Resistivity, measured		nd	ohm/m <sup>3</sup>		
Ionic strength		0,106			
Sulfate Reducing Bacteria		nd			
Aerobic Bacteria		nd			
Manganese Level		0	mg/L		
<b>Scaling Tendency</b>					
CACO3		A		CASO4	
Temp F	Stiff Davis Index	index	SOLUBILITY	Calculated	S Index
			Temp F	Actual	A Index
32	-1.44	-365	50	0.04	34.74
50	-1.24	-264	68	0.04	35.29
68	-1.04	-183	86	0.04	35.84
77	-0.94	-150	104	0.04	36.15
86	-0.83	-120	122	0.04	36.23
104	-0.61	-71	140	0.04	35.32
122	-0.39	-36	158	0.04	34.39
140	-0.15	-12	176	0.04	33.44
158	0.09	5			
176	0.34	15			
Chemical Residuals: na PPM      Amine Residuals: 25.00 PPM					
BASO4 SCALE POSSIBLE			<b>NO</b>		
<b>Water Analysis Pattern</b>					
40 30 20 10 10 20 30 40					
NOTE:Stiff Davis Index					
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' index					
-indicates undersaturation. Scale formation negative.					
0indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation.					
-Units = pounds of scale produced / 1000 bbls. of water.					
-A Index <= 0Scale formation negative.					
-A Index > 0Scale formation positive.					
				Approved: Zech Schaff 08/24/16      v4.01	





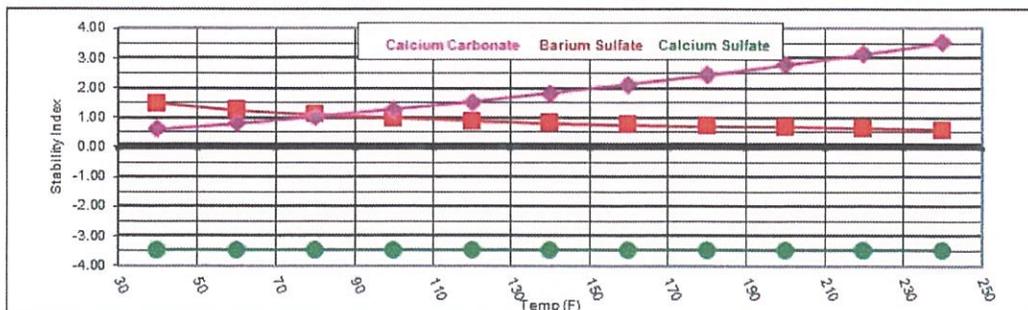
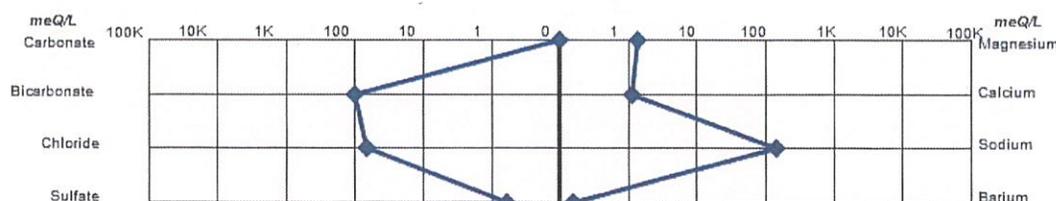
<b>To:</b> Smart Chemical Services	<b>Lab #:</b> 48528
<b>Lease:</b> Logos	<b>Sample Date:</b> 09/20/16
<b>Well No.:</b> Oxnard 332S	<b>Sample Analyzed:</b> 09/26/16-09/27/16
<b>Location:</b> Wellhead	<b>Analyzed By:</b> V.W./G.R.

<b>Analysis</b>	
Specific Gravity (74°F)	0.9959
pH, Field Determined	8
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	1.02
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	1.81
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<b>Dissolved Gases</b>	
	<b>mg/l</b>
Hydrogen Sulfide (H <sub>2</sub> S), Field	5.1
Carbon Dioxide (CO <sub>2</sub> ), Field	148
Oxygen, Field	N.D.

<b>Probable Mineral Comp.</b>	<b>mg/l</b>
Ca(HCO <sub>3</sub> ) <sub>2</sub>	88.68
CaSO <sub>4</sub>	22.53
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	100.01
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	8291.42
NaSO <sub>4</sub>	41.81
NaCl	3954.07

<b>Cations</b>	<b>mg/l</b>	<b>meq/l</b>	<b>Anions</b>	<b>mg/l</b>	<b>meq/l</b>
Sodium (Na)	3264.12	141.98	Chloride (Cl)	2397.94	67.47
Calcium (Ca)	21.93	1.09	Bicarbonate (HCO <sub>3</sub> ), Field	6173.00	101.16
Magnesium (Mg)	16.61	1.37	Carbonate (CO <sub>3</sub> ), Field	0.00	0.00
Potassium (K)	47.59	1.22	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	152.73	5.47	Sulfate (SO <sub>4</sub> )	37.54	0.78
Barium (Ba)	13.26	0.19			
Manganese (Mn)	1.98	0.07			
Strontium (Sr)	7.00	0.16			

Total Dissolved Solids, Calculated (mg/l)	12127
Total Hardness as mg/l CaCO <sub>3</sub>	123
Resistivity (Ω/m) @ 75°F	0.606



Generated by Energy Precision Testing, 615 Price Rd., Pampa, TX 79065  
 Certified QA/QC Geochemist, Neil Ray



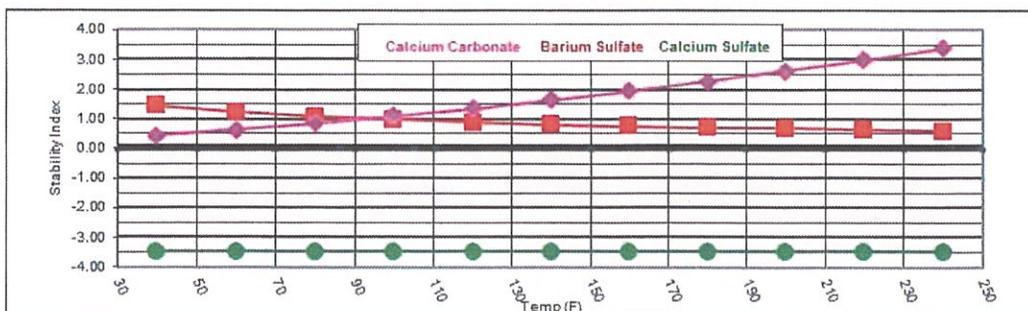
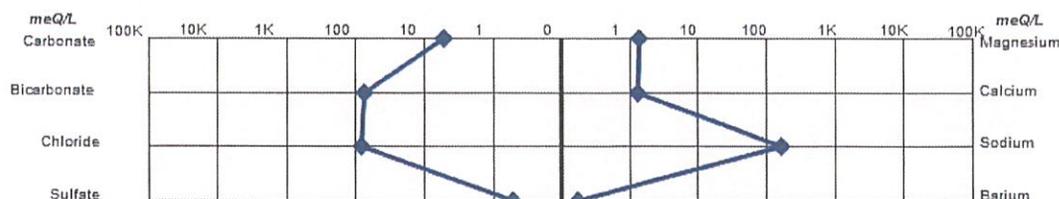
<b>To:</b> Smart Chemical Services	<b>Lab #:</b> 48527
<b>Lease:</b> Logos	<b>Sample Date:</b> 09/20/16
<b>Well No.:</b> Quinn 338T	<b>Sample Analyzed:</b> 09/26/16-09/27/16
<b>Location:</b> Wellhead	<b>Analyzed By:</b> V.W./G.R.

<b>Analysis</b>	
Specific Gravity (74°F)	1.0057
pH, Field Determined	7.9
Calcium Carbonate S.I. @ 80°F (Stiff-Davis)	0.86
Calcium Carbonate S.I. @ 140°F (Stiff-Davis)	1.65
Calcium Sulfate Scaling Tendency	no
Barium Sulfate Scaling Tendency	yes
<b>Dissolved Gases</b>	
	<b>mg/l</b>
Hydrogen Sulfide (H <sub>2</sub> S), Field	0
Carbon Dioxide (CO <sub>2</sub> ), Field	0
Oxygen, Field	N.D.

<b>Probable Mineral Comp.</b>	<b>mg/l</b>
Ca(HCO <sub>3</sub> ) <sub>2</sub>	107.20
CaSO <sub>4</sub>	27.50
CaCl <sub>2</sub>	0.00
Mg(HCO <sub>3</sub> ) <sub>2</sub>	97.84
MgSO <sub>4</sub>	0.00
MgCl <sub>2</sub>	0.00
NaHCO <sub>3</sub>	5990.83
NaSO <sub>4</sub>	33.94
NaCl	4980.37

<b>Cations</b>	<b>mg/l</b>	<b>meq/l</b>	<b>Anions</b>	<b>mg/l</b>	<b>meq/l</b>
Sodium (Na)	3782.22	164.52	Chloride (Cl)	3020.34	84.98
Calcium (Ca)	26.51	1.32	Bicarbonate (HCO <sub>3</sub> ), Field	4514.00	73.98
Magnesium (Mg)	16.25	1.34	Carbonate (CO <sub>3</sub> ), Field	156.00	5.20
Potassium (K)	36.35	0.93	Hydroxyl (OH)	0.00	0.00
Iron (Fe)	6.04	0.22	Sulfate (SO <sub>4</sub> )	34.26	0.71
Barium (Ba)	16.18	0.24			
Manganese (Mn)	0.00	0.00			
Strontium (Sr)	7.47	0.17			

Total Dissolved Solids, Calculated (mg/l)	11608
Total Hardness as mg/l CaCO <sub>3</sub>	133
Resistivity (Ω/m) @ 75°F	0.505



Generated by Energy Precision Testing, 615 Price Rd., Pampa, TX 79065  
 Certified QA/QC Geochemist, Neil Ray

Logos					
County:	San Juan		Field:	Pump Canyon	
State:	NM		Location:	Nordhaus 710	
Sampled at:	WH		Formation:		
Date:	August 11, 2016		Depth:	0	
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	0.0	0.00	Sulfate	0.0	0.00
Sodium	1,433.4	62.35	Chloride	2,000.0	56.41
Calcium	23.1	1.15	Carbonate	0.0	0.00
Magnesium	9.7	0.80	Bicarbonate	1,130.0	18.52
Iron	36.0	1.93	Hydroxide	0.0	0.00
Barium	0.0	0.00	-	0.0	0.00
Strontium	0.0	0.00	-	0.0	0.00
CATIONS	1,502.2	66.23	ANIONS	3,130.0	74.93
<b>System Parameters</b>					
Total Dissolved Solids @180C					4,632 mg/L
Sample Temperature, °F					70 F
Sample pH, standard units					7.71 Units
Dissolved Oxygen					0.0 ppm
Carbon Dioxide					0.0 mg/L
Total Sulfide, (TS)					0.0 mg/L
Sulfide Ion, (S)					0 mg/L
Dissolved Hydrogen Sulfide, (TS-S)					0 mg/L
Specific Gravity					1.0033
Resistivity, measured					0 ohm/m <sup>3</sup>
Ionic strength					0.072
Sulfate Reducing Bacteria					nd
Aerobic Bacteria					nd
Manganese Level					1 mg/L
<b>Scaling Tendency</b>					
CACO3			CASO4		
Temp F	Stiff Davis Index	A index	Temp F	SOLUBILITY Actual	Calculated S Index A Index
32	-0.18	-10	50	0.00	30.87 -30.87 -736
50	0.02	1	68	0.00	31.50 -31.50 -751
68	0.22	8	86	0.00	32.12 -32.12 -766
77	0.33	10	104	0.00	32.44 -32.44 -773
86	0.43	13	122	0.00	32.48 -32.48 -774
104	0.64	15	140	0.00	31.55 -31.55 -752
122	0.86	17	158	0.00	30.60 -30.60 -729
140	1.08	18	176	0.00	29.61 -29.61 -706
158	1.30	19			
176	1.52	20			
Chemical Residuals:	na	PPM	Amine Residuals:	0.10	PPM
BASO4 SCALE POSSIBLE	<b>NO</b>		<b>Water Analysis Pattern</b>		
NOTE:Stiff Davis Index			40 30 20 10 20 30 40		
-indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' index					
-indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation.			Approved: Zech Schaff		
-Units = pounds of scale produced / 1000 bbls. of water.			08/15/16		
-A Index =< 0Scale formation negative.			v4.01		
-A Index > 0Scale formation positive.					

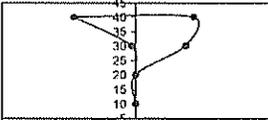
57

Logos Resources					
County:	San Juan	Field:	Pump Canyon		
State:	NM	Location:	Nordhaus 715S		
Sampled at:	WH	Formation:			
Date:	August 18, 2016	Depth:	0		
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	0.0	0.00
Sodium	4,810.4	209.24	Chloride	5,000.0	141.03
Calcium	10.5	0.52	Carbonate	nd	nd
Magnesium	4.4	0.36	Bicarbonate	4,760.0	78.01
Iron	2.4	0.13	Hydroxide	nd	nd
Barium	6.0	0.09			
Strontium	nd	nd			
CATIONS	4,833.7	210.34	ANIONS	9,760.0	219.04
<b>System Parameters</b>					
Total Dissolved Solids @180C			14,594	mg/L	
Sample Temperature, 'F			70	F	
Sample pH, standard units			8.29	Units	
Dissolved Oxygen			nd	ppm	
Carbon Dioxide			nd	mg/L	
Total Sulfide, (TS)			nd	mg/L	
Sulfide Ion, (S)			nd	mg/L	
Dissolved Hydrogen Sulfide, (TS-S)			nd	mg/L	
Specific Gravity			1.0093		
Resistivity, measured			nd	ohm/m*3	
Ionic strength			0.215		
Sulfate Reducing Bacteria			nd		
Aerobic Bacteria			nd		
Manganese Level			0	mg/L	
<b>Scaling Tendency</b>					
CACO3		A		CASO4	
Temp F	Stiff Davis Index	Temp F	SOLUBILITY Actual	Calculated	S Index
32	0.33	50	0.00	45.68	-45.68
50	0.50	68	0.00	46.09	-46.09
68	0.69	86	0.00	46.51	-46.51
77	0.79	104	0.00	46.78	-46.78
86	0.89	122	0.00	46.93	-46.93
104	1.12	140	0.00	46.03	-46.03
122	1.36	158	0.00	45.12	-45.12
140	1.62	176	0.00	44.19	-44.19
158	1.90				
176	2.20				
Chemical Residuals: 6.5 PPM      Amine Residuals: na PPM					
BASO4 SCALE POSSIBLE <input type="checkbox"/> NO <input checked="" type="checkbox"/>					
<b>Water Analysis Pattern</b>					
40 30 20 10 10 20 30 40					
NOTE:Stiff Davis Index -Indicates undersaturation. Scale formation negative. 0Indicates the water is at saturation point. Scale unlikely. +Indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' Index -Indicates undersaturation. Scale formation negative. 0Indicates the water is at saturation point. Scale unlikely. +Indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation. -Units = pounds of scale produced / 1000 bbls. of water. -A Index =< 0Scale formation negative. -A Index > 0Scale formation positive.					
Approved: Zech Schaff 08/24/16				v4.01	

58

Logos										
County:	San Juan	Field:	Pump Canyon							
State:	NM	Location:	Nordhaus 715S							
Sampled at:	WH	Formation:								
Date:	August 11, 2016	Depth:	0							
<b>H &amp; M Precision Water Analysis Report</b>										
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L					
Potassium	0.0	0.00	Sulfate	0.0	0.00					
Sodium	4,927.0	214.31	Chloride	5,500.0	155.13					
Calcium	27.3	1.36	Carbonate	0.0	0.00					
Magnesium	11.5	0.94	Bicarbonate	4,300.0	70.47					
Iron	3.6	0.19	Hydroxide	0.0	0.00					
Barium	7.0	0.10	-	0.0	0.00					
Strontium	0.0	0.00	-	0.0	0.00					
CATIONS	4,976.4	216.90	ANIONS	9,800.0	225.60					
<b>System Parameters</b>										
Total Dissolved Solids @180C					14,776 mg/L					
Sample Temperature, °F					70 F					
Sample pH, standard units					7.55 Units					
Dissolved Oxygen					0.0 ppm					
Carbon Dioxide					0.0 mg/L					
Total Sulfide, (TS)					0.0 mg/L					
Sulfide ion, (S)					0 mg/L					
Dissolved Hydrogen Sulfide, (TS-S)					0 mg/L					
Specific Gravity					1.0096					
Resistivity, measured					0 ohm/m <sup>3</sup>					
Ionic strength					0.222					
Sulfate Reducing Bacteria					nd					
Aerobic Bacteria					nd					
Manganese Level					1.5 mg/L					
<b>Scaling Tendency</b>										
CACO3		A		SOLUBILITY		CASO4				
Temp F	Stiff Davis Index	Index	Temp F	Actual	Calculated	S Index	A Index			
32	-0.05	-3								
50	0.12	6	50	0.00	45.86	-45.86	-1093			
68	0.30	12	68	0.00	46.27	-46.27	-1103			
77	0.40	14	86	0.00	46.67	-46.67	-1112			
86	0.51	16	104	0.00	46.95	-46.95	-1119			
104	0.74	19	122	0.00	47.09	-47.09	-1123			
122	0.98	21	140	0.00	46.20	-46.20	-1101			
140	1.24	23	158	0.00	45.28	-45.28	-1079			
158	1.52	23	176	0.00	44.35	-44.35	-1057			
176	1.82	24								
Chemical Residuals:	3.9	PPM	Amine Residuals:	na	PPM					
BASO4 SCALE POSSIBLE	<b>NO</b>		<b>Water Analysis Pattern</b>							
NOTE:Stiff Davis Index						40 30 20 10 10 20 30 40				
-indicates undersaturation. Scale formation negative.										
0Indicates the water is at saturation point. Scale unlikely.										
+indicates supersaturation. A positive scaling condition exists.										
NOTE:Skillman Method Calcium Sulfate 'S' Index										
-indicates undersaturation. Scale formation negative.										
0Indicates the water is at saturation point. Scale unlikely.										
+Indicates supersaturation. A positive scaling condition exists.										
NOTE:A Index; worst possible case. Assumes 100% precipitation.										
-Units = pounds of scale produced / 1000 bbls. of water.										
-A Index =< 0Scale formation negative.										
-A Index > 0Scale formation positive.										
						Approved: Zech Schaff				
						08/15/16		v4.01		

59

Logos Resources					
County:	San Juan	Field:	Pump Canyon		
State:	NM	Location:	Nordhaus 714S		
Sampled at:	WH	Formation:			
Date:	August 18, 2016	Depth:	0		
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	nd	nd	Sulfate	0.0	0.00
Sodium	4,634.3	201.58	Chloride	5,000.0	141.03
Calcium	29.4	1.47	Carbonate	nd	nd
Magnesium	12.3	1.02	Bicarbonate	4,390.0	71.95
Iron	2.0	0.11	Hydroxide	nd	nd
Barium	7.0	0.10			
Strontium	nd	nd			
Analysis Balanced					
CATIONS	4,685.0	204.28	ANIONS	9,390.0	212.98
<b>System Parameters</b>					
Total Dissolved Solids @180C			14,075	mg/L	
Sample Temperature, °F			70	F	
Sample pH, standard units			8.40	Units	
Dissolved Oxygen			nd	ppm	
Carbon Dioxide			nd	mg/L	
Total Sulfide, (TS)			nd	mg/L	
Sulfide Ion, (S)			nd	mg/L	
Dissolved Hydrogen Sulfide, (TS-S)			nd	mg/L	
Specific Gravity			1.0091		
Resistivity, measured			nd	ohm/m <sup>3</sup>	
Ionic strength			0.210		
Sulfate Reducing Bacteria			nd		
Aerobic Bacteria			nd		
Manganese Level			1	mg/L	
<b>Scaling Tendency</b>					
CACO3		A		CASO4	
Temp F	Stiff Davis Index	index	Temp F	SOLUBILITY Actual	Calculated S Index A Index
32	0.86	22	50	0.00	44.78 -44.78 -1067
50	1.03	23	68	0.00	45.20 -45.20 -1077
68	1.22	24	86	0.00	45.61 -45.61 -1087
77	1.32	24	104	0.00	45.89 -45.89 -1094
86	1.43	25	122	0.00	46.04 -46.04 -1097
104	1.65	25	140	0.00	45.14 -45.14 -1076
122	1.89	25	158	0.00	44.23 -44.23 -1054
140	2.15	26	176	0.00	43.30 -43.30 -1032
158	2.43	26			
176	2.72	26			
Chemical Residuals: na PPM		Amine Residuals: 0.05 PPM			
BASO4 SCALE POSSIBLE <span style="border: 1px solid black; padding: 2px;">NO</span>		<b>Water Analysis Pattern</b>			
NOTE:Stiff Davis Index		40 30 20 10 0 10 20 30 40			
-indicates undersaturation. Scale formation negative.					
-indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:Skillman Method Calcium Sulfate 'S' Index					
-indicates undersaturation. Scale formation negative.					
-indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE:A Index; worst possible case. Assumes 100% precipitation.		Approved: Zech Schaff			
-Units = pounds of scale produced / 1000 bbls. of water.		08/24/16 v4.01			
-A Index < 0 Scale formation negative.					
-A Index > 0 Scale formation positive.					

60

Logos					
County: San Juan			Field: Pump Canyon		
State: NM			Location: Nordhaus 714S		
Sampled at: WH			Formation:		
Date: August 11, 2016			Depth: 0		
<b>H &amp; M Precision Water Analysis Report</b>					
Sum +	mg/L	meq/L	Sum -	mg/L	meq/L
Potassium	0.0	0.00	Sulfate	1.0	0.02
Sodium	4,271.3	185.79	Chloride	4,500.0	126.93
Calcium	37.8	1.89	Carbonate	0.0	0.00
Magnesium	15.9	1.31	Bicarbonate	4,330.0	70.96
Iron	2.4	0.13	Hydroxide	0.0	0.00
Barium	6.0	0.09	-	0.0	0.00
Strontium	0.0	0.00	-	0.0	0.00
CATIONS	4,333.4	189.21	ANIONS	8,831.0	197.91
<b>System Parameters</b>					
Total Dissolved Solids @180C	13,164 mg/L				
Sample Temperature, °F	70 F				
Sample pH, standard units	8.26 Units				
Dissolved Oxygen	0.0 ppm				
Carbon Dioxide	0.0 mg/L				
Total Sulfide, (TS)	0.0 mg/L				
Sulfide Ion, (S)	0 mg/L				
Dissolved Hydrogen Sulfide, (TS-S)	0 mg/L				
Specific Gravity	1.0084				
Resistivity, measured	0 ohm/m <sup>3</sup>				
Ionic strength	0.195				
Sulfate Reducing Bacteria	nd				
Aerobic Bacteria	nd				
Manganese Level	1 mg/L				
<b>Scaling Tendency</b>					
CACO <sub>3</sub>			CASO <sub>4</sub>		
Temp F	Stiff Davis Index	A Index	Temp F	SOLUBILITY Actual	Calculated
32	0.85	28	50	0.02	43.34
50	1.03	30	68	0.02	43.77
68	1.22	31	86	0.02	44.20
77	1.32	31	104	0.02	44.48
86	1.43	32	122	0.02	44.62
104	1.65	32	140	0.02	43.73
122	1.89	33	158	0.02	42.82
140	2.15	33	176	0.02	41.89
158	2.42	33			
176	2.71	33			
Chemical Residuals: na PPM			Amine Residuals: 0.15 PPM		
BASO <sub>4</sub> SCALE POSSIBLE <span style="border: 1px solid black; padding: 2px;">NO</span>			<u>Water Analysis Pattern</u>		
NOTE: Stiff Davis Index			40 30 20 10 0 20 30 40		
-indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE: Skillman Method Calcium Sulfate 'S' Index			Approved: Zech Schaff 08/15/16 v4.01		
-indicates undersaturation. Scale formation negative.					
0 indicates the water is at saturation point. Scale unlikely.					
+indicates supersaturation. A positive scaling condition exists.					
NOTE: A Index; worst possible case. Assumes 100% precipitation.					
-Units = pounds of scale produced / 1000 bbls. of water.					
-A Index <= 0 Scale formation negative.					
-A Index > 0 Scale formation positive.					

61

# Farmington Daily Times

PART OF THE USA TODAY NETWORK

## Affidavit of Publication

Ad # 0004866108

This is not an invoice

LOGOS RESOURCES II, LLC  
PO BOX 1946

SANTA FE, NM 87504

### NOTICE

LOGOS Operating, LLC has filed an Application with the New Mexico Oil Conservation Division as follows: *Case No. 22155: Application of LOGOS Operating, LLC for Authorization to Inject and for Approval of an Enhanced Recovery Pilot Project, and for an Exception to the Project Area Formation Provisions of NMAC 19.15.26.8, San Juan County, New Mexico.* Applicant seeks an order authorizing the injection of carbon dioxide into the Fruitland Coal formation, Basin Fruitland Coal Gas Pool, (71629) in San Juan County, New Mexico in the following well:

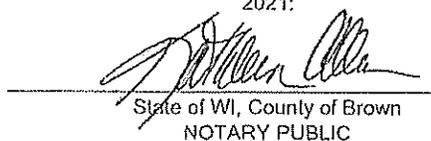
Quinn No. 3385  
1,690' FSL & 1,045' FWL (Unit K)  
Section 7  
T-31-N, R-8-W, NMPPM  
San Juan County, New Mexico

I, being duly sworn, say: Farmington Daily Times, a daily newspaper of general circulation published in English at Farmington, said county and state, and that the hereto attached Legal Notice was published in a regular and entire issue of the said DAILY TIMES, a daily newspaper duly qualified for the purpose within the State of New Mexico for publication and appeared in the internet at The Daily Times web site on the following days(s):

08/13/2021

  
Legal Clerk

Subscribed and sworn before me this August 13, 2021:

  
State of WI, County of Brown  
NOTARY PUBLIC

1-7-25  
My commission expires

**KATHLEEN ALLEN**  
Notary Public  
State of Wisconsin

Applicant proposes to convert the subject well to a Class-II injection well and utilize it for injection of carbon dioxide at depths of 2,675' to 3,008' subsurface to support enhanced recovery operations in a pilot project study area within a half-mile area of review from the Quinn No. 3385 located on portions of the following:

Township 31 North, Range 8 West  
Section 7  
Section 18

Township 31 North, Range 9 West  
Section 12  
Section 13

The well and lands are located in Pump Canyon approximately 4 miles west of State Highway 511.

This Application will be set for hearing before a Division Examiner at the New Mexico Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, New Mexico. 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 September 10, 2021 beginning at 8:15 a.m. To participate in the electronic hearing, see the instructions posted on the docket for the hearing date: <http://www.emnrd.state.nm.us/OCD/hearings.html>. You are not required to attend this hearing, but as an owner of an interest that may be affected, 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 time. If you intend to present testimony or evidence at the hearing, you must enter your appearance and serve the Division, counsel for the Applicant, and other parties with a pre-hearing statement at least four business days before the scheduled hearing date, in accordance with Division Rule 19.15.4.13 NMAC.

For further information, contact the Applicant's attorney, J. Scott Hall, LOGOS Resources II, LLC, P.O. Box 1946, Santa Fe, New Mexico 87504 (505) 303-7236.  
AD#4866108, Daily Times, Aug 13, 2021

Ad # 0004866108  
PO #: Case No 22155  
# of Affidavits 1

This is not an invoice

NIMCOCD Case No. 22155 - Quinn No. 338S Notice List - 1,690FSL & 1,045 FWL (Unit K) Section 7-T31N-R08W, NIMPM San Juan County, New Mexico

API #	NOTICE PARTY TYPE	NOTICE PARTY	ADDRESS	CARRIER
		Oil Conservation Division District III	To be submitted online	N/A
	Surface Owner	Bureau of Land Management	6251 College Blvd, Farmington, NM 87402	USPS
30-045-26782	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30055	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10760	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10852	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10999	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10922	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10944	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10778	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-26971	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24367	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24369	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-27377	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-22932	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-31905	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-10680	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-22625	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-23214	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-29003	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10490	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-27522	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-27523	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-10433	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10683	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10919	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10945	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-22243	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-28214	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10603	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-25061	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10681	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10844	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-11004	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10801	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-11084	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-10758	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS

API #	NOTICE PARTY TYPE	NOTICE PARTY	ADDRESS	CARRIER
30-045-11059	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21595	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21920	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-29259	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-13132	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-34058	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-26762	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21757	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
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30-045-29942	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30193	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-26744	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-31930	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-32406	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-32104	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-32173	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30298	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-33531	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-27491	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21762	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-26777	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30097	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30174	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-31897	Operator	Simcoe LLC	1199 Main Ave., Suite 101, Durango, CO 81301	USPS
30-045-32056	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21756	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-22767	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24411	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30098	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30147	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-29959	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30124	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24196	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24200	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21758	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-24368	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-29892	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-23584	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-30057	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS

64

API #	NOTICE PARTY TYPE	NOTICE PARTY	ADDRESS	CARRIER
30-045-26765	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS
30-045-21759	Operator	Hilcorp Energy Company	1111 Travis Street, Houston, TX 77002	USPS

65



J. Scott Hall  
 Senior Attorney  
 LOGOS Resources II, LLC  
 317 Paseo de Peralta  
 P. O. Box 1946  
 Santa Fe, NM 87504  
 Office: 505.303.7236  
 Mobile: 505.370.7362  
[shall@logosresourcesllc.com](mailto:shall@logosresourcesllc.com)

August 13, 2021

**Certified Mail / Return Receipt Requested**

To: All Interest Owners or Operators listed on the attached page

**Re: NMOCD Case No. 22155**  
**Application of Logos Operating, LLC for Authorization to Inject and for Approval of an Enhanced Recovery Pilot Project, San Juan County, New Mexico**

Dear Sir or Madam:

Pursuant to New Mexico Oil Conservation Division (NMOCD) Rule 19.15.26.8, you are hereby notified that LOGOS Operating, LLC has applied to the NMOCD for an order authorizing the injection of carbon dioxide into the Fruitland coal formation, Basin Fruitland Coal Gas Pool (71629) and for approval of enhanced recovery pilot project. LOGOS proposes to conduct injection operations at depths of 2,675' to 3,008' in the following well:

Quinn No. 338S  
 1,690' FSL & 1,045' FWL (Unit K)  
 Section 7  
 T-31-N, R-8-W, NMPM  
 San Juan County, New Mexico

A copy of the Application is enclosed. This Application will be set for hearing before a Division Examiner at the New Mexico Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, New Mexico. 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 **September 10, 2021** beginning at 8:15 a.m. To participate in the electronic hearing, see the instructions posted on the docket for the hearing date: <http://www.emnrd.state.nm.us/OCD/hearings.html>. You are not required to attend this hearing, but as an owner of an interest that may be affected, you may appear and present testimony.

66

August 13, 2021

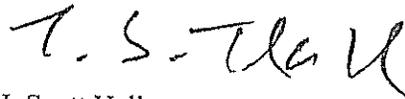
Page 2

Failure to appear at that time and become a party of record will preclude you from challenging the matter at a later time. If you intend to present testimony or evidence at the hearing, you must enter your appearance by **September 1, 2021** and serve the Division, counsel for the Applicant, and other parties with a pre-hearing statement by **September 2, 2021**, in accordance with Division Rule 19.15.4.13 NMAC.

Please feel free to contact me if you have any questions about this matter. Should you consent to the Application and the proposed injection operations, you are requested to indicate your waiver of objection by signing where indicated below and then returning this letter to me at your earliest convenience.

Sincerely,

LOGOS Operating, LLC



J. Scott Hall  
Senior Attorney

CONSENT:

By: \_\_\_\_\_

Hilcorp Energy Company  
1111 Travis Street  
Houston, TX 77002

Enduring Resources, LLC  
1050 17<sup>th</sup> Street, Suite 2500  
Denver, CO 80265

Simcoe LLC  
1199 Main Ave., Suite 101  
Durango, CO 81301

Bureau of Land Management  
6251 College Blvd.  
Farmington, NM 87402

Mario R. and Jeanette L. Ulibarri, et al. Trust  
123 Road 4556  
Blanco, NM 87412

**EXHIBIT 2**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



**New Mexico Tech**  
Petroleum Recovery Research Center

*a division of*  
New Mexico Institute of Mining & Technology  
801 Leroy Place, Socorro, NM 87801-4796  
Phone: 575-835-5144 Fax: 575-835-6031  
Email: prrc.nmt.edu <http://baervan.nmt.edu>

Dr. Robert S. Balch  
Director, Petroleum Recovery Research Center  
New Mexico Tech  
801 Leroy Place, Socorro NM 87801

September 1, 2021

Re: Technical feasibility of CO<sub>2</sub> injection into un-minable coal seams

To Whom it May Concern:

LOGOS Operating, LLC (“LOGOS”) has proposed to perform a pilot study of CO<sub>2</sub>-ECBM (CO<sub>2</sub> enhanced coal bed methane) in the Fruitland coal in the Northern San Juan Basin. I have had discussions with LOGOS regarding the similarity of their pilot study to work performed by New Mexico Tech, with Department of Energy funding, and through its Southwest Partnership on Carbon Sequestration (SWP) project. The SWP has been tasked with understanding CO<sub>2</sub> storage mechanisms in the Southwest US and has a project performance period from August 2003-August 2022 and a budget of more than \$93 million. As part of this large project, we performed a number of pilot scale injection tests into a variety of formations, including the Fruitland Coal at Pump Canyon, in a joint study with Conoco (the “Pump Canyon Study”). The Pump Canyon Study is in the public domain and a paper on the project was published via the Society of Petroleum Engineers (SPE 124002\*). As the Principal Investigator of the SWP project, I was happy to share our results and experience in CO<sub>2</sub> injection, as part of our technology transfer efforts, and to write this letter of support for their project.

Pump Canyon geology and petrophysics was studied in great detail, monitoring equipment was installed, and the project was simulated, before, during and after injection in order to fully history match and make predictions of ultimate storage volumes and expected changes in injectivity. Key observations from the study include:

1. No breakthrough observed at offset wells during injection activities which began in July of 2008 and concluded in late 2009
2. Perfluorocarbon gas phase tracers were included in the injected CO<sub>2</sub> and monitored at 46 surface sites, and no leakage was observed
3. Injectivity decreased over time as a result of swelling of the coal in response to CO<sub>2</sub> absorption which has the net effect of reducing cleat aperture and thus permeability in the coal over time
4. More than 300 MMscf of CO<sub>2</sub> was injected with an initial rate of 3.5MMscf per day and a final rate of 500 Mscf per day

Case No. 22155

Ex. 2

5. CO<sub>2</sub> can effectively displace CH<sub>4</sub> in the reservoir ultimately leading to improved recovery while simultaneously storing CO<sub>2</sub>

For the proposed pilot project by LOGOS, the Pump Canyon Study affirms the following:

1. That it is feasible to inject CO<sub>2</sub> into the Fruitland Coal and potentially see increased production because the CO<sub>2</sub> will preferentially adsorb on the coal and displace CH<sub>4</sub>
2. The injection rate of the pilot study is proposed at 250 Mscf per day, which is half of the minimum rate for the Pump Canyon Study. The formation can easily take this volume without significant pressure effects
3. The area of the CO<sub>2</sub> plume within the Fruitland Coal will be very small. No breakthrough was observed at offset wells (~1/4-mile distance) during the Pump Canyon Study with significantly larger injection volumes
4. There is no need for a statutory unit for this pilot as the potential area of impact will be extremely small, much less than 1/2 mile diameter due to the low volumes injected
5. CO<sub>2</sub> can be securely injected into coal, with no observed CO<sub>2</sub> loss over the course of the Pump Canyon Study due to preferential absorption of CO<sub>2</sub> molecules

The LOGOS pilot study is intriguing because of the proposed intent of future development. In particular, the project will provide necessary data for:

1. Understanding long-term effects of lower injection rates on offset production
2. Will provide data that can be used for simulation prior to a scaled-up pilot with a gradually increased injection rate, and by expanding the area of the pilot project by adding injection wells
3. Can ultimately add to CO<sub>2</sub> sequestration efforts. The Fruitland Coal natural gas has significant co-produced CO<sub>2</sub> on the order of 20-25% by volume. If this CO<sub>2</sub> can be captured, reinjected, and bound into the reservoir there is potential to ultimately reduce related regional CO<sub>2</sub> emissions by 3-4 million tonnes/year if adopted widely by Fruitland Coal producers

If there are additional questions, I am happy to answer them directly by phone or email.

Sincerely,



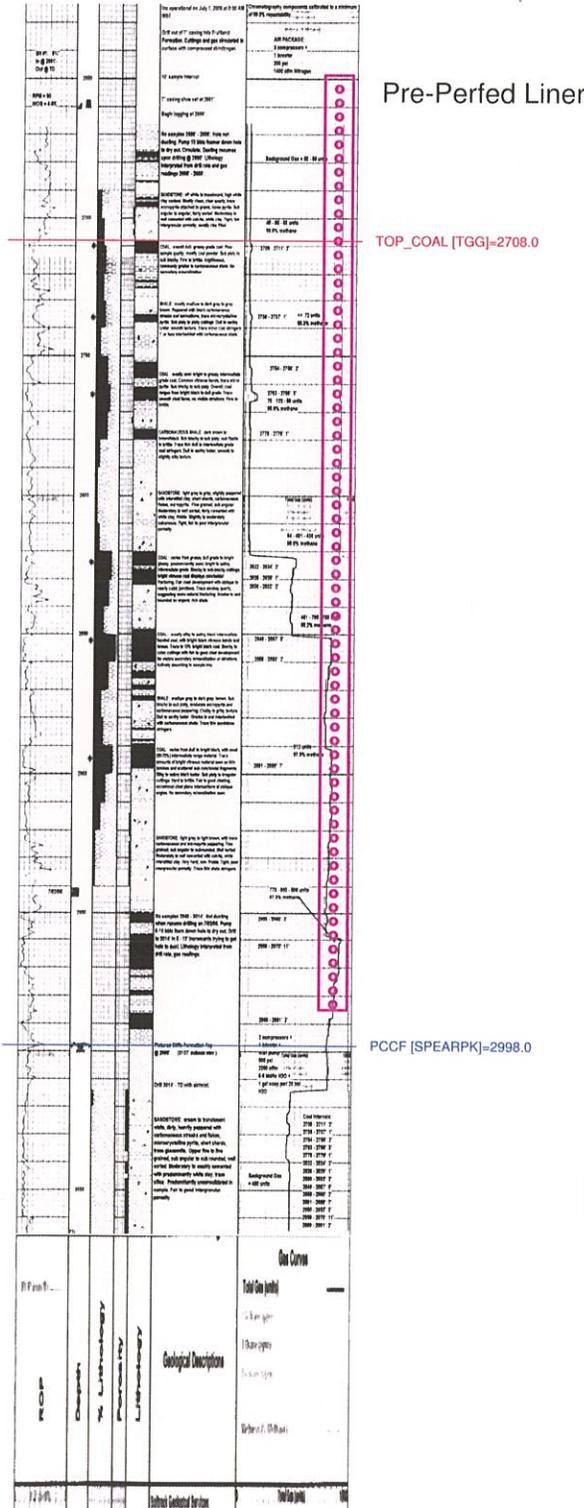
Robert S. Balch  
575-835-5305  
Robert.balch@nmt.edu

\*Oudinot, A. Y., Koperna, G. J., Phillip, Z. G., Heath, J. E., Wells, A., Young, G. B. & Wilson, T. (2011). CO<sub>2</sub> Injection Performance in the Fruitland Coal Fairway, San Juan Basin: Results of a Field Pilot. *Society of Petroleum Engineers International Conference on CO<sub>2</sub> Capture, Storage and Utilization*. SPE paper 124002

**EXHIBIT 3**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**

30045325270000  
QUINN  
338S  
LOGOS  
T31N R8W S7



Case No. 22155  
Ex. 3



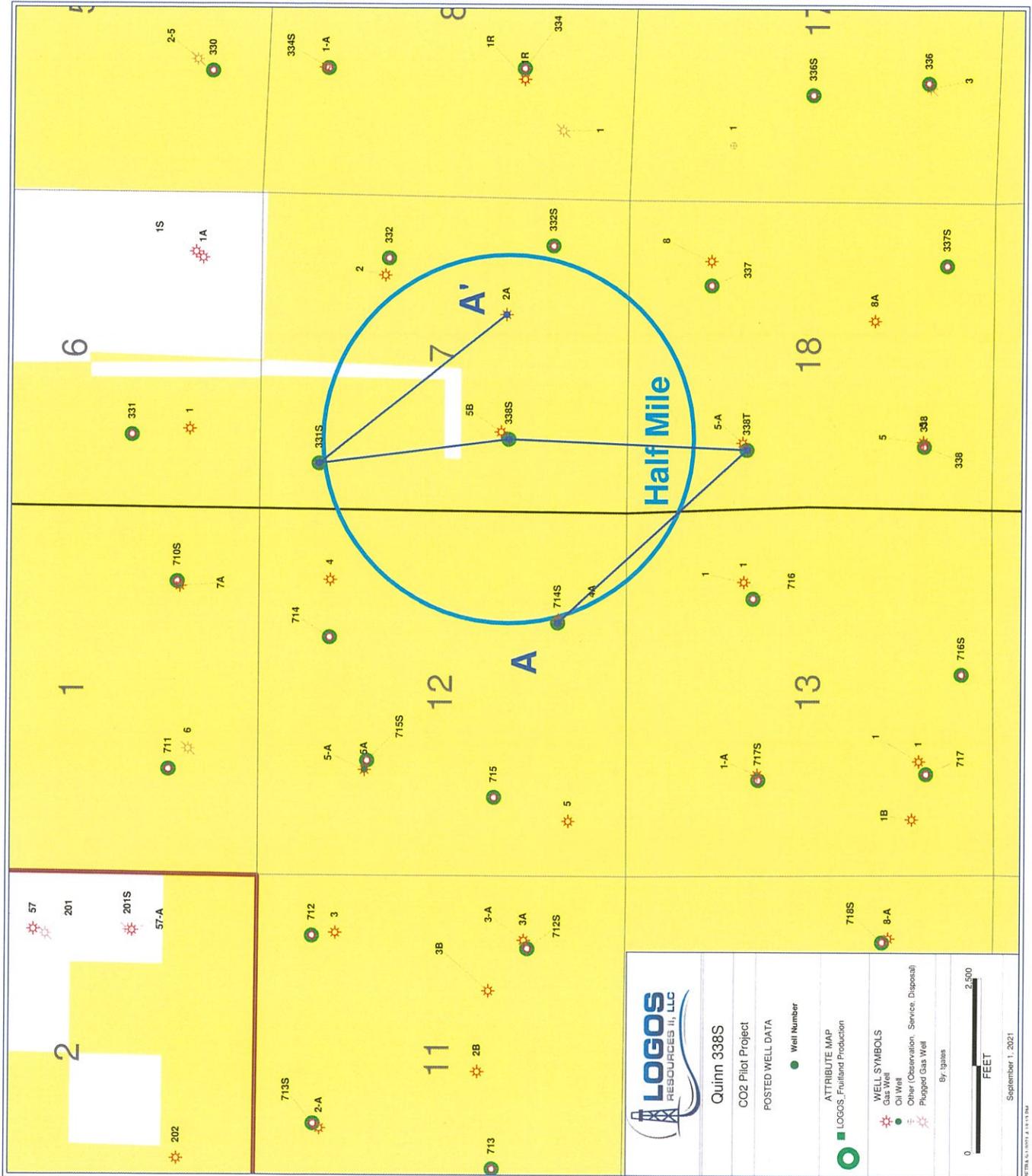
Quinn 338S  
CO2 Pilot Project  
Mudlog

By: Igitates  
September 2, 2021 1:09 PM

HS=500

**EXHIBIT 4**

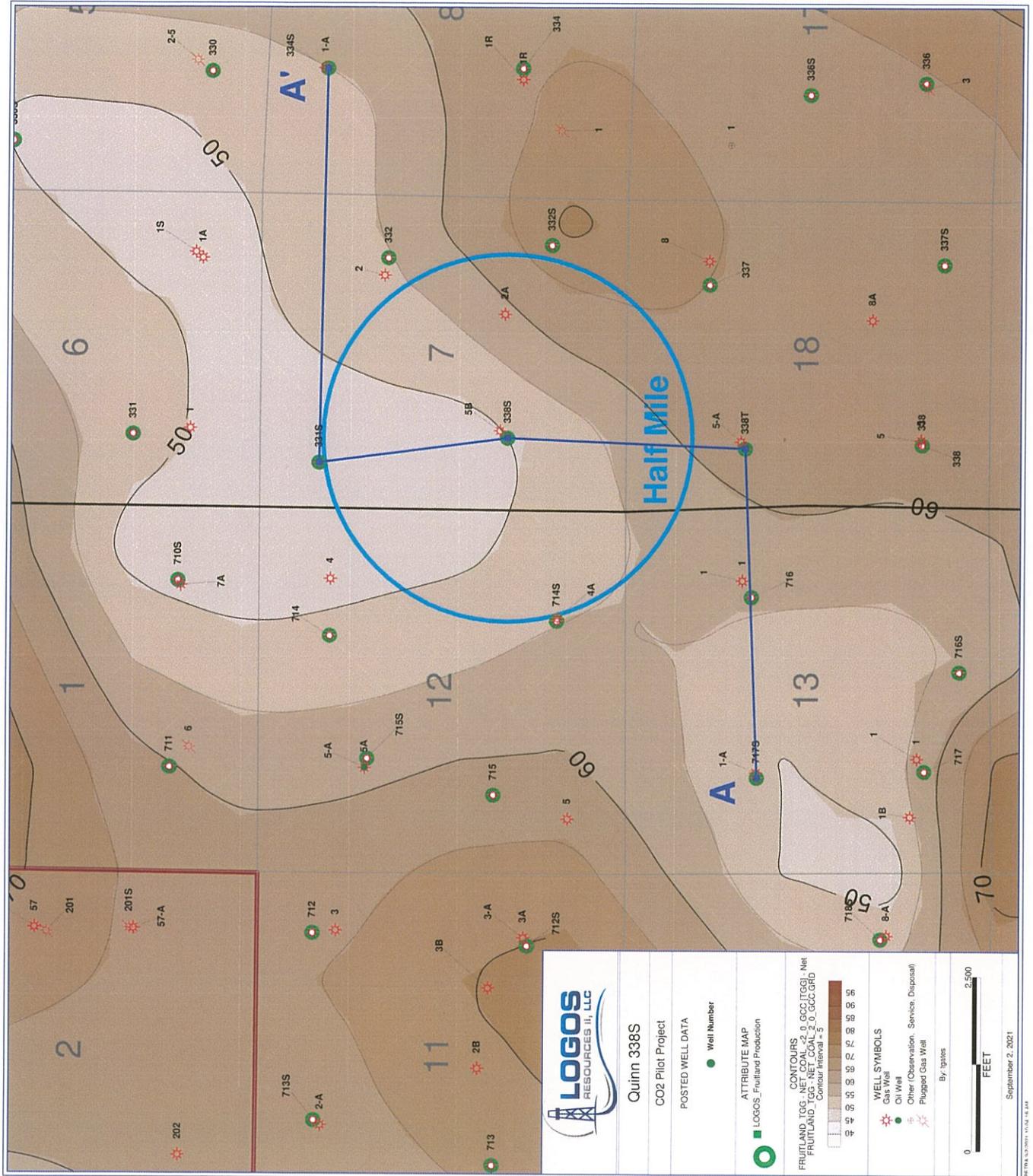
**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



Case No. 22155  
Ex. 4

**EXHIBIT 5**

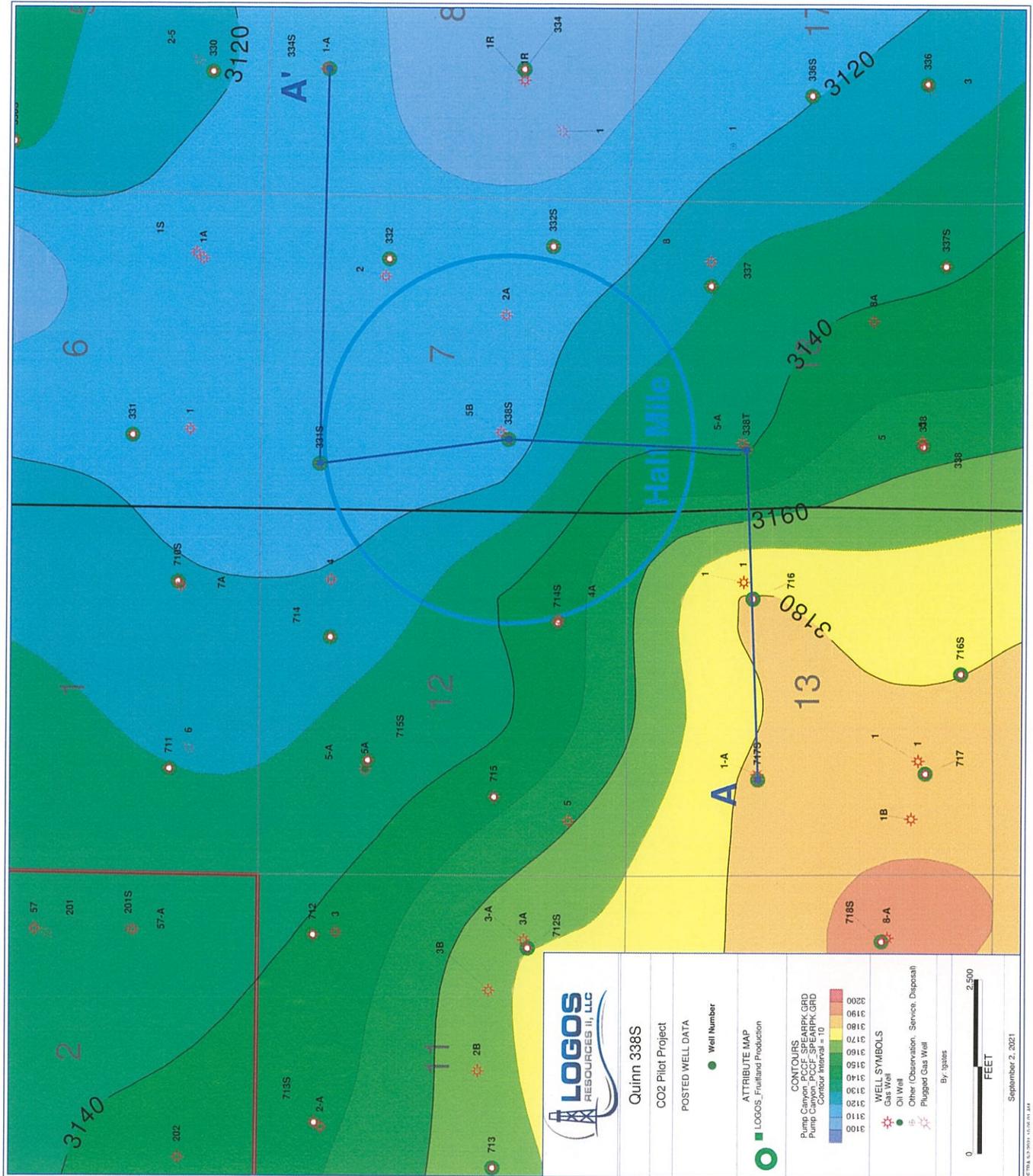
**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



Case No. 22155  
Ex. 5

## **EXHIBIT 6**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



**EXHIBIT 7**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**

Case No. 22155

Ex. 7

30045325930000  
OXNARD  
334S  
LOGOS  
T31N R8W S8



<5,675FT>

30045325080000  
JAQUEZ  
331S  
LOGOS  
T31N R8W S7



<2,720FT>

30045325270000  
QUINN  
338S  
LOGOS  
T31N R8W S7



<3,403FT>

30045344200000  
QUINN  
338T  
LOGOS  
T31N R8W S18

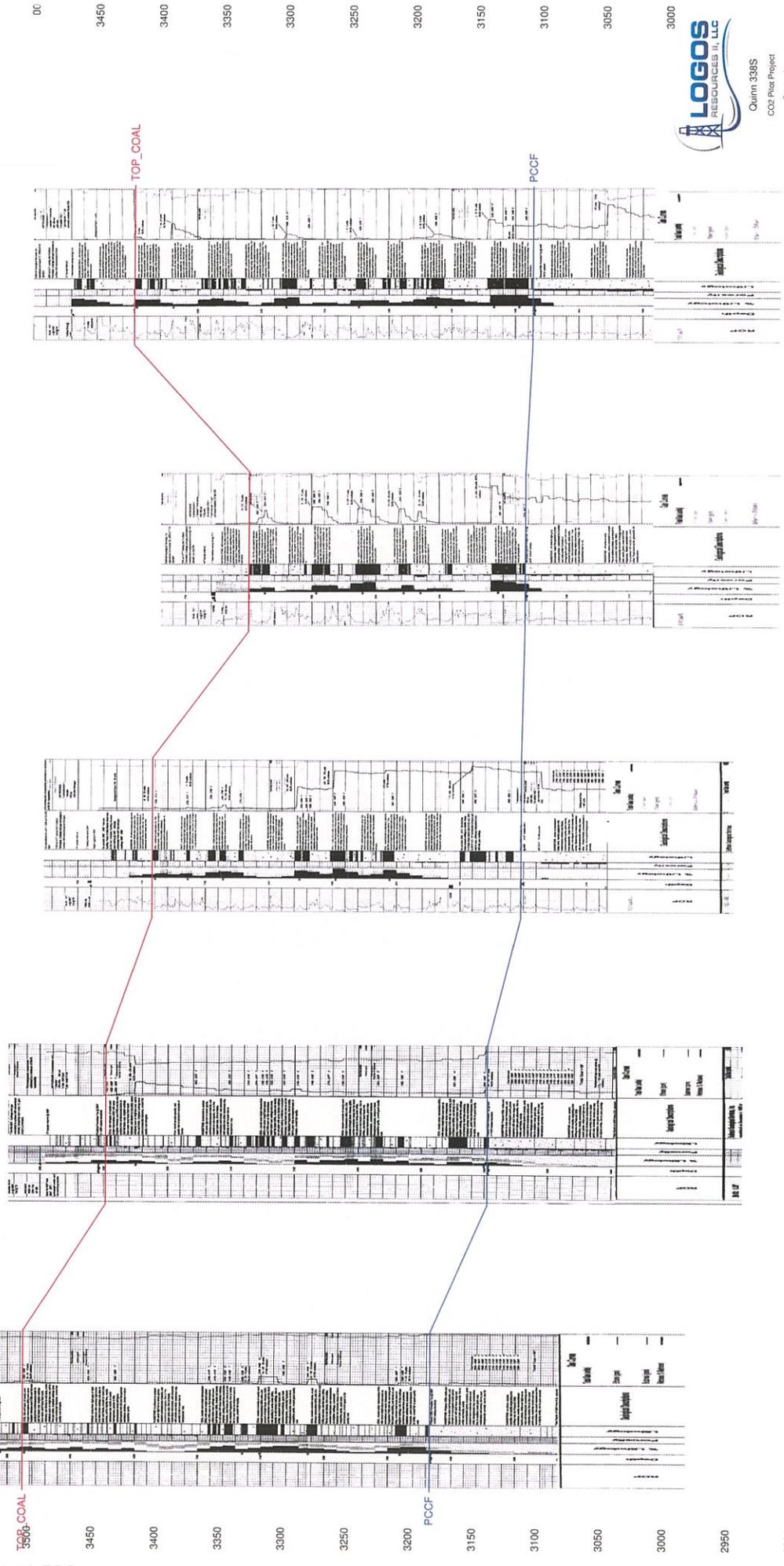


<4,737FT>

30045326290000  
NORDHAUS  
717S  
LOGOS  
T31N R8W S13



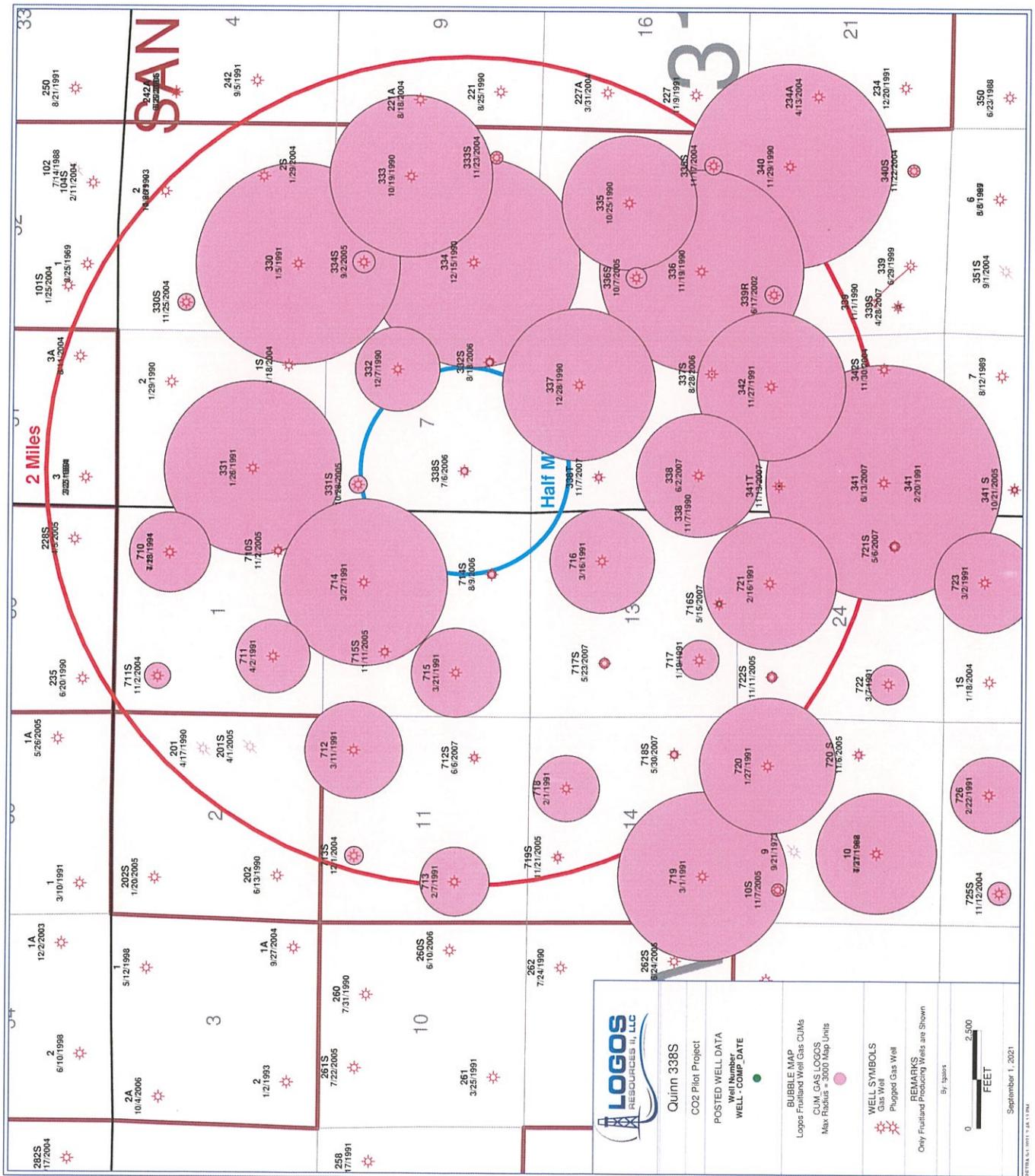
Subsea  
Depth(ft)  
3550



Quinn 338S  
CO2 Pilot Project  
Stratigraphic  
By: J. H. ...  
September 2, 2021 10:29 AM

**EXHIBIT 8**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



Case No. 22155  
Ex. 8

**EXHIBIT 9**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



## **EXHIBIT 10**

**LOGOS OPERATING, LLC  
NMOCD CASE NO. 22155  
SEPTEMBER 9, 2021**



Hilcorp Energy Company      **TRACKING # 7020 0090 0000 4230 0751**  
1111 Travis Street  
Houston, TX 77002

Enduring Resources, LLC      **TRACKING # 7020 0090 0000 4230 0737**  
1050 17<sup>th</sup> Street, Suite 2500  
Denver, CO 80265

Simcoe LLC      **TRACKING # 7020 0090 0000 4230 0720**  
1199 Main Ave., Suite 101  
Durango, CO 81301

Bureau of Land Management      **TRACKING # 7020 0090 0000 4230 0713**  
6251 College Blvd.  
Farmington, NM 87402

Mario R. and Jeanette L. Ulibarri, et al. Trust  
123 Road 4556      **TRACKING # 7020 0090 0000 4230 0768**  
Blanco, NM 87412



J. Scott Hall  
Senior Attorney  
LOGOS Resources II, LLC  
317 Paseo de Peralta  
P. O. Box 1946  
Santa Fe, NM 87504  
Office: 505.303.7236  
Mobile: 505.370.7362  
[shall@logosresourcesllc.com](mailto:shall@logosresourcesllc.com)

---

August 13, 2021

**Certified Mail / Return Receipt Requested**

To: All Interest Owners or Operators listed on the attached page

**Re: NMOCD Case No. 22155  
Application of Logos Operating, LLC for Authorization to Inject  
and for Approval of an Enhanced Recovery Pilot Project,  
San Juan County, New Mexico**

Dear Sir or Madam:

Pursuant to New Mexico Oil Conservation Division (NMOCD) Rule 19.15.26.8, you are hereby notified that LOGOS Operating, LLC has applied to the NMOCD for an order authorizing the injection of carbon dioxide into the Fruitland coal formation, Basin Fruitland Coal Gas Pool (71629) and for approval of enhanced recovery pilot project. LOGOS proposes to conduct injection operations at depths of 2,675' to 3,008' in the following well:

Quinn No. 338S  
1,690' FSL & 1,045' FWL (Unit K)  
Section 7  
T-31-N, R-8-W, NMPPM  
San Juan County, New Mexico

A copy of the Application is enclosed. This Application will be set for hearing before a Division Examiner at the New Mexico Oil Conservation Division, 1220 South St. Francis Drive, Santa Fe, New Mexico. 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 **September 10, 2021** beginning at 8:15 a.m. To participate in the electronic hearing, see the instructions posted on the docket for the hearing date: <http://www.emnrd.state.nm.us/OCD/hearings.html>. You are not required to attend this hearing, but as an owner of an interest that may be affected, you may appear and present testimony.

August 13, 2021

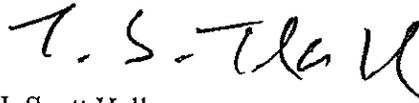
Page 2

Failure to appear at that time and become a party of record will preclude you from challenging the matter at a later time. If you intend to present testimony or evidence at the hearing, you must enter your appearance by **September 1, 2021** and serve the Division, counsel for the Applicant, and other parties with a pre-hearing statement by **September 2, 2021**, in accordance with Division Rule 19.15.4.13 NMAC.

Please feel free to contact me if you have any questions about this matter. Should you consent to the Application and the proposed injection operations, you are requested to indicate your waiver of objection by signing where indicated below and then returning this letter to me at your earliest convenience.

Sincerely,

LOGOS Operating, LLC



J. Scott Hall  
Senior Attorney

CONSENT:

By: \_\_\_\_\_

Hilcorp Energy Company  
1111 Travis Street  
Houston, TX 77002

Enduring Resources, LLC  
1050 17<sup>th</sup> Street, Suite 2500  
Denver, CO 80265

Simcoe LLC  
1199 Main Ave., Suite 101  
Durango, CO 81301

Bureau of Land Management  
6251 College Blvd.  
Farmington, NM 87402

Mario R. and Jeanette L. Ulibarri, et al. Trust  
123 Road 4556  
Blanco, NM 87412

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

**APPLICATION OF LOGOS OPERATING, LLC FOR AUTHORIZATION TO INJECT,  
FOR APPROVAL OF AND ENHANCED RECOVERY PILOT PROJECT, AND FOR AN  
EXCEPTION TO THE PROJECT AREA FORMATION PROVISIONS OF NMAC  
19.15.26.8, SAN JUAN COUNTY, NEW MEXICO**

Case No. \_\_\_\_\_

**APPLICATION**

LOGOS Operating, LLC ("LOGOS") applies pursuant to *inter alia* NMAC 19.15.26.8 for an order authorizing the injection of carbon dioxide into the Fruitland Coal formation, Basin Fruitland Coal Gas Pool (71629) in San Juan County, New Mexico. In support thereof, LOGOS states:

1. Applicant is the operator of the following well:

Quinn No. 338S  
1,690' FSL & 1,045' FWL (Unit K)  
Section 7  
T-31-N, R-8-W, NMPM  
San Juan County, New Mexico

2. The Quinn No. 338S is drilled to the Fruitland Coal Formation to a total depth (PBD) of 3,008 and with an open hole completion from 2,675' to 3,008'. LOGOS proposes to convert and equip the well as a Class II injection well for the injection of carbon dioxide through the open hole interval to support a CO<sub>2</sub> and enhanced gas recovery pilot project.

3. Injection operations through the well will be conducted at an anticipated average daily injection pressure of 200 psi, and at a maximum of 1,200 psi. Applicant proposes injection of carbon dioxide at average daily rates of approximately 250 Mcf/day and at maximum daily rates of approximately 3,500 Mcf/day. The source of the injected carbon dioxide gas will be from area

production wells. During the initial course of pilot project operations, LOGOS reasonably expects that injection gas volumes will be contained in formation and within the half-mile radius from the Quinn No. 338S.

4. Only after a sufficient period to allow for the analysis of the injection process and the effect on reservoir performance will Applicant be able to determine whether the subject lands and adjacent tracts "can best be developed and operated as a unit" in accordance with NMSA Section 70-7-4 C of the Statutory Unitization Act.

5. 320 acre spacing units are specified for development within the Basin-Fruitland Coal Gas Pool. (Order No. R-8768 B ). Accordingly, under the provisions of Division Rule NMAC 19.15.26 8. F(2), a project area consisting of the spacing unit for the Quin No. 338S and the adjoining and cornering 320 acre units comprising a total pilot project area of 2,609 acres  $\pm$  would be indicated. However, before the results of the pilot project are known, incurring the up-front costs and efforts that would be associated with re-dedicating the currently developed acreage within the 2,609 acres to a statutory unit are not warranted.

6. In lieu of designating a 2,609 project area, LOGOS proposes that a pilot project study area limited to those lands within a half-mile area of review from the Quinn No. 338S located on portions of the following:

Township 31 North, Range 8 West  
Section 7  
Section 18

Township 31 North, Range 9 West  
Section 12  
Section 13

5. It is reasonably expected that the analysis of data resulting from the conduct of the injection pilot project will lead to the development and production of additional coalbed methane reserves that would otherwise remain unrecovered and would yield additional environmental

benefits. Applicant's proposed injection operations can also be conducted in a safe and responsible manner without causing waste, impairing correlative rights or endangering fresh water, public health or the environment.

WHEREFORE, Applicant requests that this application be set for hearing on September 9, 2021 and that, following notice and hearing, the Division enter its order approving the utilization of the Quinn No. 338S well for injection of carbon dioxide into the Fruitland Coal formation at the intervals and at the pressures, volumes and rates indicated to support pilot project operations. Applicant also requests a temporary exception to the project area formation provisions of NMAC 19.15.26.8 F(2), along with such other and further provisions as the Division determines appropriate.

Respectfully submitted,

/s/ J. Scott Hall

---

J. Scott Hall  
Post Office Box 1946  
Santa Fe, NM 87504-1946  
(505) 670-7362  
[shall@logosresourcesllc.com](mailto:shall@logosresourcesllc.com)

*Attorney for LOGOS Operating, LLC  
and LOGOS Resources II, LLC*

SENDER: COMPLETE THIS SECTION	COMPLETE THIS SECTION ON DELIVERY																
<ul style="list-style-type: none"> <li>■ Complete items 1, 2, and 3.</li> <li>■ Print your name and address on the reverse so that we can return the card to you.</li> <li>■ Attach this card to the back of the mailpiece, or on the front if space permits.</li> </ul>	<p>A. Signature  <input checked="" type="checkbox"/> Agent  <input type="checkbox"/> Addressee</p>																
<p>1. Article Addressed to:</p> <p>Bureau of Land Management          6251 College Blvd., Ste. A          Farmington, NM 87402</p>	<p>B. Received by (Printed Name)          GARCIA</p> <p>C. Date of Delivery          8/17</p> <p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes          If YES, enter delivery address below: <input type="checkbox"/> No</p>																
 9590 9402 5853 0038 8801 45	<p>3. Service Type</p> <table border="0"> <tr> <td><input type="checkbox"/> Adult Signature</td> <td><input type="checkbox"/> Priority Mail Express®</td> </tr> <tr> <td><input type="checkbox"/> Adult Signature Restricted Delivery</td> <td><input type="checkbox"/> Registered Mail™</td> </tr> <tr> <td><input type="checkbox"/> Certified Mail®</td> <td><input type="checkbox"/> Registered Mail Restricted Delivery</td> </tr> <tr> <td><input type="checkbox"/> Certified Mail Restricted Delivery</td> <td><input type="checkbox"/> Return Receipt for Merchandise</td> </tr> <tr> <td><input type="checkbox"/> Collect on Delivery</td> <td><input type="checkbox"/> Signature Confirmation™</td> </tr> <tr> <td><input type="checkbox"/> Collect on Delivery Restricted Delivery</td> <td><input type="checkbox"/> Signature Confirmation Restricted Delivery</td> </tr> <tr> <td><input type="checkbox"/> Insured Mail</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Insured Mail Restricted Delivery (over \$500)</td> <td></td> </tr> </table>	<input type="checkbox"/> Adult Signature	<input type="checkbox"/> Priority Mail Express®	<input type="checkbox"/> Adult Signature Restricted Delivery	<input type="checkbox"/> Registered Mail™	<input type="checkbox"/> Certified Mail®	<input type="checkbox"/> Registered Mail Restricted Delivery	<input type="checkbox"/> Certified Mail Restricted Delivery	<input type="checkbox"/> Return Receipt for Merchandise	<input type="checkbox"/> Collect on Delivery	<input type="checkbox"/> Signature Confirmation™	<input type="checkbox"/> Collect on Delivery Restricted Delivery	<input type="checkbox"/> Signature Confirmation Restricted Delivery	<input type="checkbox"/> Insured Mail		<input type="checkbox"/> Insured Mail Restricted Delivery (over \$500)	
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<p>2. Article Number (Transfer from service label)</p> <p>7020 0090 0000 4230 0713</p>	<p>PS Form 3811, July 2015 PSN 7530-02-000-9053</p>																

Domestic Return Receipt

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<p>1. Article Addressed to:</p> <p>Mario: Jeanette Ulibarri          123 Road 4554          Blanco, NM 87412</p>	<p>B. Received by (Printed Name)          Mario R. Ulibarri</p> <p>C. Date of Delivery          8-17-2021</p> <p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes          If YES, enter delivery address below: <input checked="" type="checkbox"/> No</p>																
 9590 9402 5853 0038 8802 99	<p>3. Service Type</p> <table border="0"> <tr> <td><input type="checkbox"/> Adult Signature</td> <td><input type="checkbox"/> Priority Mail Express®</td> </tr> <tr> <td><input type="checkbox"/> Adult Signature Restricted Delivery</td> <td><input type="checkbox"/> Registered Mail™</td> </tr> <tr> <td><input type="checkbox"/> Certified Mail®</td> <td><input type="checkbox"/> Registered Mail Restricted Delivery</td> </tr> <tr> <td><input type="checkbox"/> Certified Mail Restricted Delivery</td> <td><input type="checkbox"/> Return Receipt for Merchandise</td> </tr> <tr> <td><input type="checkbox"/> Collect on Delivery</td> <td><input type="checkbox"/> Signature Confirmation™</td> </tr> <tr> <td><input type="checkbox"/> Collect on Delivery Restricted Delivery</td> <td><input type="checkbox"/> Signature Confirmation Restricted Delivery</td> </tr> <tr> <td><input type="checkbox"/> Insured Mail</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Insured Mail Restricted Delivery (over \$500)</td> <td></td> </tr> </table>	<input type="checkbox"/> Adult Signature	<input type="checkbox"/> Priority Mail Express®	<input type="checkbox"/> Adult Signature Restricted Delivery	<input type="checkbox"/> Registered Mail™	<input type="checkbox"/> Certified Mail®	<input type="checkbox"/> Registered Mail Restricted Delivery	<input type="checkbox"/> Certified Mail Restricted Delivery	<input type="checkbox"/> Return Receipt for Merchandise	<input type="checkbox"/> Collect on Delivery	<input type="checkbox"/> Signature Confirmation™	<input type="checkbox"/> Collect on Delivery Restricted Delivery	<input type="checkbox"/> Signature Confirmation Restricted Delivery	<input type="checkbox"/> Insured Mail		<input type="checkbox"/> Insured Mail Restricted Delivery (over \$500)	
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<p>1. Article Addressed to:</p> <p><b>Nalcorp Energy Company</b>  <b>Attn: Chuck Creekmore</b>  <b>1111 Travis Street</b>  <b>Houston, TX 77002</b></p>  <p>9590 9402 5853 0038 8802 75</p>	<p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes  <input checked="" type="checkbox"/> No          If YES, enter delivery address below:</p>
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<p>1. Article Addressed to:</p> <p><b>Simcoe, LLC</b>  <b>1199 Main Ave, Ste. 101</b>  <b>Durango, CO 81301</b>  <b>Attn: Kiki Moseley</b></p>  <p>9590 9402 5853 0038 8802 68</p>	<p>D. Is delivery address different from item 1? <input type="checkbox"/> Yes  <input checked="" type="checkbox"/> No          If YES, enter delivery address below:</p>
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Denver, CO 80265

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<input type="checkbox"/> Certified Mail Restricted Delivery	\$	\$0.00
<input type="checkbox"/> Adult Signature Required	\$	\$0.00
<input type="checkbox"/> Adult Signature Restricted Delivery	\$	\$0.00
Postage	\$1.40	
<b>Total Postage and Fees</b>	<b>\$7.85</b>	

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AUG 16 2021

City, State, ZIP+4®: **Denver, CO 80265**

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

Enduring Resources, LLC  
 Street and Apt. No., or PO Box No. 1050 1/2<sup>nd</sup> Street, Ste. 2500  
 City, State, ZIP+4® Denver, CO 80215

[Track Another Package +](#)

**Tracking Number:** 70200090000042300737

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Your package is moving within the USPS network and is on track to be delivered to its final destination. It is currently in transit to the next facility.

## In Transit to Next Facility

August 27, 2021

Feedback

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**Text & Email Updates**



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**Tracking History**



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**Product Information**



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# USPS Tracking®

[FAQs >](#)

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**Tracking Number:** 70200090000042300720

[Remove X](#)

Your item has been delivered to an agent for final delivery in DURANGO, CO 81301 on August 18, 2021 at 11:19 am.

## **Delivered to Agent for Final Delivery**

August 18, 2021 at 11:19 am  
DURANGO, CO 81301

Feedback

**Get Updates** 

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**Text & Email Updates**



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**Tracking History**



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**Product Information**



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**See Less** 

## Can't find what you're looking for?

Go to our [FAQs](#) section to find answers to your tracking questions.

## Track Another Package +

**Tracking Number:** 70200090000042300713

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Your item was delivered to the front desk, reception area, or mail room at 10:43 am on August 17, 2021 in FARMINGTON, NM 87402.

### **Delivered, Front Desk/Reception/Mail Room**

August 17, 2021 at 10:43 am  
FARMINGTON, NM 87402

Feedback

**Get Updates** v

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**Text & Email Updates**



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**Tracking History**



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**Product Information**



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## Can't find what you're looking for?

Go to our [FAQs](#) section to find answers to your tracking questions.

## Track Another Package +

**Tracking Number:** 70200090000042300768

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Your item was picked up at the post office at 2:55 pm on August 17, 2021 in BLANCO, NM 87412.

### **Delivered, Individual Picked Up at Post Office**

August 17, 2021 at 2:55 pm  
BLANCO, NM 87412

Feedback

**Get Updates** v

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**Text & Email Updates**



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**Tracking History**



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**Product Information**



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**See Less** ^

## Can't find what you're looking for?

Go to our [FAQs](#) section to find answers to your tracking questions.



J. Scott Hall  
Senior Attorney  
LOGOS Resources II, LLC  
317 Paseo de Peralta  
P. O. Box 1946  
Santa Fe, NM 87504  
Office: 505.303.7236  
Mobile: 505.370.7362  
[shall@logosresourcesllc.com](mailto:shall@logosresourcesllc.com)

August 13, 2021

**Certified Mail / Return Receipt Requested**

To: All Interest Owners or Operators listed on the attached page

RECEIVED  
Aug 26 2021

Re: **NMOCD Case No. 22155**  
**Application of Logos Operating, LLC for Authorization to Inject and for Approval of an Enhanced Recovery Pilot Project, San Juan County, New Mexico**

Dear Sir or Madam:

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1,690' FSL & 1,045' FWL (Unit K)  
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San Juan County, New Mexico

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August 13, 2021

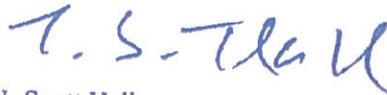
Page 2

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Please feel free to contact me if you have any questions about this matter. Should you consent to the Application and the proposed injection operations, you are requested to indicate your waiver of objection by signing where indicated below and then returning this letter to me at your earliest convenience.

Sincerely,

LOGOS Operating, LLC



J. Scott Hall  
Senior Attorney

CONSENT:

By:



Hilcorp Energy Company  
1111 Travis Street  
Houston, TX 77002

Enduring Resources, LLC

~~1050 17<sup>th</sup> Street, Suite 2500~~

~~Denver, CO 80265~~

6300 S SYRACUSE WAY, SUITE 525  
CENTENNIAL, CO 80111

Simcoe LLC  
1199 Main Ave., Suite 101  
Durango, CO 81301

Bureau of Land Management  
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