Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised August 1, 2011

WELL API NO. 30-045-29002-00	
5. Indicate Type of Lease STATE ☐ FEE ☒	
6. State Oil & Gas Lease No. N/A	
SUNDRY NOTICES AND REPORTS ON WELLS (DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)	7. Lease Name or Unit Agreement Name Disposal
1. Type of Well: Oil Well ☐ Gas Well ☒ Other – (Disposal Well)	8. Well Number: #001
2. Name of Operator San Juan Refining Co. / Western Refining Southwest, Inc. – Bloomfield Refinery	9. OGRID Number: 037218
3. Address of Operator # 50 Road 4990, Bloomfield, NM, 87413	10. Pool name or Wildcat: Blanco/Mesa Verde
4. Well Location Unit Letter I : 2442 feet from the south line and 1250 feet from the east line Section 27 Township 29 S Range 11 E NMPM County San Juan	
	11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:		SUBSEQUENT REPORT OF:	
PERFORM REMEDIAL WORK ☐	PLUG AND ABANDON ☐	REMEDIAL WORK ☐	ALTERING CASING ☐
TEMPORARILY ABANDON ☐	CHANGE PLANS ☐	COMMENCE DRILLING OPNS. ☐	P AND A ☐
PULL OR ALTER CASING ☐	MULTIPLE COMPL ☐	CASING/CEMENT JOB ☐	
DOWNHOLE COMMINGLE ☐			
OTHER: Annual Fall-Off Test ☒		OTHER: ☐	

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Western Refining Southwest, Inc. – Bloomfield Refinery requests permission to perform the annual Fall-Off Test on the Class I injection well referenced above. The injection build-up period will begin following the Acid Stimulation work, which is schedule to being on Monday, September 29th. Following a minimum of 24 hours of stable injection down-hole, the bottom hole pressure memory gauges will be lowered into the well (two memory gauges) and allowed to stabilize. Pending OCD approval, Western anticipates installing the memory gauges on Friday, September 23, 2011. The gauges will be allowed to stabilize and the well will be shut-in on Monday, September 26th. The well will be shut in for a minimum of 72 hours.

A more detailed outline of the proposed procedure is attached.

Spud Date: | Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kelly Robinson TITLE Environmental Supervisor DATE 9/16/2011

Type or print name Kelly Robinson E-mail address: kelly.robinson@wnr.com PHONE: 505-632-4166

For State Use Only

APPROVED BY: Carl J. Chavez TITLE Environmental Engineer DATE 9/16/2011

Conditions of Approval (if any):

1) Test to be run after scale removal & well acid stimulation.
2) Test to be consistent w/ attached 8/20/2010 E-mail msg. to operator & approved Fall-off Test Plan.

2011 WELL BUILDUP/FALLOFF TEST PLAN
WESTERN REFINERY - BLOOMFIELD, NM
WASTE DISPOSAL WELL NO. 1

1.0 INTRODUCTION

The following procedure describes the proposed activities to be conducted to perform the annual bottom-hole pressure survey and pressure fall-off test on Waste Disposal Well (WDW) #1, located at the Bloomfield Refinery in Bloomfield, New Mexico. The proposed procedures are in accordance with the United States Environmental Protection Agency (USEPA) 40 FCR 146.13 and the State of New Mexico Fall-Off Guidelines.

1.1 Well Information

Well Name & No.	OCD UIC or Discharge Permit #	Well Classification	API Number
WDW #1	UIC-CL1-009 GW-130	Class I Non-Hazardous	30-045-29002

2.0 BACKGROUND

2.1 Previous Fall-Off Testing

Western Refining (formally Giant Refining) has conducted fall-off tests annually on WDW-1 using quartz crystal bottom-hole memory gauges. The tests followed EPA guidelines and complied with OCD directives for UIC non-hazardous Class I injection wells.

In July 2006, a build-up/fall-off test was conducted after the well stimulation. The 72 hour build-up portion of the testing was done at a constant injection rate of 70 gallons per minute (gpm). The fall-off portion of the testing was terminated after 84 hours.

In August 2008, an additional test was conducted with a final flowing rate of 80 gpm prior to shutting in the well for a fall-off monitoring duration of 189 hours.

The results of the previous fall-off tests produced measureable results with all flow skin, storage, and linear flow regimes present. The WDW-1 had linear flow at the end of these fall-off tests. Radial flow was not observed. As a result, the calculated permeability based on radial flow equations is not a reliable estimate of injection zone permeability.

2.2 Geology

The injection zones arc porous sandstones of the lower portion of the Cliff House formation and the carbonate section of the Menefee formation. These formations occur in Waste Disposal Well #1 at the depths shows in the table below. The injection zones are shown in the attached well log for Waste Disposal Well #1.

Injection Zone Formation	Waste Disposal Well #1	
	KB Elevation = 5545 feet	
	MD below KB (ft)	SS Depth (ft)
Cliff House	3,276	2,269
Menefee	3,435	2,110

The WDW-1 is in a confined low permeability sand interval and historically is not capable of producing a bottom-hole 100 psi differential pressure drop between the final injection and shut-in pressures. Records show that WDW-1 was hydraulically fractured after it was drilled. The 2006, 2008, 2009, and 2010 Fall-Off Test data confirm this with a linear flow regime observed after the end of storage effects.

3.0 SUMMARY OF PROPOSED TESTING ACTIVITES

3.1 Data Research

Before performing the 2011 Fall-Off Test, a one-mile Area of Review (AOR) will be conducted to determine the status of any off-set wells that may be injecting into or producing from the WDW-1 injection interval. If any are found, arrangements will be made with the owners of the wells to monitor the well(s) during the build-up/fall-off test period. Historically there has not been any production or injection in the current injection interval within a one mile radius of WDW-1.

3.2 Summary of Field Activities

The proposed Fall-Off Test is similar to the procedures conducted in years prior. The initial three days of testing activities are considered the "build-up" phase of the test. The Bloomfield Refinery injection well (WDW-1) will be operated at a constant rate for a minimum of 72 hours.

After 24 hours of stable injection, bottom-hole pressure memory gauges will be lowered into the well (two gauges total) and allowed to equalize for a minimum of 48 hours, during which time down-hole pressure readings will be recorded. The memory gauges that will be used are SP-2000 hybrid-quartz gauges provided by Tefteller, Inc. These gauges will have a resolution of 0.01 psi and an accuracy of $\pm$ 0.05% of full scale. The pressure range of the gauges will be from 0-5,000 psi, minimum.

After installation and equalization of the down-hole gauges, the injection well will be blocked-in and the pressure down-hole will be monitored using bottom-hole pressure memory gauges. The recording period will be set to record pressures at a minimum of every 5 minutes, with more frequent readings collected during the early part of the fall-off test period.

The amount of time anticipated to monitor down-hole pressures will be approximately three to eight days. After such time as elapsed, the bottom-hole pressure gauges will be pulled from the well, making gradient stops every 1,000 feet. A more detailed listing of activities to be completed is described below.

The fluid that will be used for the injection test is the refinery's brine waste water (effluent). A current waste analysis of the fluid will be included in the final report.

Attachment 1 (Figure 1 from the 2008 fall-off test report) is the well schematic for WDW-1 which is the same as submitted in 2010. Table 1 is a summary of the injection intervals for the well. Table 2 is a summary of the injection fluid analysis. Table 3 is a summary of the formation fluid analysis. A connate water analysis prior to injection was not found in any of the records, therefore the original formation water properties will have to be estimated from offset wells. The majority of the background information can also be found in the permit

application that was submitted to the State of New Mexico Oil Conservation Division for the well on September 10, 1992.

3.3 Chronology of Field Activities

The following is a day-to-day summary of the activities proposed to fulfill the annual Fall-Off Testing requirement for the Bloomfield Refinery injection well (WDW-1).

During the Initial 72-hours of Testing (Build-up Phase):

1. A stabilized injection rate (approximately 40 gallons per minute) will be established using the Refinery pumps. The optimal injection rate for the three day period will be equivalent to the average injection rate for the prior 30 days of operation. A stable injection rate will be maintained for a minimum of 24-hours before the memory gauges are installed.
2. The injection well is equipped with a crown valve. Using a slick-line unit, the tandem memory gauges will be run down-hole through the crown valve and lubricator to 3,250 feet, the top of the injection interval.
3. Stable injection of the Refinery's effluent will continue into the well for a minimum of 48 hours following placement of the tandem memory gauges to allow the tandem memory gauges to stabilize. During this time, down-hole pressure readings will be recorded.
4. Once the stabilization time for the memory gauges has elapsed, the injection pump will be shut down and the well blocked-in by closing wing valve on the wellhead and in the pump room.

Pressure Fall-Off Monitoring:

5. While the well is isolated from service, bottom hole pressure readings will be recorded for a minimum of three days and up to eight days. The recording period will be set to record pressures at a minimum of every 5 minutes, with more frequent readings recorded during the early part of the fall-off test period.

Following Down-Hole Monitoring:

6. Once the appropriate fall-off monitoring time has elapsed, the memory gauges will be pulled making five minute gradient stops at 3250 ft, 3000 ft, 2000 ft, 1000 ft.
7. After the gradient interval pressure readings are collected, the fall-off test is considered complete. The slick line unit will rig down and the well will return to normal operation.

4.0 TESTING REPORT

All background information will be included in the final report, which will include a log of the events (Chronology of Field Activity), a overview of the geology, a current Area-of-Review (AOR) update, fall-off analysis including previous injection data (rate and volume history), gauge calibration certificates, bottom hole pressure analysis, well schematic, electric logs, reservoir fluid description, and injection fluid analysis. The procedure to do the fall-off test will also be included in the final report. If necessary, an AOR update will be included prior to the build-up/fall-off testing to ascertain the offset injection wells current condition.

Historically there has not been any production or injection in the current injection interval within a one mile radius of WDW-1.

4.1 Evaluation of the Test Results

The fall-off and other analysis will be completed by a geologist and/or qualified engineer. The Reservoir Engineer will utilize the standard transient pressure analysis methods and the results will be reviewed for accuracy by a licensed professional engineer (PE). The fall-off analysis will include the following;

- A log-log plot with a derivative diagnostic plot used to identify flow regimes.
- A wellbore storage portion and infinite acting portion of the plot.
- A linear flow plot with wellbore storage, P*, and slope.
- An expanded portion of the linear flow plot showing the infinite acting pressure portion (linear flow).
- The height of the injection interval used for the calculations will be 106 feet (average of 27 feet and 185 feet) unless test data indicate a different interval should be used.
- The viscosity of the formation fluid used for the calculations will be based on historical data.
- A summary of all the equations used for the analysis.
- An explanation of any temperature or pressure anomalous.

The injection records for one year prior to the testing will be included in the analysis.

Well Data Table 1

	WDW – 1
Tubing	2.875", 7.55 lb/ft, Fluoroline Cement Lined, 3221'
Packer	5.5"x 2.875", Guiberson Tools, Uni-6, ID 1.87", 3221'
Perforations	Top of the Cliff House at 3276' 3276' – 3408', 4SPF 0.5 EHD Top of the Menefee at 3400' 3435' – 3460', 4SPF 0.5 EHD
Protection Casing	5.5", 15.5 lb/ft, 3600'
Cement Top Protection Casing	Surface
PBTD / TD	RBP at 3520', Fill Tagged on 4/20/06 at 3325' & cleaned out
Formation	Cliff House / Menefee

Injected Brine Waste Water Table 2

Chemical Date	Refinery Waste Water March 10, 1998	Refinery Waste Water Sept 27, 2005
Arsenic (mg/L)	0.014	-
Calcium (mg/L)	120	68
Magnesium (mg/L)	39	33
Potassium (mg/L)	27	-
Sodium (mg/L)	920	1659
Chloride (mg/L)	1200	2200
Sulfate (mg/L)	400	708
Alkalinity (CaCO3) (mg/L)	330	100
pH (s.u.)	7.7	8.0
Specific Gravity (g/L)	1.00 – 1.01	1.00 – 1.01

Formation Brine Waste Water Table 3

Chemical Date	Formation Water May 22, 1995
Arsenic (mg/L)	0.023
Cadmium (mg/L)	0.003
Calcium (mg/L)	375
Lead (mg/L)	0.063
Magnesium (mg/L)	99
Potassium (mg/L)	69
Selenium (mg/L)	0.006
Sodium (mg/L)	3610
Chloride (mg/L)	5370
Sulfate (mg/L)	1620
Alkalinity (CaCO3) (mg/L)	306
pH (s.u.)	8.5
Specific Gravity (g/L)	-

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, August 20, 2010 11:58 AM
To: 'Hurtado, Cindy'; Roberts, Kelly G, EMNRD
Cc: Schmaltz, Randy; Kuehling, Monica, EMNRD
Subject: RE: Bloomfield Refinery - UiCI-009 Fall-Off Test (UICI-009)
Attachments: C-103 Annual FOT 8-20-10.pdf

Cindy:

Approved. Please see attachment.

As a reminder, during the steady-state injection period prior to fall-off test (FOT) monitoring, please be sure to include the real-time injection flow rate with pressure and temperature data to verify that a steady-state flow condition was achieved prior to FOT monitoring. Also, an updated historical pressure-flow rate chart should be submitted with the fall-off test package for the disposal well.

Please contact me if you have questions. Thank you.

Please be advised that NMOCD approval of this plan does not relieve ***Western Refining Southwest, Inc.- Bloomfield Refinery*** *of responsibility should their operations pose a threat to ground water, surface water, human health or the environment. In addition, NMOCD approval does not relieve* ***Western Refining Southwest, Inc.- Bloomfield Refinery*** *of responsibility for compliance with any other federal, state, or local laws and/or regulations.*

Carl J. Chavez, CHMM
New Mexico Energy, Minerals & Natural Resources Dept.
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E-mail: CarlJ.Chavez@state.nm.us
Website: http://www.emnrd.state.nm.us/ocd/index.htm
(Pollution Prevention Guidance is under "Publications")

From: Hurtado, Cindy [mailto:Cindy.Hurtado@wnr.com]
Sent: Friday, August 20, 2010 9:31 AM
To: Chavez, Carl J, EMNRD; Roberts, Kelly G, EMNRD
Cc: Schmaltz, Randy; Kuehling, Monica, EMNRD
Subject: Bloomfield Refinery - UiCI-009 Fall-Off Test

Good Morning Carl,

Please disregard the previous e-mail concerning Bloomfield Refinery's Fall-Off Test. It did not contain the signed C-103 application. This current e-mail contains the signed C-103.

Please find attached the C-103 application for Bloomfield Refinery's Class 1 Injection Well Fall-Off Test to begin on August 29, 2010. Also attached is the Fall-Off Test Plan incorporating your request to install bottom hole gauges at 48 hours before cessation of injection and the Wellbore Diagram.

Monica Kueling with Aztec OCD is available on August 30, 2010 to witness installation of the bottom hole gauges.

A hard copy of this submittal will be mailed to your office.

Thanks,