

Protested SWD Application

By Franklin Mountain Energy

3/25/21

Lamkin, Baylen, EMNRD

From: Lamkin, Baylen, EMNRD
Sent: Wednesday, April 14, 2021 1:08 PM
To: Joe Vargo
Subject: Notification of Protest for Application to Inject: NGL_London SWD No.1_Franklin Mountain Energy
Attachments: SWD-2414_NGL Water Solutions Permian, LLC_London SWD No.1_Franklin Mountain Energy Protest.pdf

RE: London SWD No.1 (API 30-25-Pending; Admin. Appl. No pBL2110443393) Unit P S22 T24S R35E, NMPM, Lea County

Mr. Vargo,

The OCD was notified by Franklin Mountain Energy that they are protesting this application. This party has been identified as an affected person for the location being considered. Because of the protest, the application can no longer be reviewed administratively. You are being notified that for this application to be considered, NGL Water Solutions Permian, LLC, currently has two options; the first is to go to hearing, the second is to negotiate a resolution with the protesting party. If the protest is withdrawn, then the application can be reviewed administratively. In the meantime, the application will be retained pending a hearing or other resolution. Please continue to provide OCD with information regarding the standing of this application and feel free to call me with any questions.

Contact for Franklin Mountain Energy:

Shelly Albrecht, CPL
Director of Land
(720)-414-7855
salbrecht@fmellc.com

Kind regards,

Baylen Lamkin

Petroleum Engineer

Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505
505-476-3401





March 25, 2021

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

Re: London SWD #1
SESE of Section 22-T24S-R35E
Operator: NGL Water Solutions Permian, LLC

Dear New Mexico Oil Conservation Division,

Franklin Mountain Energy, LLC ("FME") is an offset operator to NGL Water Solutions Permian, LLC's proposed disposal well named the London SWD #1 and planned for the SE/4SE/4 corner of Section 22, Township 24 South, Range 35 East in Lea County, New Mexico. FME formally objects to the drilling of the London SWD #1 for the following reasons:

1. FME has a large acreage position it intends to develop immediately offsetting the proposed well in Sections 14 & 23-T24S-R35E. This development block will consist primarily of horizontal wells at depths greater than the proposed injection zone. FME is concerned about the potential of creating a drilling hazard by injecting large volumes of water into formations that will subsequently be required to drill through in future wells. The increase of water in shallower formations has the potential to increase the pore pressure in the injection zones, which may lead to unstable formations, necessitate higher mud weights while drilling, and/or require an additional string of casing for FME's future development.
2. FME views the Bell Canyon, Cherry Canyon and Brushy Canyon zones as potentially unexplored and productive hydrocarbon bearing formations. It's assumed injecting large volumes of water into these zones will reduce the hydrocarbon productivity of the reservoir, economic viability of future wells, and ultimate value of FME's assets.

Should you have any questions, please contact the undersigned at (720) 414-7855 or salbrecht@fmellc.com.

Respectfully,
Franklin Mountain Energy, LLC

Shelly Albrecht, CPL
Director of Land



March 11, 2021

FRANKLIN MOUNTAIN ENERGY LLC
44 COOK ST, STE 1000
DENVER, CO 80206-5827

Subject: London SWD No. 1 Authorization to Inject

To Whom It May Concern:

Attached for your review is Form C-108, Application for Authorization to Inject, and its supplemental documents prepared for NGL Water Solution Permian LLC's London SWD No. 1 well. Section XIV of Form C-108 requires that the surface land owner on which the well is located and each leasehold operator within a one-half mile radius of the proposed well location be furnished with the application.

According to the New Mexico Oil Conservation Division, surface owners, offset operators, leasehold owners, or unleased mineral owners must file any objections or requests for hearing of administrative applications within 15 days from the date in which this application was mailed to them.

Any questions should be directed towards the applicant, NGL Water Solutions Permian, LLC.

Regards,

Joseph Vargo
Regulatory Director

(303) 815-1010, x3652
Joseph.Vargo@nglep.com

RECEIVED:	REVIEWER:	TYPE:	APP NO:
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ABOVE THIS TABLE FOR OCD DIVISION USE ONLY

NEW MEXICO OIL CONSERVATION DIVISION
 - Geological & Engineering Bureau -
 1220 South St. Francis Drive, Santa Fe, NM 87505



ADMINISTRATIVE APPLICATION CHECKLIST

THIS CHECKLIST IS MANDATORY FOR ALL ADMINISTRATIVE APPLICATIONS FOR EXCEPTIONS TO DIVISION RULES AND
 REGULATIONS WHICH REQUIRE PROCESSING AT THE DIVISION LEVEL IN SANTA FE

Applicant: <u>NGL WATER SOLUTIONS PERMIAN LLC</u>	OGRID Number: <u>372338</u>
Well Name: <u>LONDON SWD #1</u>	API: <u>TBD</u>
Pool: <u>SWD;DELAWARE</u>	Pool Code: <u>96100</u>

**SUBMIT ACCURATE AND COMPLETE INFORMATION REQUIRED TO PROCESS THE TYPE OF APPLICATION
 INDICATED BELOW**

- 1) **TYPE OF APPLICATION:** Check those which apply for [A]
 A. Location - Spacing Unit - Simultaneous Dedication
☐ NSL ☐ NSP (PROJECT AREA) ☐ NSP (PRORATION UNIT) ☐ SD

B. Check one only for [I] or [II]

[I] Commingling - Storage - Measurement

☐ DHC ☐ CTB ☐ PLC ☐ PC ☐ OLS ☐ OLM

[II] Injection - Disposal - Pressure Increase - Enhanced Oil Recovery

☐ WFX ☐ PMX ☒ SWD ☐ IPI ☐ EOR ☐ PPR

- 2) **NOTIFICATION REQUIRED TO:** Check those which apply.

- A. ☒ Offset operators or lease holders
 B. ☐ Royalty, overriding royalty owners, revenue owners
 C. ☒ Application requires published notice
 D. ☒ Notification and/or concurrent approval by SLO
 E. ☒ Notification and/or concurrent approval by BLM
 F. ☒ Surface owner
 G. ☒ For all of the above, proof of notification or publication is attached, and/or,
 H. ☐ No notice required

FOR OCD ONLY

- ☐ Notice Complete
☐ Application
 Content
 Complete

- 3) **CERTIFICATION:** I hereby certify that the information submitted with this application for administrative approval is **accurate** and **complete** to the best of my knowledge. I also understand that **no action** will be taken on this application until the required information and notifications are submitted to the Division.

Note: Statement must be completed by an individual with managerial and/or supervisory capacity.

JOSEPH VARGO

Print or Type Name

Signature

3-11-21
 Date

(303) 815-1010, extension 3652

Phone Number

Joseph.Vargo@nglep.com

e-mail Address

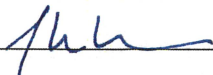
APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: _____ Secondary Recovery _____ Pressure Maintenance X Disposal _____ Storage
Application qualifies for administrative approval? _____ Yes _____ No
- II. OPERATOR: **NGL Water Solutions Permian, LLC**

ADDRESS: **865 North Albion Street, Suite 400, Denver, CO 80220**

CONTACT PARTY: **Joseph Vargo, Regulatory Director** PHONE: **(303) 815-1010**
- 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 X 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 fresh water 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: **Joseph Vargo** TITLE: **Regulatory Director**

SIGNATURE:  DATE: 3-11-21

E-MAIL ADDRESS: **Joseph.Vargo@nglep.com**

- * If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be resubmitted. Please show the date and circumstances of the earlier submittal: _____

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.

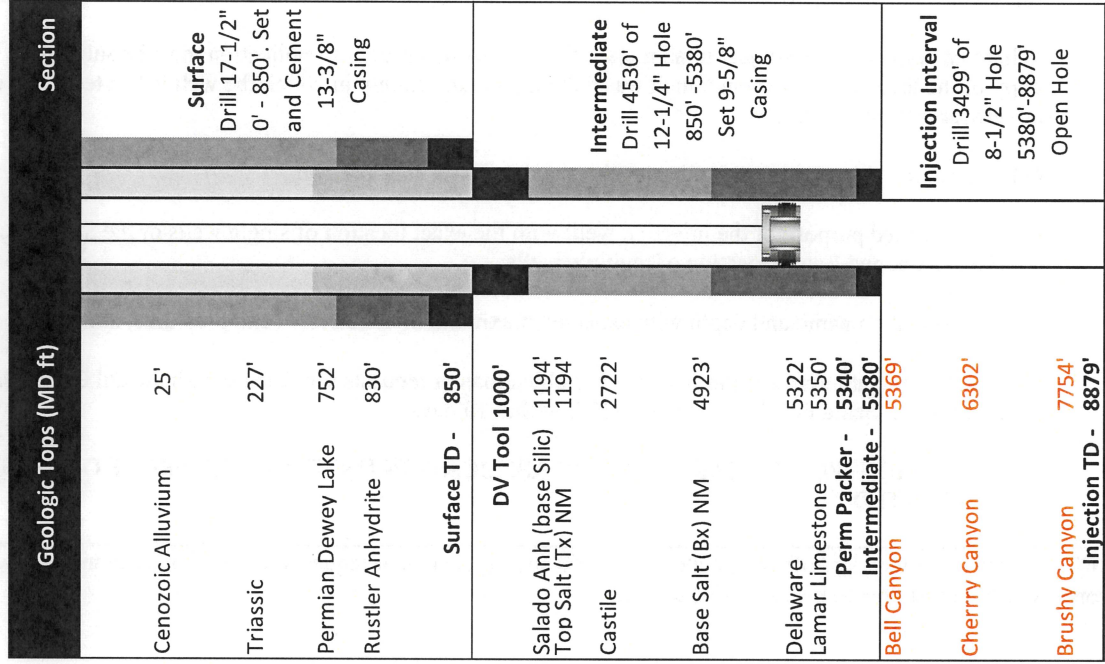
INJECTION WELL DATA SHEET

OPERATOR: NGL Water Solutions Permian, LLC
WELL NAME & NUMBER: London SWD No. 1

WELL LOCATION: 655' FSL, 355' FEL P 22 SECTION 24-S 35-E
FOOTAGE LOCATION TOWNSHIP RANGE

WELLBORE SCHEMATIC

WELL CONSTRUCTION DATA



Hole Size: 17-1/2" Casing Size: 13-3/8"

Cemented with: 807 sx. or ft³

Top of Cement: Surface Method Determined: Calculated

Intermediate Casing

Hole Size: 12-1/4" Casing Size: 9-5/8"

Cemented with: 1774 sx. or ft³

Top of Cement: Surface Method Determined: Calculated

Production Casing

Hole Size: Casing Size:

Cemented with: sx. or ft³

Top of Cement: Method Determined:

Total Depth: 8,879'

Injection Interval

Open Hole, 5,380' feet to 8,879'

(Perforated or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size: 7" Lining Material: TK-805

Type of Packer: 9-5/8" x 7" Permanent Packer w/ Stainless Trim

Packer Setting Depth: 5,340'

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

Additional Data

1. Is this a new well drilled for injection? _____ Yes _____
- If no, for what purpose was the well originally drilled? _____

2. Name of the Injection Formation: Bell Canyon, Cherry Canyon, Brushy Canyon
3. Name of Field or Pool (if applicable): SWD; Delaware
4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. _____ No _____

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

Bone Spring Sand – 10,382' TVD

Wolfcamp – 12,578' TVD

NGL Water Solutions Permian, LLC
London SWD No.1
Form C-108 Supplemental Information

III. Well Data

A. Wellbore Information

1.

Well Information	
Lease Name	Tap 10 Ranch
Well Name	London SWD No. 1
County	Lea
Location	SESE 22-T24S-R35E
Footage Location	655' FSL, 355' FEL

2. Casing Data

a.

Casing Information		
Type	Surface	Intermediate
OD	13.375"	9.625"
WT	.458"	.473"
ID	12.615"	8.835"
Drift ID	12.459"	8.679"
COD	14.375"	10.625"
Weight	54.5#	40#
Grade	J-55	L-80
Hole Size	17.5"	12.25"
Depth Set	850'	5,380'

*Please note that based on regional mapping, we expect the London SWD No. 1 to be west of the reef trend, and don't expect to encounter Capitan Reef facies. If the reef is encountered, the salt section will be isolated behind an additional cemented casing before drilling through the Capitan.

b.

Cement Information		
Casing String	Surface	Intermediate
Cement Type	Class A	Class A
Cement Yield	1.595 ft3/sk	1.468 ft3/sk
Total Cement Volume	807 sks	1774 sks
Cement Excess	100%	30% Over Caliper
TOC	Surface	Surface
Method	Circulate to Surface	DV Tool, Circulate to Surface

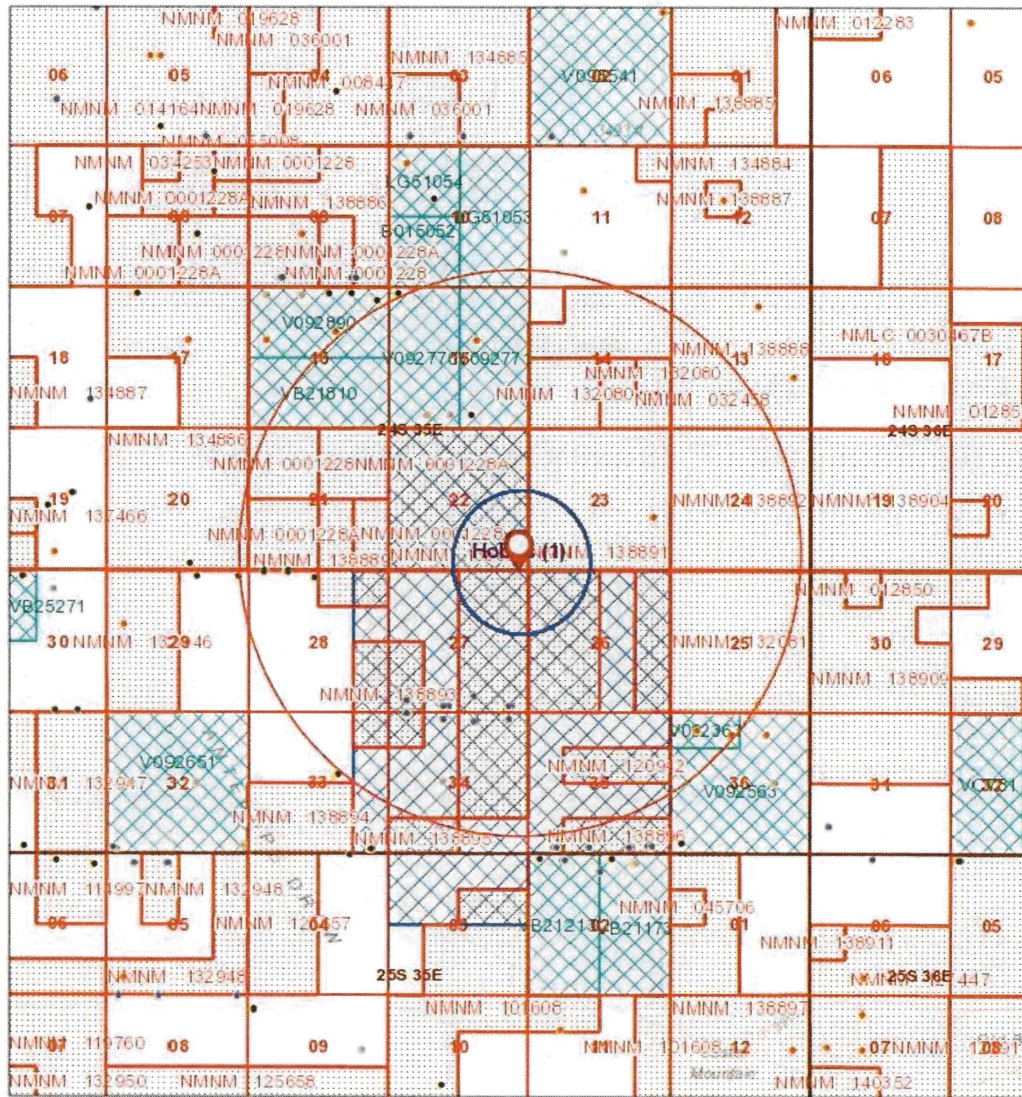
3. Tubing Description

Tubing Information	
OD	7"
WT	0.425"
ID	6.276"
Drift ID	6.151"
COD	7.656"
Weight	26#
Grade	P-110
Depth Set	5,340'

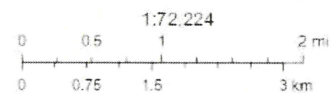
Lining Material: TK-805

4. Packer Description: 9-5/8" x 7" Permanent Packer w/ Stainless Trim set at 5,340'

V. AOR Map and list of wells within 2 miles.



- Wells - Small Scale
- undefined
 - Active
 - New
 - Plugged
 - Cancelled
 - Temporarily Abandoned
 - OCD Districts
 - ★ OCD District Offices
 - PLSS First Division
 - PLSS Townships
 - NMSLO Unit Agreement Boundaries



Oil Conservation Division of the New Mexico Energy, Minerals and Natural Resources Department, OCD, Bureau of Land Management, Texas Parks & Wildlife, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA, NOAA, EPA, USDA, BLM

#	API	Well Name	Well Type	Well Status	Operator Name
1	30-025-45048	COONSKIN FEE #028H	Oil	Active	COG OPERATING LLC
2	30-025-45051	COONSKIN FEE #603H	Oil	Active	COG OPERATING LLC
3	30-025-45053	COONSKIN FEE #702H	Oil	Active	COG OPERATING LLC
4	30-025-45052	COONSKIN FEE #701H	Oil	Active	COG OPERATING LLC
5	30-025-45050	COONSKIN FEE #602H	Oil	Active	COG OPERATING LLC
6	30-025-45049	COONSKIN FEE #601H	Oil	Active	COG OPERATING LLC
7	30-025-43683	COONSKIN FEE #025H	Oil	Active	COG OPERATING LLC
8	30-025-45030	BRAHMAN 15 10 STATE COM #452C	Oil	Cancelled	COG OPERATING LLC
9	30-025-08684	PRE-ONGARD WELL #001	Oil	Plugged (site released)	PRE-ONGARD WELL OPERATOR
10	30-025-44655	MAN HANDS 24S35E3427 #217C	Oil	Cancelled	TAP ROCK OPERATING, LLC
11	30-025-45032	BRAHMAN STATE 24 35 15 #602C	Oil	Cancelled	COG OPERATING LLC
12	30-025-45031	BRAHMAN 15 10 STATE COM #453C	Oil	Cancelled	COG OPERATING LLC
13	30-025-27167	PRE-ONGARD WELL #001	Oil	Plugged (site released)	PRE-ONGARD WELL OPERATOR
14	30-025-26016	PRE-ONGARD WELL #001	Oil	Plugged (site released)	PRE-ONGARD WELL OPERATOR
15	30-025-26127	PRE-ONGARD WELL #001	Oil	Plugged (site released)	PRE-ONGARD WELL OPERATOR
16	30-025-26123	PRE-ONGARD WELL #001	Oil	Cancelled	PRE-ONGARD WELL OPERATOR
17	30-025-46276	PORK PIE STATE COM #704H	Oil	Active	COG OPERATING LLC
18	30-025-47289	MAN HANDS FEDERAL COM #131H	Oil	New	TAP ROCK OPERATING, LLC
19	30-025-47290	MAN HANDS FEDERAL COM #135H	Oil	New	TAP ROCK OPERATING, LLC
20	30-025-47291	MAN HANDS FEDERAL COM #211H	Oil	New	TAP ROCK OPERATING, LLC
21	30-025-47292	MAN HANDS FEDERAL COM #215H	Oil	New	TAP ROCK OPERATING, LLC
22	30-025-47341	MULVA FEDERAL COM #111H	Oil	New	TAP ROCK OPERATING, LLC
23	30-025-47342	MULVA FEDERAL COM #131H	Oil	New	TAP ROCK OPERATING, LLC
24	30-025-47343	MULVA FEDERAL COM #211H	Oil	New	TAP ROCK OPERATING, LLC
25	30-025-47344	MULVA FEDERAL COM #215H	Oil	New	TAP ROCK OPERATING, LLC
26	30-025-47740	MULVA FEDERAL COM #112H	Oil	New	TAP ROCK OPERATING, LLC
27	30-025-47741	MULVA FEDERAL COM #113H	Oil	New	TAP ROCK OPERATING, LLC
28	30-025-47742	MULVA FEDERAL COM #114H	Oil	New	TAP ROCK OPERATING, LLC
29	30-025-47743	MULVA FEDERAL COM #132H	Oil	New	TAP ROCK OPERATING, LLC

30	30-025-47744	MULVA FEDERAL COM #133H	Oil	New	TAP ROCK OPERATING, LLC
31	30-025-47745	MULVA FEDERAL COM #134H	Oil	New	TAP ROCK OPERATING, LLC
32	30-025-47746	MULVA FEDERAL COM #135H	Oil	New	TAP ROCK OPERATING, LLC
33	30-025-47747	MULVA FEDERAL COM #218H	Oil	New	TAP ROCK OPERATING, LLC
34	30-025-47787	MULVA FEDERAL COM #212H	Oil	New	TAP ROCK OPERATING, LLC
35	30-025-47788	MULVA FEDERAL COM #217H	Oil	New	TAP ROCK OPERATING, LLC
36	30-025-47798	MAN HANDS FEDERAL COM #112H	Oil	New	TAP ROCK OPERATING, LLC
37	30-025-47799	MAN HANDS FEDERAL COM #113H	Oil	New	TAP ROCK OPERATING, LLC
38	30-025-47800	MAN HANDS FEDERAL COM #133H	Oil	New	TAP ROCK OPERATING, LLC
39	30-025-47801	MAN HANDS FEDERAL COM #134H	Oil	New	TAP ROCK OPERATING, LLC
40	30-025-47802	MAN HANDS FEDERAL COM #136H	Oil	New	TAP ROCK OPERATING, LLC
41	30-025-47803	MAN HANDS FEDERAL COM #137H	Oil	New	TAP ROCK OPERATING, LLC
42	30-025-47804	MAN HANDS FEDERAL COM #212H	Oil	New	TAP ROCK OPERATING, LLC
43	30-025-47805	MAN HANDS FEDERAL COM #213H	Oil	New	TAP ROCK OPERATING, LLC
44	30-025-47806	MAN HANDS FEDERAL COM #214H	Oil	New	TAP ROCK OPERATING, LLC
45	30-025-47807	MAN HANDS FEDERAL COM #216H	Oil	New	TAP ROCK OPERATING, LLC
46	30-025-47808	MAN HANDS FEDERAL COM #217H	Oil	New	TAP ROCK OPERATING, LLC
47	30-025-47809	MAN HANDS FEDERAL COM #218H	Oil	New	TAP ROCK OPERATING, LLC
48	30-025-47830	MULVA FEDERAL COM #136H	Oil	New	TAP ROCK OPERATING, LLC
49	30-025-47831	MULVA FEDERAL COM #137H	Oil	New	TAP ROCK OPERATING, LLC
50	30-025-47832	MULVA FEDERAL COM #213H	Oil	New	TAP ROCK OPERATING, LLC
51	30-025-47833	MULVA FEDERAL COM #214H	Oil	New	TAP ROCK OPERATING, LLC
52	30-025-47834	MULVA FEDERAL COM #216H	Oil	New	TAP ROCK OPERATING, LLC
53	30-025-48091	MAN HANDS FEDERAL COM #114H	Oil	New	TAP ROCK OPERATING, LLC
54	30-025-48092	MAN HANDS FEDERAL COM #132H	Oil	New	TAP ROCK OPERATING, LLC

VI. There are no completed or plugged wells in the proposed injection interval within the 1-mile AOR. None of the horizontal wells in the area penetrate the injection interval within the 1-mile AOR. Plugged and proposed wells within the 1-mile AOR are summarized below:

API No.	Well Name	Status	Notes
30-025-27167	FRAZIER FEDERAL #1	P&A'd	TD @ 4,167'
Pending C-108	JAL PUBLIC LIBRARY TRUST 23-24-35 SWD #1	Proposed SWD	Int 1 Casing set @ 5,220' w/ cmt circulated to surface Int 2 Casing set @ 12,650' w/ cmt circulated to surface

VII. Proposed Operation Data

1. Average Daily Rate: 30,000 bpd
Max Daily Rate: 35,000 bpd
2. Closed System
3. Average Surface Injection Pressure: 950 psi
Maximum Surface Injection Pressure: 1,076 psi
4. The injection fluid is to be locally produced water. Representative water analysis is attached.
5. The disposal interval is non-productive. No water samples are available from the surrounding area.

VIII. Geological Data

The Delaware Mountain Group (DMG) of the Delaware Basin consists of interbedded Guadalupian-age arkosic to subarkosic sandstone, siltstone, shale, and detrital limestone that was deposited in deep water as a series of submarine fans, channel, overbank, and pelagic suspension deposits, mainly during lowstand and early transgressive sea-level changes. Stratigraphic divisions within the Delaware Mountain Group are well understood and have been documented in the recent geologic literature (e.g., Gardner, 1997a, 1997b, Montgomery, et al., 2000a, Montgomery, et al., 2000b, Dutton, et al., 2000, and Dutton et al., 2003, and many other publications).

The Delaware basin was a restricted, deep water basin, bounded by carbonate ramp (San Andres and Grayburg formations) and carbonate rim (Goat Seep and Capitan reefs) that developed on the western margin of the Central Basin Platform, the Northwest Shelf, and the Diablo Platform that surrounded the Delaware Basin portion of the Permian Basin in West Texas and SE New Mexico.

The Delaware Mountain Group is approximately 3762' thick in the vicinity of the proposed SWD wells (Table 1). The Delaware Mountain Group is formally divided into the Brushy Canyon, Cherry Canyon, and Bell Canyon Formations in ascending order (Exhibits 1 – 4, Appendix A-1). This succession is capped by the Lamar Limestone Member of the Bell Canyon Formation, a 45' - 100' thick interval overlying the sandstones of the Bell Canyon, which is comprised of an upper shale ("Delaware Shale"), underlain by organic-rich, detrital limestone, interbedded with shale, siltstone, and sparse, very fine, arkosic to subarkosic sandstone (Exhibit 1). The Bell Canyon formation consists of clean, very fine to fine grained, friable to moderately well cemented, massive to medium and thin bedded sandstone, interbedded with carbonaceous siltstone and shale, and thin to medium bedded, detrital limestone (Exhibit 1 and Exhibit 2). The Cherry Canyon and Brushy Canyon formations consist of the following: (1) very fine to fine-grained, arkosic to subarkosic sandstones, mostly massive to locally finely laminated in character, (2) very fine-grained sandstones microlaminated with siltstone and carbonaceous shale, (3) dark-colored organic-rich siltstones (lutites), (4) carbonate beds (limestone or dolomite), which are thicker and more prevalent in the Bell Canyon and Cherry Canyon, and near the basin margins, and (5) black to dark gray, calcareous, organic-rich shales (Exhibit 2 and Exhibit 3). Carbonates are moderately abundant in the Bell Canyon and upper Cherry Canyon but decrease in thickness and abundance in the lower portion of the Cherry Canyon and

in the Brushy Canyon formations. Shale beds tend to be thin and sparse within the main body of the individual formations but become thicker and more abundant at the base of each formation. This is particularly evident at the base of the Brushy Canyon formation, where the underlying shales have been informally designated as the Avalon Shale, the uppermost shale of the Bone Spring Formation (Exhibit 4).

Porosity and permeability of the Bell Canyon, Cherry Canyon, and Brushy Canyon range from 12% to 25%, and 1 – 5 mD, respectively, but locally, streaks of permeability can reach up to 200 md (Dutton, 2008, Montgomery, et al., 2000a and 2000b, Spain, 1992). These reservoir parameters, together with good to excellent lateral continuity of the sand bodies within the Delaware Mountain Group indicate that sandstone within the Delaware Mountain Group is highly capable of taking water injection.

Upward vertical migration of injected salt water from the Delaware Mountain Group will be inhibited by the extremely low permeability of the shale, detrital limestone, and tightly cemented siltstone of the Lamar Limestone Member at the top of the Delaware Mountain Group (Exhibit 1). This impermeable interval extends beneath the Capitan Reef to the East and will prevent the migration of injected salt water into the overlying Capitan Reef regional aquifer (Cross Section A-A'). The Capitan Reef is overlain by approximately 2,400' of interbedded anhydrite and salt (Cross section A-A'). To the west of the Capitan Reef in the Delaware basin, the Delaware Mountain Group is overlain by approximately 4,500' of interbedded anhydrite, salt, and thin shales (Cross Section A-A'), which will provide an additional effective barrier to upward migration of injected salt water. The locations of wells used for Cross Section A – A' are shown on the Cross Section Index map, both of which are located in Appendix A-1. The shales and tightly cemented siltstone and sandstone of the basal Brushy Canyon will isolate the underlying Avalon Shale and Sandstone from invasion by injected salt water. We have proposed a buffer zone of approximately 250' above the top of the Leonardian Avalon shale (Top Bone Spring formation) from the bottom of the proposed injection zone in the lower Brushy Canyon (Exhibit 4).

- A. Injection zone - Bell Canyon, Cherry Canyon, and Brushy Canyon Formations, Delaware Mountain Group, illustrated on Cross Section A – A'.

Table 1 - Local formation tops and anticipated drilling depths to the injection zone (pale blue):

Formation	Depth
Rustler Anhydrite	830'
Salado	1,194'
Delaware Mountain Group	5,322'
Lamar Limestone	5,350'
Bell Canyon	5,369'
Cherry Canyon	6,302'
Brushy Canyon	7,754'
Base Brushy Canyon Injection Zone	8,900'
Bone Spring, Leonardian (Avalon Shale)	9,129'
Bone Spring 1st Limestone	9,236'

Underground Sources of Drinking Water

The most closely offsetting water wells are drilled to 1,250' or shallower, generally producing from the Santa Rosa, Chinle, and Ogallala formations. Fresh water depth varies from 40' to 475' (300' on average) in the area in the form of sporadic alluvial sources and the Santa Rosa. In general, any USDWs (i.e., Upper Rustler) would be expected to fall above the salt and anhydrite of the Rustler/Salado/Castile evaporites and will be protected. The top of the Rustler is estimated at approximately 830'. An independent, third party review was conducted to confirm these findings and can be found in Appendix A-1. Regional mapping indicates the location to be west of the Capitan Reef facies.

References:

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- Gardner, M.H., 2018 Tectonics and Sedimentation of Permian Delaware Basin Deep Water Systems, abstract, Rocky Mountain Section, SEPM (Sedimentary for Sedimentary Geology), Luncheon Presentation, March 27, 2018.
- Montgomery, S.L., John Worrall, and Dean Hamilton, 2000a, Delaware Mountain Group, West Texas and Southeastern New Mexico, A case of refound opportunity: Part 1 – Brushy Canyon, *Bull. Amer. Assoc. of Petrol. Geol.*, v. 83, no. 12, pp. 1901-1926.
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- Spain, D.R., 1992, Petrophysical evaluation of a slope fan/ Basin Floor fan complex: Cherry Canyon Formation, Ward County, Texas, *Bull. Amer. Assoc. of Petrol. Geol.*, v. 76, no. 6, pp. 805-827.

IX. No proposed stimulation program planned at this time.

X. There are no logs or test data on the well. During the process of drilling and completion, the following logging program will be used: Gamma Ray, Caliper, Resistivity, Neutron, and Density for intermediate and injection interval, 200' correlation cased hole neutron from shoe up into casing, CBL for intermediate and surface.

XI. There are no producing freshwater wells within one mile of the location. CP-01119-POD2 shown on the 1-mile water well map could not be located.

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 London SWD #1) and any underground sources of drinking water.

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TITLE: Sr. Geologist

SIGNATURE: 

DATE: 3/10/2021

Offset Produced Water Analysis																		
wellname	api	section	township	range	unit	country	formation	ph	tds_mg/L	sodium_mg/L	calcium_mg/L	iron_mg/L	magnesium_mg/L	manganese_mg/L	chloride_mg/L	bicarbonate_mg/L	sulfate_mg/L	co2_mg/L
FIGHTING OKRA 18 FEDERAL COM #001H	3002540382	18 265	34E	E	Lea	Lea	AVALON UPPER	8.25	1508.7	66908.6	9313	10	1603	1.6	121072.7	1024.8	940	1950
ICHABOD 7 FEDERAL #001H	3002540043	7 265	34E	P	Lea	Lea	AVALON UPPER	8.35	1508.7	317.4	90.7	0	55.4	0	242.4	125	675	0
ICHABOD 7 FEDERAL #001H	3002540043	7 265	34E	P	Lea	Lea	AVALON UPPER	5.97	220460.7	66687.9	13470	121.8	2827	3.42	134969.6	440	910	1400
FIGHTING OKRA 18 FEDERAL COM #001H	3002540382	18 265	34E	E	Lea	Lea	AVALON UPPER	7.5	163025.9	58095.8	4006	28.5	648.2	0.76	96767.1	915	2000	6
ICHABOD 7 FEDERAL #001H	3002540043	7 265	34E	P	Lea	Lea	AVALON UPPER	7.25	29003.5	76053.3	8718	159.9	1414	3.26	136469.2	231.8	1395	900
ICHABOD 7 FEDERAL #001H	3002540043	7 265	34E	P	Lea	Lea	AVALON UPPER	7.19	196841.4	66599.5	7587	25.7	1213	1.25	118673.2	976	1300	1820
FIGHTING OKRA 18 FEDERAL COM #001H	3002540382	18 265	34E	E	Lea	Lea	AVALON UPPER	7	196841.4	66599.5	7587	25.7	1213	1.25	118673.2	976	1300	1820
FIGHTING OKRA 18 FEDERAL COM #001H	3002540382	18 265	34E	E	Lea	Lea	AVALON UPPER	7	196841.4	66599.5	7587	25.7	1213	1.25	118673.2	976	1300	1820
ICHABOD 7 FEDERAL #001H	3002540043	7 265	34E	P	Lea	Lea	AVALON UPPER	6.7	211246.6	71749.9	7064	68	1291	2	125645	1049.2	2840	50
ICHABOD 7 FEDERAL #001H	3002542425	27 235	33E	A	Lea	Lea	BONE SPRING 1ST SAND	5.6	171476.3	55383.2	9140	40.4	1023	1.1	104576.4	244	560	770
BELL LAKE 19 STATE #001H	3002541024	19 245	33E	M	Lea	Lea	BONE SPRING 2ND SAND	6.77	134649.2	44572.9	6215	37.9	759.3	0.93	81681.6	244	785	200
BELL LAKE 19 STATE #002H	3002541515	19 245	33E	O	Lea	Lea	BONE SPRING 2ND SAND	7.01	128413.3	44271.6	4207	41.1	705.9	0.78	77482.5	366	910	300
BELL LAKE 19 STATE #003H	3002541516	19 245	33E	O	Lea	Lea	BONE SPRING 2ND SAND	6.67	138617.2	46648.4	5778	41.1	731.5	1.1	84081	244	710	300
BELL LAKE 19 STATE #004H	3002541517	19 245	33E	O	Lea	Lea	BONE SPRING 2ND SAND	6.67	138617.2	46648.4	5778	30.5	718.2	0.83	80381.7	244	675	300
SALADO DRAW 6 FEDERAL #001H	3002541293	6 265	34E	M	Lea	Lea	BONE SPRING 3RD SAND	6.6	99401.9	34493.3	3295	0.4	396.8	0.37	59986.5	109.8	710	70
SALADO DRAW 6 FEDERAL #001H	3002541293	6 265	34E	M	Lea	Lea	BONE SPRING 3RD SAND	6.5	99612.7	34586.5	3244	10.3	417.7	0.39	59986.5	138.6	820	50
SALADO DRAW 6 FEDERAL #001H	3002541293	6 265	34E	M	Lea	Lea	BONE SPRING 3RD SAND	6.7	95604	31066	3196	10	394	0.5	59071	183	100	100
SALADO DRAW 6 FEDERAL #001H	3002541293	6 265	34E	M	Lea	Lea	BONE SPRING 3RD SAND	7	98321.4	33892.3	3267	9.5	534.7	0.39	59386.6	635	300	300
SALADO DRAW 6 FEDERAL #001H	3002541293	6 265	34E	M	Lea	Lea	BONE SPRING 3RD SAND	7.3	81566.4	26319.4	2687.4	26.1	326.7	0.39	50281.2	399.7	100	100
SNAPPING 2 STATE #014H	3001542688	2 265	31E	P	EDDY	EDDY	WOLF CAMP	7.3	81566.4	26319.4	2687.4	26.1	326.7	0.39	50281.2	399.7	100	100
SNAPPING 2 STATE #002H	3001542895	2 235	31E	C	EDDY	EDDY	WOLF CAMP	6.8	119471.8	37359.2	5659.1	22.4	746.1		73177.5		1035.5	250

Appendix A-1



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TAP 10 Groundwater Statement Verification
January 29, 2021

The following items are related to the proposed C-108 statement for groundwater resources in the area surrounding the proposed TAP 10 SWD wells. This memo summarizes observations regarding static water levels and general water quality in the area based on data from the USGS, OSE and from relevant literature sources.

- Based on USGS and OSE data, static water levels in T24S, R35E vary between 10' and 560' below ground surface (bgs). The aquifer identification codes from the USGS range from Quaternary/bolson/surficial to Chinle to Santa Rosa and these are reasonable identifications for this area (two wells are misidentified as "surficial" with water tables greater than 100' bgs, and these may be Ogallala or Chinle wells).
- The USGS data table provided to ZGC by IPT includes three wells that are exceptionally deep for water wells: one listed at 1,250' TD, one at 5,713' TD and one at 5,300' TD.
 - o The 1,250' well has a water table at ~270' bgs and is coded as a Santa Rosa aquifer. This well may include a groundwater contribution from the underlying Dewey Lake and Rustler Formations and water quality may be correspondingly poor.
 - o The 5,713' well has a water table at ~1,050 bgs. This well is located in sec. 20, T24S, R36E. Nearby producing wells (e.g., 30-025-43779) list a Rustler top around 770' suggesting the local water table occurs in the upper Rustler.
 - o The 5,300' well has a water table at ~480-540' bgs and the well is located in sec. 28, T23S, R35E. This is probably a Santa Rosa well, but may also include contributions from Permian strata.
 - o These deeper wells are most likely wells drilled for hydrocarbon production or potash mining that proved to not be useable and were turned over for either use or monitoring. For example, the 1,250' deep well has a note in the associated OSE record that states: "This well will be used for livestock watering purpose also". It was originally drilled by Gulf, then turned over to a private individual (J. Post).
- The OSE data lists two wells drilled to ~5,390' TD with standing water recorded at ~4,400' and 4,365' bgs and one well drilled to ~1,570' TD with no water level recorded. Because the data recorded and presented by OSE represents a one-time water level measurement recorded immediately after the well was completed, there is no information about the current static water level. Both driller records indicate these wells encountered "limestone/dolostone/chalk" from ~4,400' to TD. It is highly unlikely that water sourced from this deep and from limestone or dolostone will be potable, even by livestock standards, but without chemistry data, it's not clear if this water may meet the (lower) standards for livestock water. All three of these wells appear to have been drilled by or for Intercontinental Potash Corporation and so were presumably not drilled for drinking or livestock water use.

Water quality notes from Jones (1973) for a study area, Los Medaños, just northwest of the Tap 10 area:

- The Santa Rosa Sandstone supplies most stock well water in the Los Medaños area and surrounding townships.
- The Rustler yields greater quantities of water than the Santa Rosa, but much of the Rustler water contains excessive dissolved material.
 - o Rustler water is probably from the Culebra Dolomite and/or the Magenta Dolomite
 - o Some specific conductance measurements for Rustler water were as high as 15,000 micromhos/centimeter (this is extremely high) although most values ranged from 1,000 to 5,000 micromhos/centimeter.
- The local groundwater is a more complex aquifer system that includes lower Chinle sandstone beds, the Santa Rosa Sandstone, and horizons within the Dewey Lake and Rustler Formations.
- The quantity of water is variable throughout the area, but other than Rustler wells, generally ranged from 5 to 10 gallons per minute (gpm). Rustler wells can be 100 gpm or higher.

Jones, C.L., 1973, Salt deposits of the Los Medaños area, Eddy and Lea County, with sections on ground water hydrology (M.E. Cooley) and surficial geology (G.O. Bachman): USGS Open-file Report 73-135, 73 p.

Respectfully submitted,

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Noah Jemison, Ph.D.

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