Additional Information

Garcia, John A, EMNRD

From: Richard Hill <rhill@wellconsultant.com>
Sent: Tuesday, June 2, 2020 12:20 PM
To: Garcia, John A, EMNRD
Subject: [EXT] RE: West Jal Deep SWD No.6
Attachments: Drilling procedure.pdf

Please see the attachment witch reflects a revision to a freshwater system. I also revised the circulating medium table to show the same. Please note the maximum mud weight is higher than what is listed in the drilling procedure, this is only for casing design to ensure pipe integrity at the listed depth.

Thank you,

BC&D Operating, Inc
Richard Hill
SVP Engineering
(405) 837-8147
rhill@wellconsultant.com

From: Garcia, John A, EMNRD <JohnA.Garcia@state.nm.us>
Sent: Tuesday, June 2, 2020 12:53 PM
To: Richard Hill <rhill@wellconsultant.com>
Subject: RE: West Jal Deep SWD No.6

Thanks Richard, Could you also send me an mended Drilling procedure which reflects using fresh water when drilling through the captain reef to your depth of 5200 feet.

Intermediate 1

- Drill 17-1/2" hole to 5,200' and R&C 13-3/8" 61# HCL-10 BTC casing. A lead and a tail slurry will be pumped with top of cement at surface (150% excess on lead and 100% excess on tail). Directional surveys will be take taken for directional control. The mud will be a cut brine system with w weight of 8.4 – 8.9 ppg using loss circulation control. Any broken connection will be tested for well control. Casing shoe depth will be 100' past the base of the Capitan Reef and determined by mud logger. Full suite of logs consisting on GR/CNL/CDN will be ran to identify Capitan Reef. A cement bond log will be ran after casing is cemented in place. All information gathered on the Capitan Reef will be shared with NMOCD for future study and analysis.

Thank you,

John Garcia
Petroleum Specialist
Oil Conservation Division
1220 South St. Francis Drive
Santa Fe, New Mexico 87505

505-476-3441

From: Richard Hill <rhill@wellconsultant.com>
Sent: Friday, May 29, 2020 6:49 PM
To: Garcia, John A, EMNRD <JohnA.Garcia@state.nm.us>
Subject: [EXT] Re: West Jal Deep SWD No.6

Sorry for the late response... I think the original application was a typo, when I made the correction I adjusted it based on the casing design. However the Dev top will be determined off mud logs and e-logs. My well bore design only works if the 7" casing is set into the top of the Dev, it would be a economic failure to not cover the entire Woodford shale with casing. In this particular area the Woodford and Miss are extremely tight and will not take water, they would only lead to hole stability issues if left uncased. I hope this helps and I will look deeper into this matter Monday morning.

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From: Garcia, John A, EMNRD <JohnA.Garcia@state.nm.us>
Sent: Friday, May 29, 2020 10:59:17 AM
To: Richard Hill <rhill@wellconsultant.com>
Subject: RE: West Jal Deep SWD No.6

Richard,

I have a question in regard to the additional information you had sent in. You had resubmitted a table which has the geological depths. However this table had different tops for the Devonian then the original application. Which one is accurate? What information lead to a change of 13'?' both tables are below

Original application is on the left / additional information is on the right.

b. Injection Zone: Siluro-Devonian Formation

Formation Tops	Depth
Rustler	1,351'
Top Salt	1,460'
Base Salt	3,360'
Top Capitan Reef	4,030'
Base Capitan Reef	5,050'
Delaware	5,221'
Bone Spring	7,884'
Wolfcamp	11,145'
Penn	11,269'
Strawn	11,482'
Atoka	12,095'
Morrow	12,449'
Mississippian Shale	14,544'
Woodford	15,217'
Devonian	15,381'
Fusselman	16,404'
Montoya	16,972'

Microsoft Outlook - Memo Style

Formation Tops
Rustler
Top Salt
Base Salt
Top Capitan Reef
Base Capitan Reef
Delaware
Bone Spring
Wolfcamp
Penn
Strawn
Atoka
Morrow
Mississippian Shale
Woodford
Devonian
Fusselman
Montoya

Thank you,

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1220 South St. Francis Drive
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From: Richard Hill <rhill@wellconsultant.com>
Sent: Thursday, May 21, 2020 10:01 AM
To: Garcia, John A, EMNRD <JohnA.Garcia@state.nm.us>
Subject: [EXT] RE: West Jal Deep SWD No.6

Thank you for the email, and I'm sorry about the confusion. We plan to set 7" casing in the top of the Dev, so the Woodford and Mississippian will be covered. We never had intentions of perforating the 700' in your first question; we were requesting it to give us room to adjust the packer setting depth in case of future issues. That is an easy fix, and we can cut the 700' off and only ask for the open hole interval.
That will fix the top half of the target formation; the Montoya is only a geologic marker and not for injection. I believe in the application, the procedure calls for cement being spotted in the Montoya and a 100' above.

Please see the attachments with amended documents, please let me know if there is another page that needs to be updated.

BC&D Operating, Inc

Richard Hill
SVP Engineering
(405) 837-8147
rhill@wellconsultant.com

From: Garcia, John A, EMNRD <JohnA.Garcia@state.nm.us>
Sent: Thursday, May 21, 2020 9:20 AM
To: Richard Hill <rhill@wellconsultant.com>
Subject: West Jal Deep SWD No.6

Richard,

I am currently reviewing BC&D Operating's application of West Jal Deep SWD No.6 and had a few questions.

1. The injection interval is listed as 14,544' to 17,100' while the open hole ranges from 15,250' to 17,100'. Can you explain why the injection interval is listed at approximately 700 ft larger than the open hole interval?

2. Target formations are listed as Mississippian – Devonian – Fusselman – Montoya. However, the division currently does not allow injection into the Mississippian – Woodford – Montoya. These formations will need to be excluded from the injection interval. Please submit the necessarily corrected information to mend this. (Also this will need to be reflected in the injection interval depths)

Thank you,

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BC&D Operating

West Jal Deep SWD #6

Drilling plan

Surface Hole

- Drill 26" hole to 1,250' and R&C 20" 94# J-55 BTC casing. A lead and a tail slurry will be pumped with top of cement at surface (150% excess on lead and 50% excess on tail). Directional surveys will be take taken for directional control. The mud will be a freshwater system with a weight of 8.4 ppg. A 5M BOPE system will be installed and tested before drilling out the 20" casing shoe. Casing shoe depth will be 25' into the rustler and determined by mud logger.

Intermediate 1

- Drill 17-1/2" hole to 5,200' and R&C 13-3/8" 61# HCL-10 BTC casing. A lead and a tail slurry will be pumped with top of cement at surface (150% excess on lead and 100% excess on tail). Directional surveys will be take taken for directional control. The mud will be a fresh water system with w weight of 8.4 – 8.9 ppg using loss circulation control. Any broken connection will be tested for well control. Casing shoe depth will be 100' past the base of the Capitan Reef and determined by mud logger. Full suite of logs consisting on GR/CNL/CDN will be ran to identify Capitan Reef. A cement bond log will be ran after casing is cemented in place. All information gathered on the Capitan Reef will be shared with NMOCD for future study and analysis.

Intermediate 2

- Drill 12-1/4" hole to 11,564' and R&C 9-5/8" 40# HCL-80 BTC casing. A Two stage cement job will be performed with the DV tool at 5,500'. A lead and a tail cement will be pumped on both stages. Stage 2 cement will be circulated to surface (150% excess on lead and 100% excess on tail). Directional surveys will be take taken for directional control. The mud will be a cut brine system with a weight of 9.6 – 10 ppg using loss circulation control. A 10M BOPE system will be installed and tested before drilling out the shoe. Casing set depth well be identified with mud logger and Gamma. The casing will be set 150' into the Strawn. Cement bond log will be ran after casing is cemented in place.

Intermediate 3

- Drill 8-1/2" hole to 15,250' and R&C 7" 32# HCP-110 BTC drilling liner. One slurry of cement will be pumped with the top of cement covering the liner top (50% excess). Directional surveys will be take taken for directional control. The mud will be a 70/30 oil base mud system with a weight of 12 – 12.5 ppg. Any broken connections will be tested for well control. Casing set depth will be

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Well: **West Jal Deep SWD #6**

Circulating Medium Table

Section	Hole Size	Top Depth	Bottom Depth	Mud Type	Min Mud Weight (ppg)	Max Mud Weight (ppg)	Gel Strength (lbs/100 sqft)	PH	Viscosity	Salinity (ppm)	Filtration	Additional Characteristics
Surface	26.000	0	1250.00	Fresh Water	8.4	8.4	-	9	28-36	-	N/C	
Intermediate #1	17.500	1250	5400.00	Fresh Water	8.4	9.7	-	9	28-36	-	N/C	Loss Circulation Control
Intermediate #2	12.250	5400	11564.00	Cut Brine	9.6	9.8	-	10-10.5	28-36	-	N/C	Los Circulation Control
Intermediate #3	8.500	11564	15250.00	Oil Base Water	12	12.5	-	-	60	-	N/C	30/70 %
Production	6.000	15250	17100.00	Cut Brine	9	9	-	9	28-36	-	-	

Side 1

INJECTION WELL DATA SHEET

OPERATOR: BC&D Operating, Inc. (25670)

WELL NAME & NUMBER: West Jal Deep SWD #6

WELL LOCATION: 1200' FNL & 1300' FEL | A | 8 | 25S | 36E

FOOTAGE LOCATION | UNIT LETTER | SECTION | TOWNSHIP | RANGE

WELLBORE SCHEMATIC

Please see attached wellbore schematic in the following pages.

WELL CONSTRUCTION DATA

Surface Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. ***or*** _____ ft^3

Top of Cement: _____ Method Determined: _____

Intermediate Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. ***or*** _____ ft^3

Top of Cement: _____ Method Determined: _____

Production Casing

Hole Size: _____ Casing Size: _____

Cemented with: _____ sx. ***or*** _____ ft^3

Top of Cement: _____ Method Determined: _____

Total Depth: _____

Injection Interval

15,250' feet to 17,100'

(Perforated or Open Hole; indicate which)

INJECTION WELL DATA SHEET

Tubing Size: 4-1/2" Lining Material: Duoline

Type of Packer: 4-1/2" TCPC Permanent Packer w/ High Temp Elastomer & Full Inconel

Packer Setting Depth: 15,150'

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

Additional Data

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

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

2. Name of the Injection Formation: Dev- Fuss

3. Name of Field or Pool (if applicable): SWD; Dev - Fuss

4. Has the well ever been perforated in any other zone(s)? List all such perforated intervals and give plugging detail, i.e. sacks of cement or plug(s) used. No

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

   Yates - Seven Rivers @ 3,589'

   Bone Spring at 8,050'

   Wolfcamp @ 11,145'

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P.O. Box 302 Hobbs, NM 88241
(405) 837-8147

III. WELL DATA

1. **Lease name; Well No.; Location by Section, Township and Range; and footage location within the section.**

   West Jal Deep SWD #6, Sec 8, T25S, R36E, 1200 FNL & 1300 FEL.

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.**

Casing Size	Setting Depth	Sack of Cement	Hole Size	Top of Cement	Determined
20"	1,250'	1,205	26"	Surface	Circulate
13-3/8"	5,200'	1,970	17-1/2"	Surface	Circulate
9-5/8"	11,564'	1,920	12-1/4"	Surface	Circulate
7"	11,265' - 15,250'	388	8-1/2"	11,265'	Circulate

3. **A description of the tubing to be used including its size, lining material, and setting depth.**

   4-1/2" (0 – 15,150') OD, Internally Plastic-Coated tubing set 50' – 100' above open hole.

4. **The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.**

   4-1/2" TCPC Permanent packer w/ high temp elastomer & full Inconel.

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.**

   Dev – Fuss

   Pool Name: SWD; Dev - Fuss

2. **The injection interval and whether it is perforated or open-hole.**

   15,250' – 17,100' Open Hole Injection Interval

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Additional Questions on C-108

VII.

1. **Proposed average and maximum daily rate and volume of fluids to be injected;**

    a. Average 30,000 BWPD, Max 40,000 BWPD.
    b. Rate will also be determined by maximum pressure. (.2 psi/ft to top of injection interval).

2. **Whether the system is open or closed;**

    a. Closed System, Commercial SWD

3. **Proposed average and maximum injection pressure;**

    a. Average injection pressure: 2,340 psi (surface pressure).
    b. Maximum injection pressure: 3,053 psi (surface pressure).

4. **Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and,**

    a. The injection fluid is to be locally produced water. It is expected that the source water will predominantly be from the Bone Spring and Wolfcamp formations. Attached are produced water sample analyses taken from the closest wells that feature samples from the Delaware, Bone Spring, Wolfcamp, and Strawn formations.

5. **If injection is for disposal purposes into a zone not productive of oil and 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.)**

    a. The disposal interval is non-productive. No water samples are available from the surrounding area.

VIII.

1. **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.**

West Jal Deep SWD #6

BC&D Operating, Inc
1200' FNL & 1300' FWL
Sec. 8, T25S, R36E, Lea Co, NM
Lat. 32.148828, Long. 103.282759

Surface - (Conventional)

Hole Size	26"
Casing	20" - 94# J-55 BTC Casing
Depth Top:	Surface
Depth Bottom:	1250'
Cement:	560 sxs tail, 1.35 yield, class C + additives
	645 sxs lead, 1.75 yield, class C + additives
Cement Top:	Surface - (circulated)

Intermediate #1 - (Conventional)

Hole Size	17.5"
Casing	13-3/8" - 61# L-80HC BTC Casing
Depth Top:	Surface
Depth Bottom:	5200'
Cement:	490 sxs tail, 1.33 yield, Class C 50/50 + additives
	1480 sxs lead, 1.75 yield, Class C + additives
Cement Top:	Surface - (circulated)

Intermediate #2 - (Conventional)

Hole Size	12.25"
Casing	9-5/8" - 40# L-80HC BTC Casing
Depth Top:	Surface
Depth Bottom:	11564'
Cement:	Stage 1 - 520 sxs tail, 1.2 yield, Class H + additives
	Stage 1 - 590 sxs lead, 2.0 yield, Class H 50/50 + additives
	Stage 2 - 260 sxs tail, 1.33 yield, Class C + additives
	Stage 2 - 550 sxs lead, 2.5 yield, Class C 50/50 + additives
Cement Top:	Surface - (circulated)
ECP/DV Tool:	5500'

Intermediate #3 - (Liner)

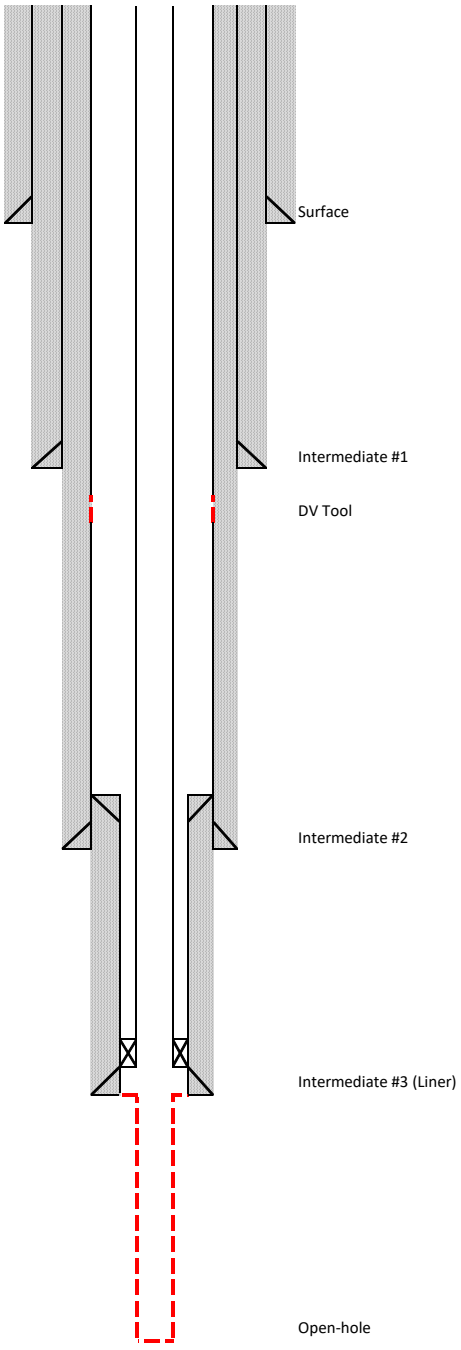
Hole Size	8.5"
Casing	7" - 32# P-110HC BTC SpCL Casing
Depth Top:	11265'
Depth Bottom:	15250'
Cement:	388 sxs tail, 1.33 yield, Class H 50/50 + additives
Cement Top:	11265' - (Volumetric)

Intermediate #4 - (Open Hole)

Hole Size	6"
Casing	7" - 32# P-110HC BTC SpCL Casing
Depth Top:	15250'
Depth Bottom:	17100'
Inj Interval:	15250' - 17100' (Open-Hole Completion)

Tubing

Tubing Depth:	15140'
Tubing:	4-1/2" 11.6# N-80 Duoline
Packer Depth:	15150'
Packer:	4-1/2" TCPC Permanent packer w/ high temp elastomer & full inconel



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a. The Devonian formation is a dolomitic ramp carbonate that occurs below the Woodford shale and above the Fusselman formation. Strata found in the Devonian formation include two major groups, the Wristen Buildups and Thirtyone Deepwater Chert, with the Wristen being more abundant. The Wristen Groups is composed of mixed limestone and dolomites with mudstone to grainstone and boundstone textures. Porosity in the Wristen group is a result of both primary and secondary development. Present are moldic, vugular, karstic (including collapse breccia) features that allow for higher porosities and permeabilities. The Thirtyone Formation contains two end-member reservoir facies, skeletal packstones/grainstones and spiculitic chert, with most of the porosity and permeability found in the coarsely crystalline cherty dolomite. These particular characteristics allow for this formation to be a tremendous Salt Water Disposal horizon.

b. Injection Zone: Siluro-Devonian Formation

Formation Tops	Depth
Rustler	1,351’
Top Salt	1,460’
Base Salt	3,360’
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Woodford	15,217'
Devonian	15,250'
Fusselman	16,404'
Montoya	16,972'

c. Underground sources of drinking water within 1-mile of the proposed location. There are no wells in the area of review. Water wells in the surrounding area have an average depth of 495’ and an average water depth of 295’

Garcia, John A, EMNRD

From: Richard Hill <rhill@wellconsultant.com>
Sent: Thursday, May 21, 2020 10:01 AM
To: Garcia, John A, EMNRD
Subject: [EXT] RE: West Jal Deep SWD No.6
Attachments: West Jal Deep #6 SWD C-108 AMENDED PAGES.pdf

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That will fix the top half of the target formation; the Montoya is only a geologic marker and not for injection. I believe in the application, the procedure calls for cement being spotted in the Montoya and a 100' above.

Please see the attachments with amended documents, please let me know if there is another page that needs to be updated.

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