R. T. HICKS CONSULTANTS, LTD.

901 Rio Grande Blvd NW ▲ Suite F-142 ▲ Albuquerque, NM 87104 ▲ 505.266.5004 ▲ Since 1996
Carlsbad ▲ Durango ▲ Hobbs

May 11, 2020

Victoria Venegas
Oil Conservation Division
811 S. First St.
Artesia NM 88210

RE: NDHR1917233146 BOUNDARY RAIDER 6 FEDERAL #002H 30-025-41884

Dear Ms. Venegas:

On behalf of Devon Energy, we are pleased to submit additional documentation developed by a Registered Professional Geologist that demonstrates with high degree of scientific certainty that the elevation of the groundwater surface (potentiometric surface) is more than 100 feet beneath the spill footprint at the above-referenced site.

For the benefit of our client, the portion of Rule 29 that addresses determination of the depth to groundwater is reproduced below with emphasis added:

> **(2) Depth to ground water.** The responsible party must determine the depth to ground water where the release occurred. If the exact depth to ground water is unknown, the responsible party must provide a reasonable determination of probable ground water depth using data generated by numeric models, cathodic well lithology, water well data, published information or other tools as approved by the appropriate division district office. If the responsible party uses water well data, the responsible party must provide all pertinent well information.

At the site, the exact depth to groundwater is unknown. Attached is a reasonable determination of the probable potentiometric surface elevation at the site (Figures 2a and 2b). As explained in the attachment, the data used to generate the potentiometric surface is derived from measurements made by professionals, in this case the USGS staff and Hicks Consultants. Some of the data, also from professional measurements, are found in Open File Report 95 (1971). At least ten of the wells used to generate the map were evaluated within the past 10 years by the USGS and at elevenl wells/borings shown on Figure 2b are reasonably recent measurements made by Hicks Consultants.

Driller's logs from the NM Office of the State Engineer that provide reasonable data relative to the lithology of the subsurface, are also presented in the attachment. Finally, we have used this approach described above and presented in the attachment to gain NMOCD approval of C-147 permits for produced water storage containments, C-144 permits for temporary pits and permanent pits, C-141 reports for various releases.

We understand that many C-141 submissions are not created by professional hydrogeologists with decades of experience evaluating groundwater issues in the Permian Basin of New Mexico. We have seen some C-141 submissions that are clearly deficient. We contend that the internal guidance, reproduced below with emphasis, provides an excellent protocol for OCD to decide if the determination of the depth to groundwater beneath a release site is *reasonable*, as required by the Rule.

> IX. DETERMINING DEPTH TO GROUNDWATER:
> a. The remediation levels provided in Table I are largely dependent upon depth to groundwater. As such, the OCD focuses upon depth to water estimation. 19.15.11(A)(2) NMAC allows for various means of determining depth to groundwater. If nearby wells are used, it is *preferable* if they are situated within ½-

mile of the release, the water level information is no more than 25 years old, and well construction information is provided. If the water level information does not meet these criteria, the OCD may require boring to a limited depth for verification. If the operator has applicable information which does not meet the above preference, we will review it on a case by case basis to determine if it is acceptable.
b. If the water well information is representative of a confined aquifer (often described as "artesian"), the depth to water in the well will be considered the depth to the bottom of the upper confining layer, not the observed water level in the well.
c. It is important to note that wells installed for water supply purposes may not be screened across shallower, less-productive zones. Those less-productive zones might contain protectable water.

It is our contention that OCD's review of the attachment will result in a OCD finding that the conclusions are acceptable. Please contact me if you have any questions or comments.

Be safe, and we thank you for your attention to this matter.

Sincerely,
R.T. Hicks Consultants

Randall T. Hicks PG
Principal

Distance to Groundwater

Figure 1, Figure 2, and the discussion presented below demonstrates that groundwater (fresh water as defined by NMOCD Rules) at the location is greater than 100 feet beneath the release footprint. Specifically, the depth to the potentiometric surface is (3550--3390=) 160 feet.

Hydrogeology of Boundary Raider Release Site

The Boundary Raider 6 site is 16.5 miles east of the Salt Lake within Nash Draw and about 22.5 miles north of the Texas state line. According to the New Mexico State geologic map (seen on Figures 1 and 2), the site is in an area where the surface unit is Quaternary age eolian piedmont deposits (Qe/Qp).

In the area nearest Boundary Raider 6, there are several wells whose principal water bearing unit is identified by the USGS database as the Chinle Formation or Santa Rosa Formation, which are Triassic in age. The Chinle/Santa Rosa does not crop out within the boundary of Figure 2a, but the State Map does show Chinle outcrop about 10 miles north (2 miles west of the Lea/Eddy border) and 18 miles south (5 miles east of the Lea/Eddy border). Given the dip of these rocks toward the center of the Delaware Basin, their presence beneath the site is a certainty. On the western margin of Figure 2, The Permian Rustler Formation crops out 7.5 miles due west of the Boundary Raider release site and the overlying Permian Quartermaster Formation is mapped about 9 miles west-northwest of the release site. The presence of these Permian units below the release site is also a certainty.

An examination of driller's logs from OSE database not only document the presence of Chinle/Santa Rosa as an aquifer but also the underlying Rustler Formation. Well C-3351 in the Appendix is 4 miles west of the Boundary Raider site and the presence of anhydrite at a depth of 310 feet suggests that this well produces from the Rustler. Well C-3749 is 3 miles southwest of the release site and the driller's log indicates that the Santa Rosa Sandstone is not water bearing and is at a depth of 20-70 feet below surface. As discussed below, indirect evidence suggests that the Chinle produces water from USGS-15262, which is located 2 miles east of the release site.

Depth to Water Analysis

Figure 1a-1c are geologic/ topographic map that show:

1. The location of the Boundary Raider 6 Fed 2H well as a maroon hexagon.
2. Water wells that are not documented in the public databases but were identified by field inspection or other published reports as colored squares. These well numbers correspond to the Hicks Consultants internal database. Data from all of these wells are in Open File Report 95[1].
3. Water wells from the USGS database as triangles. Well numbers correspond to an identifier in the USGS database.

[1] https://geoinfo.nmt.edu/publications/openfile/downloads/0-99/95/ofr_95.pdf

4. Water wells from the OSE database as a blue triangle inside colored circles that indicate well depth. OSE wells are often miss-located in the WATERS database as older wells are plotted in the center of the quarter, quarter, quarter, of the Section Township and Range. Well numbers correspond to the identifiers in the OSE database. Well numbers showing "No DTW" and "No Date" are typically permit applications and not completed water supply wells.
5. The depth-to-water from the most recent available measurement for each well is provided adjacent to the well symbol.

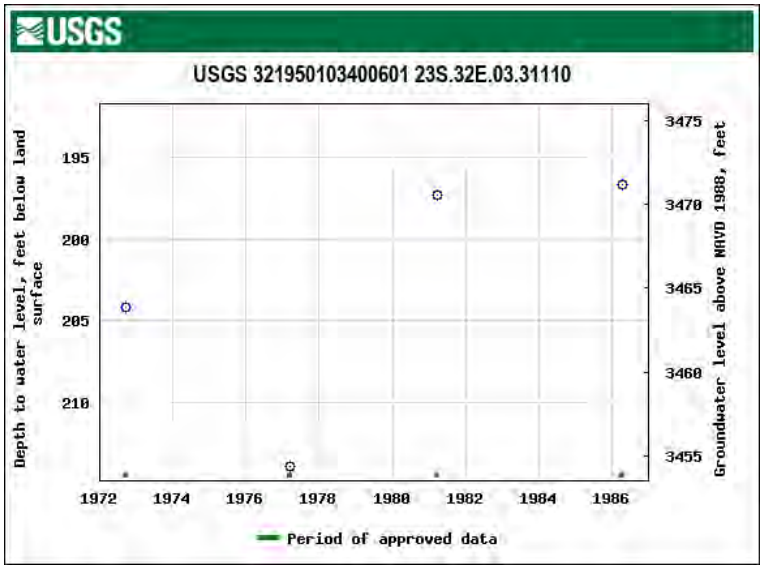
The wells shown in these figures are nearest to the Boundary Raider release and none of the data that we would use for defining the top of groundwater elevation (Figure 1a and 1b) is recent data.

Figure 2a and 2b are large-scale topographic maps that shows:
1. The location of the Boundary Raider 6 Fed 2H well as a maroon hexagon.
2. Water wells measured by the USGS, the year of the measurement and the calculated elevation of the groundwater surface Figure 2a).
3. Water level data measured professionals and obtained from public data, such as NMBMMR Open File Report 95 and water levels measured by Hicks Consultants.
4. Isocontour lines displaying the elevation of the uppermost groundwater surface based upon these measurements made by professionals (USGS and Misc databases). The interpretation is the product of Hicks Consultants.

We relied upon the most recent data from each well measured by the USGS and other professionals to create the water table elevation map shown in Figures 2a and 2b. Because the data are crowded on the map, Figure 2a shows only the USGS data and Figure 2b shows only the Misc data. Water level data from the OSE database rely upon observed water levels by drillers during the completion of the water well. The OSE dataset provides some useful data in certain areas. The area shown in Figure 2 contains sufficient high-quality data that we did not rely on OSE values.

Data demonstrate that water levels on the western side of the maps are from wells completed in the Rustler Formation and wells on the eastern side of the maps draw water from the Chinle and/or Santa Rosa Sandstone. On the west side of the maps, the Rustler crops out (Pr) and the Triassic Chinle/Santa Rosa have been removed by erosion. We conclude that throughout much of the western third of Figure 2, the sandstone of the Chinle and underlying Santa Rosa, are effectively dry and cannot provide water for beneficial use.

On the east side of these maps, Hicks Consultants logged many oil well conductor pipes to a depth of 100-120 feet (e.g. Misc-390, Misc-16). Figure 2c shows this area of data more clearly. All of these auger holes were "dust dry" to total depth, demonstrating that the upper Chinle was, as indicated in the attached OSE well logs, dry (see Figure 2c for the location of the OSE wells with driller's logs). Misc-99 is an old windmill measured by Hicks Consultants in 2013 and the potentiometric surface elevation of 3494 feet ASL is markedly different from the 1976 USGS-15071 data from a well located less than ½ mile south. The USGS well is probably completed in the Santa Rosa Sandstone and Misc-99 is shallower and draws water from saturated sandstones of the upper Chinle. This same relationship probably exists due east of the Boundary Raider release site where USGS-15265 reports a 2013 pumping potentiometric surface elevation of 3161 (identified by the USGS as Santa Rosa) while USGS-15262 determined a water level elevation of 3417 in 1986 (probably a Chinle sandstone but identified by the USGS as Santa Rosa Sandstone). As shown in the graphic for this well to the right, the static water elevation for more about 12 years varies by about 10-15 feet with the most data showing 3471 feet ASL and this is the measurement used in Figures 2a and 2b.



For the potentiometric surface map (Figures 2a and 2b), we honored all data from the uppermost water bearing zone that we know are accurate to the best of our knowledge. As long-term data from USGS wells show that water levels do not fluctuate over time, mixing older data with recent data to create the potentiometric surface map is acceptable.

From these data, we conclude:

- Based upon the groundwater map of the regional aquifer (permeable units in the upper Chinle/Dockum), the elevation of the groundwater surface beneath the release site is about 3390.
- The auger borings and OSE wells logs provide ample evidence that perched, shallow groundwater zones within the area does not exist.
- The *minimum* distance between the spill and the uppermost water-bearing zone is approximately (3550-3390=) 160 feet.
- Well logs available from the OSE database report that groundwater sufficient for beneficial use exists at depths of more than 300 feet below land surface in the Santa Rosa Sandstone (see Appendix WELL LOGS, C-2348, C-3555 and C-3851). However, the attached well logs show "dry" sandstones above the Santa Rosa and some windmills tap these upper sandstones.

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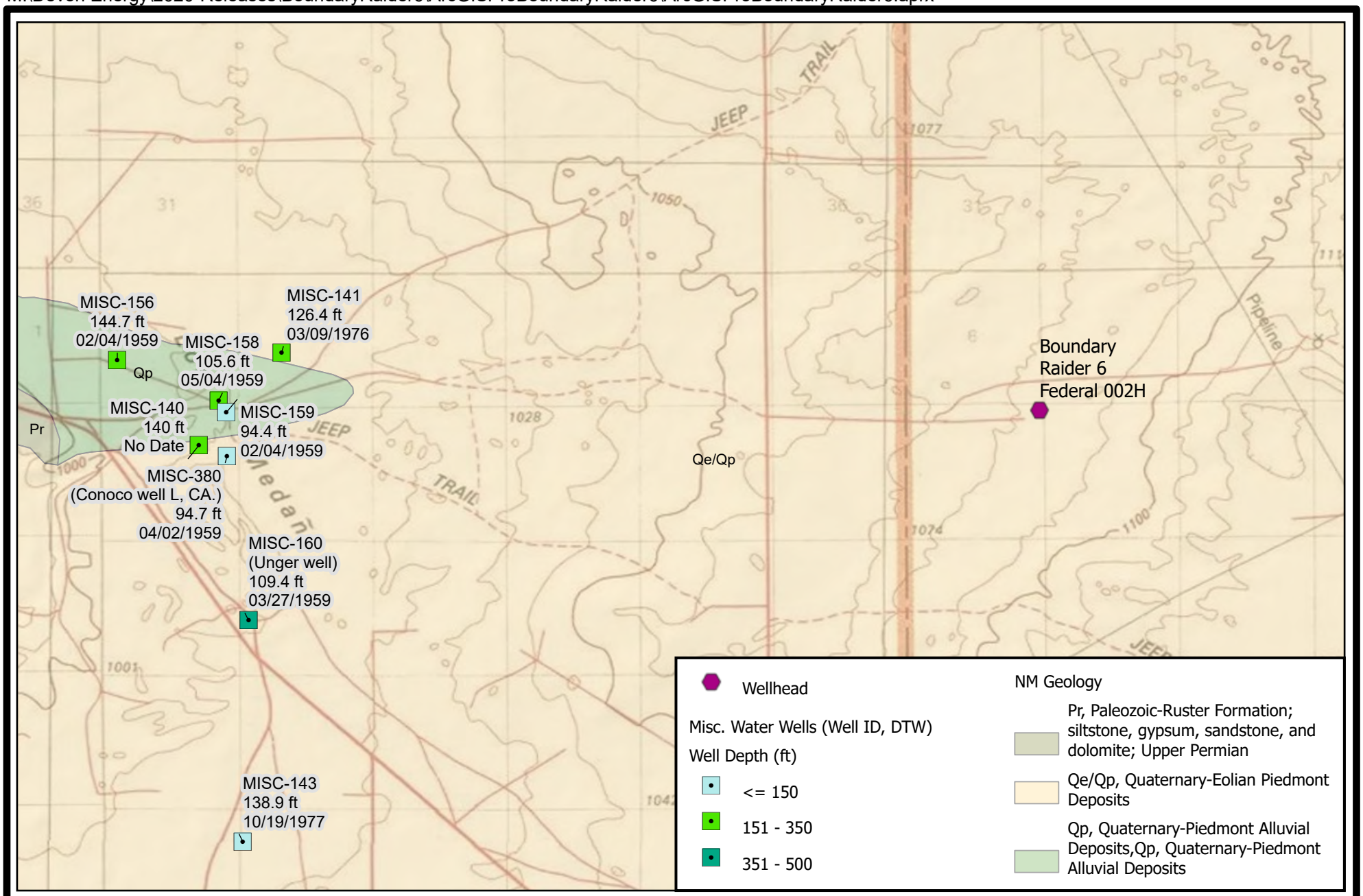

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MISC Depth to Water and Geology

Figure 1a

Devon Energy Boundary Raider 6

May 2020

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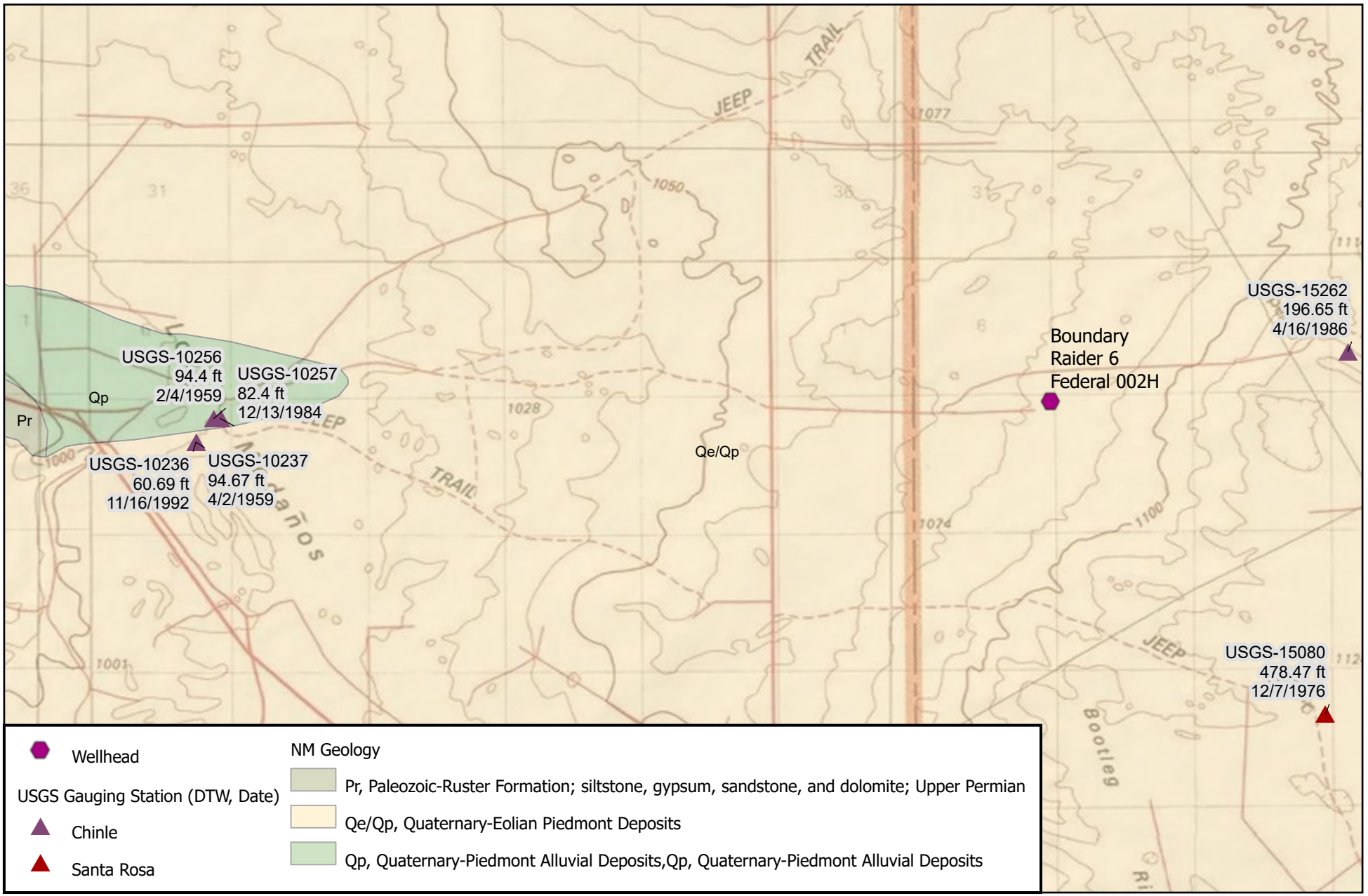

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USGS Depth to Water and Geology

Figure 1b

Devon Energy Boundary Raider 6

May 2020

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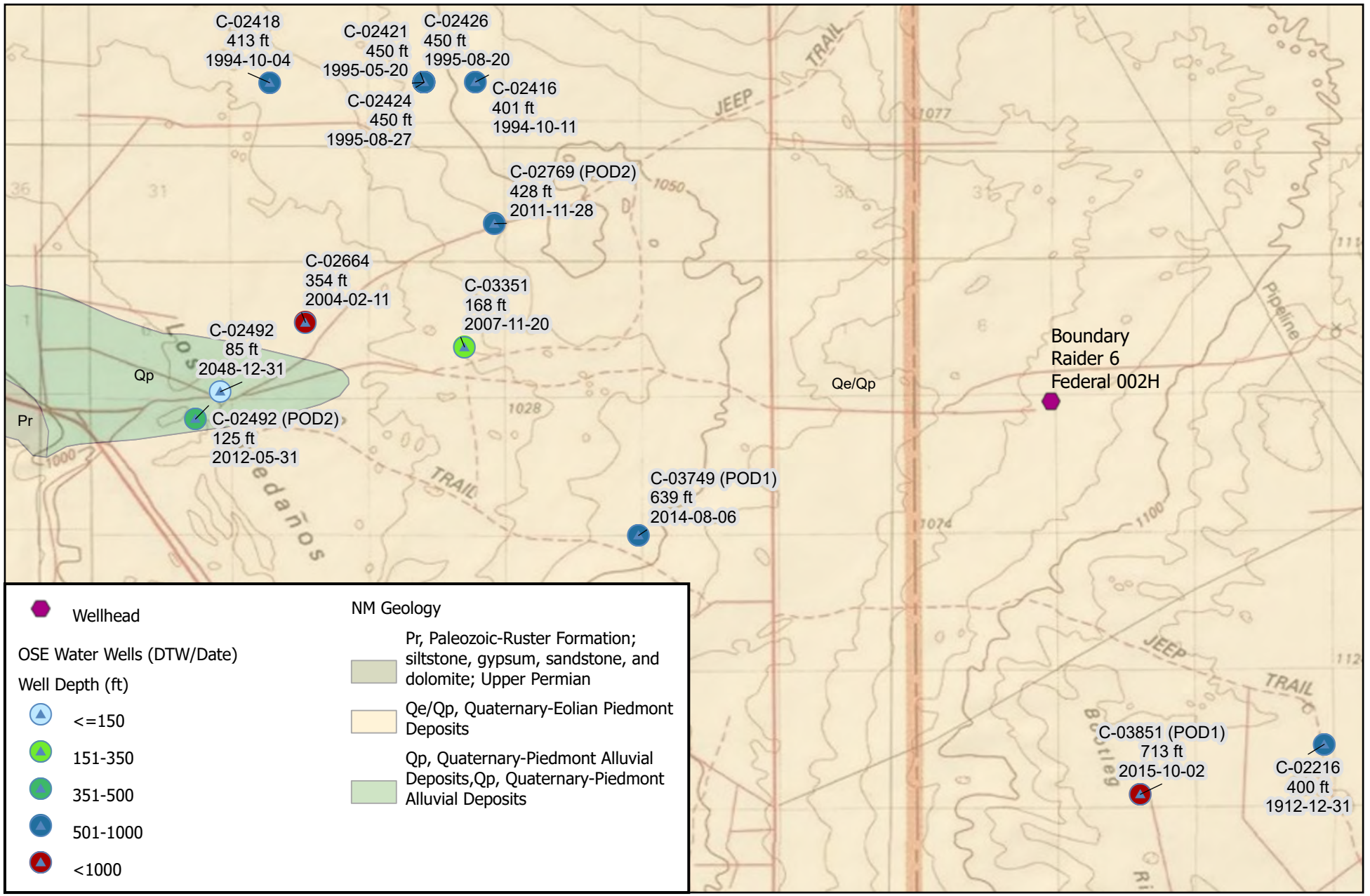

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OSE Depth to Water and Geology

Figure 1c

Devon Energy Boundary Raider 6

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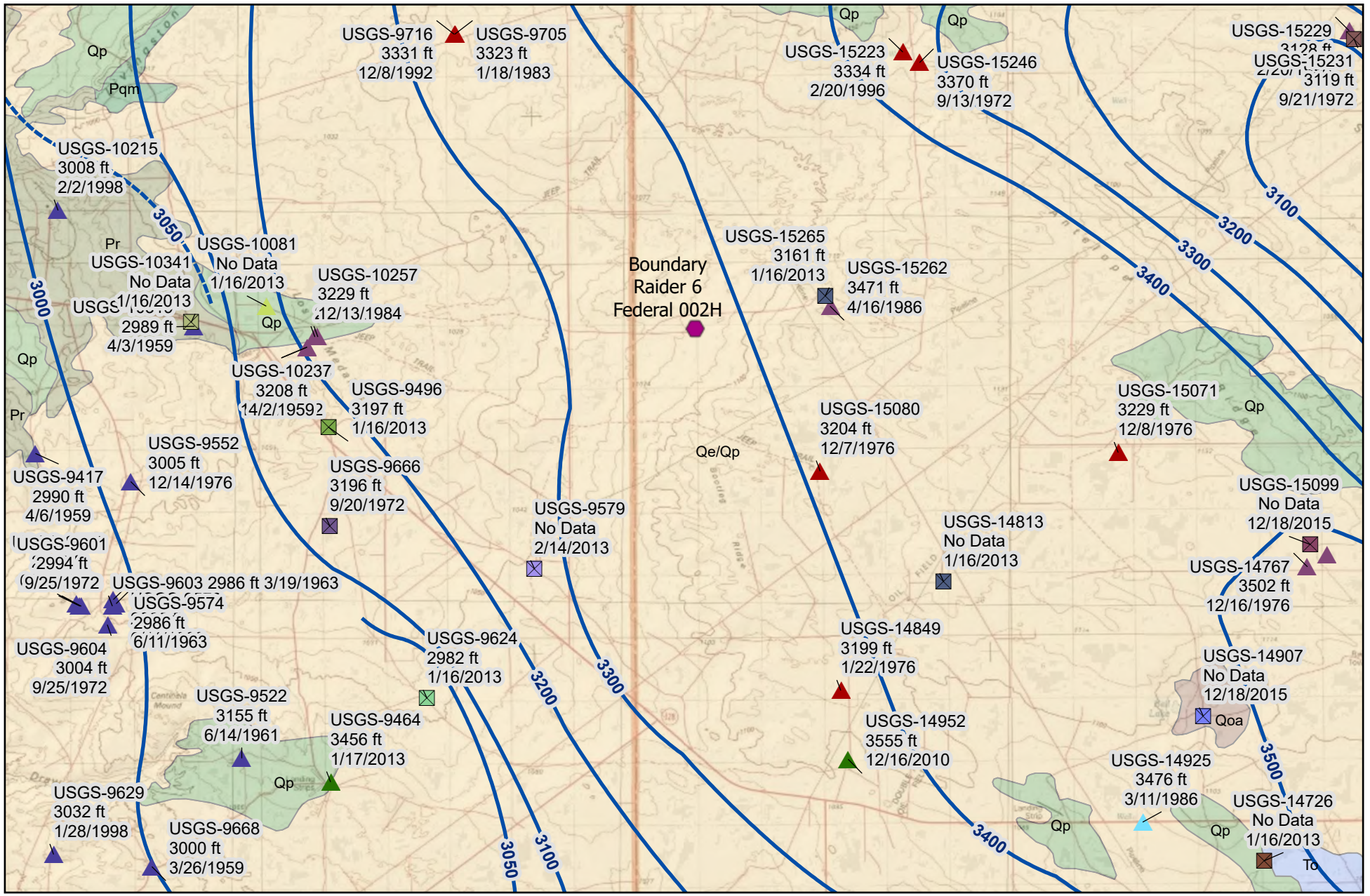

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USGS Groundwater Elevation, Potentiometric Surface and Geology

Figure 2a

Devon Energy Boundary Raider 6

May 2020

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	USGS Ground Water Elevation, Potentiometric Surface, and Geology	Figure 2a Legend
	Devon Energy Boundary Raider 6	May 2020

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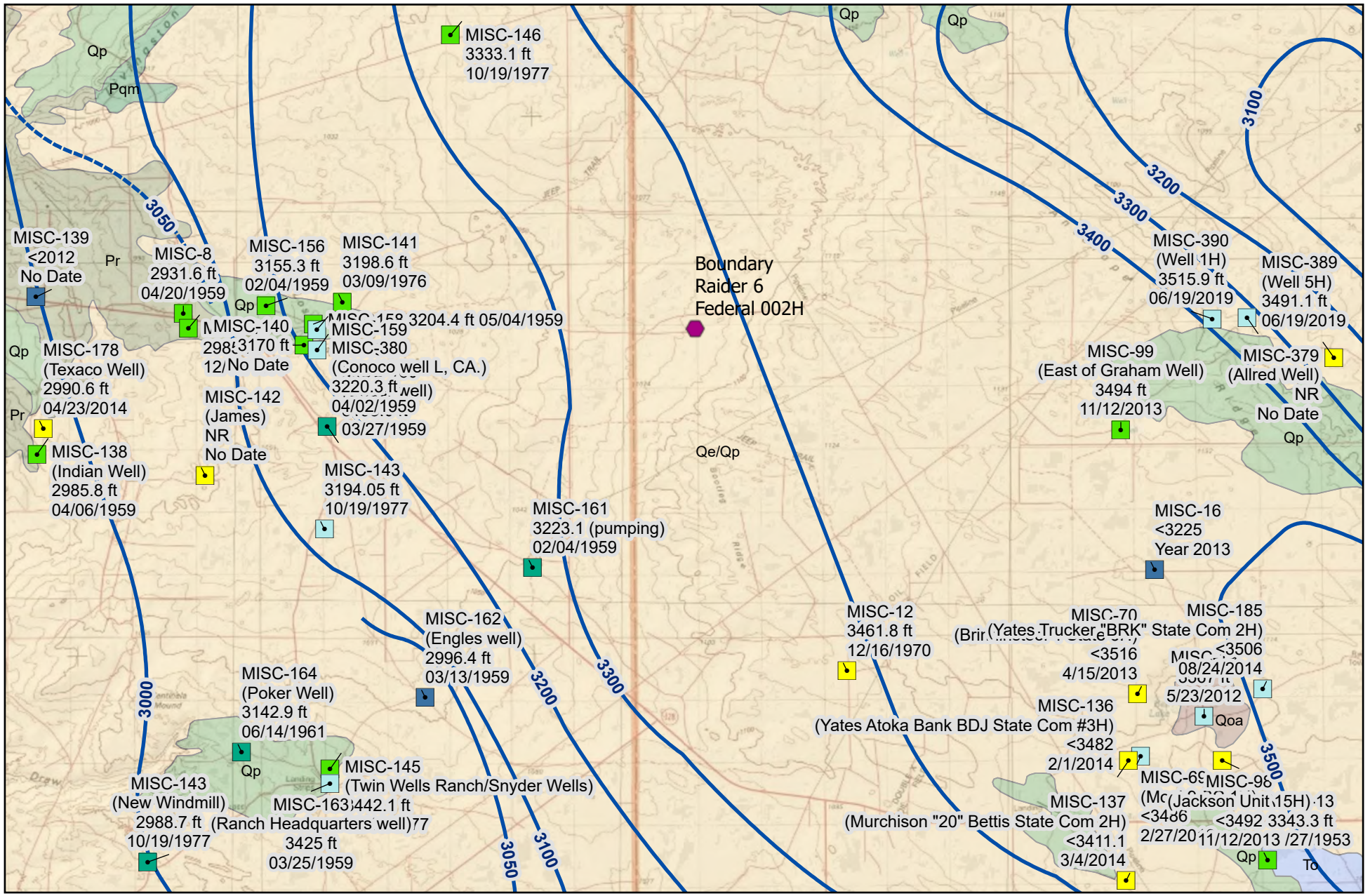

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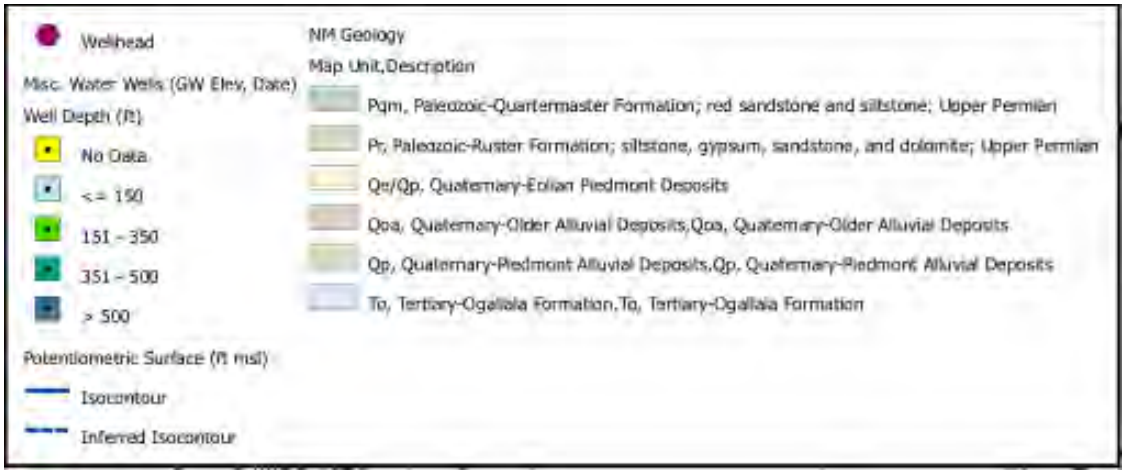
MISC Groundwater Elevation, Potentiometric Surface and Geology

Figure 2b

Devon Energy Boundary Raider 6

May 2020



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	MISC Ground Water Elevation, Potentiometric Surface, and Geology	Figure 2b Legend
	Devon Energy Boundary Raider 6	May 2020

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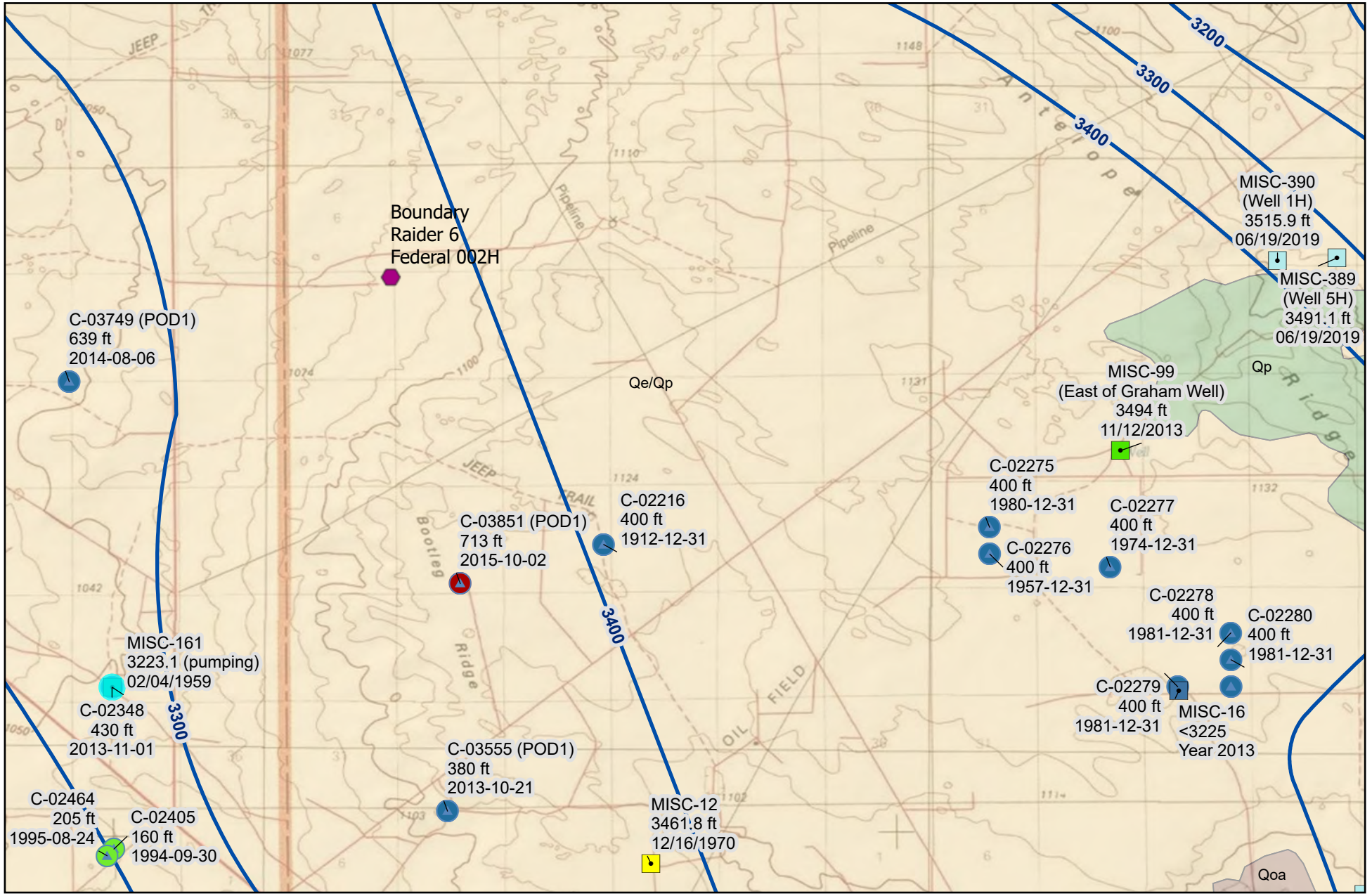
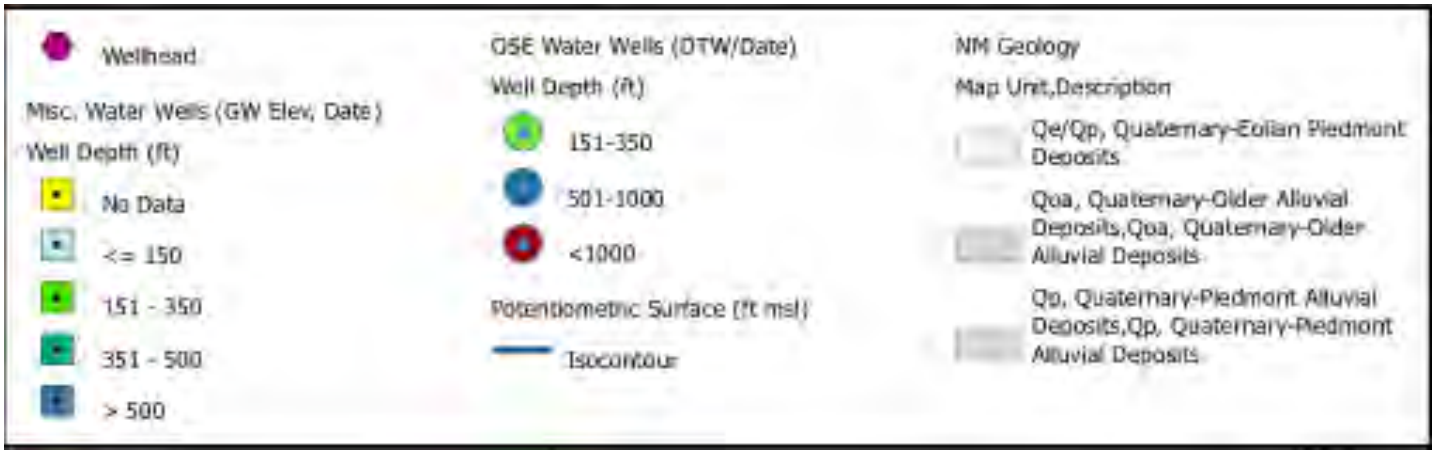


R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	MISC and OSE Wells, Potentiometric Surface and Geology	Figure 2c
	Devon Energy Boundary Raider 6	May 2020



R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	MISC and OSE Wells, Potentiometric Surface, and Geology	Figure 2c Legend
	Devon Energy Boundary Raider 6	May 2020

APPENDIX WELL LOGS

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

469289

Section 1. GENERAL INFORMATION

(A) Owner of well BLM- STACY MILLS Owner's Well No. C-3351

Street or Post Office Address P.O. BOX 1358

City and State LOVING, NEW MEXICO 88256

Well was drilled under Permit No. C-3351 and is located in the:

a. SE ¼ NW ¼ SE ¼ ¼ of Section 4 Township 23-S Range 31-E N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____
Subdivision, recorded in _____ County.

d. X=614968.79 feet, Y=3577879.68 feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor GLENN'S WATER WELL SERVICE INC. License No. WD-421

Address P.O. BOX 692 TATUM, NEW MEXICO 88267

Drilling Began 11/20/07 Completed 11/20/07 Type tools ROTARY Size of hole 7 7/8 in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 320 ft.

Completed well is ☒ shallow ☐ artesian. Depth to water upon completion of well 168 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
240	265	25	SAND ROCK	25

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
8 5/8	.188	PE	1	20	20	NONE	CEMENTED	
6 5/8	.188	PE	1	304	304	NONE	152	304

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

STATE ENGINEER OFFICE
ROSWELL, NEW MEXICO
2007 DEC -4 A 11:38

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____
State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received 12.4.07

Quad _____ FWL _____ FSL _____

File No. C-3351 Use STK Location No. 235.31E.4.414

Section 6. LOG OF HOLE

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	6	6	SAND
6	12	6	RED CLAY
12	15	3	CALECHE
15	28	13	RED CLAY AND CALACHE
28	105	77	RED SHALE
105	170	65	RED CLAY AND RED SHALE
170	200	30	RED SHALE
200	240	40	RED SANDY SHALE
240	265	25	RED SAND STONE
265	268	3	RED CLAY
268	310	42	RED SANDY SHALE
310	320	10	RED SHALE, SOME ANHYDRITE

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Corky J. Cox
Driller

393496

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, deepened or reconditioned. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
C-3749 POD 1 (H12R)	C-3749 POD 1
WELL OWNER NAME(S): US Dept of Energy	PHONE (OPTIONAL): 575-234-7488
WELL OWNER MAILING ADDRESS: POB 3090	CITY: Carlsbad STATE: NM ZIP: 88221-3090

WELL LOCATION (FROM GPS)	DEGREES	MINUTES	SECONDS	
LATITUDE	32	18	42.0588	N
LONGITUDE	-103	45	26.7078	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND

* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS - PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

From Jal Hwy take Redd Rd 3 miles north, head west 1 mile on dirt road to H12 Well site

2. DRILLING & CASING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
NM 331	Randy Stewart	Stewart Brothers

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
7/10/14	8/6/14	865	865	

COMPLETED WELL IS: ○ ARTESIAN ○ DRY HOLE ◉ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): 639

DRILLING FLUID: ○ AIR ○ MUD ADDITIVES – SPECIFY:

DRILLING METHOD: ◉ ROTARY ○ HAMMER ○ CABLE TOOL ○ OTHER – SPECIFY:

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	40	17 1/2	13 3/8	Weld	12 1/4	.375	
40	820	12 1/4	5" Fiberglass Blank	Threaded	4.5		
820	846	12 1/4	5" Fiberglass Slotted	Threaded	4.5		.070
846	858	12 1/4	5" Fiberglass Blank	Threaded	4.5		

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
857	865	12 1/4	8/12 Sand	2	Tremie
851	857	12 1/4	Gelacryl Superflex Seal	1	Tremie
816	851	12 1/4	8/16 Sand Pack	6	Tremie
811	816	12 1/4	Fine Sand	1	Tremie
806	811	12 1/4	Gelacryl Super Flex	1	Tremie

STATE ENGINEER OFFICE RECEIVED

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	C-3749	POD NUMBER	1	TRN NUMBER	548076
LOCATION	4-4-3	23S.32E.07			PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
1	12	11	Dune sand and pad material	○ Y ◉ N	
12	16	4	Mescalero Caliche	○ Y ◉ N	
16	20	4	Gatuna (Sandstone)	○ Y ◉ N	
20	70	50	Santa Rosa (Sandstone)	○ Y ◉ N	
70	620	550	Dewy Lake Sandstone	○ Y ◉ N	
620	648	28	Anhydrite	○ Y ◉ N	
648	663	15	Mudstone	○ Y ◉ N	
663	678	15	Anhydrite	○ Y ◉ N	
678	702	4	Magenta Dolomite	○ Y ○ N	
702	756	54	Anhydrite	○ Y ○ N	
756	772	16	Halite	○ Y ○ N	
772	820	48	Anhydrite	○ Y ○ N	
820	846	26	Culebra Dolomite	◉ Y ○ N	
846	856	10	Mudstone	○ Y ◉ N	
856	865	9	Anhydrite	○ Y ◉ N	
				○ Y ○ N	
				○ Y ○ N	
				○ Y ○ N	
				○ Y ○ N	
				○ Y ○ N	
				○ Y ○ N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA: ○ PUMP ◉ AIR LIFT ○ BAILER ○ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 5

5. TEST; RIG SUPERVISION

WELL TEST — TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

MISCELLANEOUS INFORMATION:

Monitor Well

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

Don Ward

2014 SEP 11 STATE ENGINEER OFFICE

6. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

Randy Stewart — Randy Stewart — 8/30/14

SIGNATURE OF DRILLER / PRINT SIGNEE NAME — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	C-3749	POD NUMBER	1	TRN NUMBER	548076
LOCATION	4-4-3	23S.32E.07			PAGE 2 OF 2

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

STATE ENGINEER OFFICE
ROSWELL

2013 NOV -7 A 11:11

1. GENERAL AND WELL LOCATION

OSE POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
C-2348	C-2348
WELL OWNER NAME(S)	PHONE (OPTIONAL)
MARK McCloy - McCloy Ranches	432-940-4459
WELL OWNER MAILING ADDRESS	CITY / STATE / ZIP
P.O. Box 1076 254 Diamond Rd	Jal NM 88252

WELL LOCATION (FROM GPS): DEGREES / MINUTES / SECONDS

	DEGREES	MINUTES	SECONDS	
LATITUDE	32	16	12.91	N
LONGITUDE	103	45	03.61	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND
* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

Hwy 128 to 18 mm 1 mile N 1 mile west on Red Road

2. DRILLING & CASING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
1654	John Sirman	Sirman Drilling & Const. LLC

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
10/31/13	11/1/13	700'-0	700'-0	575-~~600~~

COMPLETED WELL IS: ☐ ARTESIAN ☐ DRY HOLE ☑ SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): 430'-0

DRILLING FLUID: ☑ AIR ☐ MUD ☐ ADDITIVES – SPECIFY:

DRILLING METHOD: ☑ ROTARY ☑ HAMMER ☐ CABLE TOOL ☐ OTHER – SPECIFY:

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
0	560	10	PVC	Certa-Lok	6	DR-17	Blank
560	620	10	PVC	Certa Lok	6	DR-17	.032 Screen
620	680	10	PVC	Certa Lok	6	DR-17	Blank
680	700	10	PVC	Certa Lok	6	DR-17	.032 Screen

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
0	20	10	3/8 bentonite hole plug	6 bags	gravity
67	700	10	3/8 pea gravel	5 yds	gravity

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	POD NUMBER	TRN NUMBER
C-2348		491413

LOCATION: C 23S.31E.26.3.4.1 LIVESTOCK

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	10	10	Brown sand	☐ Y ☒ N	
10	15	5	White caliche	☐ Y ☒ N	
15	125	110	Brown Sandstone	☒ Y ☐ N	
125	315	190	Red shale	☐ Y ☒ N	
315	700	385	Red sandstone	☒ Y ☐ N	10
				☐ Y ☐ N	
				☐ Y ☐ N	
				☐ Y ☐ N	
				☐ Y ☐ N	
	700			☐ Y ☐ N	
				☐ Y ☐ N	
				☐ Y ☐ N	
				☐ Y ☐ N	
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				☐ Y ☐ N	
				☐ Y ☐ N	
				☐ Y ☐ N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA: ☐ PUMP ☒ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 7

STATE ENGINEER OFFICE ROSWELL, NM NOV 7 PM 1:11

5. TEST; RIG SUPERVISION

WELL TEST: TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

MISCELLANEOUS INFORMATION:

none

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

none

6. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

John Sierman — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

11/3/13 — DATE

FOR OSE INTERNAL USE — WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	POD NUMBER	TRN NUMBER
C-2348		491413

LOCATION: C — 23S.31E.26.3.4.1 — Livestock

WELL RECORD & LOG

OFFICE OF THE STATE ENGINEER

www.ose.state.nm.us

1. GENERAL AND WELL LOCATION

OSE POD NUMBER (WELL NUMBER)	OSE FILE NUMBER(S)
POD-1	C-3851
WELL OWNER NAME(S)	**PHONE (OPTIONAL)**
WIPP- Department of Energy Carlsbad Field Office	(575)234-7488
WELL OWNER MAILING ADDRESS	**CITY / STATE / ZIP**
PO Box 3090	Carlsbad / NM / 88221-3090

WELL LOCATION (FROM GPS)		DEGREES	MINUTES	SECONDS	
	LATITUDE	32	17	2.3	N
	LONGITUDE	103	41	42.3	W

* ACCURACY REQUIRED: ONE TENTH OF A SECOND

* DATUM REQUIRED: WGS 84

DESCRIPTION RELATING WELL LOCATION TO STREET ADDRESS AND COMMON LANDMARKS – PLSS (SECTION, TOWNSHIP, RANGE) WHERE AVAILABLE

3.5 mi. east of Redd Rd. Section 20, Township 23s, Range 32e

2. DRILLING & CASING INFORMATION

LICENSE NUMBER	NAME OF LICENSED DRILLER	NAME OF WELL DRILLING COMPANY
WD-1723	Randy Stewart	Stewart Brothers Drilling

DRILLING STARTED	DRILLING ENDED	DEPTH OF COMPLETED WELL (FT)	BORE HOLE DEPTH (FT)	DEPTH WATER FIRST ENCOUNTERED (FT)
8-19-15	10-2-15	1392	1405	1354

COMPLETED WELL IS: [x] ARTESIAN [ ] DRY HOLE [ ] SHALLOW (UNCONFINED)

STATIC WATER LEVEL IN COMPLETED WELL (FT): 713

DRILLING FLUID: [ ] AIR [x] MUD ADDITIVES – SPECIFY:

DRILLING METHOD: [x] ROTARY [ ] HAMMER [ ] CABLE TOOL [ ] OTHER – SPECIFY:

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM (inches)	CASING MATERIAL AND/OR GRADE (include each casing string, and note sections of screen)	CASING CONNECTION TYPE	CASING INSIDE DIAM. (inches)	CASING WALL THICKNESS (inches)	SLOT SIZE (inches)
+2	35	24	LCS	weld	14	.375	n/a
35	1354	12.250	Blank FRP	Threaded	5	.25	n/a
1354	1383	12.250	Slotted FRP	Threaded	5	.25	.070
1383	1393	12.250	Blank FRP	Threaded	5	.25	

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2015 NOV 10 PM 3:35

3. ANNULAR MATERIAL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	BORE HOLE DIAM. (inches)	LIST ANNULAR SEAL MATERIAL AND GRAVEL PACK SIZE-RANGE BY INTERVAL	AMOUNT (cubic feet)	METHOD OF PLACEMENT
0	35	24	neat cement	61	tremie
35	1347	12.250	neat cement	1080	tremie
1347	1352	12.250	Gelacryl seal	3.25	tremie
1352	1353	12.250	Bentonite pellets	.35	tremie
1353	1383	12.250	6-9 Sand	19.60	tremie
1383	1389	12.250	Gelacryl seal	3.92	tremie
1389	1405	12.250	bentonite seal(.65 cu/ft)6-9 sand	9.80	tremie

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 10/29/15)

FILE NUMBER	C-3851	POD NUMBER	1	TRN NUMBER	564731
LOCATION	23S.32E.20.4.3.3			monitor	PAGE 1 OF 2

4. HYDROGEOLOGIC LOG OF WELL

DEPTH (feet bgl) FROM	DEPTH (feet bgl) TO	THICKNESS (feet)	COLOR AND TYPE OF MATERIAL ENCOUNTERED - INCLUDE WATER-BEARING CAVITIES OR FRACTURE ZONES (attach supplemental sheets to fully describe all units)	WATER BEARING? (YES / NO)	ESTIMATED YIELD FOR WATER-BEARING ZONES (gpm)
0	6	6	Pad material & brown sand	Y ✓N	
6	36	30	Caliche	Y ✓N	
36	120	84	Gatuna Sandstone	Y ✓N	
120	440	320	Chinle Sandstone	Y ✓N	
440	576	136	Santa Rosa Sandstone	Y ✓N	
576	1198	622	Dewey Lake Sandstone	Y ✓N	
1198	1228	30	Anhydrite	Y ✓N	
1228	1238	10	Mudstone	Y ✓N	
1238	1248	10	Anhydrite	Y ✓N	
1248	1265	17	Magenta Dolemite	Y ✓N	
1265	1332	67	Anhydrite	Y ✓N	
1332	1340	8	mudstone	Y ✓N	
1340	1354	14	Anhydrite	Y ✓N	
1354	1380	16	Culebra Dolemite	✓Y N	3.00
1380	1390	10	mudstone	Y ✓N	
1390	1405	15	Anhydrite	Y ✓N	
				Y N	
				Y N	
				Y N	
				Y N	
				Y N	

METHOD USED TO ESTIMATE YIELD OF WATER-BEARING STRATA:

☐ PUMP ☑ AIR LIFT ☐ BAILER ☐ OTHER – SPECIFY:

TOTAL ESTIMATED WELL YIELD (gpm): 3.00

STATE ENGINEER OFFICE ROSWELL, NEW MEXICO 2015 NOV 10 PM 3:35

5. TEST; RIG SUPERVISION

WELL TEST: TEST RESULTS - ATTACH A COPY OF DATA COLLECTED DURING WELL TESTING, INCLUDING DISCHARGE METHOD, START TIME, END TIME, AND A TABLE SHOWING DISCHARGE AND DRAWDOWN OVER THE TESTING PERIOD.

MISCELLANEOUS INFORMATION:

PRINT NAME(S) OF DRILL RIG SUPERVISOR(S) THAT PROVIDED ONSITE SUPERVISION OF WELL CONSTRUCTION OTHER THAN LICENSEE:

Danny L White

6. SIGNATURE

THE UNDERSIGNED HEREBY CERTIFIES THAT, TO THE BEST OF HIS OR HER KNOWLEDGE AND BELIEF, THE FOREGOING IS A TRUE AND CORRECT RECORD OF THE ABOVE DESCRIBED HOLE AND THAT HE OR SHE WILL FILE THIS WELL RECORD WITH THE STATE ENGINEER AND THE PERMIT HOLDER WITHIN 20 DAYS AFTER COMPLETION OF WELL DRILLING:

Danny White — Danny L. White — SIGNATURE OF DRILLER / PRINT SIGNEE NAME

10/31/15 — DATE

FOR OSE INTERNAL USE

WR-20 WELL RECORD & LOG (Version 06/08/2012)

FILE NUMBER	C-3851	POD NUMBER	1	TRN NUMBER	564731	
LOCATION	23S.32E.20.4.3.3			monitor		PAGE 2 OF 2

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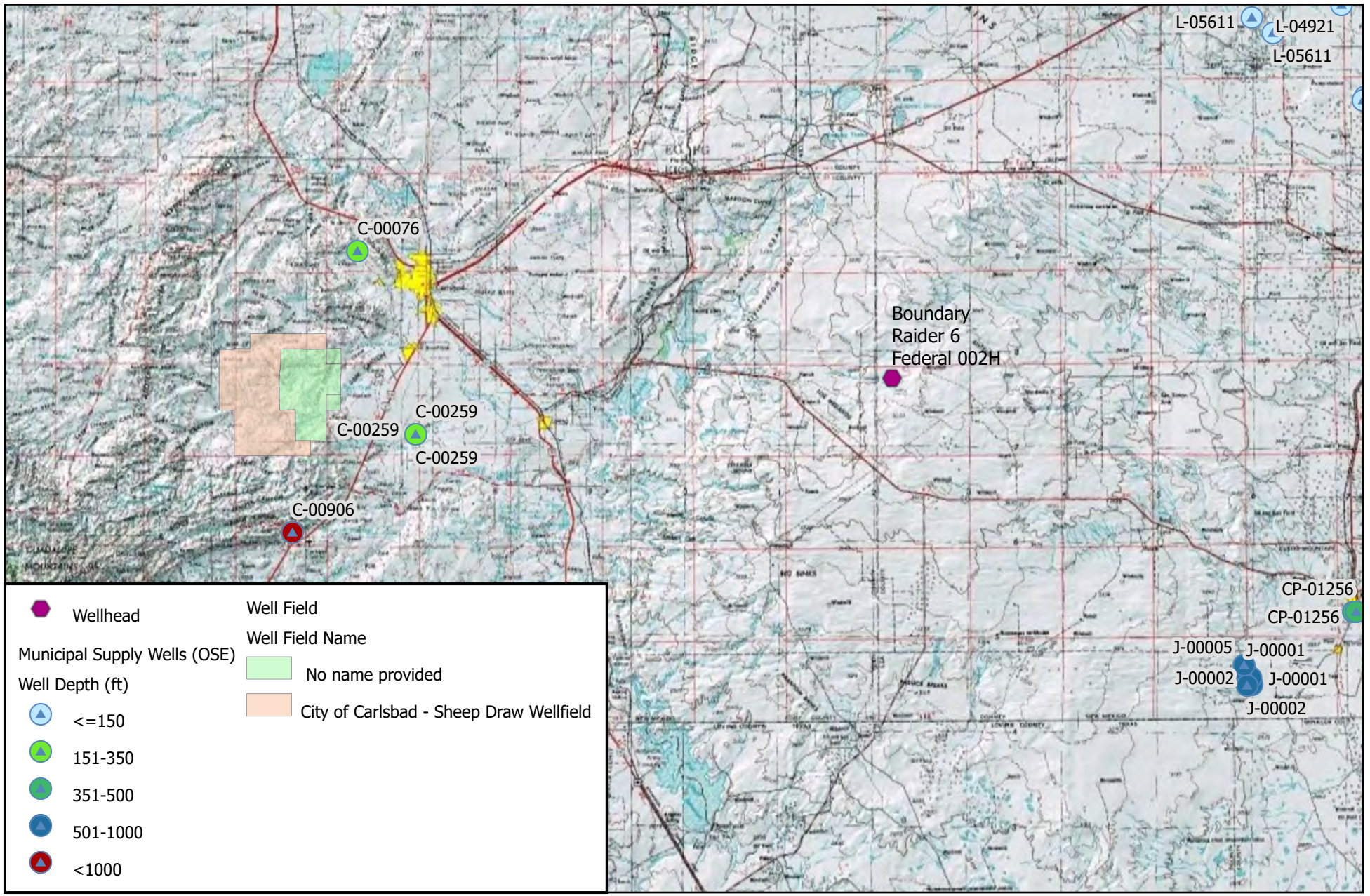

R.T. Hicks Consultants, Ltd
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Albuquerque, NM 87104
Ph: 505.266.5004

Municipal Well Fields and Municipalities	Figure 3
Devon Energy Boundary Raider 6	May 2020

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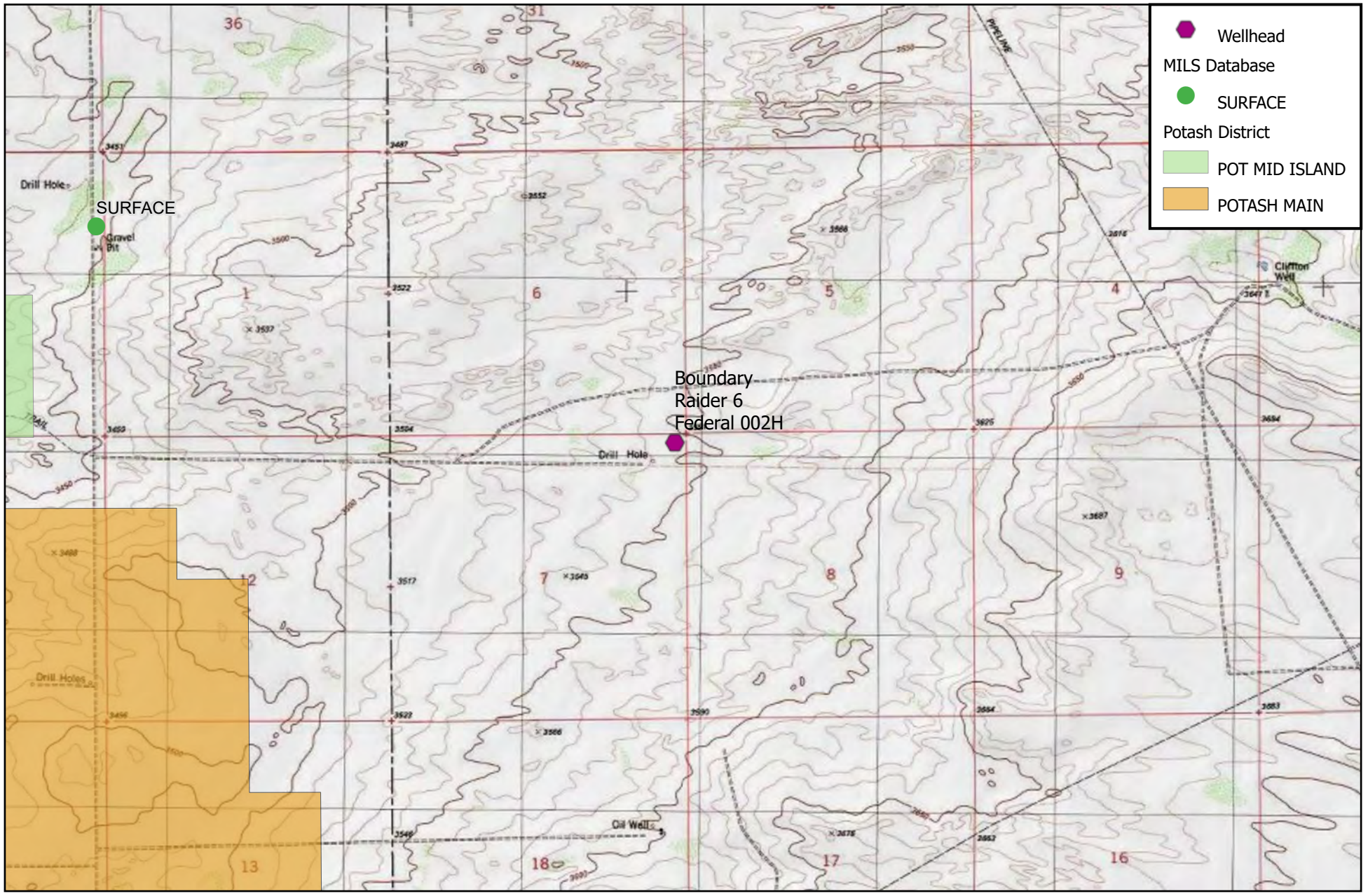

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Albuquerque, NM 87104
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Mines and Minerals

Figure 4

Devon Energy Boundary Raider 6

May 2020

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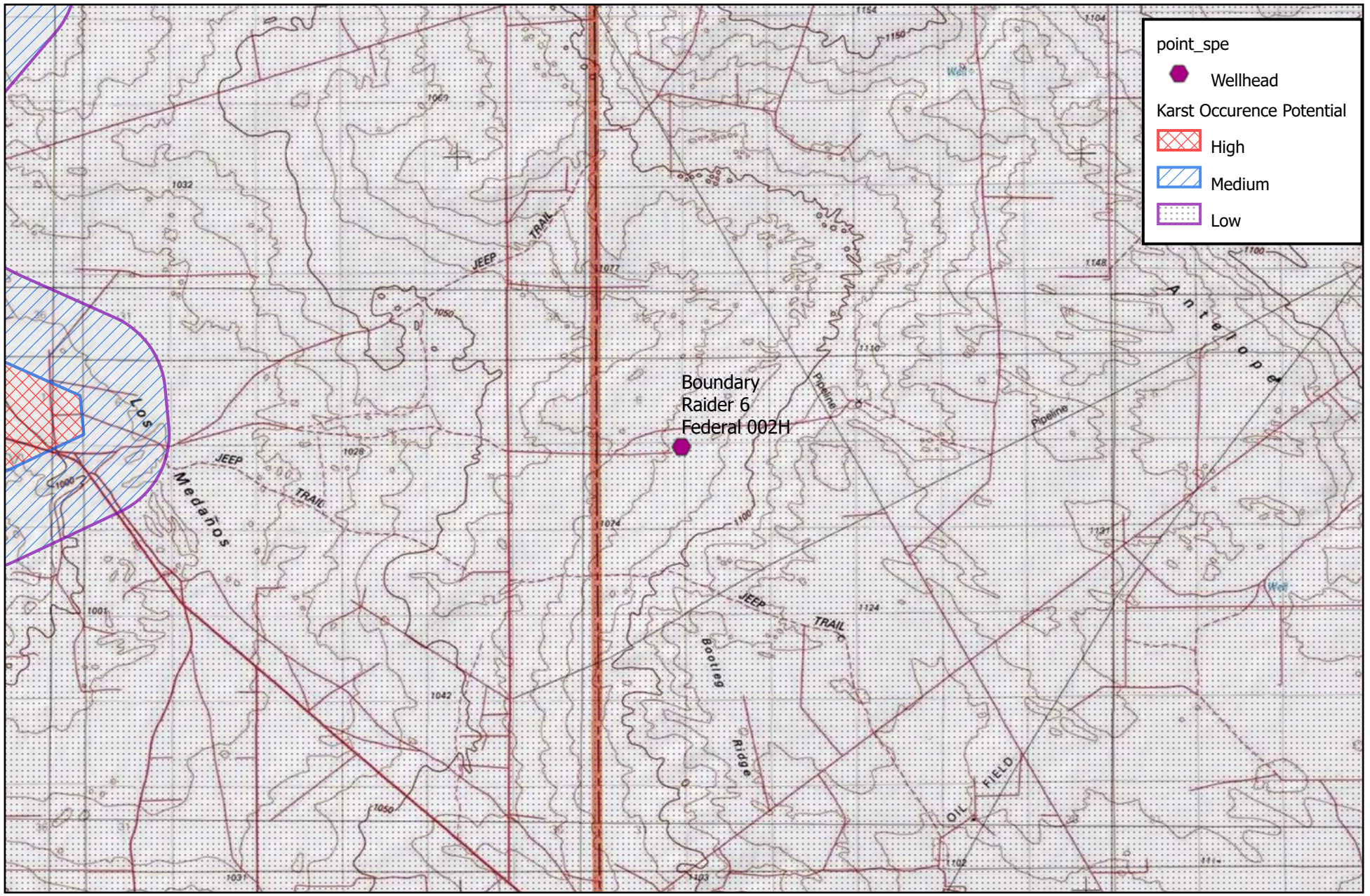

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Karst Potential	Figure 5
Devon Energy Boundary Raider 6	May 2020

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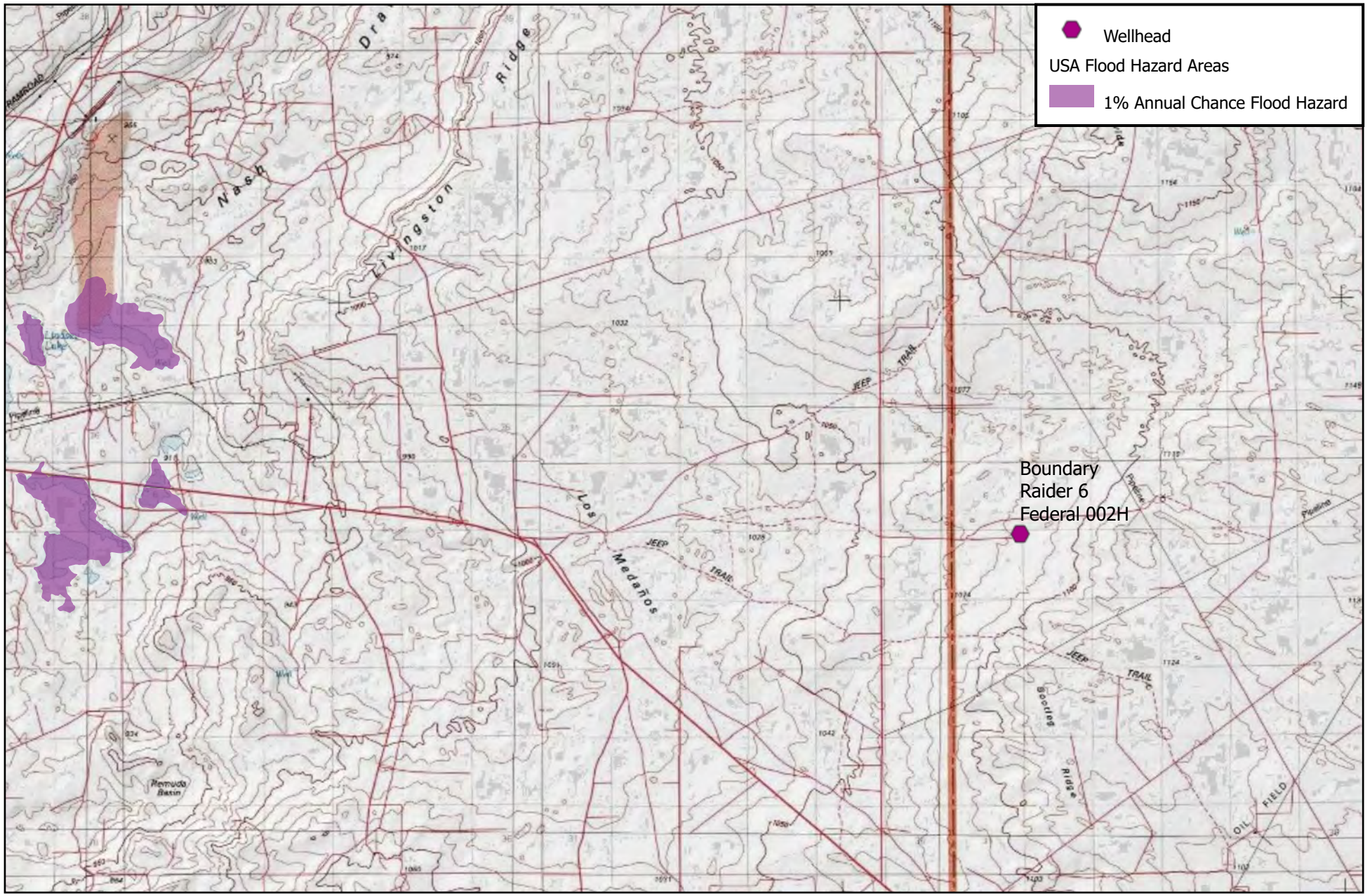

R.T. Hicks Consultants, Ltd 901 Rio Grande Blvd NW Suite F-142 Albuquerque, NM 87104 Ph: 505.266.5004	Flood Hazard	Figure 6
	Devon Energy Boundary Raider 6	May 2020

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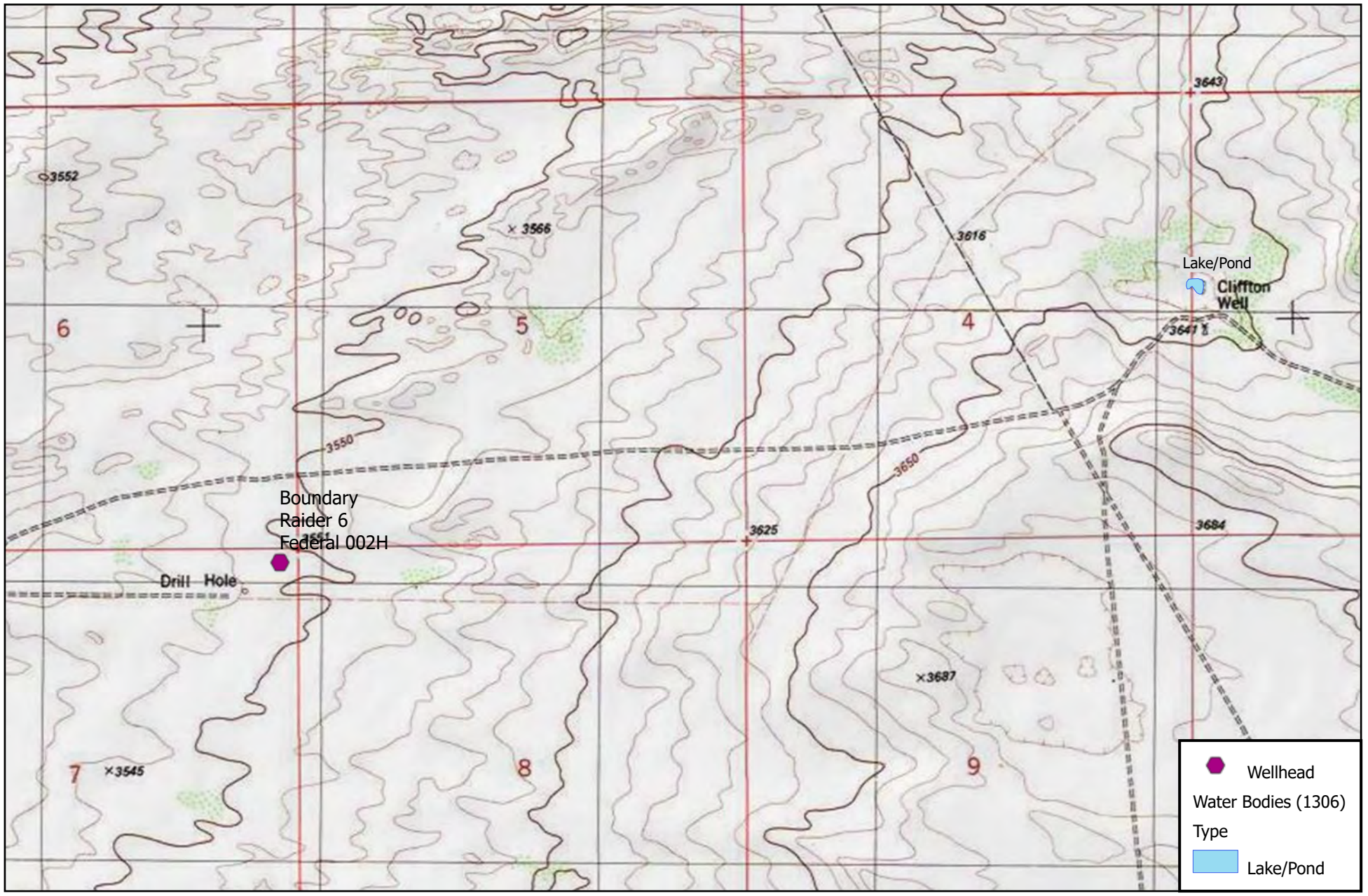

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Surface Water

Figure 7

Devon Energy Boundary Raider 6

May 2020

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Nearby Structures

Figure 8

Devon Energy Boundary Raider 6

May 2020

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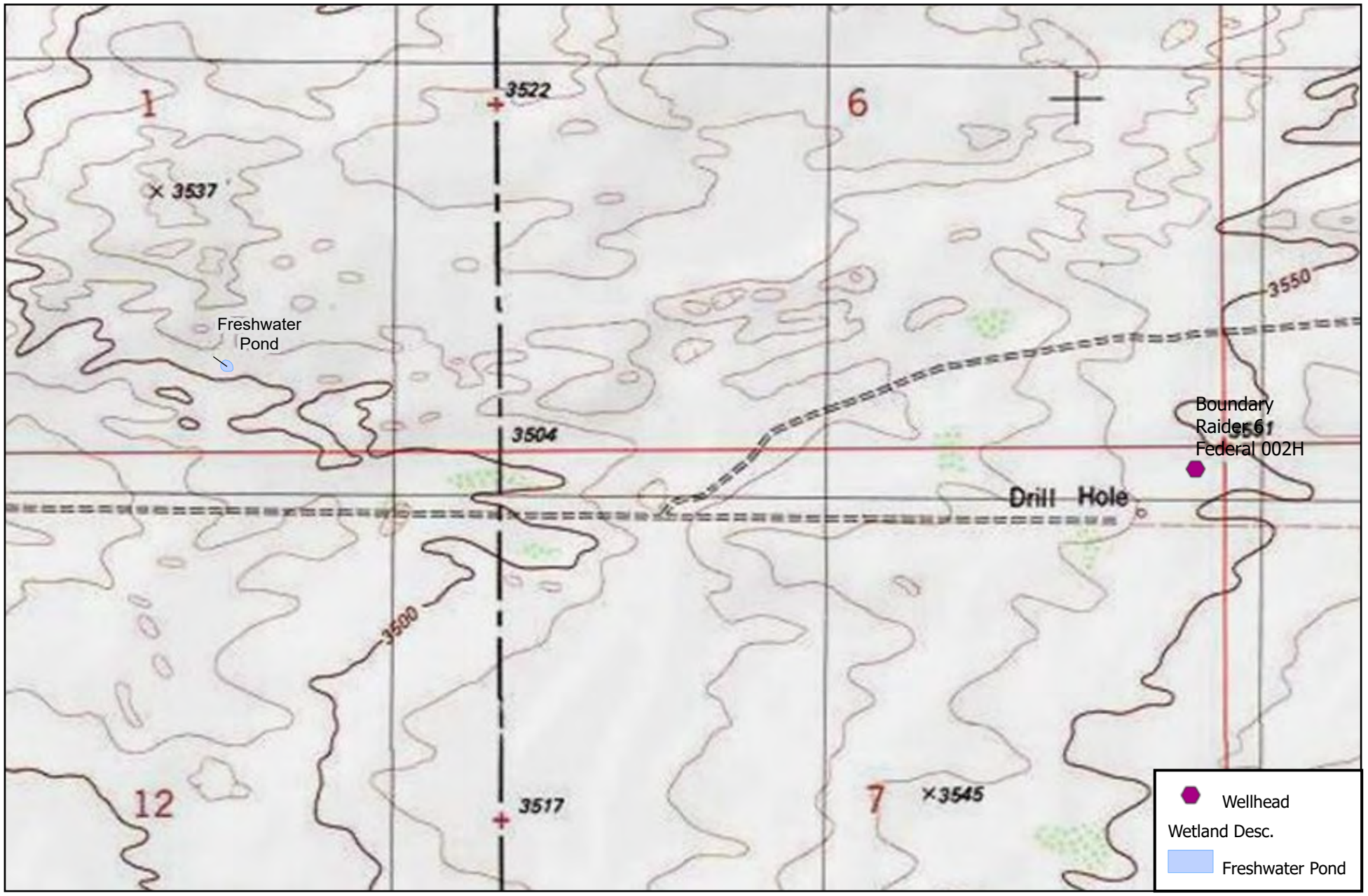

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Nearby Wetlands

Figure 9

Devon Energy Boundary Raider 6

May 2020