

From: Abshire, David
Sent: Wednesday, May 09, 2018 2:44 PM
To: Graves, Brian <Graves.Brian@epa.gov>
Cc: Johnson, Ken-E <Johnson.Ken-E@epa.gov>
Subject: RE: Malone Service - Injection Wells Testing Procedures

Thank you gentlemen...I will send the Superfund approval to the MCP so that they can move forward. MCP indicated that they would conduct the MITs last week in May and conduct the plugging of WDW-138 first week of June.

From: Graves, Brian
Sent: Tuesday, May 08, 2018 10:45 AM
To: Abshire, David <abshire.david@epa.gov>
Cc: Johnson, Ken-E <Johnson.Ken-E@epa.gov>
Subject: RE: Malone Service - Injection Wells Testing Procedures

David,

Ken and I have reviewed and it looks good.

Brian

From: Abshire, David
Sent: Tuesday, May 08, 2018 7:27 AM
To: Graves, Brian <Graves.Brian@epa.gov>
Cc: Johnson, Ken-E <Johnson.Ken-E@epa.gov>
Subject: FW: Malone Service - Injection Wells Testing Procedures

Brian...if you guys are OK with the MCP correction, please advise and I then can approve the MCP moving forward and conducting these tests as you have indicated. I appreciate ya'll work. Thanks.

From: Brian Moore [<mailto:bmoore@projectnavigator.com>]
Sent: Monday, May 07, 2018 3:56 PM
To: Abshire, David <abshire.david@epa.gov>
Cc: Graves, Brian <Graves.Brian@epa.gov>; Johnson, Ken-E <Johnson.Ken-E@epa.gov>; Foster, Anne <Foster.Anne@epa.gov>; Marilyn Long <marilyn.long@tceq.texas.gov>; Bob Piniewski <bobp@projectnavigator.com>
Subject: RE: Malone Service - Injection Wells Testing Procedures

David/Brian/Ken,

Thank you for the response. The correct acid listing is 12/3% HF and the correction has been made in the attached procedures.

David: If no additional information is needed and the testing procedures for both WDW-138 and WDW-073 are approved, the WDW-073 acid job, followed by the start of the 24 hour injection period is



currently being scheduled for May 29, 2018. Please advise if the WDW-138 and WDW-073 testing procedures are approved.

The MCP will be submitting the WDW-138 closure procedures after the internal review process is completed. Should you have any questions please let me know.

Kindest Regards,

Brian Moore | Project Manager

E-mail: bmoore@projectnavigator.com

Project Navigator, Ltd.

15990 N. Barkers Landing, Suite 325, Houston, TX 77079

O: 713.468.5961 | C: 713.534.4546 | Web: www.ProjectNavigator.com

E-MAIL NOTICE: This transmission may be (1) subject to Attorney-Client Privilege, (2) an attorney work product, or (3) strictly confidential. If you are not the intended recipient of this message, you may not disclose, print, copy or disseminate this information. If you have received this in error, please notify the sender only and delete the message.

From: Abshire, David [<mailto:abshire.david@epa.gov>]

Sent: Monday, May 7, 2018 8:00 AM

To: Bob Piniewski

Cc: Brian Moore; Graves, Brian; Johnson, Ken-E; Foster, Anne; Marilyn Long

Subject: FW: Malone Service - Injection Wells Testing Procedures

OK...EPA UIC has conducted a review of the MCP-WDW MIT and PFOT procedures – see the following. If you have any questions concerning these procedures or the path forward in any way, do not hesitate to call me and the EPA UIC technical team.

Thanks.....I will be on travel through Wednesday, please call my cell if you need me (817.944.6854).

From: Graves, Brian

Sent: Friday, May 04, 2018 11:21 AM

To: Abshire, David <abshire.david@epa.gov>

Cc: Johnson, Ken-E <Johnson.Ken-E@epa.gov>

Subject: RE: Malone Service - Injection Wells Testing Procedures

David,

Ken and I both have reviewed the Malone Service Company Superfund Site testing procedures for WDW-073 and WDW-138 and our comments follow:

1. The argument for forgoing the falloff test in WDW-138 is reasonable, especially since MCP will plug the well and shut off access to the upper injection interval. The static pressure measurement should be adequate information given the limited and intermittent operation of the well. The remainder of the WDW-138 MIT procedures looked fine.
2. For WDW-073, the acid job described in the Steps looks good but in the summary table it lists "12/3% HCL" while the steps indicate 12/3% HF acid (HCL/HF).
3. On the WDW-073 falloff procedures, it states that the injection period, at the maximum sustained rate, prior to the falloff test will last for a minimum of 24 hours so the falloff

period of approximately 20 hours should be adequate but the log-log plot may be somewhat compressed if there is not additional rate history to be accounted for. Since the well is being stimulated prior to injection, it is difficult to use more than the 24 hours of injection history following the stimulation under new skin factor conditions, so likely 20 hours of falloff will compress with the 24 hour preceding injection period. The acid job should provide an increased chance of achieving radial flow conditions so the proposed procedures seem reasonable. The WDW-073 MIT procedures looked fine as well.

Brian Graves
R6 UIC Land Ban Coordinator
214-665-7193
graves.brian@epa.gov

From: Abshire, David
Sent: Monday, April 30, 2018 11:14 AM
To: Graves, Brian <Graves.Brian@epa.gov>
Cc: Johnson, Ken-E <Johnson.Ken-E@epa.gov>
Subject: Malone Service - Injection Wells Testing Procedures

I know we all received the Malone Service injection well Testing Procedures..., please let me know if you need anything else from the MCP.

MSC Well No. 1 (WDW073)**2018 Stimulation/Mechanical Integrity Testing Procedure****GENERAL INFORMATION**

NOTE:	All depths based on completion sketch.	
KB above ground level:	11.5' above LMF	
Top wellhead connection:	2-7/8" EUE 8Rd Female	
TD:	5,124'	
PBTD:	5,055'	
Protection Casing:	7", 26.0 lb/ft, K-55 set from 5,118' to surface. Cemented with lead slurry of 390 sacks of Class H cement with 12% Bentonite gel and tail slurry of 100 sacks of Class H with 2% calcium chloride.	
Liner:	5", 23.2 lb/ft, P-110, LTC (ID = 4.044") set from 4,833' to surface with cementing stage tool at 3,372'. First Stage cement consisted of 32 sacks of Class A cement with 0.9 gal/sack of Latex lead slurry and tail slurry of 76 cu ft of Epseal with silica flower. Second Stage consisted of 225 sacks of Class A cement with 0.9 gal/sack of Latex. Cement returns to surface following the Second Stage.	
Perforations:	4,912' to 4,642' 4,950' to 4,995'	
Packer (Lower):	Baker Model D set at 4,863', Minimum ID = 3,875" Note: Packer utilized as a bridge plug for cementing of 5" liner during workover operations in 1980. Plug removed from packer after completion of cementing.	
Packer (Completion/Upper)	Baker Hornet set from 4,700'	
Tubing String:	2-3/8", 4.7 lb/ft, J-55, EUE 8rd tubing from 4,700' to surface, (ID=1.995").	
Volume to Top Perforation	2-3/8" Tubing (0.003866 bpf)	18.2 bbl
	5" Liner (0.01589 bpf)	2.1 bbl
	7" Casing (0.0383 bpf)	3.0 bbl
	Volume to Top Perf	23.3 bbl
	Volume to Bottom Perf	26.4 bbl
Bottom Hole Pressure:	2,257.35 psi @ 4,910' (8.67 ppg EMW) at 90°F during 1994 Well Testing.	
Temperature Survey Date:	August 8, 2014, tagged at 5,055'	
Top of Solids Fill:	5,043', RTS on July 22, 2015	
MSIP:	1,300 psig	

WDW073 ACID STIMULATION

<u>STEP</u>	<u>Task</u>
1.	Project Navigator will ensure that the well is removed from service for a period of 48 hours prior to testing operations.
2.	Project Navigator will provide adequate access to wellhead.
3.	Geostock Sandia and all third-party vendors will complete Project Navigator orientation requirements prior to initiating on-site activities. Conduct safety meeting.
4.	Move in and rig up an acid pumper with 1,740 gallons of 15% Hydrochloric (HCl) acid, 1,800 gallons of 12/3% Hydrochloric/Hydrofluoric (HF) acid containing inhibitor, surfactant, and iron control additives. Move in and rig up transport truck with 120 barrels of 2-percent potassium chloride (KCl) brine.
5.	Rig up treating lines to injection tubing. Pressure test all lines with 2% KCl brine to 1,500 psi.
6.	Pump 420 gallons (10 bbls) of KCl brine to flush wellhead and establish pump-in rate. Maximum treatment pressure will not exceed 1,200 psig.
7.	Pump Stage 1, 150 gallons (3.6 bbls) of mutual solvent, 600 gallons (14.3 bbls) of 15% HCl acid with inhibitors down the injection tubing followed by 1,080 gallons (25.7 bbls) of 12/3% HF acid, 360 gallons (8.6 bbls) of 15% HCl acid, and 210 gallons (5 bbls) of Auroragel diverter at 2 to 3 barrels per minute.
8.	Pump Stage 2, 100 gallons (2.4 bbls) of mutual solvent, 540 gallons (12.9 bbls) of 15% HCl acid with inhibitors down the injection tubing followed by 720 gallons (17.1 bbls) of 12/3% HF acid, and 240 gallons (5.7 bbls) of 15% HCl acid at 2 to 3 barrels per minute. Displace the acid from the injection tubing with 1,260 gallons (30 bbls) of KCl brine. Stop displacement and allow HF acid to soak for 30 minutes.
9.	Resume displacement and pump the remaining 4,620 gallons (110 bbls) of KCl brine to displace the acid from the wellbore (See Stimulation Treatment Table on next page).

WDW073 Stimulation Treatment

Objective	Product	Gallons	Barrels	Rate (bpm)	Maximum Treatment Pressure (psi)
Pressure test lines				1	1,500
Flush wellhead & Establish Injection Rate	KCl brine	420	10	2 - 3	1,200
Stage 1 – Acid Matrix	Solvent	150	3.6	2 - 3	1,200
	15% HCl	600	14.3		
	12/3% HF	1,080	25.7		
	15% HCl	360	8.6		
	Auroragel	210	5		
Stage 2 – Acid Matrix	Solvent	100	2.4	2 - 3	1,200
	15% HCl	540	12.9		
	12/3% HF	720	17.1		
	15% HCl	240	5.7		
Treatment Displacement	KCl brine	4,620	110	2-3	1,200

10. Rig down and move out equipment.

11. Return well to injection service immediately after rigging down stimulation equipment to overdisplace the acid from the near wellbore area.

INJECTIVITY/FALLOFF TEST

12. Project Navigator will maintain continuous injection to WDW073 at the maximum sustainable rate for a minimum of 24 hours prior to moving in logging equipment. The maximum permitted surface injection pressure of 1,300 psig will not be exceeded. Record injection rate and wellhead pressure on Project Navigator recording equipment.
13. Move in and rig up a wireline logging unit and pressure control equipment for monitoring the bottomhole pressure during the final hours of the injection phase while continuing to inject fluid. A surface readout pressure gauge and memory gauge will be installed on the wireline. Lower gauges into the hole, and set the surface readout pressure gauge at 4,910' while constant rate injection is continued. Record approximately one hour of bottomhole pressure.
14. Stop injection abruptly, and monitor pressure falloff at 4,910' for approximately 20 hours.

15. After approximately 20 hours of pressure falloff, the bottom hole pressure data from the surface readout pressure gauge will be downloaded and a preliminary analysis of the data will be performed. The test will be ended when radial flow conditions are confirmed. The pressure falloff portion of test is expected to range between 16 and 24 hours (2015 test - radial flow conditions recorded at 17 hours – 2015 test was last test with demonstrated radial flow period).
16. Pull out of the wellbore taking pressure gradient stops at 4,500', 3,000', 1,500', and surface.
17. Rig down BHP gauges and prepare for radioactive tracer survey.

ANNULUS PRESSURE TEST

18. Install a calibrated test gauge or pressure transducer on the annulus of WDW073. A certificate of calibration must be provided with the gauge or transducer.
19. Utilizing Malone's annulus pump, pressurize the 5-inch protection casing by 2-7/8-inch injection tubing annulus slowly until the annulus pressure of $\pm 1,400$ psi (MSIP + 100 psi) is reached.
20. Monitor and record the annulus pressure of WDW073 every five minutes for a minimum of 30 minutes. In accordance with the TCEQ guidelines for the APT, the annulus pressure test will be considered acceptable if the pressure loss or gain is less than 5% of the starting test pressure during the 30-minute test period. If the pressure loss or buildup is greater than 5% of the initial test pressure, the annulus pressure test will be repeated. The results of the annulus pressure test will be reported to the Project Navigator project manager.

Radioactive Tracer Survey

21. Move in and rig up a wireline logging unit, mast unit, and wireline lubricator with grease injector pressure control equipment.
22. Rig up a RTS tool string, upper and lower gamma ray detectors, radioactive fluid ejector, and a collar detector (CCL) to conduct a RTS on WDW073. Set up RTS tools and recorder according to the TCEQ RTS guidelines.
23. Run the RTS tools in the hole to $\pm 4,700$ -feet.
24. Start injecting with filtered fluid at a constant rate of ± 20 gallons per minute (gpm).
25. Run a correlation strip across the packer. Depth correlate the log to the Coastal Wireline Services' RTS performed on August 1, 2017.
26. Run a base gamma ray/CCL from top of fill in wellbore to approximately 200 feet above the packer (4,500 feet).
27. Take a 5-minute statistical check above the packer at 4,690 feet. Take a 5-minute statistical check above the perforations at 4,900 feet.

28. Per the TCEQ guidelines, conduct a moving survey from above the packer to the injection interval to check for leaks between those two points. Move the RTS tool to $\pm 4,500$ feet (± 200 feet above the packer). Eject a slug of RA material at $\pm 4,500$ feet, and verify ejection on the lower detector.
29. After verification, lower the tool below the slug, and monitor the movement of the slug by making and recording a series of upward overlapping passes across the slug until the slug is no longer detected. Note times and pass numbers on the log. Verify that no leaks between the packer and the injection interval are detected.
30. Repeat the moving survey as above. After repeating the moving survey one time, proceed to Step Number 20.
31. Per the TCEQ guidelines, conduct a stationary survey or time drive survey above the perforated injection interval to check for upward fluid migration outside or behind the cemented casing.
32. Move the RTS tool to $\pm 4,900$ feet. Increase the injection rate to ± 140 gpm, or the maximum achievable rate controlled by the maximum surface injection pressure of 1,300 psig with a 100-psi safety factor. Additionally, the injection rate is limited by the injection pump which will only allow a maximum injection rate of approximately 150 gpm. This will test the bottomhole cement at the maximum allowable injection pressure due to either the injection formation properties or the injection system design limits.
33. After a constant injection rate is established, eject a radioactive slug, and verify ejection on the lower detector while remaining stationary and recording on time drive.
34. Continue recording on time drive for a minimum of 15 minutes. Verify no upward migration.
35. Repeat the stationary survey in Steps 32 to 34 above. After repeating the stationary survey one time, proceed to Step Number 36.
36. Reduce injection rate to ± 20 gpm.
37. Run a final gamma ray/CCL base log from TD to approximately 200 feet above the packer or $\pm 4,500$ feet.
38. Cease fluid injection.
39. Pull out of the well with the electric line RTS tools.
40. NOTE: A preliminary analysis of the RTS survey will be conducted on site by the logging company representative and the Geostock Sandia representative.

PREPARE REPORT

41. Geostock Sandia will prepare the Well Testing report in accordance with TCEQ and USEPA guidelines. The report will be submitted to Project Navigator for review and editing. After receiving Project Navigator's changes, the final report will be prepared and submitted to Project Navigator within five days.