Initial Application Part I

Received: **08/02/2019**

This application is placed in file for record. It MAY or MAY NOT have been reviewed to be determined Administratively Complete

Revised March 23, 2017

RECEIVED: 08/02/2019	REVIEWER:	TYPE: SWD	APP NO: pMAM1921443519

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: Solaris Water Midstream, LLC **OGRID Number:** 371643

Well Name: Cal Naughton Jr SWD 1 **API:** 30-015-

Pool: SWD; Devonian **Pool Code:** 96101

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

SWD-2226

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

FOR OCD ONLY

☐ Notice Complete

☐ Application Content Complete

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

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.

Brian Wood

Print or Type Name

B. Wood

Signature

7-30-19

Date

505 466-8120

Phone Number

brian@permitswest.com

e-mail Address

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 XXX Disposal _____ Storage
Application qualifies for administrative approval? XXX Yes _____ No

II. OPERATOR: SOLARIS WATER MIDSTREAM, LLC

ADDRESS: 907 TRADEWINDS BLVD., SUITE B, MIDLAND TX 79706

CONTACT PARTY: BRIAN WOOD (PERMITS WEST, INC.) PHONE: 505 466-8120

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 XXX 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:

Cal Naughton Jr SWD 1
SWD; Devonian

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: BRIAN WOOD TITLE: CONSULTANT

SIGNATURE:  DATE: JULY 29, 2019

E-MAIL ADDRESS: brian@permitswest.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: _____

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

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.

Side 1

INJECTION WELL DATA SHEET

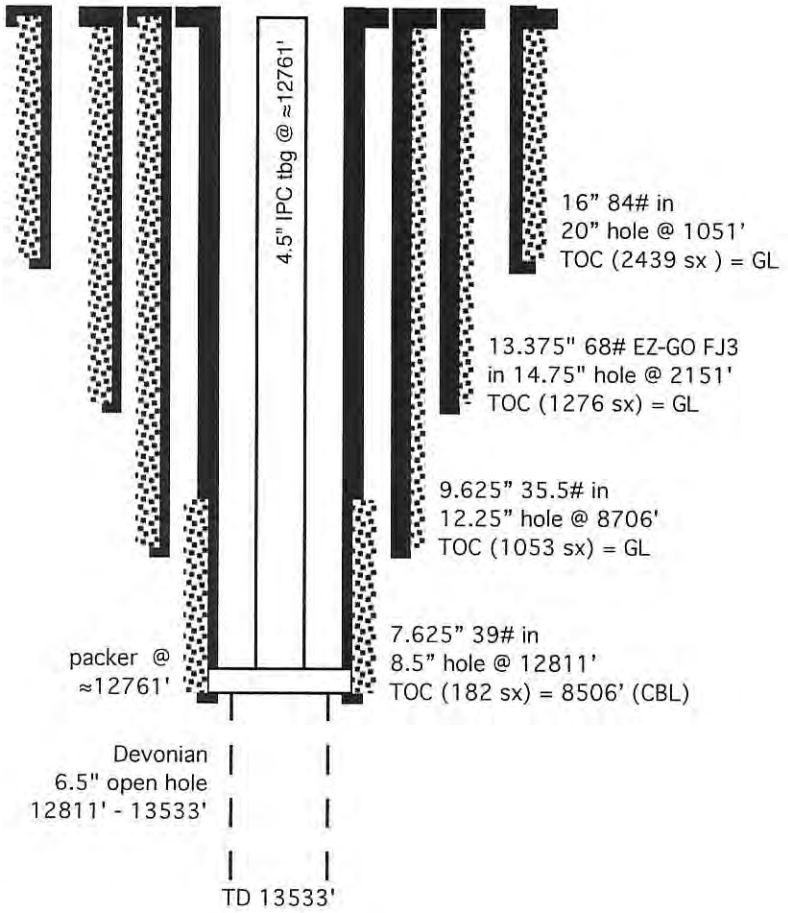
OPERATOR: SOLARIS WATER MIDSTREAM, LLC

WELL NAME & NUMBER: CAL NAUGHTON JR SWD 1

WELL LOCATION:	1500 FNL & 285 FWL	E	12	25 S	25 E
	FOOTAGE LOCATION	UNIT LETTER	SECTION	TOWNSHIP	RANGE

WELLBORE SCHEMATIC

(not to scale)



WELL CONSTRUCTION DATA

Surface Casing

Hole Size: 18.25" Casing Size: 16"

Cemented with: 2439 sx. *or* _____ ft³

Top of Cement: SURFACE Method Determined: CIRCULATE

Intermediate Casing

Hole Size: 14.75" 12.25" Casing Size: 13.375" @ 2151' 9.625" @ 8706'

Cemented with: 2329 sx. *or* _____ ft³

Top of Cement: SURFACE Method Determined: CIRCULATE

Production Casing

Hole Size: 8.5" Casing Size: 7.625"

Cemented with: 182 sx. *or* _____ ft³

Top of Cement: 8506' Method Determined: CBL

Total Depth: LINER @ 12811' & TD @ 13533'

Injection Interval

6.5" HOLE SIZE 12811 feet to 13533'

~~(Perforated~~ or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size: 4.5" Lining Material: DUOLINE GLASSBORE

Type of Packer: NICKEL PLATED DOUBLE GRIP RETRIEVABLE

Packer Setting Depth: ≈12761'

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

Additional Data

1. Is this a new well drilled for injection? XXX Yes _____ No

   If no, for what purpose was the well originally drilled? _____

2. Name of the Injection Formation: DEVONIAN

3. Name of Field or Pool (if applicable): SWD;DEVONIAN (96101)

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. N/A

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

   OVER: GRAYBURG (1980'), BRUSHY CANYON (3431'), BONE SPRING (5616'), WOLFCAMP (8726'), ATOKA (10586'), & MORROW (11182')

   UNDER: NONE

I. Goal is to drill a 13,533' deep commercial saltwater disposal well on fee surface. Proposed disposal interval will be 12,811' - 13,533' in the SWD; Devonian (96101). See Exhibit A for map and C-102.

II. Operator: Solaris Water Midstream, LLC [OGRID 371643]
Operator phone number: (432) 203-9020
Operator address: 907 Tradewinds Blvd., Suite B, Midland TX 79706
Contact for Application: Brian Wood (Permits West, Inc.)
Phone: (505) 466-8120

III. A. (1) Lease (fee surface / BLM subsurface): NMNM-104661
Lease Size: 1,600 acres
Lease Area: N2, NESW, N2SE, & SESE Sec. 12, T. 25 S., R. 25 E. et al
Well name and number: Cal Naughton Jr SWD 1
Location: 1500' FNL & 285' FWL Section 12, T. 25 S., R. 25 E.

A. (2) Surface casing (16", 84#, J-55, BTC) will be set at 1,051' in an 18.25" hole and cemented to GL with 2,439 sacks.

First intermediate casing (13.375", 68#, L-80, EZ-GO FJ3) will be set at 2,151' in a 14.75" hole and cemented to GL with 1,276 sacks

Second intermediate casing (9.625", 35.5#, HCP-110, BTC) will be set at 8,706' in a 12.25" hole and cemented to GL with 1,053 sacks.

Liner (7.625", 39#, P-110) will be set at 12,811' in an 8.5" hole and cemented to 8,506' (TOL) with 182 sacks.

A 6.5" open hole will be drilled to 13,533'.

A. (3) Tubing will be CLS 4.5" duoline 20 Glassbore® or its equivalent. Setting depth will be ≈12,761'. (Disposal interval will be 12,811' to 13,533'.)

A. (4) A nickel plated double grip retrievable packer will be set at ≈12,761' (or ≤100' above the top of the open hole which will be at 12,811').

B. (1) Disposal zone will be the Devonian (SWD; Devonian (96101) pool). Estimated fracture gradient is ≈0.65 psi/foot.

B. (2) Disposal interval will be open hole from 12,811' to 13,533'.

B. (3) Well has not been drilled. It will be drilled as a saltwater disposal well.

B. (4) No perforated intervals are in the well.

B. (5) Productive zones in the 1-mile area of review and above the Devonian (12,811') are the Grayburg (1,980'), Brushy Canyon (3,431'), Bone Spring (5,616'), Wolfcamp (8,726'), Atoka (10,586'), and Morrow (11,182'). No oil or gas zone is below the Devonian within 1 mile.

IV. This is not an expansion of an existing injection project. It is disposal only.

V. Exhibit B shows and tabulates the 6 wells (3 oil or gas + 1 P&A + 2 water) within a 1-mile radius. Deepest well within a mile is 11,670' TVD. Exhibit C shows all 35 existing wells (13 oil or gas wells + 9 P & A wells + 1 SWD + 12 water wells) within a 2-mile radius.

All leases within a 1-mile radius are BLM, fee, or NMSLO. All leases within a 2-mile radius are BLM, fee, or NMSLO. Exhibits D and E show all the leases within a 1-mile radius and lessors within a 2-mile radius.

VI. No Devonian penetrator is within a mile. Deepest (11,670' TVD) well (30-015-31943) within a mile bottomed in the Morrow, 1141' above the Devonian.

VII. 1. Average injection rate will be ≈30,000 bwpd. Maximum injection rate will be 40,000 bwpd.
2. System will be open and closed. Water will both be trucked and piped.
3. Average injection pressure will be <2,500 psi
Maximum injection pressure will be 2,562 psi (= 0.2 psi/foot x 12,811' (top of open hole)).
4. Disposal water will be produced water, mainly from Bone Spring and Wolfcamp wells. There are 67 approved Bone Spring wells and 106 approved Wolfcamp wells in T. 25 S., R. 25 & 26 E. The well will take other Permian Basin waters. Abstracts of produced water analyses (from Go-Tech) from wells in T. 24 S., R. 26 E. are in Exhibit F. (Go-Tech had no analyses from T. 25 S., R. 25 & 26 E.) The table below compares nearby produced waters to Devonian produced water.

Parameter (in mg/l)	Devonian	Atoka	Morrow	Pennsylvanian	San Andres	Wolfcamp
Chloride	121100 – 136964	N/A	81000-129200	10000	2948 – 5070	9100 - 10000
Sulfate	2220 – 2511	N/A	81 – 1910	1320	413 – 887	1320 - 7300
TDS	203100 - 229700	60623	123887 - 216221	19085	2948 - 6811	N/A

Solaris has not experienced compatibility problems in the first 13 months of operating its Solaris Eddy State 2 (30-015-44001) Devonian SWD well. Over 6,608,424 barrels have been disposed to date.

5. Closest Devonian producer is more than half dozen miles away. Closest Devonian SWD APD (30-015-45394) is 1.58 miles east-northeast in B-7-25s-26e. This is Solaris' Mike Honcho SWD 1. APD is approved. C-108 has been filed and protested.

VIII. The Devonian (estimated 922' thick) is mainly composed of carbonates. Closest possible underground source of drinking water above the proposed disposal interval is the Quaternary at the surface. According to State Engineer

records (Exhibit G), two water wells are within a mile. Deepest of the two wells is 115'. Water bearing strata were reported from 40' to 115'. No active water well was found within a mile during November 14 & 15, 2018 and July 15, 2019 field inspections. The Capitan Reef is 2-1/4 miles northwest. No underground source of drinking water is below the proposed disposal zone.

Formation tops are:

Quaternary = 0'
Rustler anhydrite = 591'
Top salt = 1101'
Base salt = 2081'
Bell Canyon = 2101'
Cherry Canyon = 2881'
Brushy Canyon = 3431'
Bone Spring = 5616'
Wolfcamp = 8726'
Cisco = 10001'
Strawn = 10196'
Atoka = 10586'
Morrow = 11182'
Barnett = 11951'
Devonian = 12811'
disposal interval = 12811' - 13533'
TD = 13533'
(Fusselman = 13733')

Twelve water wells are within a 2-mile radius according to State Engineer records (Exhibit G), deepest of which is 360'. There will be >2 miles of vertical separation and shale, salt, and anhydrite intervals between the bottom of the only likely underground water source (Quaternary) and the top of the Devonian.

IX. The well will be stimulated with acid as needed.

X. A CBL will be run from production casing setting depth to TOC. GR/neutron log will be run from TD to GL.

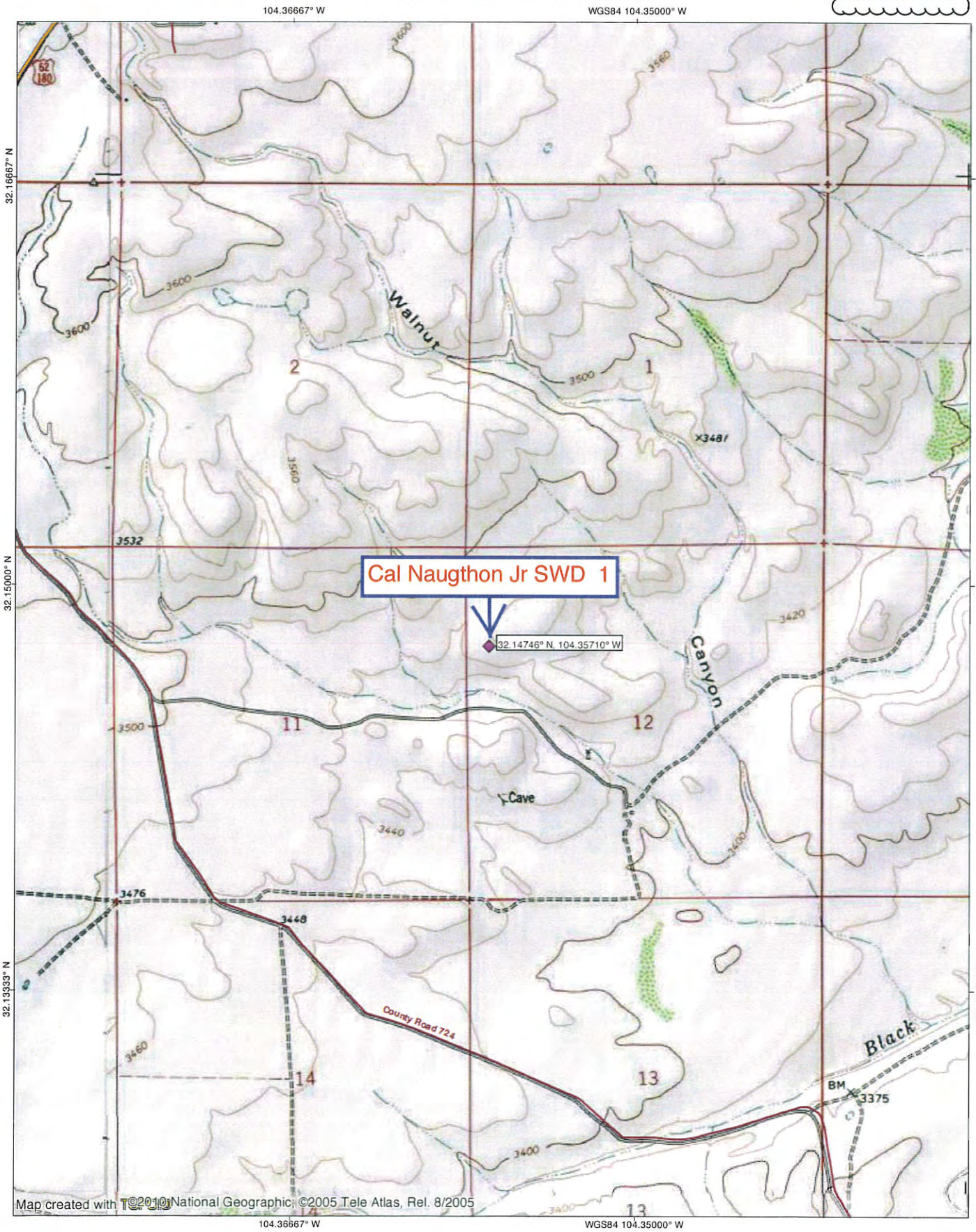
XI. No active water well was found within a mile during November 14-15, 2018 and July 15, 2019 field inspections.

XII. Solaris Water Midstream, LLC (Exhibit H) is not aware of any geologic or engineering data that may indicate the Devonian is in hydrologic connection with any underground sources of water. Deepest water well within a 2-mile radius is 360'. There are 256 approved Devonian SWD wells in New Mexico, of which 155 are active. Closest Quaternary fault is ≈36 miles southwest.

XIII. A legal ad (see Exhibit I) was published on May 16, 2019. Notice (this application) has been sent (Exhibit J) to the surface owners (David & Eva Maley), all well operators (Cimarex Energy Co. of Colorado, JKM, & Tap Rock) regardless of depth, lessees of record (Cabal Energy, LRF JR, Robert Hanagan, Berry & Janice Lucas, Magnum Hunter, Marathon, Spenergy, Tap Rock, & XTO), operating right holders, and government lessors (BLM & NMSLO) within a mile.

TOPO! map printed on 06/06/19 from "Untitled.tpo"

EXHIBIT A



NATIONAL GEOGRAPHIC

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 miles
0.0 0.5 1.0 km

TN MN
7°
06/06/19

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

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

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

Form C-102
Revised August 1, 2011

Submit one copy to appropriate District Office

EXHIBIT A

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

API Number	Pool Code	Pool Name
30-015-	96101	SWD; Devonian

Property Code	Property Name	Well Number
	CAL NAUGHTON JR SWD	1

OGRID No.	Operator Name	Elevation
371643	SOLARIS WATER MIDSTREAM	3472'

Surface Location

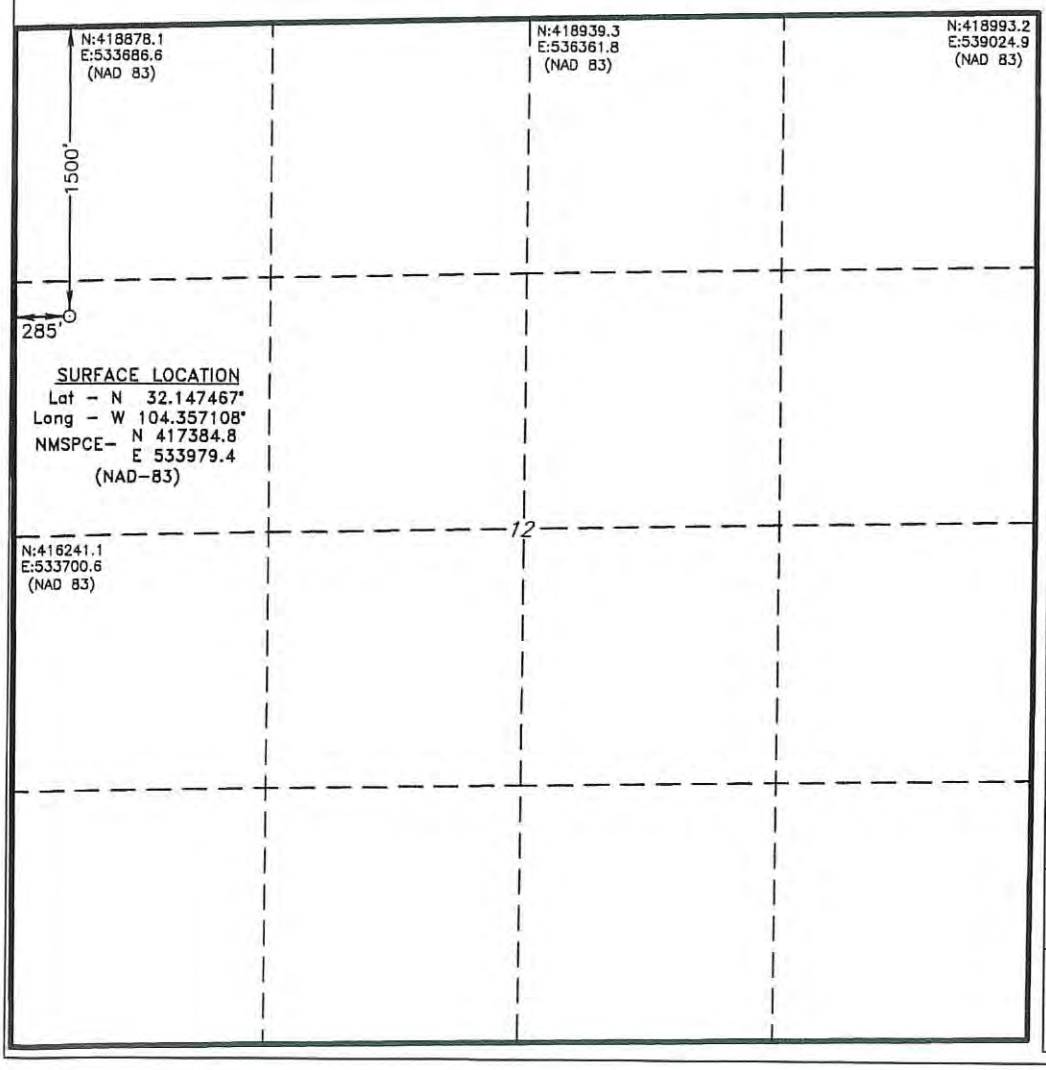
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	12	25 S	25 E		1500	NORTH	285	WEST	EDDY

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	Joint or Infill	Consolidation Code	Order No.

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

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

7-28-19
Signature Date

BRIAN WOOD
Printed Name

brian@permitswest.com
Email Address

SURVEYOR CERTIFICATION

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

MAY 3, 2019
Date Surveyed

Signature & Seal of Professional Surveyor

GARY L. JONES
NEW MEXICO
7977
REGISTERED PROFESSIONAL LAND SURVEYOR
BASIN SURVEYS

Certificate Number Gary L. Jones 7977

0' 1000' 2000' 3000' 4000' N
SCALE: 1" = 2000'
WO Num.: 34548

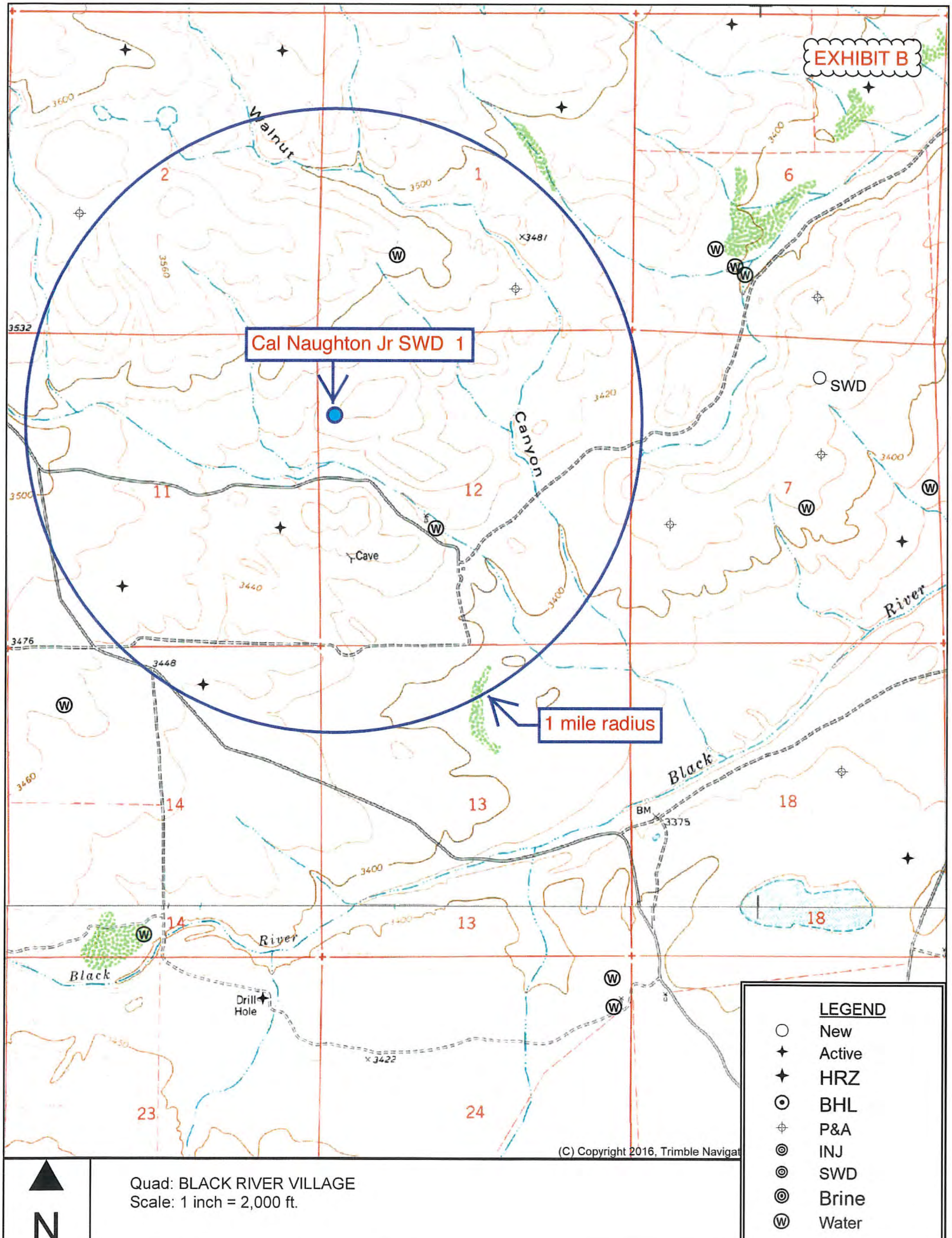


EXHIBIT B
Cal Naughton Jr SWD 1
1 mile radius
Walnut
Canyon
Black River
Cave
Drill Hole
SWD
BM
3375
3422
3481
3532
3476
3448
3500
3560
3600
3420
3440
3400
3460
2
1
6
11
12
7
14
13
18
23
24
(C) Copyright 2016, Trimble Navigat
Quad: BLACK RIVER VILLAGE
Scale: 1 inch = 2,000 ft.
N
LEGEND
New
Active
HRZ
BHL
P&A
INJ
SWD
Brine
Water

SORTED BY DISTANCE FROM CAL NAUGHTON JR SWD 1

API	OPERATOR	WELL	STATUS	UNIT-SECTION-T25S-R25E	TVD	ZONE @ TD	FEET FROM CAL NAUGHTON JR SWD 1
3001523457	JKM	Shearnwest Federal 001	O	I-11	11650	Morrow	2009
3001521023	Snow	WC Federal 001	P&A	O-1	2060	Grayburg	3792
3001531943	JKM	Wild Hog 11 Federal 001	G	N-11	11670	Morrow	4529
3001522946	Tap Rock	Meander Federal 001	G	B-11	11641	Morrow	4954

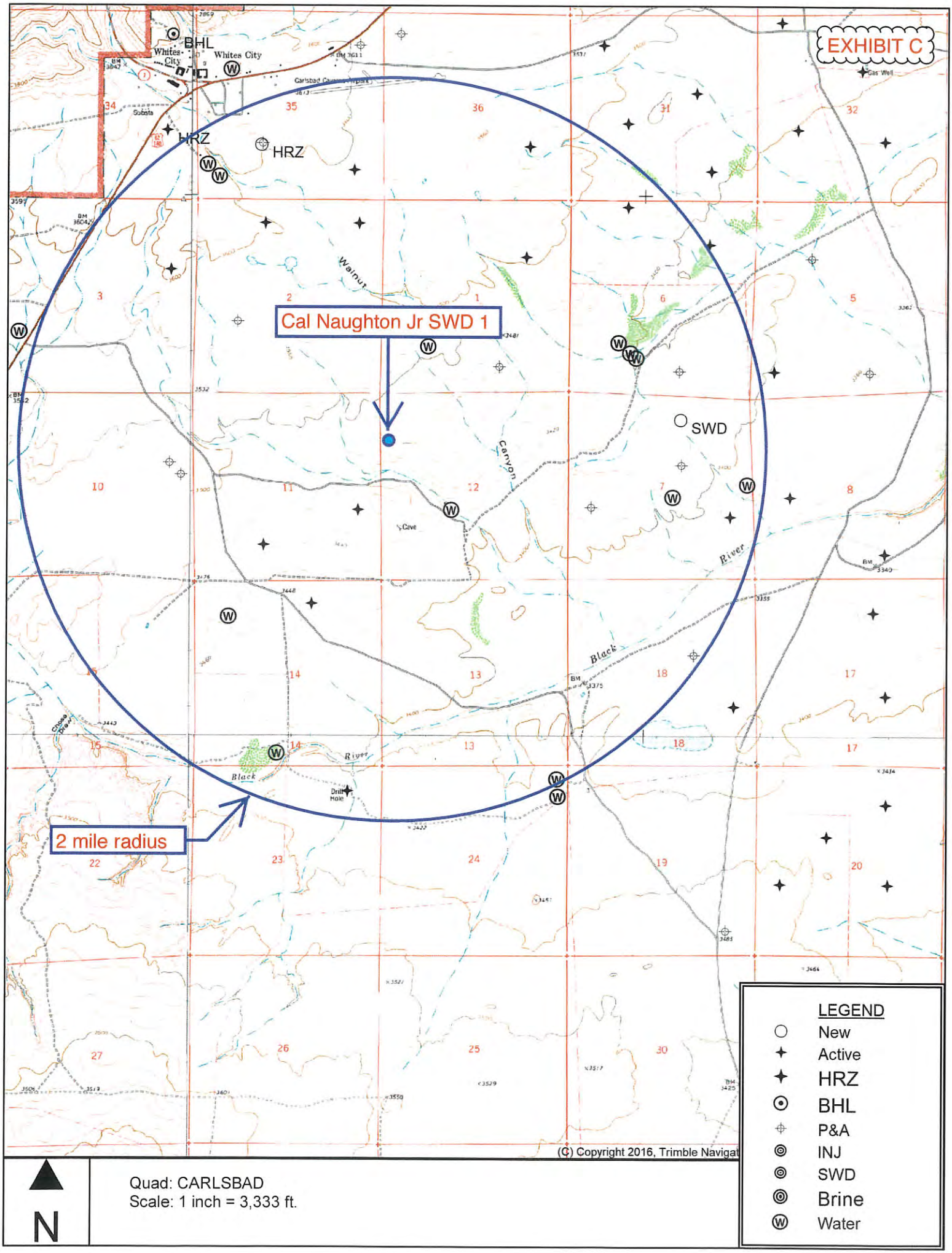
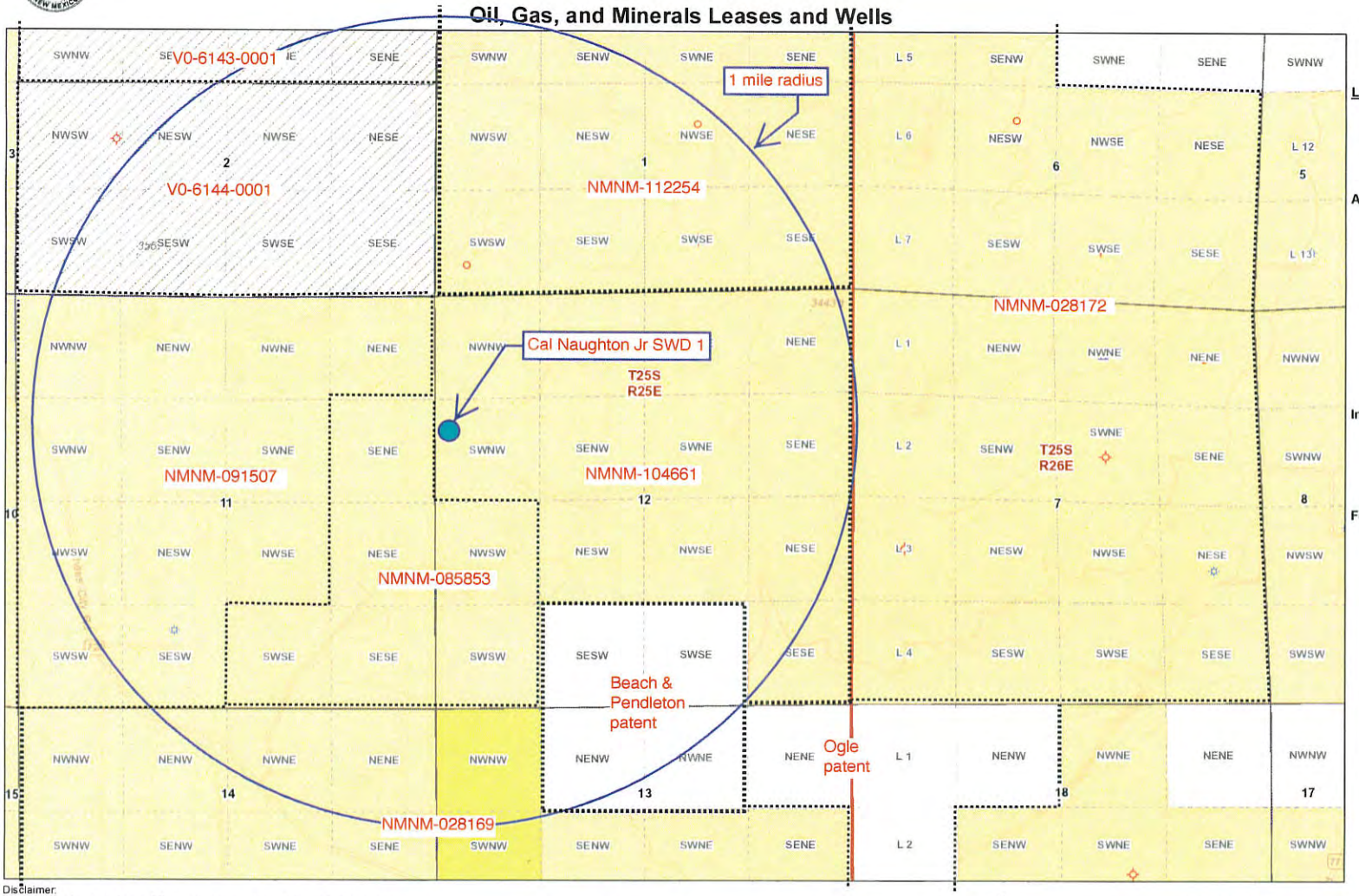


EXHIBIT C
BHL
Whites City
HRZ
HRZ
Cal Naughton Jr SWD 1
SWD
2 mile radius
Walnut
Canyon
Cave
Black
River
Drill Hole
(C) Copyright 2016, Trimble Navigat
LEGEND
New
Active
HRZ
BHL
P&A
INJ
SWD
Brine
Water
N
Quad: CARLSBAD
Scale: 1 inch = 3,333 ft.

New Mexico State Land Office

Oil, Gas, and Minerals Leases and Wells

EXHIBIT D



Legend

- Townships
- Sections
- Subdivisions

Active Wells

- Water Storage
- Miscellaneous
- Salt Water Disposal
- Injection
- Carbon Dioxide
- Gas
- Oil

Inactive Wells

- Plugged / Dry / Abandoned
- Cancelled / Not Drilled

- Oil and Gas Leases

Federal Minerals Ownership

- All Minerals
- Coal Only
- Oil and Gas Only
- Oil, Gas and Coal Only
- Other Minerals

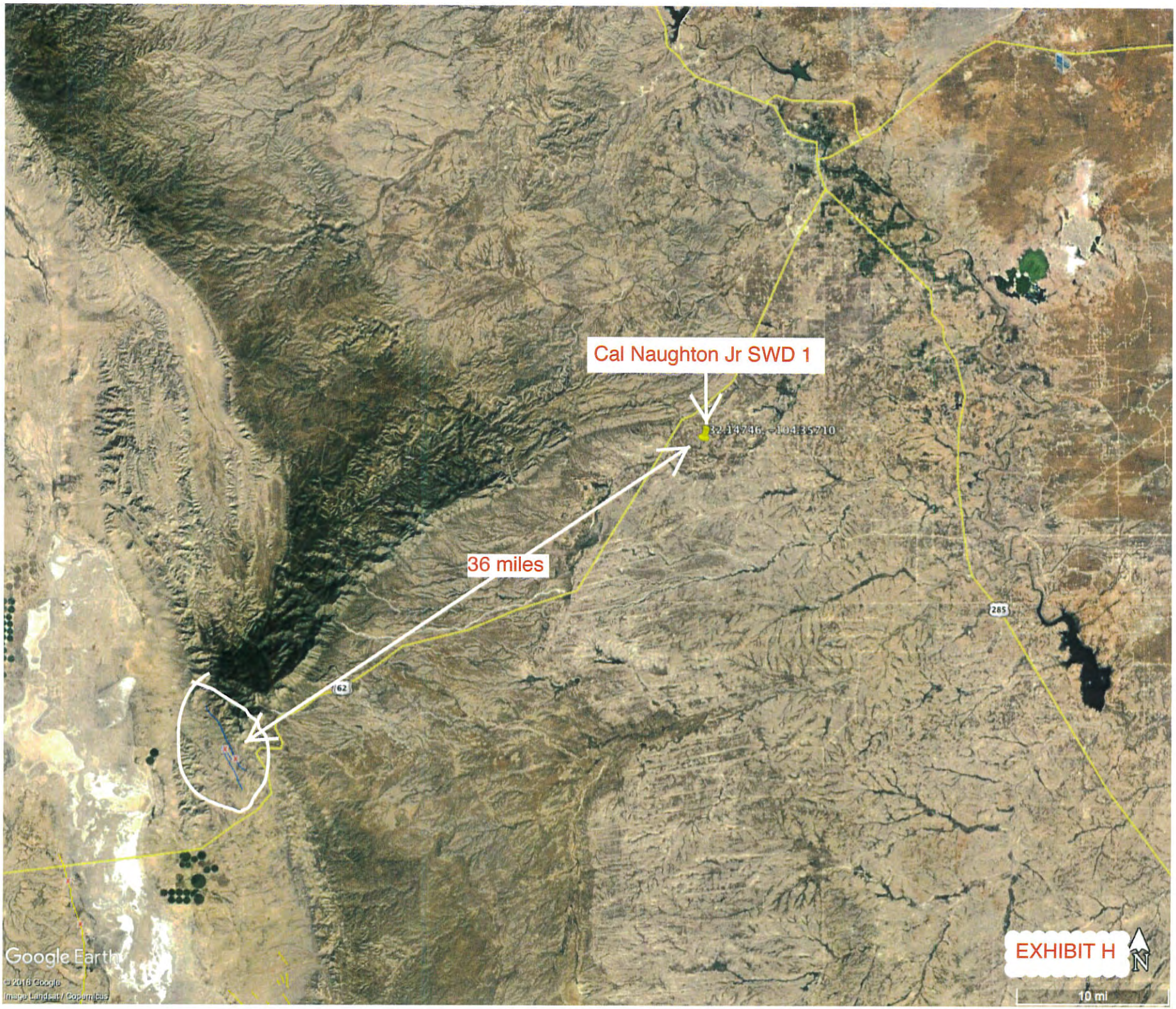
0 0.2 0.4 0.8 mi

0 0.35 0.7 1.4 km

N

EXHIBIT D

Map Created: 7/28/2019


Cal Naughton Jr SWD 1
32.14746, -104.35710
36 miles
62
285
EXHIBIT H
N
10 mi
Google Earth
© 2016 Google
Image Landsat / Copernicus

CARLSBAD
CURRENT-ARGUS

EXHIBIT I

AFFIDAVIT OF PUBLICATION

Ad No.
0001286100

PERMITS WEST, INC.
37 VERANO LOOP

SANTA FE NM 87508

I, a legal clerk of the **Carlsbad Current-Argus**, a newspaper published daily at the City of Carlsbad, in said county of Eddy, state of New Mexico and of general paid circulation in said county; that the same is a duly qualified newspaper under the laws of the State wherein legal notices and advertisements may be published; that the printed notice attached hereto was published in the regular and entire edition of said newspaper and not in supplement thereof on the date as follows, to wit:

05/16/19

Legal Clerk

Subscribed and sworn before me this
16th of May 2019.

State of WI, County of Brown
NOTARY PUBLIC

9-19-21
My Commission Expires

VICKY FELTY
NOTARY PUBLIC
STATE OF WISCONSIN

Ad#:0001286100
P O : 1500FNL
# of Affidavits :0.00

Solaris Water Midstream, LLC is applying to drill the Cal Naughton Jr SWD 1 as a saltwater disposal well. The well is staked at 1500 FNL & 285 FWL Sec. 12, T. 25 S., R. 25 E., Eddy County and is 2.3 miles southeast of White City, NM. Disposal will be in the Devonian from 12,811' to 13,533'. Maximum injection pressure will be 2,562 psi. Maximum disposal rate will be 40,000 bwpd. Interested parties must file objections or requests for hearing with the NM Oil Conservation Division, 1220 South Saint Francis Dr., Santa Fe, NM 87505 within 15 days. Additional information can be obtained by contacting: Brian Wood, Permits West, Inc., 37 Verano Loop, Santa Fe, NM 87508. Phone number is (505) 466-8120.

May 16, 2019

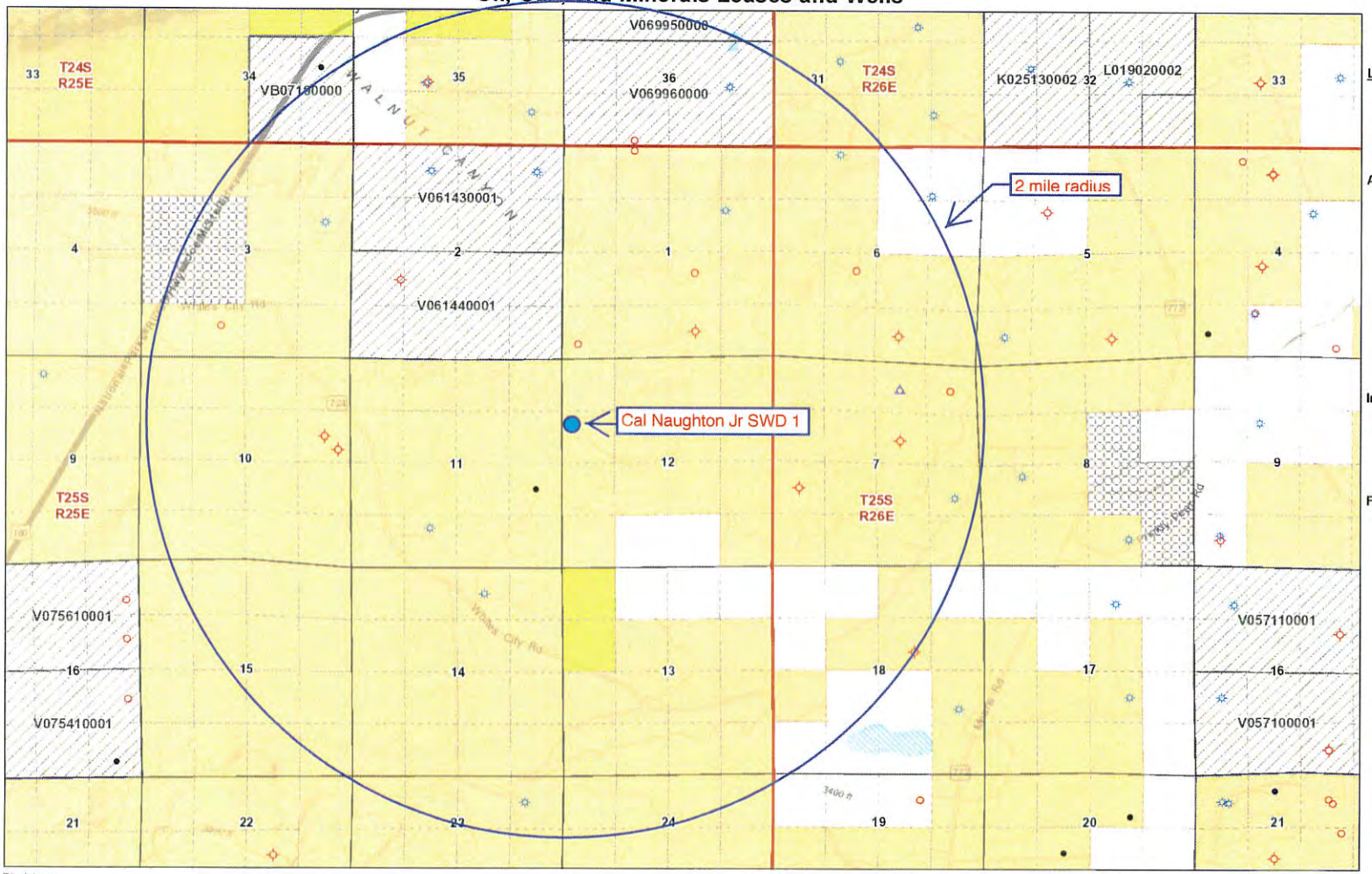
CAL NAUGHTON JR SWD 1 AREA OF REVIEW LEASES

Aliquot Parts in Area of Review	Lessor	Lease	Lessee(s) of Record	Operators (all shallower than Devonian)
T. 25 S., R. 25 E.				
S2NW4 & S2 Sec. 1	BLM	NMNM-112254	Magnum Hunter	Cimarex Energy Co. of Colo.
S2NE4 & SENW Sec. 2	NMSLO	V0-6143-0001	Magnum Hunter	Cimarex Energy Co. of Colo.
S2 Sec. 2	NMSLO	V0-6144-0001	Magnum Hunter	Cimarex Energy Co. of Colo.
N2NE4, SWNE, NWSE, & W2 Sec. 11	BLM	NMNM-091507	LRF JR LLC, Robt. Hanagan, Cabal Energy	JKM
SENE, E2SE4, & SWSE Sec. 11	BLM	NMNM-085853	Cabal Energy	JKM
N2, NESW, N2SE4, & SESE Sec. 12	BLM	NMNM-104661	Marathon	none
SESW & SWSE Sec. 12	fee	Beach & Pendleton patent	Berry & Janice Lucas	none
NENE Sec. 13	fee	Ogle patent	Berry & Janice Lucas	none
NWNE & NENW Sec. 13	fee	Beach & Pendleton patent	Berry & Janice Lucas	none
W2NW4 & SENW Se. 13	BLM	NMNM-028169	Tap Rock & XTO	none
N2NE4, SENE, & NENW Sec. 14	BLM	NMNM-028169	Tap Rock & XTO	Tap Rock
T. 25 S., R. 26 E.				
Lots 1-3 Sec. 7	BLM	NMNM-028172	Spenergy & XTO	none

New Mexico State Land Office

EXHIBIT E

Oil, Gas, and Minerals Leases and Wells



Legend

- Townships
- Sections
- Subdivisions

Active Wells

- Water Storage
- Miscellaneous
- Salt Water Disposal
- Injection
- Carbon Dioxide
- Gas
- Oil

Inactive Wells

- Plugged / Dry / Abandoned
- Cancelled / Not Drilled
- Oil and Gas Leases

Federal Minerals Ownership

- All Minerals
- Coal Only
- Oil and Gas Only
- Oil, Gas and Coal Only
- Other Minerals

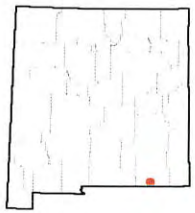
0 0.4 0.8 1.6 mi

0 0.5 1 2 km

N

EXHIBIT E

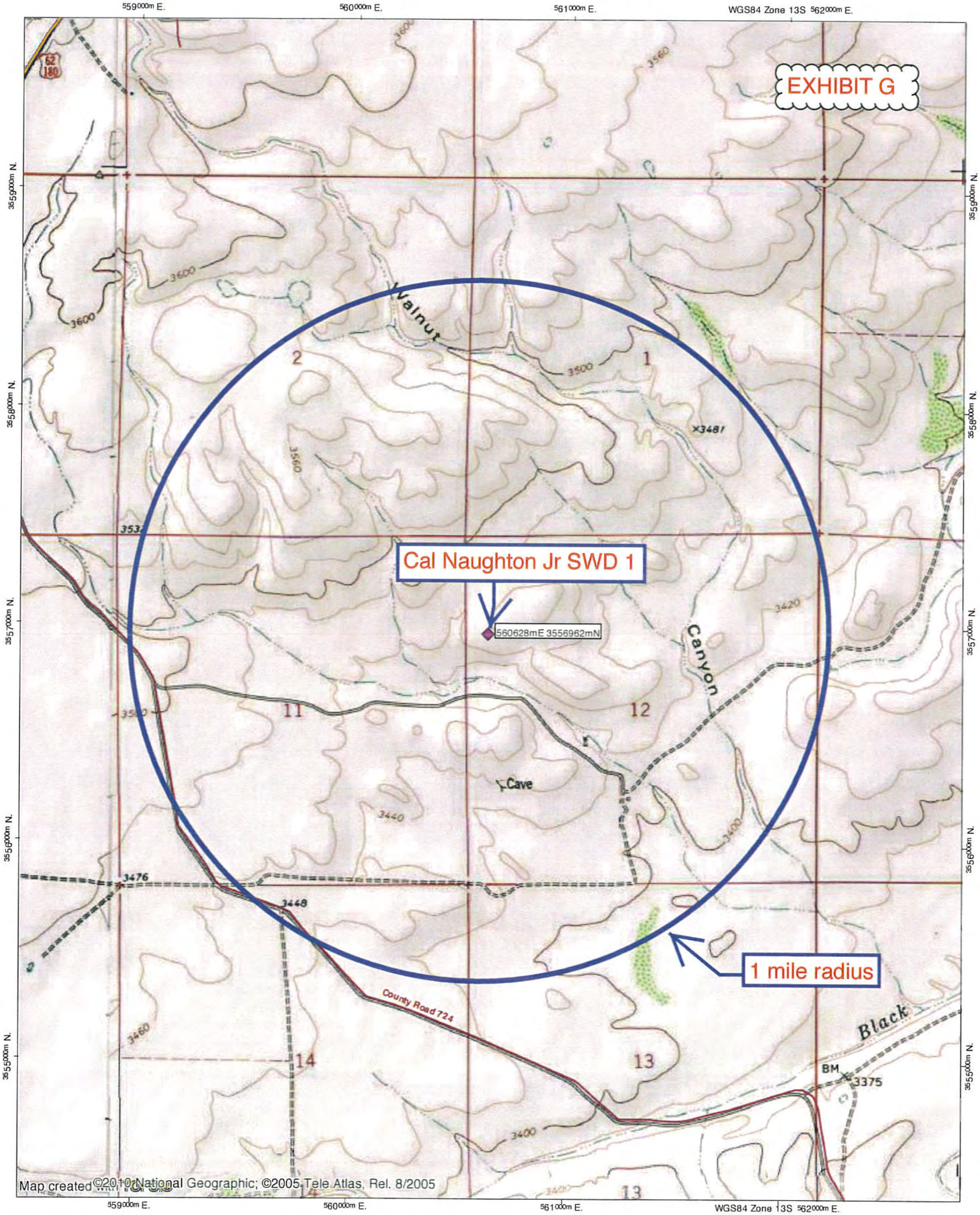
Map Created: 7/28/2019



PRODUCED WATER ANALYSES (mg/l)

API	Section	Township	Range	Formation	TDS	Chloride	Bicarbonate	Sulfate
3001500389	12	24S	26E	ATOKA	60623			
3001500387	11	24S	26E	DELAWARE	230993	137300	650	3099
3001500408	29	24S	26E	DEVONIAN		10120	653	1336
3001510280	5	24S	25E	DEVONIAN	229706	136964	198	2511
3001510280	5	24S	25E	DEVONIAN	203100	121100	175	2220
3001520301	11	24S	26E	MORROW	123887	81000	368.28	81
3001510280	5	24S	25E	MORROW	176935	106800	159	1150
3001510280	5	24S	25E	MORROW	196574	118655	177	1278
3001510280	5	24S	25E	MORROW	216221	129200	293	1910
3001522118	19	24S	26E	PENNSYLVANIAN	19085	10000	645	1320
3001500408	29	24S	26E	PENNSYLVANIAN	19085	10000	645	1320
3001500386	11	24S	26E	SAN ANDRES	10492	5070	618	413
3001500385	11	24S	26E	SAN ANDRES	6811	2948	429	887
3001500408	29	24S	26E	WOLFCAMP		10000	645	1320
3001505973	18	24S	26E	WOLFCAMP		9100		7300

TOPO! map printed on 06/06/19 from "Untitled.tpo"



NATIONAL GEOGRAPHIC

0.0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 miles

0.0 0.5 1.0 km

TN MN

7°

06/06/19

EXHIBIT G

New Mexico Office of the State Engineer

Water Column/Average Depth to Water

(A CLW##### in the POD suffix indicates the POD has been replaced & no longer serves a water right file.)

(R=POD has been replaced, O=orphaned, C=the file is closed)

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

POD Number	Code	POD Sub-basin	County	Q 64	Q 16	Q 4	Sec	Tws	Rng	X	Y	Distance	Depth Well	Depth Water	Water Column
C 00834		C	ED		2	3	12	25S	25E	561156	3556423*	754	115	58	57
C 01552		C	ED			3	01	25S	25E	560939	3557820*	912	71	43	28
C 02997		C	ED	4	1	1	14	25S	25E	559243	3555500*	2013	100		
C 04049 POD1		CUB	ED	3	2	3	06	25S	26E	562592	3557864	2161	165	120	45
C 04050 POD1		CUB	ED	1	4	3	06	25S	26E	562695	3557776	2221	165	125	40
C 04036 POD1		C	ED	1	4	3	06	25S	26E	562745	3557733	2252	160	125	35
C 03258		C	ED	1	1	4	07	25S	26E	563073	3556546*	2480	360		
C 02190		C	ED		3	3	35	24S	25E	559125	3559259*	2745	140		
C 04019 POD1		CUB	ED	4	4	3	14	25S	25E	559668	3554330	2800	80	35	45
C 01546		C	ED	1	3	3	35	24S	25E	559024	3559358*	2883	350		
C 03285		C	ED	4	4	2	07	25S	26E	563713	3556658	3099	84	60	24
C 03035		C	ED	2	2	2	24	25S	25E	562091	3554125*	3192	120	70	50

1 mile = 1610 m

Average Depth to Water: **79 feet**
Minimum Depth: **35 feet**
Maximum Depth: **125 feet**

Record Count: 12

UTMNAD83 Radius Search (in meters):

Easting (X): 560628 **Northing (Y):** 3556962 **Radius:** 3220

***UTM location was derived from PLSS - see Help**


Capitan reef
2-1/4 miles
32.14746, -104.35710
Cal Naughton Jr SWD 1
EXHIBIT G
N
1 mi
Google Earth

PERMITS WEST, INC.
PROVIDING PERMITS for LAND USERS
37 Verano Loop, Santa Fe, New Mexico 87508 (505) 466-8120

EXHIBIT H

Seismic Risk Assessment

Solaris Water Midstream, LLC

Cal Naughton Jr SWD No. 1

Section 12, Township 25 South, Range 25 East

Eddy County, New Mexico

Cory Walk

Cory Walk

B.S., M.S.

Geologist

Permits West Inc.

July 29, 2019

EXHIBIT H

GENERAL INFORMATION

Cal Naughton Jr SWD #1 is located in the NW ¼, section 12, T25S, R25E, about 2 miles southeast of Whites City, NM in the Permian Basin. Solaris Water Midstream, LLC proposes the injection zone to be within the Devonian formation through an open hole from 12,811'-13,533' below ground surface. This report assesses any potential concerns relating to induced seismicity along deep penetrating Precambrian faults or the connection between the injection zone and known underground potable water sources.

SEISMIC RISK ASSESSMENT

Historical Seismicity

Searching the USGS earthquake catalog resulted in no (0) earthquakes above a magnitude 2.5 within 6 miles (9.7 km) of the proposed deep disposal site since 1970 (Fig 1). According to this dataset, the nearest historical earthquake occurred in 1974 about 17 miles (~27 km) northeast and had a magnitude of 3.9.

Basement Faults and Subsurface Conditions

A structure contour map (Fig. 1) of the Precambrian basement shows the Cal Naughton Jr SWD #1 is approximately 6 miles from the nearest basement-penetrating fault inferred by Ewing (1990). **Basic information about these faults based on GIS data from Jackson and Jackson (2008) is listed in Table 1.**

Snee and Zoback (2018) state, "In the western part of Eddy County, New Mexico, S_{Hmax} is ~north–south (consistent with the state of stress in the Rio Grande Rift; Zoback and Zoback, 1980) but rotates to ~east-northeast–west-southwest in southern Lea County, New Mexico, and the northernmost parts of Culberson and Reeves counties, Texas." Around the Cal Naughton Jr SWD #1 site, Snee and Zoback indicate a **S_{Hmax} direction of N035°E and an A_φ of 0.52, indicating a normal and strike-slip faulting stress regime**.

Induced seismicity is a growing concern of deep SWD wells. Relatively new software developed by the Stanford Center for Induced and Triggered Seismicity allows for the probabilistic screening of deeply penetrating faults near the proposed injection zone (Walsh et al., 2016; Walsh et al., 2017). This software uses parameters such as stress orientations, fault strike/dip, injection rates, fault friction coefficients, etc. to estimate the potential for fault slip. Using the best available data as input parameters (Table 2) along with production data from 15 active SWD wells within a 15 mile radius of the proposed SWD, the Fault Slip Potential (FSP) models suggest the fault with the highest risk is fault 2 (Fig 2; Table 1). Fault 2 has a twenty (0.20) percent chance of slip through the year 2045. **This model also suggests a pore pressure increase of 18 psi on fault 2 (Fig. 3; Table 1) due to the proposed SWD well.** A pressure increase of 2000 psi on this fault would result in a 100% probability of fault slip while an increase of 300 psi results in a 50% probability of fault slip.

EXHIBIT H

GROUNDWATER SOURCES

Quaternary Alluvium acts as the principal aquifer used for potable ground water near the Cal Naughton Jr SWD #1 location (Hendrickson and Jones, 1952). Nicholson and Clebsch (1961) state, "Potable ground water is not available below the Permian and Triassic unconformity but, because this boundary is not easily defined, the top of the Rustler anhydrite formation is regarded as the effective lower limit of 'potable' ground water." Around the Cal Naughton Jr SWD #1 well, the top of a thick anhydrite unit interpreted to represent the Rustler Formation lies at a depth of ~591 feet bgs.

STRATIGRAPHY

Thick permeability barriers exist above (Woodford shale; 110 ft thick) and below (Simpson Group; 90 ft thick) the targeted Devonian injection zone (Plate 2, Comer et al., 1991; Fig. 8, Frenzel et al., 1988). Well data indicates ~12,200 ft of rock separating the top of the Devonian from the previously stated lower limit of potable water at the top of the Rustler anhydrite formation and ~1,000' between the bottom of the injection zone and the top of the Precambrian Basement.

CONCLUDING STATEMENT

Available geologic and engineering data evaluated around the Cal Naughton Jr SWD #1 well show no potential structural or stratigraphic connection between the Devonian injection zone and any subsurface potable water sources. Based on Fault Slip Potential modeling there is a 20% probability (0.20) of inducing seismic activity along nearby deeply penetrating Precambrian faults.