

Initial Application Part I

Received: 08/07/2019

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



Foundation Energy Management, LLC
15 E 5th St, Suite 1200
Tulsa, OK 74103

July 26, 2019

Mr. Phillip Goetz
Mr. Michael McMillan
New Mexico Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, NM 87505

Re: Submittal of Non-Commercial C-108 Application for Administrative Approval

Gentlemen:

Foundation Energy Management LLC (Ogrid # 370740) hereby submits a C-108 application to dispose produced water into Blue Quail Federal #1, API 30-025-33222.

This well will be converted from oil production to produced water disposal in the Bell Canyon of the Delaware Mountain Group. This well is a NON-COMMERCIAL SWD well and will serve only wells operated by Foundation Energy Management, LLC. A public notice was published in The Lovington Leader May 30, 2019.

The application is attached for your review and approval. If you have questions, feel free to contact me at 918.526.5592 or by email at jsmith@foundationenergy.com

Sincerely yours,

A handwritten signature in blue ink, appearing to read "James A. Smith".

James A. Smith
HSE-Regulatory Supervisor

Xc: Hobbs District Office

APPLICATION FOR AUTHORIZATION TO INJECT

- I. PURPOSE: ☐ Secondary Recovery ☐ Pressure Maintenance ☒ Disposal
☐ Storage
Application qualifies for administrative approval? ☒ Yes ☐ No
- II. OPERATOR: Foundation Energy Management, LLC
ADDRESS: 5057 Keller Springs Rd., Suite 650, Addison, TX 75001
CONTACT PARTY: James Smith, HSE/Regulatory Supervisor PHONE: 918.526.5592
- III. WELL DATA: Complete the data required on the reverse side of this form for each well proposed for injection.
Additional sheets may be attached if necessary.
- IV. Is this an expansion of an existing project? ☐ Yes ☒ No
If yes, give the Division order number authorizing the project: _____
- V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

See Attachment
- 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.

See Attachment
- VII. Attach data on the proposed operation, including:
1. Proposed average and maximum daily rate and volume of fluids to be injected;

Proposed average daily rate: 750 BWP
Proposed maximum daily rate: 1500 BWP
 2. Whether the system is open or closed;

Closed
 3. Proposed average and maximum injection pressure;

Proposed average injection pressure: 600 psi
Proposed maximum pressure: 928 psi
 4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,

This is a non-commercial saltwater disposal well, and will be used by Foundation Energy Management, LLC only. The wells producing to this facility include:

Source of Produced Water		
Name	API	Well Completion
Blue Quail Federal 02	30-025-35047	53817] SAND DUNES; DELAWARE, EAST
Blue Quail Federal 03	30-025-39818	[53800] SAND DUNES; BONE SPRING
Sharbro Federal 01	30-025-33054	[53800] SAND DUNES; BONE SPRING
Sharbro Federal 02	30-025-34867	[96916] DIAMONDTAIL; DELAWARE, SOUTHWEST
Sharbro Federal 03	30-025-34868	[96916] DIAMONDTAIL; DELAWARE, SOUTHWEST
Sharbro Federal 04	30-025-34961	[96916] DIAMONDTAIL; DELAWARE, SOUTHWEST
Sharbro Federal 05	30-025-34962	[96916] DIAMONDTAIL; DELAWARE, SOUTHWEST
Sharbro Federal 06	30-025-35048	[53817] SAND DUNES; DELAWARE, EAST
Sharbro Federal 08	30-025-35154	[53817] SAND DUNES; DELAWARE, EAST
Sharbro Federal 10	30-025-40218	[53800] SAND DUNES; BONE SPRING

Water analyses are attached

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.).

See Attachment

- *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.

The Bell Canyon is a fine-to-very-fine-grained sandstone of Permian age, with intergranular porosity and permeability of 10-100 mD. The formation is 210' thick and its depth is 4,640'-4,850'

There are no underground sources of drinking water below the Bell Canyon. The base of underground sources of drinking water above the Bell Canyon is the Rustler at a depth of 846'. A Bell Canyon structure map and thickness map are attached to this application.

- IX. Describe the proposed stimulation program, if any.

5,000-10,000 gals 7.5% HCL with ball sealers for diversion

- *X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division, they need not be resubmitted).

Logs have been filed with the Division.

- *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.

There are NO freshwater wells within one mile of the proposed disposal well. Examination of the Office of the State Engineer (OSE) website shows a DOE observation well drilled in SW/4 SE/4 7-23S-32E, its OSE POD Number is C 03749 POD1. However, confirmation from DOE indicates this information is incorrect and the well is located in 15-23S-31E. The confirmation email from DOE is attached.

- 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.

I have examined the available geologic and engineering data and find no evidence of open faults or any other hydrologic connection between the Bell Canyon (disposal zone) and any underground sources of drinking water.

Tyler Pansa

Tyler Pansa, Geologists

7/26/19

Date

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: James Smith, HSE/Regulatory Supervisor TITLE: HSE/Regulatory Supervisor

SIGNATURE:

James Smith

DATE: July 25, 2019

E-MAIL ADDRESS: JSmith@foundationenergy.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.

See Attachment.

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.

See Attachment.

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: Foundation Energy Management, LLC

WELL NAME & NUMBER: 660' FSL 1,980' FEL Blue Quail Federal #1

WELL LOCATION: FOOTAGE LOCATION

UNIT LETTER

7

SECTION

T23S

TOWNSHIP

R32E

RANGE

WELLBORE SCHEMATICWELL CONSTRUCTION DATASurface Casing

Hole Size: 17-1/2"
Cemented with: 600 sx.
Top of Cement: Surface

Casing Size: 13-3/8"
or _____
Method Determined: _____

ft³Intermediate Casing

Hole Size: 12-1/4"
Cemented with: 1,600 sx.
Top of Cement: Surface

Casing Size: 8-5/8"
or _____
Method Determined: _____

ft³Production Casing

Hole Size: 7-7/8"
Cemented with: 1,350 sx.
Top of Cement: 1,906'
Total Depth: 8,850'

Casing Size: 5-1/2"
or _____
Method Determined: _____

ft³Injection Interval

4,640' To 4,850'

(Perforated or Open Hole; indicate which)
Perforated

INJECTION WELL DATA SHEET

Tubing Size: 2-7/8" Lining Material: Salta Lined Tubing

Type of Packer: 5-1/2" Model R Packer

Packer Setting Depth: +/- 4,600'

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

Additional Data

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

If no, for what purpose was the well originally drilled? Crude Oil Production

2. Name of the Injection Formation: Bell Canyon

3. Name of Field or Pool (if applicable): N/A

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.

Well is perforated in Sand Dunes; Delaware East Pool 6,618-8,467' SEL

The perforation detail is shown on the attached wellbore schematic.

CIBP will be set at 4,900' with 5 sx. cement on top of CIBP.

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

Overlying: None

Underlying: Brush Canyon (Delaware) 6818'-8475'

List of Attachments
Blue Quail Federal #1
API 30-025-33222
C-108 Application

Map with ½ mile AOR

Map with all leases within 2 miles

Tabulation of Data on All Wells of Public Record within AOR

Tabulation of Data on All Leases within 2 miles

Water Analyses of Produced Water

Water Analysis of Bell Canyon (Disposal Zone) from Tomcat 15 Federal #2 (30-025-33909)

Bell Canyon Structure Map

Bell Canyon Isopach

Letter from DOE confirming water well location

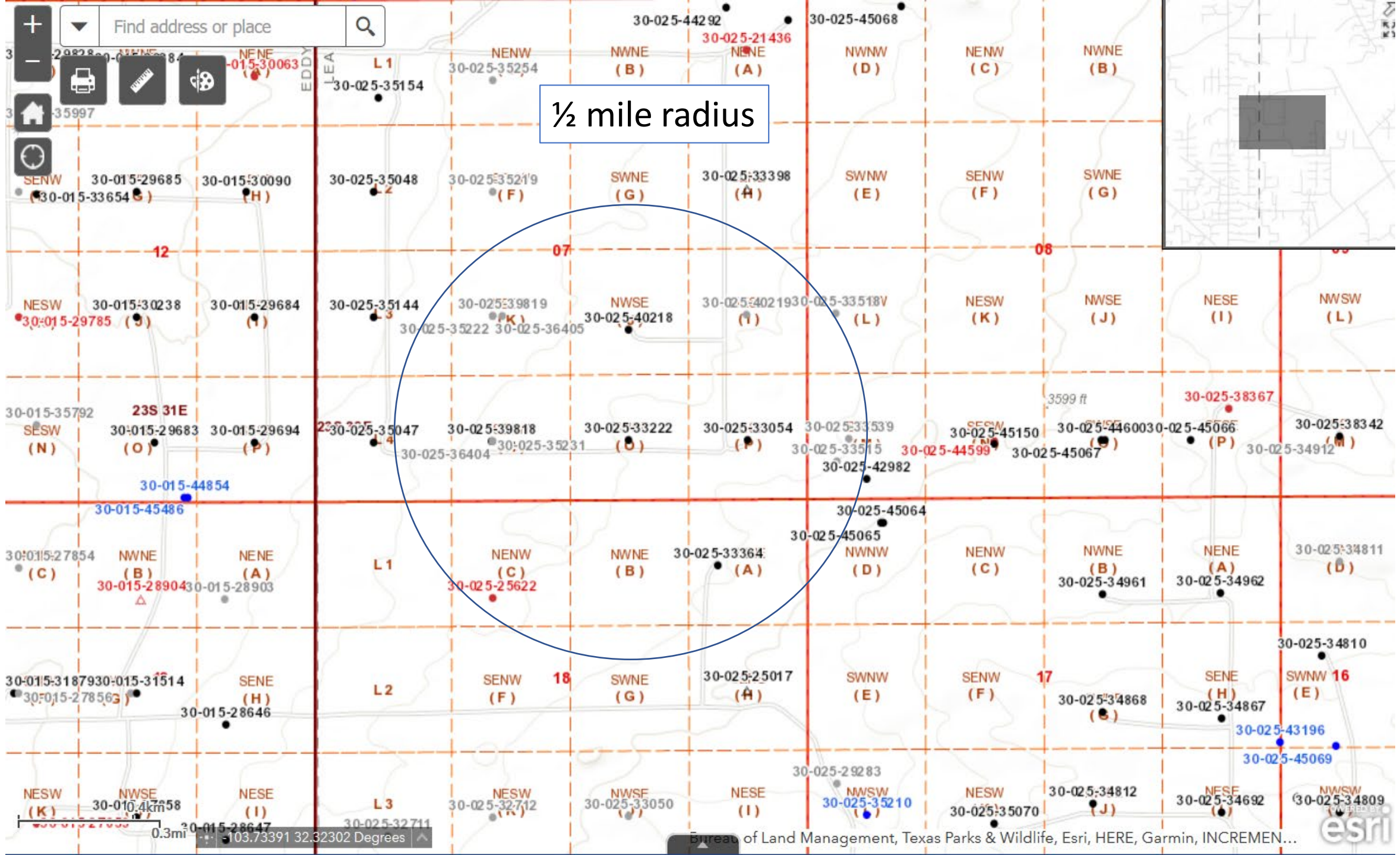
Proof of Notice to affected parties within AOR

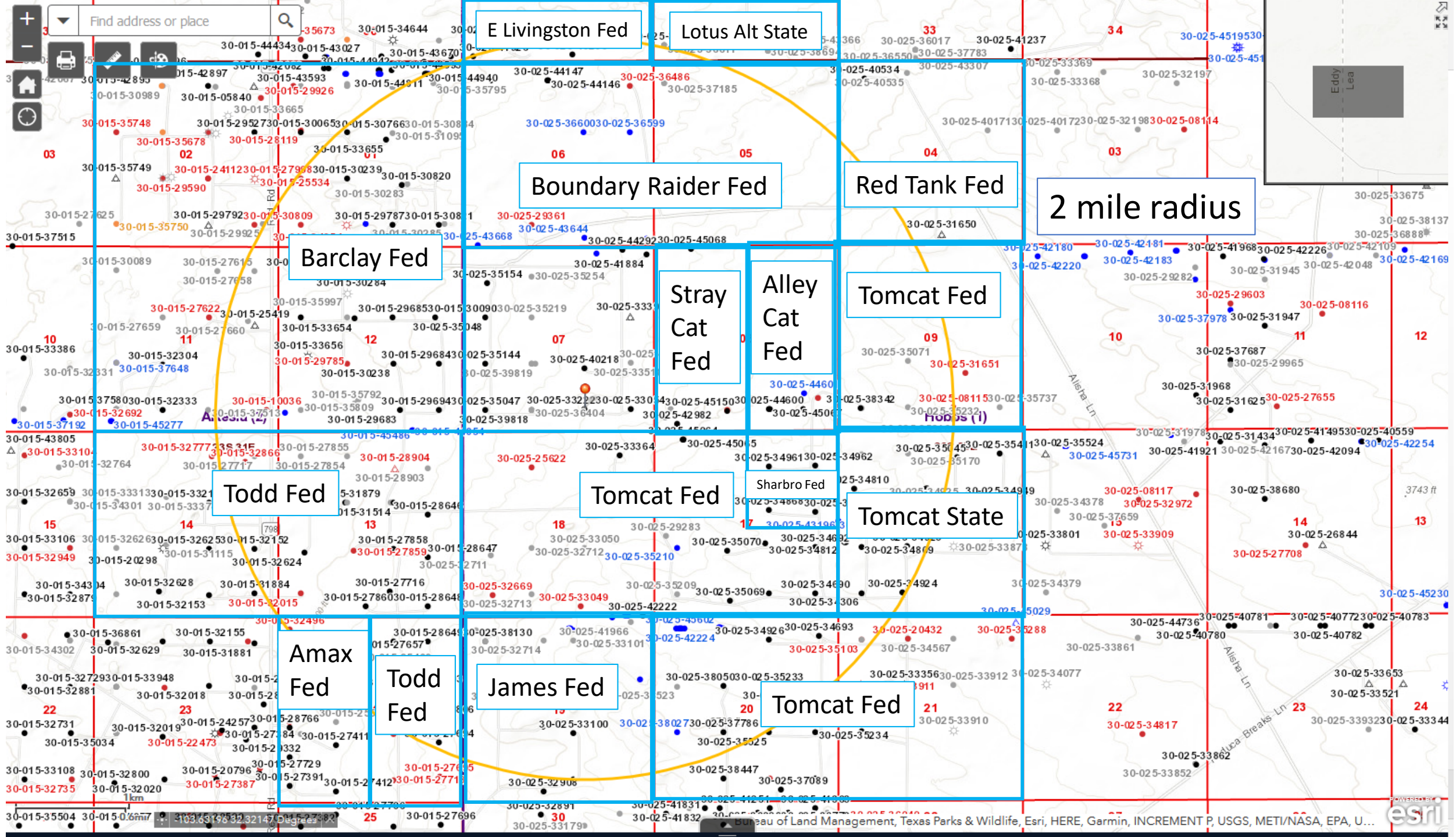
Affidavit to Publication

Wellbore Schematic before Conversion to SWD

Wellbore Schematic after Conversion to SWD

Wellbore Schematic for P&A Wellbore (SDE 18 FEDERAL #001)





Tabulation of Data on All Wells of Public Record within AOR

[illegible]

ALL OIL AND GAS LEASES WITHIN 2 MILE RADIUS
OF BLUE QUAIL FEDERAL #1 API 30-025-33222

NMNM 126065
NMNM 062223
NMNM 063994
NMNM 132067
NMNM 086151
NMNM 018848
NMNM 098826
NMNM 098192
NMNM 097891
NMNM 0 559539
NMNM 116573
NMNM 086153
NMNM 022080
NMNM 0 404441
NMNM 0 533177A
NMNM 040655
VO-4340-0004
VO-0302-0004

Imperative Water Analysis Report

IMPERATIVE
CHEMICAL PARTNERS

SYSTEM IDENTIFICATION

Company: Foundation Energy Management LLC - Hobbs
Location: Blue Quail 2
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-10389

Sample Date: 06-20-2019

Report Date: 06-27-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	1746
Magnesium(as Mg)	364.80
Barium(as Ba)	0.194
Strontium(as Sr)	79.21
Sodium(as Na)	35912
Potassium(as K)	1140
Iron(as Fe)	76.31
Manganese(as Mn)	2.51

ANIONS

Chloride(as Cl)	64000
Sulfate(as SO ₄)	300.00
Dissolved CO ₂ (as CO ₂)	350.00
Bicarbonate(as HCO ₃)	793.00
H ₂ S (as H ₂ S)	205.00
Boron(as B)	24.82

PARAMETERS

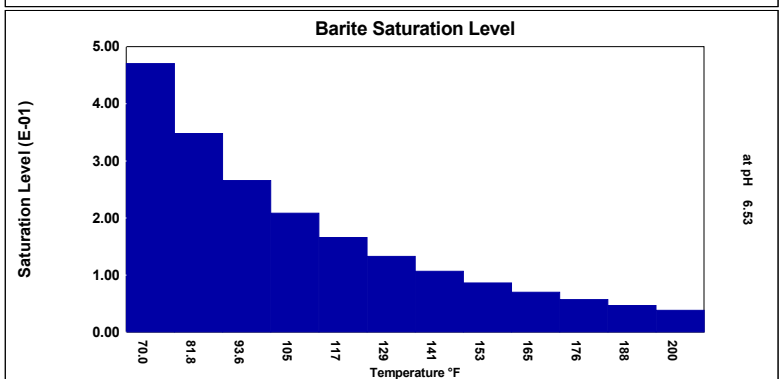
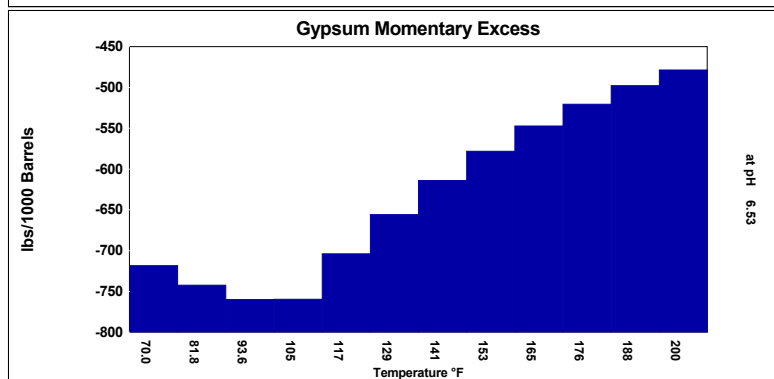
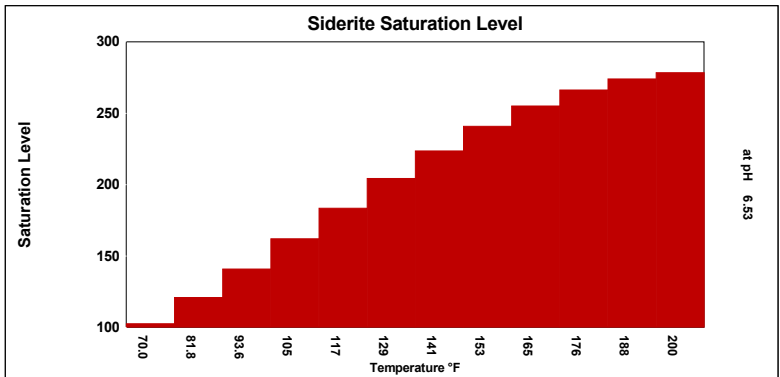
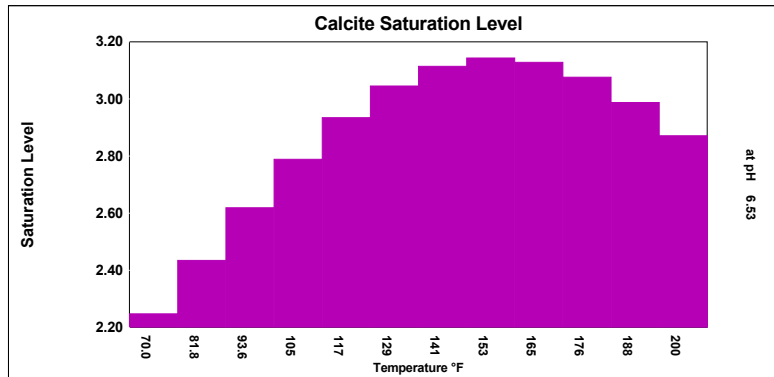
Temperature(°F)	77.00
Sample pH	6.50
Conductivity	144666
T.D.S.	103178
Resistivity	6.91
Sp.Gr.(g/mL)	1.07

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	2.25	0.102	0.0580	-900.89	0.0876	-718.58	0.470	-0.129	0.124	-145.60	102.49	0.210	553.36	7.36	0.113	0.249
81.82	1.36	2.43	0.108	0.0577	-885.38	0.0823	-742.46	0.348	-0.215	0.120	-146.81	120.85	0.210	486.36	7.24	0.174	0.294
93.64	1.73	2.62	0.113	0.0592	-850.04	0.0783	-760.07	0.265	-0.317	0.119	-146.03	140.89	0.209	432.44	7.13	0.258	0.339
105.45	2.09	2.79	0.116	0.0623	-798.55	0.0765	-759.63	0.208	-0.435	0.120	-144.15	162.01	0.208	387.26	7.00	0.348	0.384
117.27	2.45	2.93	0.118	0.0673	-734.99	0.0816	-704.01	0.166	-0.575	0.120	-142.37	183.44	0.205	345.22	6.88	0.362	0.430
129.09	2.82	3.04	0.117	0.0742	-663.31	0.0866	-655.90	0.133	-0.747	0.120	-141.08	204.27	0.201	304.56	6.74	0.361	0.475
140.91	3.18	3.11	0.115	0.0836	-587.17	0.0913	-614.27	0.107	-0.955	0.119	-140.24	223.52	0.196	265.65	6.61	0.346	0.520
152.73	3.55	3.14	0.112	0.0959	-509.82	0.0957	-578.29	0.0861	-1.21	0.118	-139.85	240.74	0.189	229.47	6.46	0.383	0.565
164.55	3.91	3.13	0.106	0.112	-434.04	0.0999	-547.26	0.0699	-1.51	0.117	-139.86	255.03	0.180	196.16	6.31	0.416	0.611
176.36	4.27	3.08	0.100	0.133	-362.04	0.104	-520.61	0.0569	-1.87	0.115	-140.29	266.25	0.171	166.25	6.16	0.438	0.656
188.18	4.64	2.99	0.0931	0.159	-295.44	0.107	-497.87	0.0466	-2.30	0.113	-141.11	273.98	0.161	139.71	6.00	0.240	0.701
200.00	5.00	2.87	0.0855	0.194	-235.33	0.110	-478.66	0.0383	-2.81	0.111	-142.33	278.34	0.151	116.57	5.83	0.174	0.746
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.

Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

IMPERATIVE
CHEMICAL PARTNERS

Company: Foundation Energy Management LLC - Hobbs
Location: Blue Quail 3
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-10387

Sample Date: 06-20-2019

Report Date: 06-27-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	1566
Magnesium(as Mg)	323.20
Barium(as Ba)	0.181
Strontium(as Sr)	69.83
Sodium(as Na)	36524
Potassium(as K)	990.60
Iron(as Fe)	72.98
Manganese(as Mn)	2.22

ANIONS

Chloride(as Cl)	65000
Sulfate(as SO ₄)	231.00
Dissolved CO ₂ (as CO ₂)	550.00
Bicarbonate(as HCO ₃)	915.00
H ₂ S (as H ₂ S)	171.00
Boron(as B)	22.67

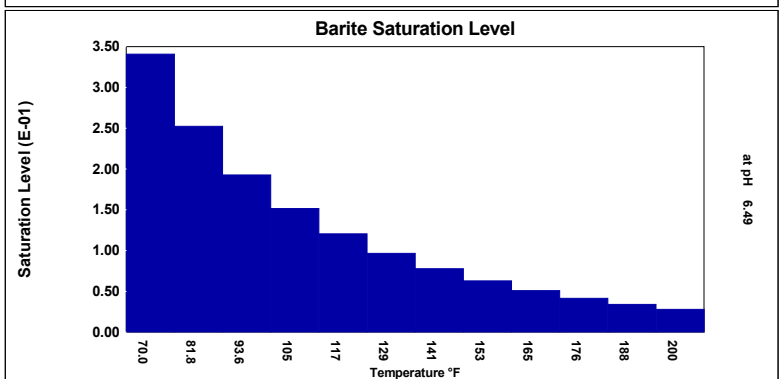
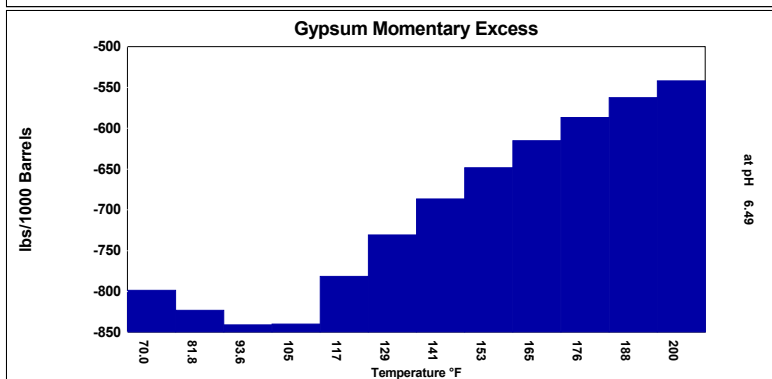
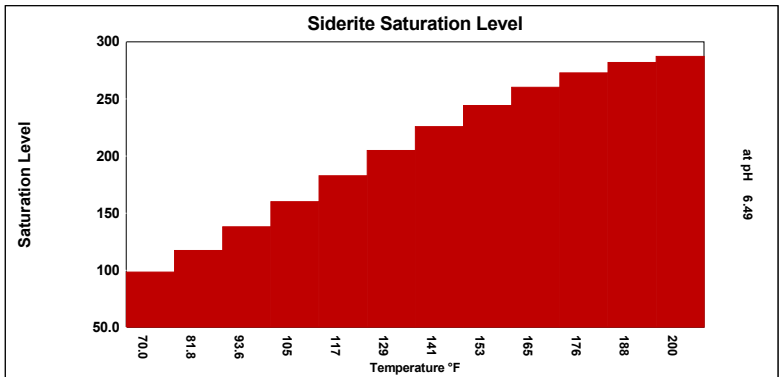
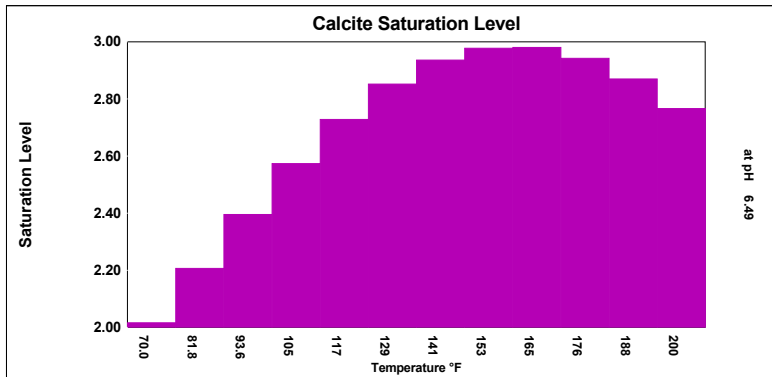
PARAMETERS

Temperature(°F)	77.00
Sample pH	6.46
Conductivity	145217
T.D.S.	104411
Resistivity	6.89
Sp.Gr.(g/mL)	1.08

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	2.02	0.0941	0.0403	-981.76	0.0608	-798.79	0.341	-0.207	0.0846	-161.86	98.39	0.214	374.28	7.04	0.131	0.302
81.82	1.36	2.21	0.103	0.0401	-965.29	0.0572	-823.21	0.252	-0.317	0.0825	-162.79	117.23	0.216	334.05	6.93	0.211	0.357
93.64	1.73	2.40	0.110	0.0412	-928.27	0.0544	-841.09	0.193	-0.447	0.0819	-161.73	137.96	0.218	301.07	6.82	0.310	0.412
105.45	2.09	2.57	0.116	0.0434	-874.46	0.0533	-840.15	0.151	-0.597	0.0822	-159.56	160.06	0.218	272.99	6.70	0.415	0.467
117.27	2.45	2.73	0.120	0.0469	-808.01	0.0569	-781.60	0.121	-0.775	0.0824	-157.51	182.65	0.217	245.99	6.58	0.430	0.522
129.09	2.82	2.85	0.121	0.0518	-732.95	0.0604	-730.80	0.0965	-0.993	0.0823	-155.97	204.86	0.215	219.15	6.45	0.426	0.577
140.91	3.18	2.94	0.120	0.0584	-652.99	0.0637	-686.72	0.0777	-1.26	0.0819	-154.92	225.68	0.210	192.84	6.31	0.408	0.632
152.73	3.55	2.98	0.117	0.0670	-571.48	0.0668	-648.52	0.0627	-1.57	0.0812	-154.32	244.25	0.203	167.68	6.17	0.448	0.687
164.55	3.91	2.98	0.113	0.0782	-491.26	0.0697	-615.49	0.0510	-1.95	0.0803	-154.16	260.21	0.196	144.36	6.03	0.484	0.742
176.36	4.27	2.94	0.107	0.0927	-414.65	0.0725	-587.05	0.0416	-2.41	0.0792	-154.42	272.77	0.186	123.00	5.88	0.507	0.797
188.18	4.64	2.87	0.0997	0.112	-343.38	0.0749	-562.72	0.0340	-2.94	0.0778	-155.10	281.87	0.177	103.90	5.73	0.276	0.852
200.00	5.00	2.77	0.0919	0.136	-278.67	0.0772	-542.12	0.0280	-3.58	0.0763	-156.20	287.20	0.166	87.03	5.57	0.199	0.907
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management LLC - Hobbs
Location: Sharbro Federal 1
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-10388

Sample Date: 06-20-2019

Report Date: 06-27-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	19800
Magnesium(as Mg)	3478
Barium(as Ba)	2.24
Strontium(as Sr)	1191
Sodium(as Na)	68713
Potassium(as K)	1849
Iron(as Fe)	19.32
Manganese(as Mn)	6.57

ANIONS

Chloride(as Cl)	175000
Sulfate(as SO ₄)	163.00
Dissolved CO ₂ (as CO ₂)	380.00
Bicarbonate(as HCO ₃)	73.20
H ₂ S (as H ₂ S)	3.40
Boron(as B)	36.44

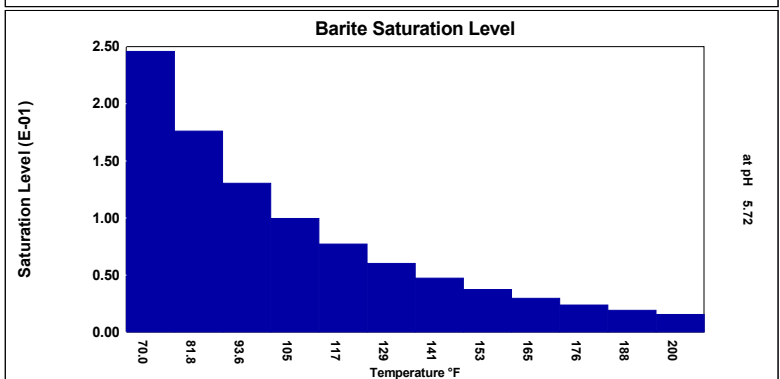
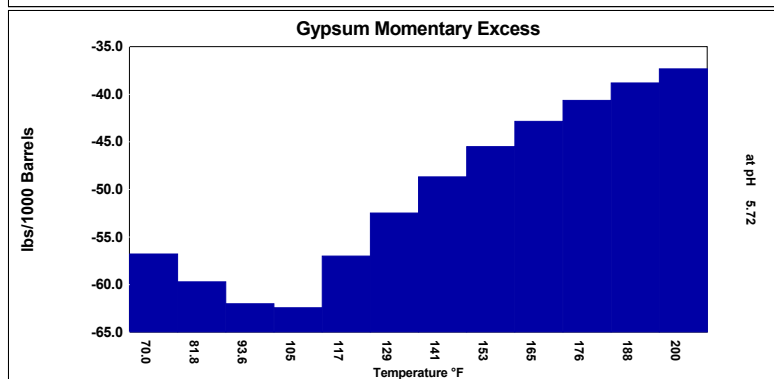
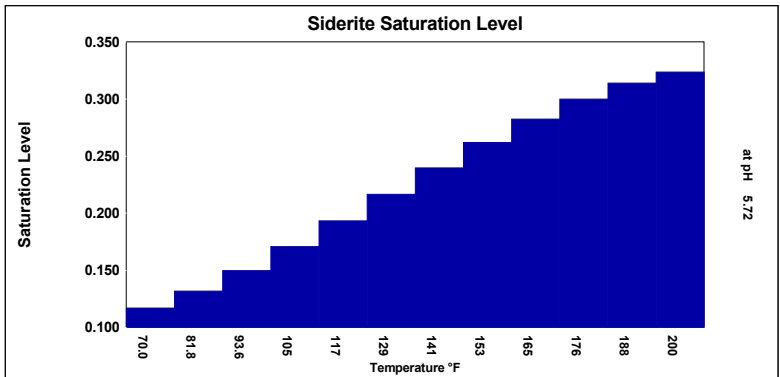
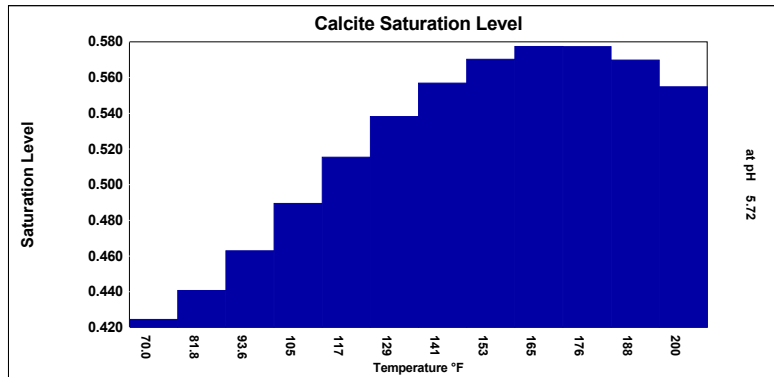
PARAMETERS

Temperature(°F)	77.00
Sample pH	5.68
Conductivity	485493
T.D.S.	255597
Resistivity	2.06
Sp.Gr.(g/mL)	1.20

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	0.424	-0.00166	0.119	-63.59	0.146	-56.78	0.246	-3.13	0.0855	-108.88	0.117	-0.0107	0.0515	-1.01	0.338	0.0523
81.82	1.36	0.441	-0.00148	0.115	-62.49	0.133	-59.71	0.176	-4.40	0.0807	-109.75	0.132	-0.00892	0.0450	-1.15	0.519	0.0618
93.64	1.73	0.463	-0.00132	0.115	-59.50	0.123	-62.02	0.130	-5.76	0.0777	-108.77	0.150	-0.00749	0.0406	-1.28	0.733	0.0713
105.45	2.09	0.489	-0.00118	0.118	-55.05	0.117	-62.43	0.0995	-7.17	0.0757	-106.80	0.171	-0.00633	0.0375	-1.40	0.955	0.0808
117.27	2.45	0.515	-0.00105	0.124	-49.61	0.122	-57.01	0.0771	-8.67	0.0738	-104.98	0.193	-0.00539	0.0347	-1.52	1.02	0.0903
129.09	2.82	0.538	>-0.001	0.133	-43.62	0.126	-52.48	0.0601	-10.32	0.0719	-103.67	0.216	-0.00463	0.0320	-1.64	1.07	0.0998
140.91	3.18	0.557	>-0.001	0.147	-37.47	0.130	-48.69	0.0472	-12.10	0.0698	-102.84	0.240	-0.00400	0.0292	-1.77	1.11	0.109
152.73	3.55	0.570	>-0.001	0.165	-31.47	0.134	-45.51	0.0373	-14.03	0.0677	-102.48	0.262	-0.00349	0.0265	-1.92	1.14	0.119
164.55	3.91	0.577	>-0.001	0.189	-25.83	0.137	-42.86	0.0297	-16.12	0.0656	-102.55	0.282	-0.00307	0.0238	-2.08	1.16	0.128
176.36	4.27	0.577	>-0.001	0.220	-20.71	0.140	-40.65	0.0237	-18.38	0.0635	-103.08	0.300	-0.00274	0.0212	-2.25	1.16	0.138
188.18	4.64	0.570	>-0.001	0.260	-16.18	0.142	-38.83	0.0191	-20.82	0.0613	-104.04	0.314	-0.00247	0.0186	-2.45	0.632	0.147
200.00	5.00	0.555	>-0.001	0.312	-12.26	0.144	-37.35	0.0154	-23.47	0.0591	-105.46	0.324	-0.00226	0.0162	-2.66	0.378	0.157
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Fountain Energy Managment LLC - Hobbs
Location: Sharbro 2
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-10157

Sample Date: 06-17-2019

Report Date: 06-21-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca) 20580
Magnesium(as Mg) 3733
Barium(as Ba) 3.81
Strontium(as Sr) 1735
Sodium(as Na) 67259
Potassium(as K) 1892
Iron(as Fe) 28.47
Manganese(as Mn) 5.66

ANIONS

Chloride(as Cl) 175000
Sulfate(as SO₄) 0.00
Dissolved CO₂(as CO₂) 880.00
Bicarbonate(as HCO₃) 48.80
H₂S (as H₂S) 1.70
Boron(as B) 38.10

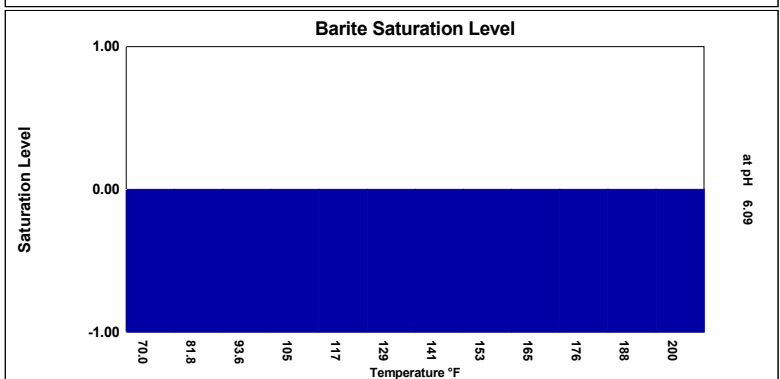
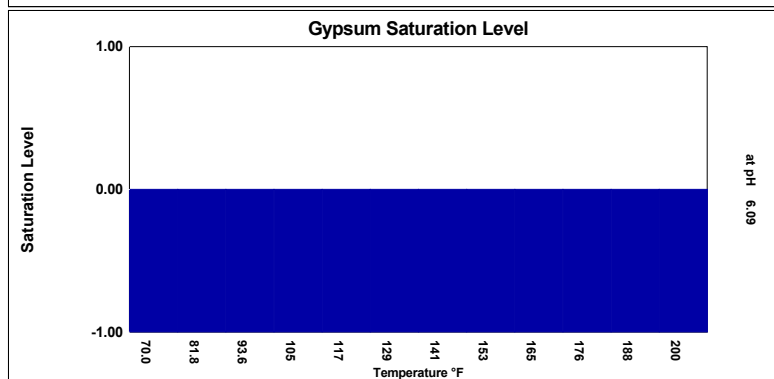
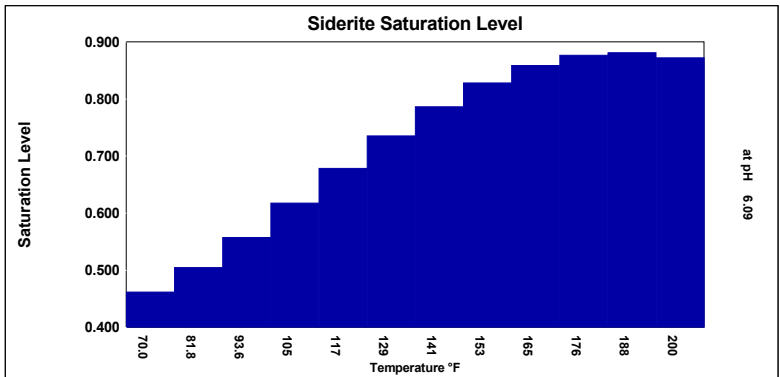
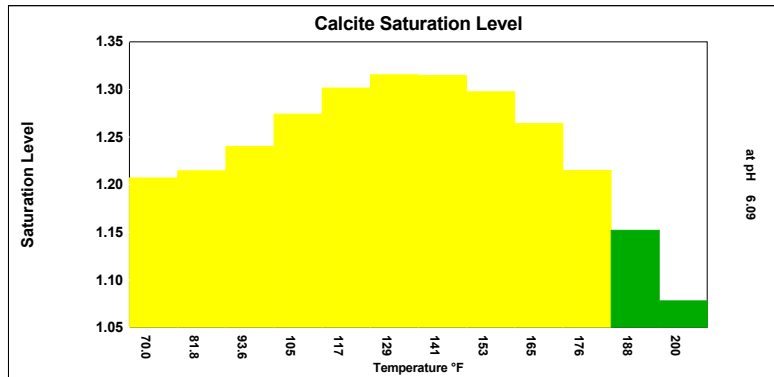
PARAMETERS

Temperature(°F) 77.00
Sample pH 6.04
Conductivity 488654
T.D.S. 255837
Resistivity 2.05
Sp.Gr.(g/mL) 1.20

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	1.21	< 0.001	0.00	-68.62	0.00	-63.16	0.00	-7.90	0.00	-87.77	0.462	-0.00443	0.181	-0.367	0.127	0.0264
81.82	1.36	1.21	< 0.001	0.00	-67.15	0.00	-65.46	0.00	-9.23	0.00	-88.02	0.505	-0.00347	0.150	-0.455	0.201	0.0312
93.64	1.73	1.24	< 0.001	0.00	-63.92	0.00	-67.22	0.00	-10.58	0.00	-86.89	0.557	-0.00266	0.128	-0.539	0.285	0.0359
105.45	2.09	1.27	< 0.001	0.00	-59.34	0.00	-67.21	0.00	-11.94	0.00	-85.04	0.617	-0.00199	0.113	-0.620	0.369	0.0407
117.27	2.45	1.30	< 0.001	0.00	-53.85	0.00	-61.71	0.00	-13.37	0.00	-83.34	0.678	-0.00146	0.1000	-0.706	0.381	0.0455
129.09	2.82	1.32	< 0.001	0.00	-47.88	0.00	-57.09	0.00	-14.93	0.00	-82.06	0.735	-0.00106	0.0876	-0.802	0.388	0.0503
140.91	3.18	1.31	< 0.001	0.00	-41.78	0.00	-53.20	0.00	-16.62	0.00	-81.19	0.786	>-0.001	0.0762	-0.909	0.390	0.0551
152.73	3.55	1.30	< 0.001	0.00	-35.85	0.00	-49.94	0.00	-18.47	0.00	-80.69	0.828	>-0.001	0.0657	-1.03	0.415	0.0599
164.55	3.91	1.26	< 0.001	0.00	-30.29	0.00	-47.19	0.00	-20.47	0.00	-80.56	0.858	>-0.001	0.0561	-1.16	0.442	0.0647
176.36	4.27	1.21	< 0.001	0.00	-25.25	0.00	-44.90	0.00	-22.65	0.00	-80.80	0.876	>-0.001	0.0473	-1.32	0.463	0.0695
188.18	4.64	1.15	< 0.001	0.00	-20.79	0.00	-43.01	0.00	-25.03	0.00	-81.40	0.881	>-0.001	0.0395	-1.49	0.239	0.0743
200.00	5.00	1.08	< 0.001	0.00	-16.94	0.00	-41.46	0.00	-27.62	0.00	-82.37	0.872	>-0.001	0.0327	-1.68	0.0851	0.0791
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management, LLC Hobbs
Location: Sharbro 3
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-8532

Sample Date: 05-03-2019

Report Date: 05-10-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	20370
Magnesium(as Mg)	3545
Barium(as Ba)	4.70
Strontium(as Sr)	2033
Sodium(as Na)	81430
Potassium(as K)	2493
Iron(as Fe)	20.57
Manganese(as Mn)	5.54

ANIONS

Chloride(as Cl)	180000
Sulfate(as SO ₄)	0.00
Dissolved CO ₂ (as CO ₂)	1400
Bicarbonate(as HCO ₃)	122.00
H ₂ S (as H ₂ S)	5.10
Boron(as B)	37.67

PARAMETERS

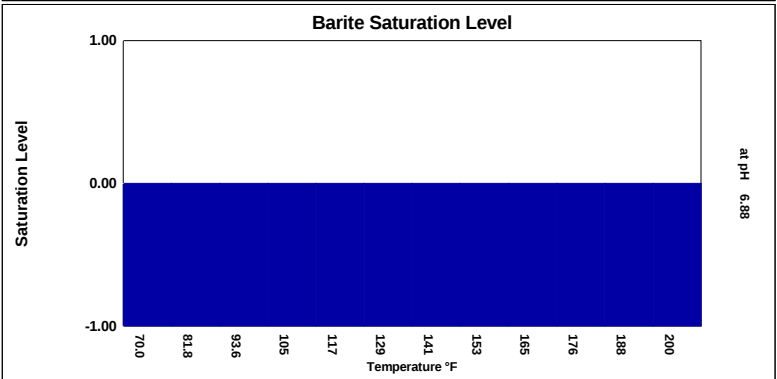
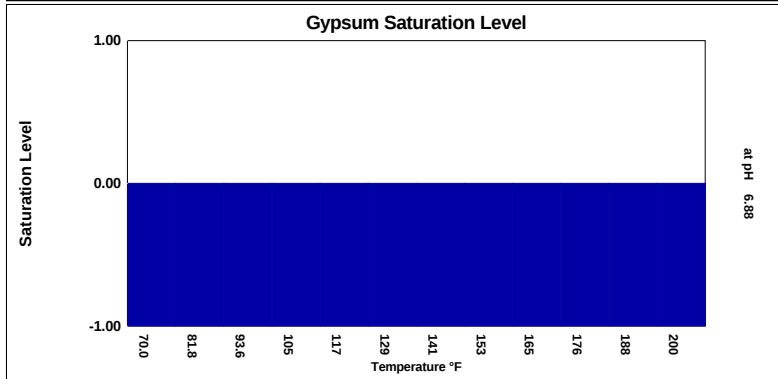
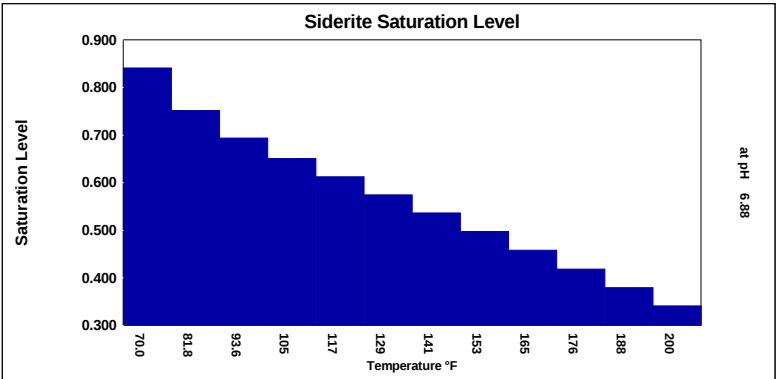
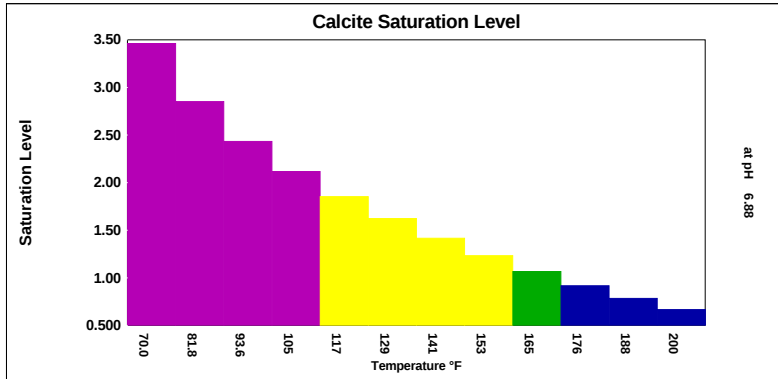
Temperature(°F)	77.00
Sample pH	6.78
Conductivity	560448
T.D.S.	270712
Resistivity	1.78
Sp.Gr.(g/mL)	1.21

IMPERATIVE
CHEMICAL PARTNERS

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	3.46	0.00591	0.00	-62.74	0.00	-59.73	0.00	-7.86	0.00	-79.29	0.841	-0.00182	7.23	0.672	0.0250	0.0237
81.82	1.36	2.85	0.00410	0.00	-61.39	0.00	-61.90	0.00	-9.22	0.00	-79.54	0.751	-0.00241	4.46	0.540	0.0363	0.0280
93.64	1.73	2.43	0.00294	0.00	-58.44	0.00	-63.56	0.00	-10.60	0.00	-78.53	0.693	-0.00256	2.96	0.415	0.0115	0.0323
105.45	2.09	2.12	0.00214	0.00	-54.25	0.00	-63.55	0.00	-11.99	0.00	-76.86	0.650	-0.00253	2.06	0.292	0.0215	0.0366
117.27	2.45	1.85	0.00154	0.00	-49.23	0.00	-58.35	0.00	-13.45	0.00	-75.33	0.612	-0.00246	1.48	0.166	0.0738	0.0409
129.09	2.82	1.62	0.00106	0.00	-43.76	0.00	-53.98	0.00	-15.04	0.00	-74.19	0.574	-0.00238	1.07	0.0305	0.139	0.0452
140.91	3.18	1.42	< 0.001	0.00	-38.19	0.00	-50.31	0.00	-16.78	0.00	-73.42	0.536	-0.00231	0.783	-0.115	0.181	0.0495
152.73	3.55	1.23	< 0.001	0.00	-32.77	0.00	-47.22	0.00	-18.67	0.00	-72.99	0.497	-0.00225	0.576	-0.272	0.243	0.0538
164.55	3.91	1.07	< 0.001	0.00	-27.69	0.00	-44.64	0.00	-20.72	0.00	-72.90	0.458	-0.00220	0.425	-0.444	0.305	0.0582
176.36	4.27	0.917	>-0.001	0.00	-23.09	0.00	-42.48	0.00	-22.96	0.00	-73.15	0.418	-0.00216	0.315	-0.630	0.343	0.0625
188.18	4.64	0.784	>-0.001	0.00	-19.01	0.00	-40.69	0.00	-25.40	0.00	-73.73	0.379	-0.00212	0.233	-0.834	0.184	0.0668
200.00	5.00	0.666	>-0.001	0.00	-15.49	0.00	-39.24	0.00	-28.05	0.00	-74.66	0.341	-0.00209	0.173	-1.06	0.126	0.0711
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}/{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management, LLC Hobbs
Location: Sharbro 5
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-8533

Sample Date: 05-03-2019

Report Date: 05-10-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca) 18560
Magnesium(as Mg) 3203
Barium(as Ba) 2.59
Strontium(as Sr) 1220
Sodium(as Na) 77930
Potassium(as K) 2460
Iron(as Fe) 32.62
Manganese(as Mn) 3.97

ANIONS

Chloride(as Cl) 169000
Sulfate(as SO₄) 124.00
Dissolved CO₂(as CO₂) 800.00
Bicarbonate(as HCO₃) 122.00
H₂S (as H₂S) 3.40
Boron(as B) 37.26

PARAMETERS

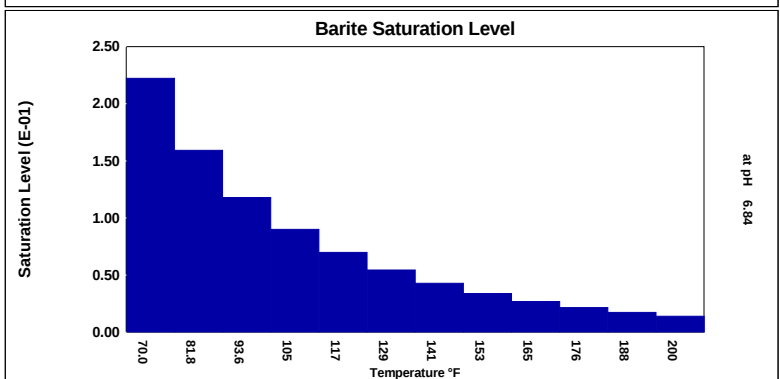
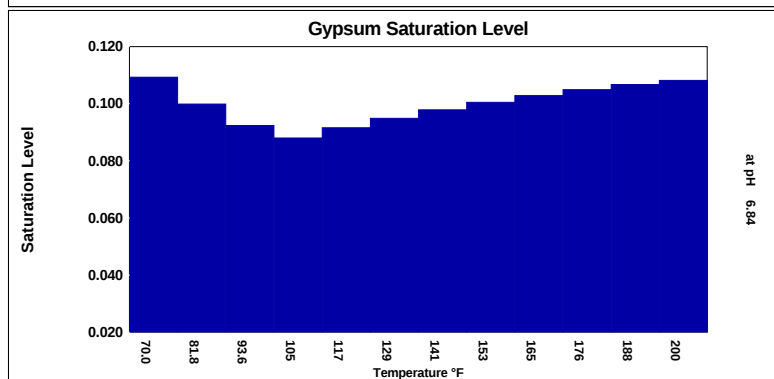
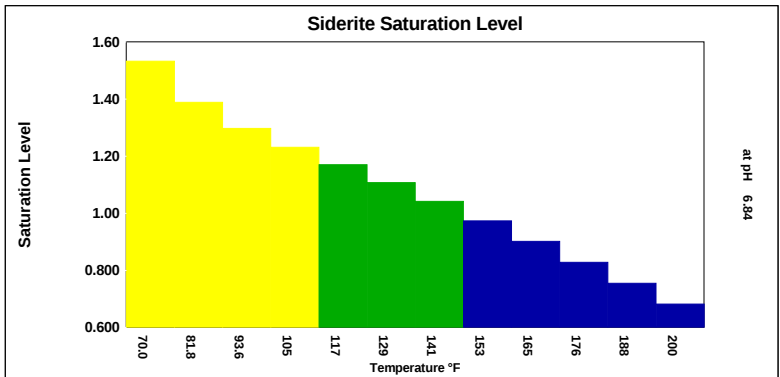
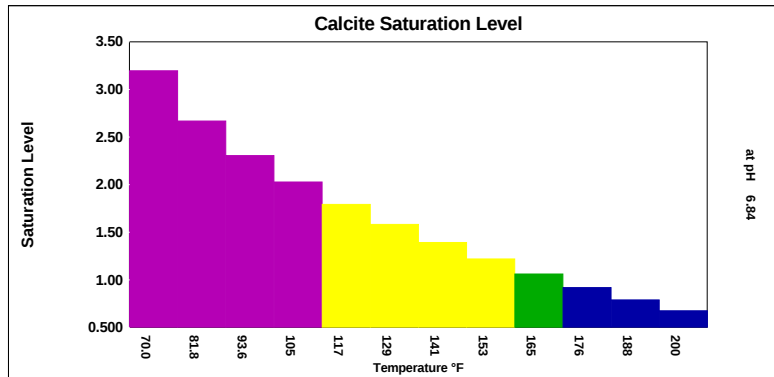
Temperature(°F) 77.00
Sample pH 6.75
Conductivity 509830
T.D.S. 256017
Resistivity 1.96
Sp.Gr.(g/mL) 1.19

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	3.19	0.00638	0.0900	-66.84	0.109	-61.04	0.222	-3.68	0.0685	-107.61	1.53	0.00373	7.12	0.475	0.0177	0.0252
81.82	1.36	2.67	0.00447	0.0871	-65.60	0.0999	-63.92	0.159	-5.03	0.0647	-108.36	1.39	0.00231	4.46	0.393	0.0289	0.0298
93.64	1.73	2.30	0.00324	0.0869	-62.45	0.0924	-66.17	0.118	-6.45	0.0623	-107.32	1.30	0.00152	3.01	0.313	0.0152	0.0343
105.45	2.09	2.03	0.00239	0.0892	-57.83	0.0880	-66.48	0.0900	-7.88	0.0607	-105.33	1.23	0.00102	2.13	0.231	0.0206	0.0389
117.27	2.45	1.79	0.00173	0.0939	-52.20	0.0916	-60.79	0.0697	-9.40	0.0592	-103.48	1.17	< 0.001	1.54	0.143	0.0716	0.0435
129.09	2.82	1.58	0.00121	0.101	-46.03	0.0949	-56.03	0.0544	-11.05	0.0576	-102.15	1.11	< 0.001	1.13	0.0435	0.138	0.0481
140.91	3.18	1.39	< 0.001	0.112	-39.70	0.0978	-52.04	0.0427	-12.83	0.0560	-101.29	1.04	< 0.001	0.835	-0.0682	0.190	0.0527
152.73	3.55	1.22	< 0.001	0.125	-33.54	0.100	-48.70	0.0338	-14.76	0.0543	-100.89	0.973	>-0.001	0.619	-0.195	0.256	0.0572
164.55	3.91	1.06	< 0.001	0.144	-27.75	0.103	-45.90	0.0269	-16.83	0.0526	-100.93	0.901	>-0.001	0.460	-0.337	0.320	0.0618
176.36	4.27	0.918	>-0.001	0.167	-22.49	0.105	-43.57	0.0215	-19.08	0.0509	-101.41	0.828	>-0.001	0.343	-0.498	0.358	0.0664
188.18	4.64	0.789	>-0.001	0.198	-17.84	0.107	-41.65	0.0173	-21.50	0.0492	-102.33	0.754	>-0.001	0.255	-0.678	0.191	0.0710
200.00	5.00	0.673	>-0.001	0.237	-13.82	0.108	-40.09	0.0140	-24.13	0.0475	-103.69	0.682	>-0.001	0.190	-0.880	0.131	0.0756
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}/{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.

Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management, LLC Hobbs
Location: Sharbro 6
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-8531

Sample Date: 05-03-2019

Report Date: 05-10-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	20130
Magnesium(as Mg)	3575
Barium(as Ba)	2.97
Strontium(as Sr)	1497
Sodium(as Na)	80130
Potassium(as K)	2551
Iron(as Fe)	17.68
Manganese(as Mn)	5.95

ANIONS

Chloride(as Cl)	177000
Sulfate(as SO ₄)	60.00
Dissolved CO ₂ (as CO ₂)	850.00
Bicarbonate(as HCO ₃)	146.40
H ₂ S (as H ₂ S)	5.10
Boron(as B)	35.56

PARAMETERS

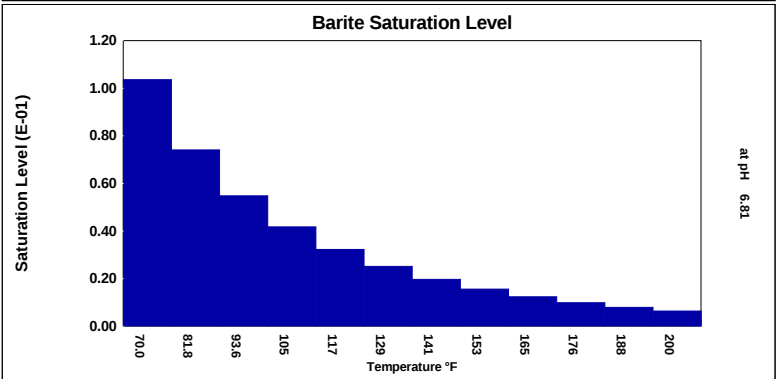
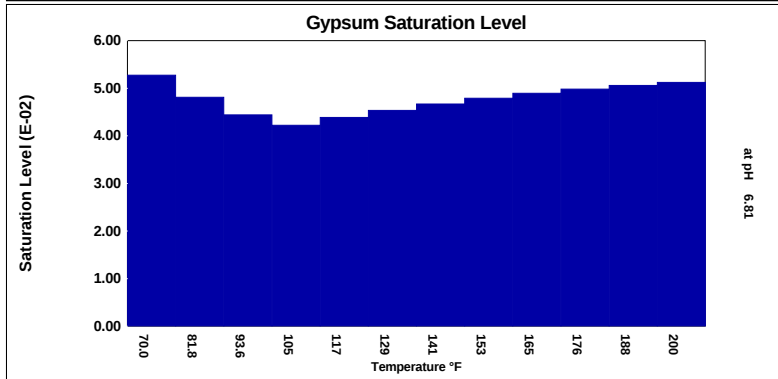
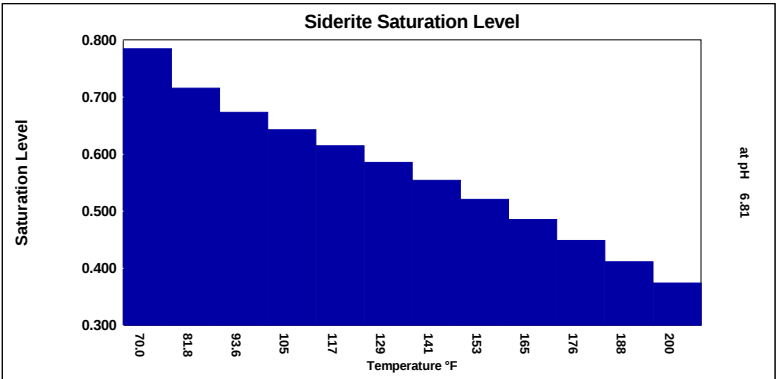
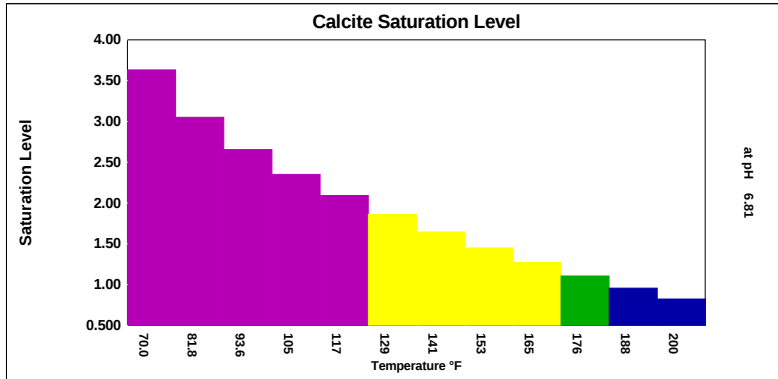
Temperature(°F)	77.00
Sample pH	6.72
Conductivity	551680
T.D.S.	266463
Resistivity	1.81
Sp.Gr.(g/mL)	1.20

IMPERATIVE
CHEMICAL PARTNERS

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	3.63	0.00644	0.0441	-60.79	0.0527	-57.12	0.104	-5.89	0.0342	-98.14	0.784	-0.00283	5.11	0.558	0.0303	0.0320
81.82	1.36	3.05	0.00463	0.0426	-59.57	0.0481	-59.49	0.0740	-7.34	0.0322	-98.64	0.715	-0.00317	3.24	0.426	0.0439	0.0378
93.64	1.73	2.65	0.00346	0.0425	-56.71	0.0444	-61.32	0.0547	-8.82	0.0309	-97.55	0.673	-0.00312	2.20	0.302	0.0275	0.0436
105.45	2.09	2.35	0.00264	0.0435	-52.59	0.0422	-61.45	0.0417	-10.28	0.0301	-95.62	0.643	-0.00296	1.57	0.182	0.0294	0.0494
117.27	2.45	2.09	0.00201	0.0457	-47.61	0.0439	-56.32	0.0322	-11.82	0.0293	-93.85	0.615	-0.00280	1.15	0.0590	0.0854	0.0552
129.09	2.82	1.86	0.00150	0.0492	-42.17	0.0453	-52.02	0.0251	-13.48	0.0285	-92.54	0.585	-0.00266	0.849	-0.0726	0.143	0.0610
140.91	3.18	1.64	0.00107	0.0541	-36.61	0.0467	-48.42	0.0197	-15.27	0.0276	-91.68	0.554	-0.00255	0.631	-0.214	0.186	0.0668
152.73	3.55	1.45	< 0.001	0.0607	-31.19	0.0479	-45.39	0.0155	-17.21	0.0268	-91.25	0.520	-0.00246	0.471	-0.367	0.256	0.0726
164.55	3.91	1.27	< 0.001	0.0694	-26.12	0.0489	-42.85	0.0123	-19.30	0.0259	-91.22	0.485	-0.00240	0.353	-0.533	0.329	0.0784
176.36	4.27	1.11	< 0.001	0.0806	-21.51	0.0498	-40.74	0.00984	-21.57	0.0250	-91.60	0.449	-0.00234	0.264	-0.713	0.395	0.0843
188.18	4.64	0.956	>-0.001	0.0953	-17.43	0.0506	-38.99	0.00791	-24.02	0.0241	-92.38	0.411	-0.00230	0.198	-0.910	0.224	0.0901
200.00	5.00	0.822	>-0.001	0.114	-13.90	0.0512	-37.57	0.00639	-26.69	0.0232	-93.59	0.374	-0.00227	0.149	-1.13	0.153	0.0959
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}/{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management, LLC-Hobbs
Location: Sharbro 4
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-8534

Sample Date: 05-03-2019

Report Date: 05-10-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	12830
Magnesium(as Mg)	2250
Barium(as Ba)	1.06
Strontium(as Sr)	622.90
Sodium(as Na)	79196
Potassium(as K)	2262
Iron(as Fe)	22.82
Manganese(as Mn)	2.78

ANIONS

Chloride(as Cl)	157000
Sulfate(as SO ₄)	174.00
Dissolved CO ₂ (as CO ₂)	700.00
Bicarbonate(as HCO ₃)	122.00
H ₂ S (as H ₂ S)	1.70
Boron(as B)	37.21

PARAMETERS

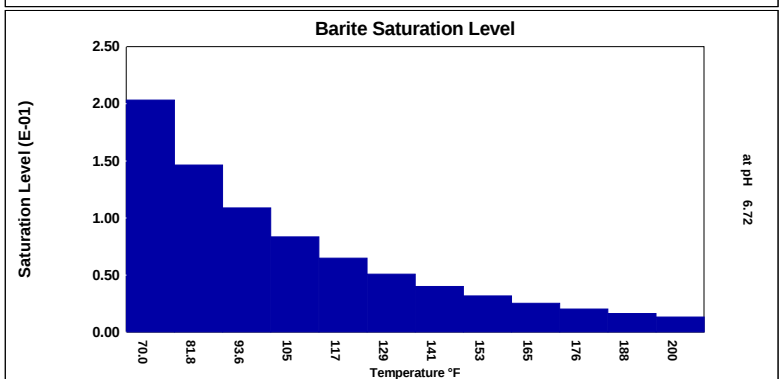
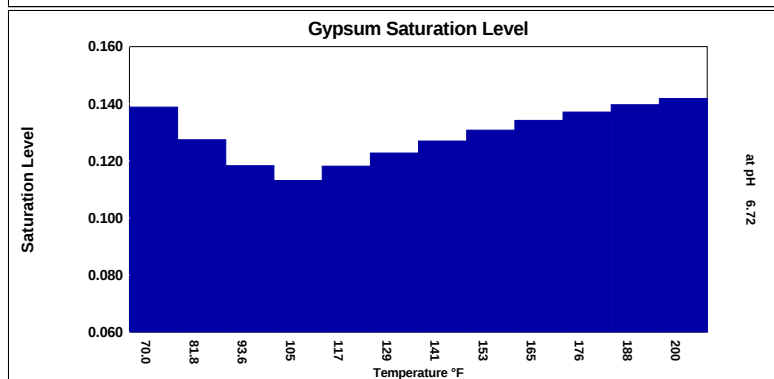
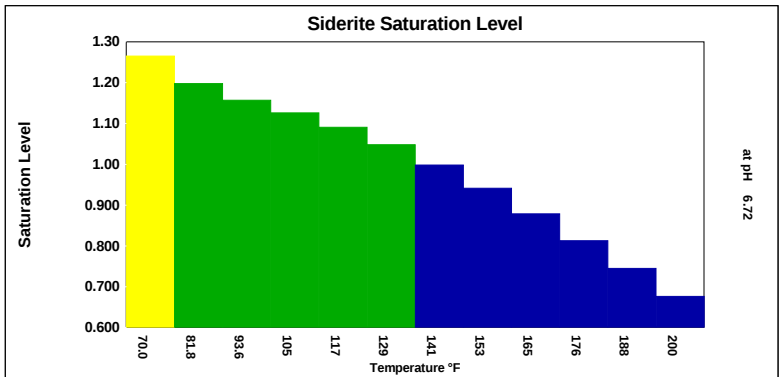
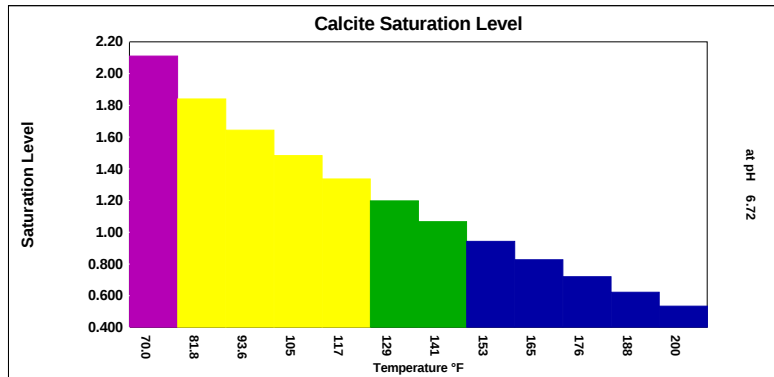
Temperature(°F)	77.00
Sample pH	6.64
Conductivity	445273
T.D.S.	240116
Resistivity	2.25
Sp.Gr.(g/mL)	1.18

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	2.11	0.00563	0.112	-107.19	0.139	-94.93	0.203	-2.20	0.0780	-156.54	1.26	0.00259	1.73	0.0989	0.0130	0.0306
81.82	1.36	1.84	0.00392	0.109	-105.23	0.127	-99.63	0.146	-3.13	0.0740	-157.61	1.20	0.00164	1.15	0.0277	0.0472	0.0361
93.64	1.73	1.64	0.00279	0.109	-100.13	0.118	-103.32	0.109	-4.19	0.0715	-156.35	1.16	0.00112	0.809	-0.0468	0.0939	0.0417
105.45	2.09	1.48	0.00196	0.112	-92.61	0.113	-103.88	0.0834	-5.33	0.0700	-153.82	1.13	< 0.001	0.593	-0.126	0.166	0.0472
117.27	2.45	1.34	0.00128	0.118	-83.44	0.118	-94.83	0.0648	-6.60	0.0685	-151.47	1.09	< 0.001	0.442	-0.214	0.216	0.0528
129.09	2.82	1.20	< 0.001	0.128	-73.37	0.123	-87.25	0.0507	-8.02	0.0669	-149.76	1.05	< 0.001	0.330	-0.314	0.262	0.0583
140.91	3.18	1.07	< 0.001	0.142	-63.04	0.127	-80.91	0.0400	-9.60	0.0653	-148.67	0.998	>-0.001	0.248	-0.428	0.303	0.0639
152.73	3.55	0.942	>-0.001	0.159	-52.96	0.131	-75.59	0.0317	-11.34	0.0635	-148.17	0.941	>-0.001	0.187	-0.557	0.360	0.0694
164.55	3.91	0.826	>-0.001	0.183	-43.50	0.134	-71.14	0.0253	-13.25	0.0616	-148.23	0.878	>-0.001	0.140	-0.702	0.401	0.0750
176.36	4.27	0.719	>-0.001	0.213	-34.90	0.137	-67.43	0.0202	-15.34	0.0597	-148.86	0.812	>-0.001	0.105	-0.865	0.428	0.0806
188.18	4.64	0.622	-0.00114	0.253	-27.29	0.140	-64.37	0.0163	-17.61	0.0578	-150.05	0.744	>-0.001	0.0793	-1.05	0.225	0.0861
200.00	5.00	0.533	-0.00138	0.304	-20.70	0.142	-61.88	0.0132	-20.08	0.0559	-151.82	0.676	>-0.001	0.0595	-1.25	0.151	0.0917
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}/{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.

Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management, LLC Hobbs
Location: Sharbro 8
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-8530

Sample Date: 05-03-2019

Report Date: 05-10-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	22150
Magnesium(as Mg)	3786
Barium(as Ba)	1.33
Strontium(as Sr)	821.00
Sodium(as Na)	76639
Potassium(as K)	2487
Iron(as Fe)	13.55
Manganese(as Mn)	7.97

ANIONS

Chloride(as Cl)	175000
Sulfate(as SO ₄)	147.00
Dissolved CO ₂ (as CO ₂)	850.00
Bicarbonate(as HCO ₃)	73.20
H ₂ S (as H ₂ S)	5.10
Boron(as B)	49.57

PARAMETERS

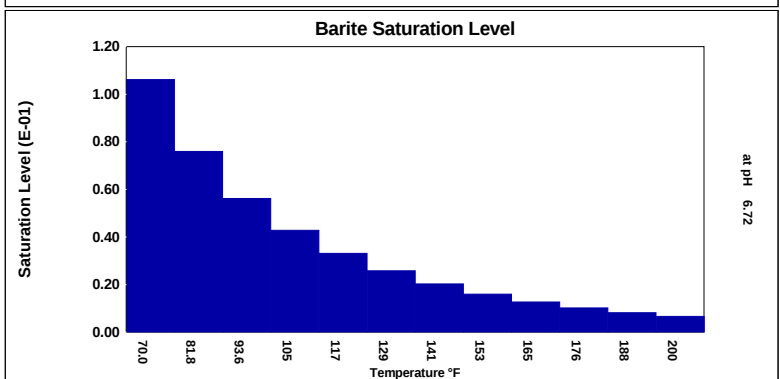
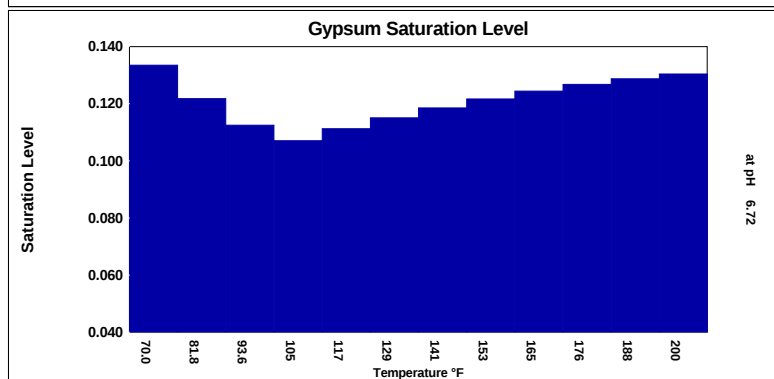
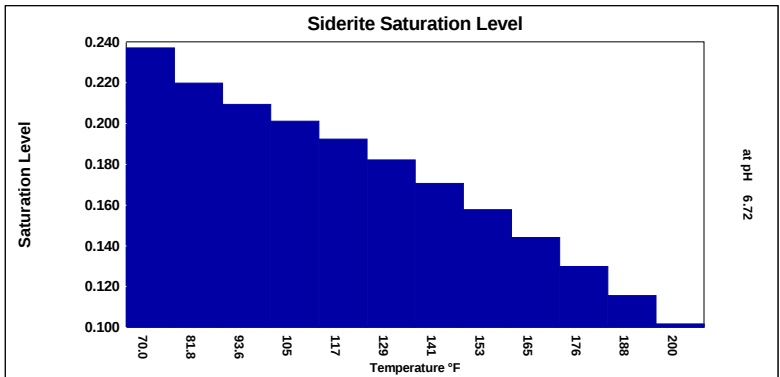
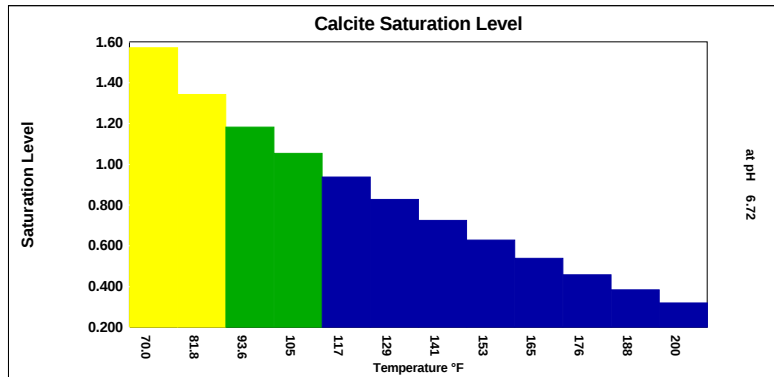
Temperature(°F)	77.00
Sample pH	6.64
Conductivity	544270
T.D.S.	263591
Resistivity	1.84
Sp.Gr.(g/mL)	1.20

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	1.57	0.00128	0.111	-51.95	0.133	-47.62	0.106	-4.50	0.0429	-153.69	0.237	-0.0132	2.91	0.362	0.0233	0.0184
81.82	1.36	1.34	< 0.001	0.107	-51.04	0.122	-50.01	0.0759	-5.87	0.0404	-154.51	0.220	-0.0114	1.89	0.228	0.0319	0.0217
93.64	1.73	1.18	< 0.001	0.107	-48.60	0.112	-51.90	0.0561	-7.31	0.0389	-153.07	0.209	-0.00993	1.31	0.101	0.0902	0.0250
105.45	2.09	1.05	< 0.001	0.109	-44.98	0.107	-52.21	0.0428	-8.77	0.0378	-150.40	0.201	-0.00870	0.945	-0.0224	0.181	0.0284
117.27	2.45	0.937	>-0.001	0.115	-40.56	0.111	-47.71	0.0331	-10.33	0.0369	-147.94	0.192	-0.00770	0.693	-0.152	0.212	0.0317
129.09	2.82	0.827	>-0.001	0.124	-35.70	0.115	-43.95	0.0258	-12.01	0.0359	-146.14	0.182	-0.00689	0.511	-0.293	0.228	0.0350
140.91	3.18	0.725	>-0.001	0.136	-30.71	0.119	-40.80	0.0202	-13.83	0.0348	-144.96	0.171	-0.00623	0.377	-0.447	0.237	0.0384
152.73	3.55	0.628	>-0.001	0.153	-25.84	0.122	-38.16	0.0160	-15.80	0.0337	-144.39	0.158	-0.00569	0.278	-0.616	0.272	0.0417
164.55	3.91	0.539	>-0.001	0.175	-21.27	0.124	-35.95	0.0127	-17.92	0.0326	-144.39	0.144	-0.00524	0.204	-0.802	0.304	0.0451
176.36	4.27	0.457	>-0.001	0.204	-17.12	0.127	-34.12	0.0102	-20.22	0.0315	-144.97	0.130	-0.00486	0.150	-1.01	0.326	0.0484
188.18	4.64	0.384	>-0.001	0.241	-13.44	0.129	-32.61	0.00816	-22.71	0.0304	-146.13	0.116	-0.00455	0.110	-1.24	0.170	0.0517
200.00	5.00	0.319	>-0.001	0.288	-10.26	0.130	-31.39	0.00659	-25.41	0.0293	-147.88	0.102	-0.00429	0.0799	-1.49	0.113	0.0551
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}/{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.

Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



Imperative Water Analysis Report

SYSTEM IDENTIFICATION

Company: Foundation Energy Management LLC - Hobbs
Location: Sharbro 10
Sample Source: Wellhead
Account Rep: Mike Gomez

Sample ID#: W-10386

Sample Date: 06-20-2019

Report Date: 06-27-2019

WATER CHEMISTRY

CATIONS

Calcium(as Ca)	16890
Magnesium(as Mg)	2928
Barium(as Ba)	1.89
Strontium(as Sr)	996.70
Sodium(as Na)	72095
Potassium(as K)	1512
Iron(as Fe)	15.05
Manganese(as Mn)	5.49

ANIONS

Chloride(as Cl)	174000
Sulfate(as SO ₄)	151.00
Dissolved CO ₂ (as CO ₂)	480.00
Bicarbonate(as HCO ₃)	97.60
H ₂ S (as H ₂ S)	3.40
Boron(as B)	31.89

PARAMETERS

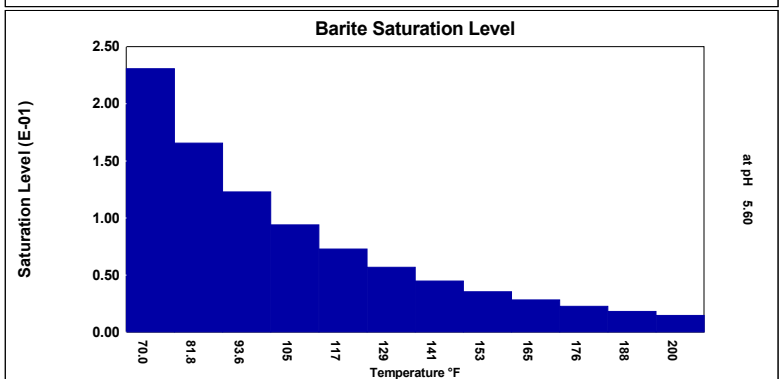
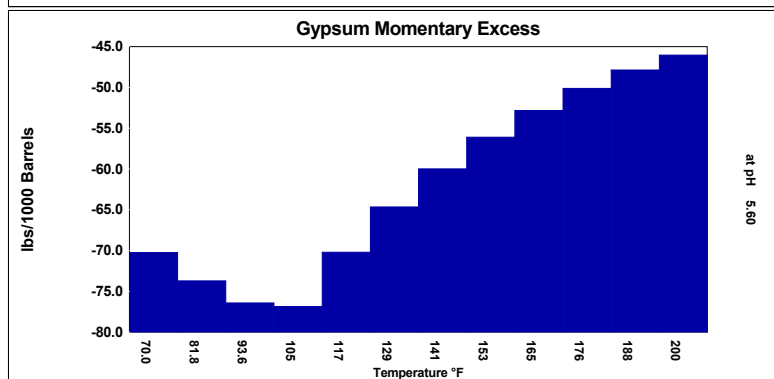
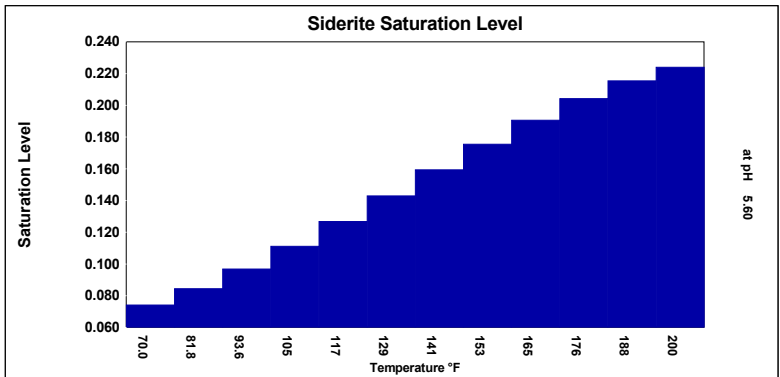
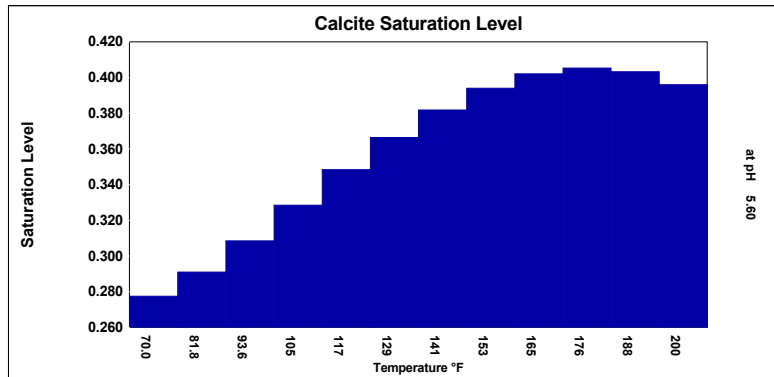
Temperature(°F)	77.00
Sample pH	5.56
Conductivity	472474
T.D.S.	253742
Resistivity	2.12
Sp.Gr.(g/mL)	1.20

IMPERATIVE
CHEMICAL PARTNERS

SCALE AND CORROSION POTENTIAL

Temp. (°F)	Press. (atm)	Calcite CaCO ₃		Anhydrite CaSO ₄		Gypsum CaSO ₄ *2H ₂ O		Barite BaSO ₄		Celestite SrSO ₄		Siderite FeCO ₃		Mackawenite FeS		CO ₂ (mpy)	pCO ₂ (atm)
70.00	1.00	0.277	-0.00257	0.106	-78.36	0.130	-70.25	0.231	-2.97	0.0795	-122.65	0.0741	-0.0143	0.0237	-1.37	0.472	0.0739
81.82	1.36	0.291	-0.00232	0.103	-76.94	0.119	-73.71	0.166	-4.18	0.0752	-123.55	0.0843	-0.0120	0.0210	-1.53	0.720	0.0873
93.64	1.73	0.308	-0.00210	0.103	-73.24	0.110	-76.43	0.123	-5.48	0.0725	-122.45	0.0967	-0.0101	0.0192	-1.67	1.01	0.101
105.45	2.09	0.328	-0.00191	0.105	-67.78	0.105	-76.85	0.0938	-6.84	0.0707	-120.27	0.111	-0.00865	0.0180	-1.80	1.31	0.114
117.27	2.45	0.348	-0.00174	0.111	-61.12	0.110	-70.21	0.0728	-8.30	0.0691	-118.25	0.127	-0.00743	0.0168	-1.93	1.42	0.128
129.09	2.82	0.366	-0.00161	0.120	-53.80	0.114	-64.65	0.0569	-9.90	0.0674	-116.79	0.143	-0.00644	0.0157	-2.07	1.50	0.141
140.91	3.18	0.382	-0.00149	0.132	-46.29	0.117	-60.00	0.0447	-11.64	0.0656	-115.86	0.159	-0.00563	0.0145	-2.21	1.57	0.154
152.73	3.55	0.394	-0.00140	0.149	-38.96	0.121	-56.10	0.0354	-13.54	0.0637	-115.43	0.175	-0.00496	0.0133	-2.37	1.61	0.168
164.55	3.91	0.402	-0.00134	0.170	-32.09	0.124	-52.84	0.0282	-15.59	0.0617	-115.49	0.191	-0.00441	0.0121	-2.54	1.65	0.181
176.36	4.27	0.405	-0.00129	0.198	-25.84	0.126	-50.12	0.0226	-17.81	0.0598	-116.03	0.204	-0.00396	0.0108	-2.73	1.65	0.195
188.18	4.64	0.403	-0.00126	0.235	-20.31	0.128	-47.88	0.0182	-20.21	0.0578	-117.06	0.215	-0.00359	0.00962	-2.93	0.936	0.208
200.00	5.00	0.396	-0.00125	0.282	-15.52	0.130	-46.05	0.0147	-22.82	0.0558	-118.58	0.224	-0.00330	0.00845	-3.16	0.624	0.222
		xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels	xSAT	Lbs per 1000 Barrels		

Saturation Levels (xSAT) are the ratio of ion activity to solubility, e.g. {Ca}{CO₃}/K_{sp}. pCO₂ (atm) is the partial pressure of CO₂ in the gas phase.
Lbs/1000 Barrels scale is the quantity of precipitation (or dissolution) required to instantaneously bring the water to equilibrium.



C108-Item VII #5

Disposal Zone Formation Water Analysis
Tomcat 15 Federal #2
Delaware Bell Canyon Zone

North Permian Basin Region

P.O. Box 740

Sundown, TX 79372-0740

(806) 229-8121

Lab Team Leader - Sheila Hernandez

(432) 495-7240

Water Analysis Report by Baker Petrolite

Company:	DEVON ENERGY CORPORATION	Sales RDT:	44212
Region:	PERMIAN BASIN	Account Manager:	WAYNE PETERSON (505) 910-9389
Area:	ARTESIA, NM	Sample #:	437125
Lease/Platform:	TOM CAT '15' FEDERAL	Analysis ID #:	82330
Entity (or well #):	2	Analysis Cost:	\$80.00
Formation:	UNKNOWN		
Sample Point:	WELLHEAD		

Summary		Analysis of Sample 437125 @ 75 °F					
Sampling Date:	05/16/08	Anions	mg/l	meq/l	Cations	mg/l	meq/l
Analysis Date:	05/27/08	Chloride:	105918.0	2987.56	Sodium:	51117.9	2223.5
Analyst:	KIMBERLY POOLE	Bicarbonate:	73.0	1.2	Magnesium:	2020.0	166.17
TDS (mg/l or g/m3):	172866.9	Carbonate:	0.0	0.	Calcium:	11404.0	569.06
Density (g/cm3, tonne/m3):	1.121	Sulfate:	618.0	12.87	Strontium:	631.0	14.4
Anion/Cation Ratio:	1	Phosphate:			Barium:	11.0	0.16
		Borate:			Iron:	64.0	2.31
		Silicate:			Potassium:	993.0	25.4
Carbon Dioxide:	350 PPM	Hydrogen Sulfide:		0 PPM	Aluminum:		
Oxygen:		pH at time of sampling:		6	Chromium:		
Comments:		pH at time of analysis:			Copper:		
		pH used in Calculation:		6	Lead:		
					Manganese:	17.000	0.62
					Nickel:		

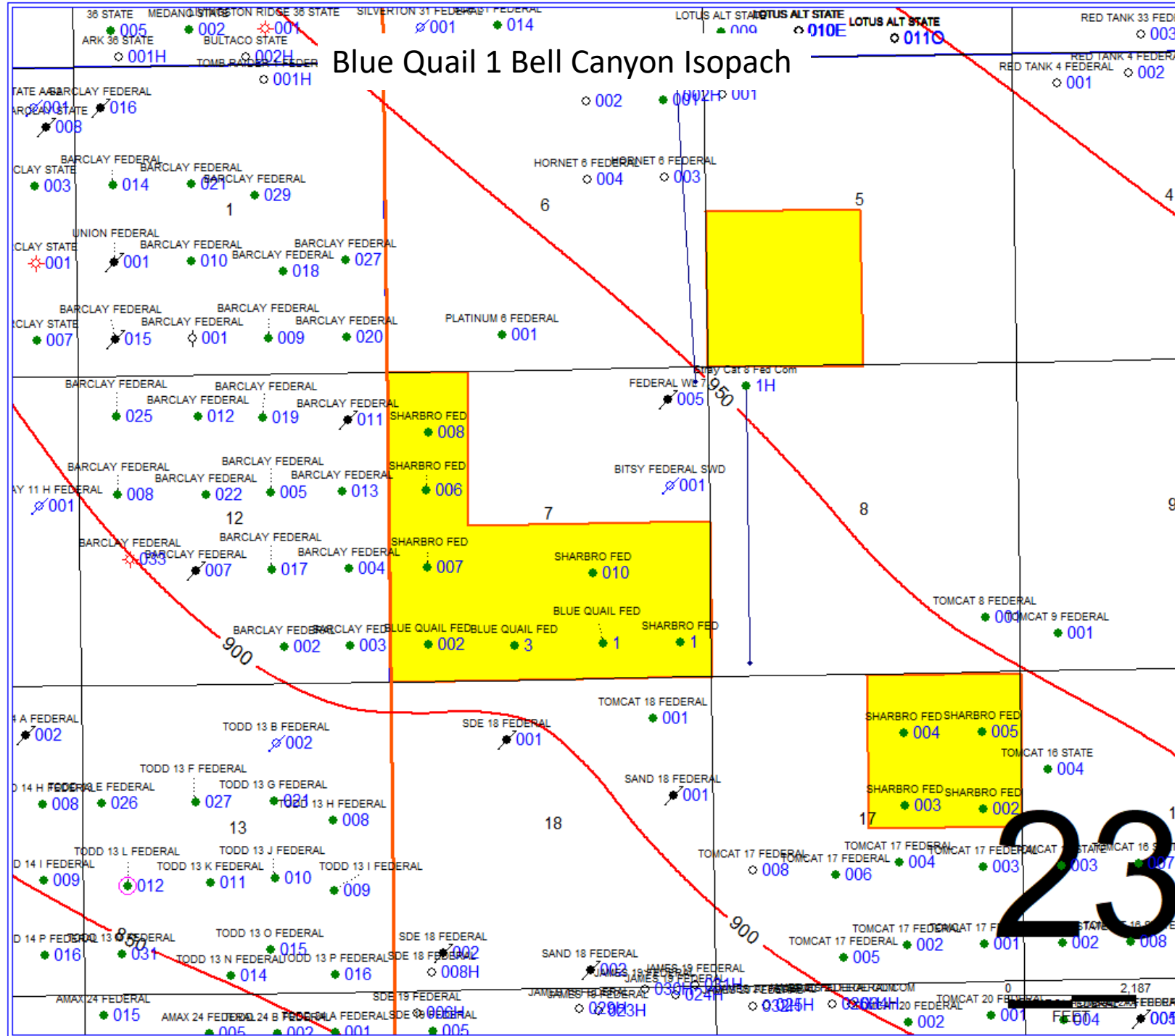
Conditions		Values Calculated at the Given Conditions - Amounts of Scale in lb/1000 bbl										
Temp	Gauge Press.	Calcite CaCO ₃		Gypsum CaSO ₄ *2H ₂ O		Anhydrite CaSO ₄		Celestite SrSO ₄		Barite BaSO ₄		CO ₂ Press
°F	psi	Index	Amount	Index	Amount	Index	Amount	Index	Amount	Index	Amount	psi
80	0	-0.42	0.00	-0.27	0.00	-0.26	0.00	0.17	70.26	1.51	5.63	0.46
100	0	-0.33	0.00	-0.33	0.00	-0.26	0.00	0.15	63.44	1.32	5.63	0.57
120	0	-0.25	0.00	-0.38	0.00	-0.23	0.00	0.15	61.37	1.16	5.34	0.67
140	0	-0.15	0.00	-0.42	0.00	-0.17	0.00	0.15	62.85	1.01	5.34	0.77

Note 1: When assessing the severity of the scale problem, both the saturation index (SI) and amount of scale must be considered.

Note 2: Precipitation of each scale is considered separately. Total scale will be less than the sum of the amounts of the five scales.

Note 3: The reported CO₂ pressure is actually the calculated CO₂ fugacity. It is usually nearly the same as the CO₂ partial pressure.

Blue Quail 1 Bell Canyon Isopach



From: [Anderson Ward](#)
To: ["ken-mcqueen@outlook.com"](mailto:ken-mcqueen@outlook.com)
Subject: FW: OSE POD# C03749POD1
Date: Monday, July 1, 2019 9:22:07 AM

Ooops, seems I missed the "u" in McQueen- my apologies ...

From: Anderson Ward
Sent: Tuesday, June 25, 2019 9:56 AM
To: 'Ken-mcqueen@outlook.com' <Ken-mcqueen@outlook.com>
Subject: OSE POD# C03749POD1

Hi Ken,

It was nice talking to you.

Based on the information you provided, well C03749POD1 is part of the DOE's well network (Well H-12), but is not in 7, 23S, 32E, it is actually in 15, 23S, 31E, which is about 2 miles away. The UTM Coordinates are: 13S, X: 616974, Y: 3575562. The Decimal Degree Coordinates (NAD83) are: Long: -103.757416, Lat: 32.311682. I don't know how to proceed.

Anderson



Dr. Anderson L. Ward
Office of Environmental Protection
U.S. Department of Energy, Carlsbad Field Office
Email: Anderson.Ward@cbfo.doe.gov
Office: 575-234-7018
Site: 575-234-8428
Cell: 575-706-5291

Affidavit of Publication

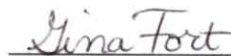
STATE OF NEW MEXICO)
) ss.
COUNTY OF LEA)

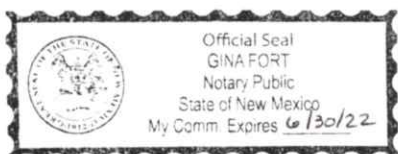
Joyce Clemens being first duly sworn on oath deposes and says that she is Advertising Manager of THE LOVINGTON LEADER, a once a week newspaper of general paid circulation published in the English language at Lovington, Lea County, New Mexico; that said newspaper has been so published in such county continuously and uninterruptedly for a period in excess of Twenty-six (26) consecutive weeks next prior to the first publication of the notice hereto attached as hereinafter shown; and that said newspaper is in all things duly qualified to publish legal notices within the meaning of Chapter 167 of the 1937 Session Laws of the State of New Mexico.

That the notice which is hereto attached, entitled Legal Notice was published in a regular and entire issue of THE LOVINGTON LEADER and not in any supplement thereof, for one (1) day(s), beginning with the issue of May 30, 2019, 2019 and ending with the issue of May 30, 2019, 2019.

And that the cost of publishing said notice is the sum of \$ 20.27 which sum has been (Paid) as Court Costs.


Joyce Clemens, Advertising Manager
Subscribed and sworn to before me this 31st day of May, 2019.


Gina Fort
Notary Public, Lea County, New Mexico
My Commission Expires June 30, 2022



LEGAL NOTICE

Foundation Energy Management, 5057 Keller Springs Rd., Suite 650, Addison, TX 75001 proposes to convert Blue Quail Federal #1, API 30-025-33222, located 660' FSL and 1980' FEL of Sec 7-T23S-R32E to non-commercial water disposal in Bell Canyon formation at 4,640'-4,850' with expected maximum pressure of 928 psi and maximum injection rate of 1,500 BWPD. Contact party is James Smith, HSE/Regulatory Supervisor at 918.526.5592. Interested parties may file objections or request for hearing to the Oil Conservation Division within 15 days.

Published in the Lovington Leader May 30, 2019

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Street and Apt. No., or PO Box No.

300 W 2ND STREET

City, State, ZIP+4® RUSSWELL, NM 88201

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Sent To ROLLA R HINKLE III

Street and Apt. No., or PO Box No.

105 W 3 RD STREET, SUITE 302

City, State, ZIP+4® RUSSWELL NM 88201

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Sent To HOWARD B. CANNON / ANDREA

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☐ Return Receipt (electronic)	\$0.00	
☐ Certified Mail Restricted Delivery	\$0.00	
☐ Adult Signature Required	\$0.00	
☐ Adult Signature Restricted Delivery	\$0.00	
Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	STRATA PRODUCTION CO.	
Street and Apt. No., or PO Box No.	1301 N SYCAMORE	
City, State, ZIP+4®	ROSWELL, NM 88201	

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☐ Return Receipt (electronic)	\$0.00	
☐ Certified Mail Restricted Delivery	\$0.00	
☐ Adult Signature Required	\$0.00	
☐ Adult Signature Restricted Delivery	\$0.00	
Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	STEPHANIE G. RICHARD, Commissioner	
Street and Apt. No., or PO Box No.	P.O. Box 1148	
City, State, ZIP+4®	SE, NM 87501	

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☐ Certified Mail Restricted Delivery	\$0.00	
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Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	FRANKLIN & ROXANNE HANERS	
Street and Apt. No., or PO Box No.	2738 CHOCHECHERRY AVE	
City, State, ZIP+4®	HENDERSON, NV 89074	

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Postage	\$1.75	
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Sent To	DEVON ENERGY PRODUCTION CO	
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☐ Adult Signature Required	\$0.00	
☐ Adult Signature Restricted Delivery	\$0.00	
Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	TIM SPISAK, State Dir.	
Street and Apt. No., or PO Box No.	301 DINOSAUR TRAIL	
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☐ Return Receipt (electronic)	\$0.00	
☐ Certified Mail Restricted Delivery	\$0.00	
☐ Adult Signature Required	\$0.00	
☐ Adult Signature Restricted Delivery	\$0.00	
Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	XTO ENERGY INC.	
Street and Apt. No., or PO Box No.	22777 SPRINGWOODS VILLAGE	
City, State, ZIP+4®	SPRING, TX 77389 PMBX	

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Extra Services & Fees (check box, add fee as appropriate)	\$0.00	06
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☐ Return Receipt (electronic)	\$0.00	
☐ Certified Mail Restricted Delivery	\$0.00	
☐ Adult Signature Required	\$0.00	
☐ Adult Signature Restricted Delivery	\$0.00	
Postage	\$1.75	
Total Postage and Fees	\$5.25	
Sent To	EILEEN M GROOMS	
Street and Apt. No., or PO Box No.	2906 DIAMOND A DRIVE	
City, State, ZIP+4®	ROSWELL, NM 88201	

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Product	Qty	Unit Price	Price
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First-Class Mail® Large Envelope (Domestic) (SANTA FE, NM 87508) (Weight:0 Lb 5.70 Oz) (Estimated Delivery Date) (Saturday 08/03/2019)	1	\$1.75	\$1.75
Certified (USPS Certified Mail #) (70181130000062542826)			\$3.50
First-Class Mail® Large Envelope (Domestic) (ROSWELL, NM 88201) (Weight:0 Lb 5.70 Oz) (Estimated Delivery Date) (Monday 08/05/2019)	1	\$1.75	\$1.75
Certified (USPS Certified Mail #) (70181130000062542666)			\$3.50
First-Class Mail® Large Envelope (Domestic) (SANDY, UT 84092) (Weight:0 Lb 5.70 Oz) (Estimated Delivery Date) (Monday 08/05/2019)	1	\$1.75	\$1.75
Certified (USPS Certified Mail #) (70181130000062542802)			\$3.50
First-Class Mail® Large Envelope (Domestic) (SEDONA, AZ 86336) (Weight:0 Lb 5.70 Oz) (Estimated Delivery Date) (Monday 08/05/2019)	1	\$1.75	\$1.75
Certified (USPS Certified Mail #) (70181130000062542796)			\$3.50
First-Class Mail® Large Envelope (Domestic) (SALT LAKE CITY, UT 84121) (Weight:0 Lb 5.70 Oz) (Estimated Delivery Date) (Monday 08/05/2019)	1	\$1.75	\$1.75
Certified (USPS Certified Mail #) (70181130000062542789)			\$3.50
First-Class Mail® Large Envelope	1	\$1.75	\$1.75

(Domestic)
 (SALT LAKE CITY, UT 84121)
 (Weight:0 Lb 5.70 Oz)
 (Estimated Delivery Date)
 (Monday 08/05/2019)

Certified		\$3.50	
(USPS Certified Mail #)			
(70181130000062542772)			
First-Class Mail®	1	\$1.75	\$1.75
Large Envelope			
(Domestic)			
(ROSWELL, NM 88201)			
(Weight:0 Lb 5.70 Oz)			
(Estimated Delivery Date)			
(Monday 08/05/2019)			
Certified		\$3.50	
(USPS Certified Mail #)			
(70181130000062542758)			
First-Class Mail®	1	\$1.75	\$1.75
Large Envelope			
(Domestic)			
(ROSWELL, NM 88201)			
(Weight:0 Lb 5.70 Oz)			
(Estimated Delivery Date)			
(Monday 08/05/2019)			
Certified		\$3.50	
(USPS Certified Mail #)			
(70181130000062542734)			
First-Class Mail®	1	\$1.75	\$1.75
Large Envelope			
(Domestic)			
(ROSWELL, NM 88201)			
(Weight:0 Lb 5.70 Oz)			
(Estimated Delivery Date)			
(Monday 08/05/2019)			
Certified		\$3.50	
(USPS Certified Mail #)			
(70181130000062542741)			
First-Class Mail®	1	\$1.75	\$1.75
Large Envelope			
(Domestic)			
(RUIDOSO, NM 88345)			
(Weight:0 Lb 5.70 Oz)			
(Estimated Delivery Date)			
(Saturday 08/03/2019)			
Certified		\$3.50	
(USPS Certified Mail #)			
(70181130000062542697)			
Total:		\$78.75	

Debit Card Remit'd \$78.75
 (Card Name:VISA)
 (Account #:XXXXXXXXXXXX7487)
 (Approval #)
 (Transaction #:418)
 (Receipt #:023685)
 (Debit Card Purchase:\$78.75)
 (Cash Back:\$0.00)
 (AID:A0000000980840 Chip)
 (AL:US DEBIT)
 (PIN:Verified)

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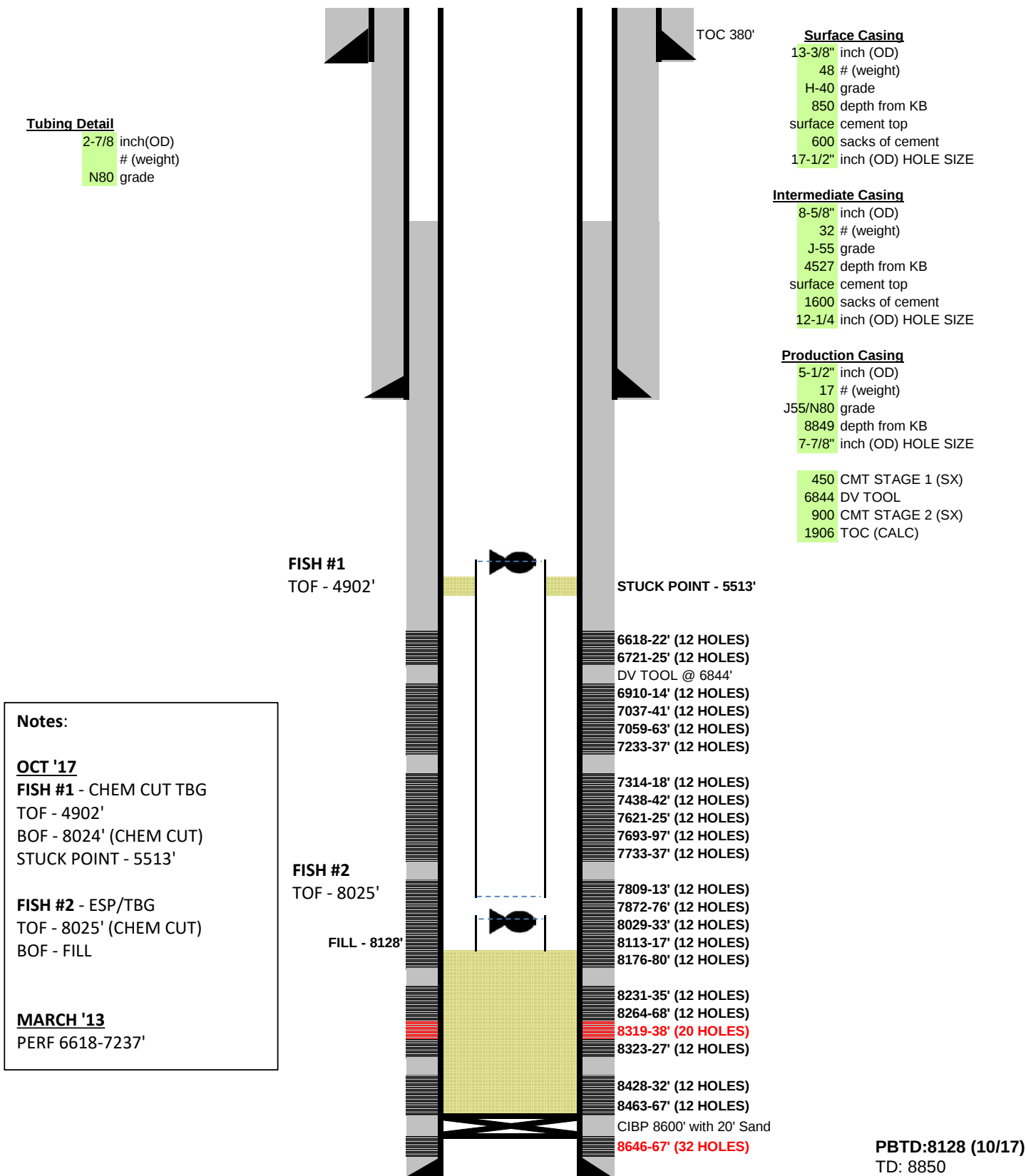


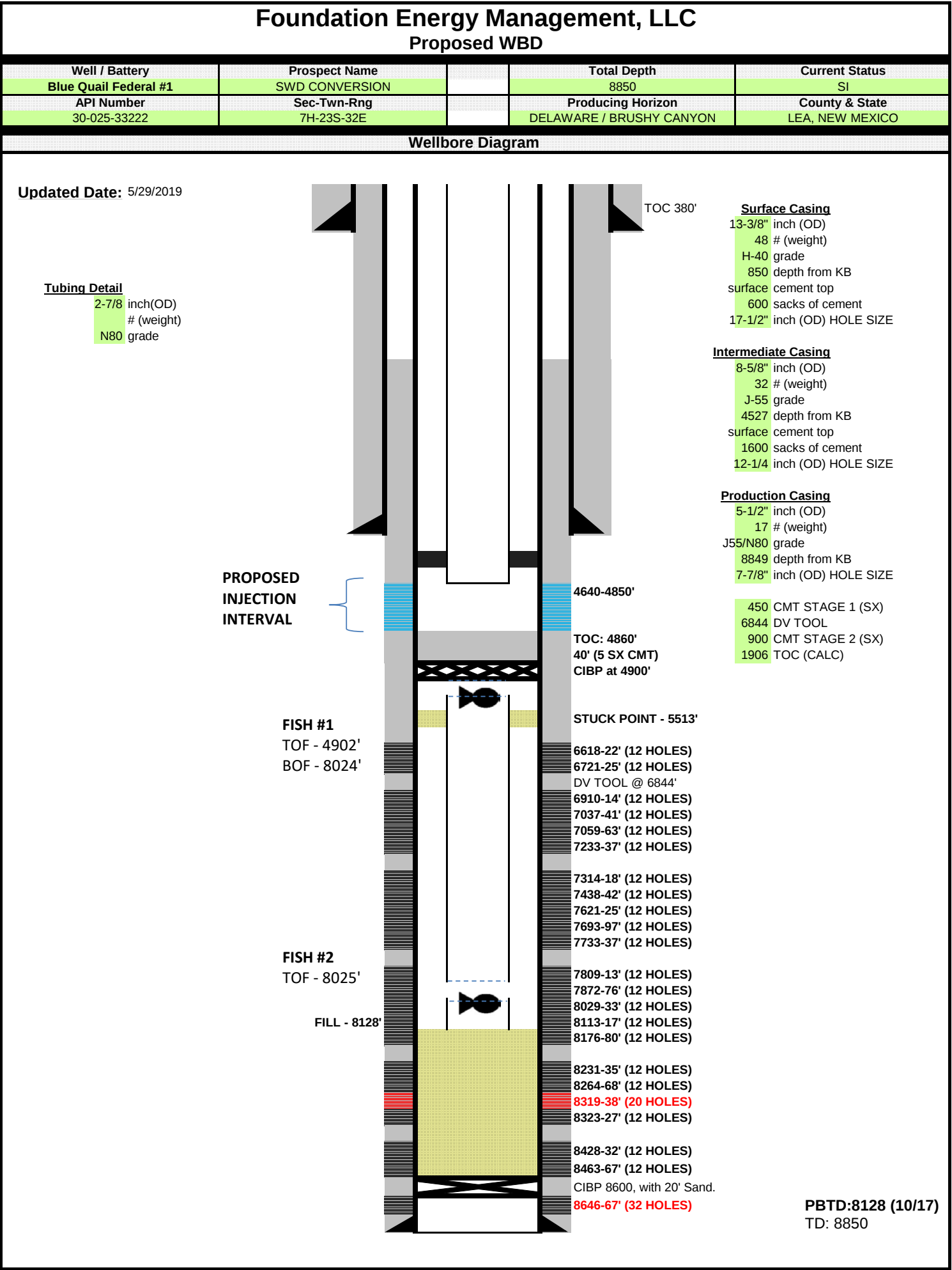
or call 1-800-410-7420.

Foundation Energy Management, LLC
Current WBD

Well / Battery	Prospect Name		Total Depth	Current Status
Blue Quail Federal #1	SWD CONVERSION		8850	SI
API Number	Sec-Twn-Rng		Producing Horizon	County & State
30-025-33222	7H-23S-32E		DELAWARE / BRUSHY CANYON	LEA, NEW MEXICO

Wellbore Diagram





SDE 18 FEDERAL

Well / Battery	API Number		Total Depth	Sec - Twn - Rng
SDE 18 Federal	30-025-25622		9300	18C- 23S - 32E

WELLBORE DIAGRAM

