UIC - I - ___009

GENERAL CORRESPONDENCE

YEAR(S):

2003 - Present

From:	Robinson, Kelly [Kelly.Robinson@wnr.com]
Sent:	Thursday, October 06, 2011 10:17 AM
To:	Powell, Brandon, EMNRD; Kuehling, Monica, EMNRD
Cc:	Chavez, Carl J, EMNRD; Schmaltz, Randy
Subject:	Acidization Work Scheduled for the Bloomfield Refinery Injection Well

Good Morning Brandon and Monica,

As of 10am this morning, Western Refining Southwest, Inc. (Western) was able to finalize the schedule for acidizing the injection well at the Bloomfield Refinery. Halliburton is scheduled to arrive on-site between 9am and 10am tomorrow, October 7th, 2011. I will be the Western representative who will oversee these activities. If you have any questions regarding these schedule activities, please feel free to contact me at your convenience.

Following the well acidization activities, the injection well will be returned to normal operation. I will be contacting you again next week to schedule a time that meets your schedule for conducting the Annual Fall-Off Test.

Thank you for your time, and have a great day!

Sincerely,

Kelly R. Robinson Environmental Supervisor

Western Refining Southwest, Inc.

111 County Road 4990 Bloomfield, NM87413

(o) 505-632-4166

(c) 505-801-5616

(f) 505-632-4024

(e) kelly.robinson@wnr.com

MEMORANDUM

TO: GLENN VON GONTEN

FROM: CARL CHAVEZ

SUBJECT: WEEKLY REPORT FOR THE ENVIRONMENTAL BUREAU WEEK OF June 27, 2010

DATE: July 2, 2010

ADMINISTRATIVE

• Filing of correspondence, reports, etc. - ongoing.

REMEDIATION PLANS

• See "Abatement Plans" below.

ABATEMENT PLANS

• Enterprise Products Abatement Plan Submittals S. Carlsbad CS and Trunk "A"Terminal approval w/ conditions for landfarm work plan issued.

DISCHARGE PERMITS

- GW-001: Western Bloomfield Refinery
 - Sent e-mail on June 29, 2010 to Western Refining requesting signed discharge permit with final fee... Waiting for Western to remit signed renewed discharge permit with final fee to OCD by July 15.
 - Sent reminder to H2S Contingency Plan and sharing of public notice information from Navajo Refining Company next week. Also advised that Western may want to schedule a meeting with the LEPC or local Fire Marshall to determine who does what in the event of a worst case scenario to educate the public. The Hazwoper evacuation plan was referenced.
 - *Reviewed Facility-Wide Groundwater Monitoring Plan June 2010 received 6-30-2010.*
- GW-032: Western Gallup Refinery
 - Completed "Major Modification" to discharge permit documents (Administratively Complete, Public Notice and Modified Discharge Permit) and

(i.e., G-106 and 107 Forms). Additional testing 55-7 and stats analysis using deeper geothermal wells as data points. BLM wants OCD approval (see approval above) on water quality for their records allowing discharge into the unlined pit.

- BW-028 NOV
 - Scheduled meeting for July 7, 2010 to discuss status of OCD-EB reviews of NOVs from April 2010.
- **UICI-005 NOV**
 - Received Annual Report on June 30, 2010 and currently conducting complete review of Key Energy Services, L.L.C. 2009 Annual Report in response to OCD NOV. The deadline was met with report going back to 2006. Key became the new owner of the well September 8, 1997. They apparently did not acquire the records from the seller (Sunco)....
 - Searched historical well files at OCD for GW-235 for NOV review, but was unsuccessful.
 - Processed Key Energy Services L.L.C. C-103 Sundry Notice with conditions for Fall-Off Test to commence 7/8/2010.
- UICI-009 Class I (NH) Well Western Refining Southwest, Bloomfield Refinery
 - Awaiting instructions from Mark Fesmire according to Mikal Altomare on how to proceed based on draft discharge permit posted on OCD Website on April 25, 2010 and alleged hearing request from Western. The final discharge permit is pending further instructions or order for issuance of final discharge permit. Glenn said he'd check with Mikal Altomare about this on 6/22/2010.

GEOTHERMAL

Working Groups:

- Reviewed California's recent Geothermal Regulatory changes for final recommendations to consider before 7/30/2010 and to submit to ECMD for consideration in the report to Governor. Particularly interested in technical recommendations, since OCD Engineering Bureau did not respond to first request for recommendations.
- *Reviewing draft forms and resource webpage from Mikal A.*

PART 36 - SURFACE WASTE MANAGEMENT FACILITY PERMITS:

AUTHORIZATION TO MOVE PRODUCED WATER:

From: Sent: To: Subject: Altomare, Mikal, EMNRD Friday, April 16, 2010 5:24 PM Jones, William V., EMNRD; Chavez, Carl J, EMNRD; Macquesten, Gail, EMNRD FW: Western Refining: Injection Well

Fyi – just received from counsel for WRSW. Stay tuned...



Assistant General Counsel Oil Conservation Division Energy, Minerals & Natural Resources Department 1220 South St. Francis Drive Santa Fe, NM 87505 Tel 505.476.3480 ~ Fax 505.476.3462 <u>mikal.altomare@state.nm.us</u>

From: Edmund H. Kendrick [mailto:EKendrick@montand.com] Sent: Friday, April 16, 2010 5:23 PM To: Altomare, Mikal, EMNRD Subject: Western Refining: Injection Well

Mikal,

As we discussed on Tuesday (4/13), Western has gone ahead and provided public notice this week of the discharge permit renewal application. Western will be providing OCD with proof of that public notice shortly. Also Western has drafted a request for public hearing for review by Western management. I will forward that request to you as soon as possible on Monday (4/19).

Ned

Edmund H. Kendrick Attorney at Law Montgomery & Andrews, P.A. 325 Paseo de Peralta (87501) P.O. Box 2307 Santa Fe, NM 87504-2307 <u>ekendrick@montand.com</u> (505) 986-2527 (direct dial) (505) 982-4289 (fax)

THIS MESSAGE MAY BE SUBJECT TO ATTORNEY-CLIENT PRIVILEGE OR CONTAIN CONFIDENTIAL INFORMATION OR ATTORNEY WORK PRODUCT. UNLESS YOU ARE THE ADDRESSEE (OR AUTHORIZED TO RECEIVE FOR THE ADDRESSEE), YOU MAY NOT USE, COPY, OR DISCLOSE TO ANYONE THE MESSAGE OR ANY INFORMATION CONTAINED IN THE MESSAGE. IF YOU HAVE RECEIVED THIS MESSAGE IN ERROR, PLEASE ADVISE THE SENDER BY REPLY E-MAIL [ekendrick@montand.com], AND DELETE THE MESSAGE. THANK YOU.

From: Sent: To:

Subject:

Attachments:

Altomare, Mikal, EMNRD Monday, April 19, 2010 11:51 AM VonGonten, Glenn, EMNRD; Macquesten, Gail, EMNRD; Chavez, Carl J, EMNRD; Perrin, Charlie, EMNRD FW: Western Refining: Injection Well Letter to Mark Fesmire 4-19-10 (00180814).PDF

Fyi



Assistant General Counsel Oil Conservation Division Energy, Minerals & Natural Resources Department 1220 South St. Francis Drive Santa Fe, NM 87505 Tel 505.476.3480 ~ Fax 505.476.3462 <u>mikal.altomare@state.nm.us</u>

From: Edmund H. Kendrick [mailto:EKendrick@montand.com] Sent: Monday, April 19, 2010 11:48 AM To: Altomare, Mikal, EMNRD Subject: Western Refining: Injection Well

Mikal,

Following up on my Friday (4/16) email, I am attaching Western's request for a public hearing on its discharge plan permit renewal application. The original is being hand delivered to Mr. Fesmire.

Ned

Edmund H. Kendrick Attorney at Law Montgomery & Andrews, P.A. 325 Paseo de Peralta (87501) P.O. Box 2307 Santa Fe, NM 87504-2307 <u>ekendrick@montand.com</u> (505) 986-2527 (direct dial) (505) 982-4289 (fax)

THIS MESSAGE MAY BE SUBJECT TO ATTORNEY-CLIENT PRIVILEGE OR CONTAIN CONFIDENTIAL INFORMATION OR ATTORNEY WORK PRODUCT. UNLESS YOU ARE THE ADDRESSEE (OR AUTHORIZED TO RECEIVE FOR THE ADDRESSEE), YOU MAY NOT USE, COPY, OR DISCLOSE TO ANYONE THE MESSAGE OR ANY INFORMATION CONTAINED IN THE MESSAGE. IF YOU HAVE RECEIVED THIS MESSAGE IN ERROR, PLEASE ADVISE THE SENDER BY REPLY E-MAIL [ekendrick@montand.com], AND DELETE THE MESSAGE. THANK YOU.

From:Chavez, Carl J, EMNRDSent:Tuesday, April 13, 2010 4:48 PMTo:'Schmaltz, Randy'Subject:RE: Bloomfield Inj Well Public Notice

Approved. Thank you.

Please note that OCD 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.

1

Carl J. Chavez, CHMM New Mexico Energy, Minerals & Natural Resources Dept. Oil Conservation Division, Environmental Bureau 1220 South St. Francis Dr., Santa Fe, New Mexico 87505 Office: (505) 476-3490 Fax: (505) 476-3462 E-mail: <u>CarlJ.Chavez@state.nm.us</u> Website: <u>http://www.emnrd.state.nm.us/ocd/</u>index.htm (Pollution Prevention Guidance is under "Publications")

From: Schmaltz, Randy [mailto:Randy.Schmaltz@wnr.com]
Sent: Tuesday, April 13, 2010 4:44 PM
To: Chavez, Carl J, EMNRD
Subject: Bloomfield Inj Well Public Notice

Carl,

I have made the requested change to the notice. The Spanish version will replicate the English version. The change is highlighted in red.

Thanks for your help!

Randy Schmaltz Environmental Manager

Western Refining Southwest, Inc. Bloomfield Refinery #50 County Road 4990 Bloomfield, New Mexico 87413 (505) 632-4171 (505) 320-6989 email: <u>randy.schmaltz@wnr.com</u>

NOTICE OF PUBLICATION

Notice is hereby given that pursuant to New Mexico Water Quality Control Commission Regulations (20.6.23108 NMAC), the following discharge permit application(s) has been submitted to the Director of the New Mexico oil Conservation Division ("NMOCD"), 1220 S. Saint Francis Drive, Santa Fe, New Mexico 87505, Telephone (505) 476-3440:

(UICI – 009) Western Refining Southwest, Inc. - Bloomfield Refinery James R. Schmaltz, Environmental Manager, # 50 Road 4990 or PO Box 159, Bloomfield, New Mexico 87413 has submitted a renewal application for a Class 1 (non-hazardous) Injection Well Discharge Permit UIC- CLI- 009 (GW-130) for Disposal Well No. 1 (API#30-045-29002) located in the NE/4, SE/4 of Section 7, Township 29 North, Range 11 West, NMPM, San Juan County, New Mexico. The injection well is located within the refinery property approximately 1.05 miles south of the intersection of Hwy-544 and Hwy 550 on Hwy-550 turn East on Road 4990 about 0.5 mile to the refinery. Oil field exempt and non-exempt non-hazardous industrial waste water generated through refining operations and remediation activities will be injected into Disposal Well No. 1 for disposal into the Cliff House Formation in the injection intervals from 3276 to 3408 feet and Menefee Formation in the injection interval from 3435 to 3460 feet. The Total Dissolved Solids (TDS) concentration of injected waste fluid is about 15,600 mg/L. The TDS of the formation fluids is about 25,000 mg/L. Groundwater most likely to be affected by a spill, leak or accidental discharge is at a depth of approximately 10 to 30 feet below the ground surface, with a TDS concentration of about 200 mg/L. The discharge plan addresses well construction, operation, monitoring, associated surface facilities, and provides a contingency plan in the event of accidental spills, leaks, and other accidental discharges in order to protect fresh water.

The NMOCD has determined that the application is administratively complete and has prepared a draft permit. The NMOCD will accept comments and statements of interest regarding this application and will create a facility-specific mailing list for persons who wish to receive future notices. Persons interested in obtaining further information, submitting comments or requesting to be on a facility-specific mailing list for future notices may contact the Environmental Bureau Chief of the Oil Conservation Division at the address given above. The administrative completeness determination and draft permit may be viewed at the above address between 8:00 a.m. and 4:00 p.m., Monday through Friday, or may be also be viewed at the NMOCD web site http://www.emnrd.state.nm.us/ocd/. Persons interested in obtaining a copy of the application and draft permit may contact the address above. Prior to ruling on any proposed discharge permit or major modification, the Director shall allow a period of at least (30) days after the date of publication of this notice, during which interested persons may submit comments or request that NMOCD hold a public hearing. Requests for a public hearing shall set forth the reasons why a hearing should be hold. A hearing will be held if the Director determines that there is significant public interest.

If no public hearing is held, the Director will approve or disapprove the proposed permit based on information available, including all comments received. If a public hearing is held, the director will approve or disapprove the proposed permit based on information in the permit application and information submitted at the hearing.

.

From:	Altomare, Mikal, EMNRD
Sent:	Friday, April 09, 2010 4:04 PM
То:	ekendrick@montand.com
Cc:	Macquesten, Gail, EMNRD; Chavez, Carl J, EMNRD; Jones, William V., EMNRD; VonGonten, Glenn, EMNRD; Perrin, Charlie, EMNRD
Subject:	Western Refining Southwest, Inc. Class I Waste Disposal Well no. 1, pending renewal UIC-I-9
Attachments:	2010 4-9 letter to counsel Kendrick re permit renewal notice.pdf

Importance:

High

Mr. Kendrick,

Please find attached correspondence of today's date which is also being sent by United States Mail.

Sincerely, Mikal Altomare



Assistant General Counsel Oil Conservation Division Energy, Minerals & Natural Resources Department 1220 South St. Francis Drive Santa Fe, NM 87505 Tel 505.476.3480 ~ Fax 505.476.3462 <u>mikal.altomare@state.nm.us</u> New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson Governor

Jon Goldstein Cabinet Secretary Jim Noel Deputy Cabinet Secretary Mark Fesmire Division Director Oil Conservation Division



April 9, 2010

EDMUND H. KENDRICK Montgomery & Andrews PA P.O. Box 2307 Santa Fe, NM 87504-2307 *Also via email: <u>ekendrick@montand.com</u>*

Re: WESTERN REFINING SOUTHWEST, INC. – (OGRID 037218) Class I Waste Disposal Well No. 1, API No. 30-045-29002 Discharge Plan Permit Renewal Application for UIC-I-9

Dear Mr. Kendrick,

This is in response to your correspondence dated March 25, 2010 regarding the request made by your client, Western Refining Southwest Inc. (WRSW), that the OCD withdraw public notice issued relating to the proposed Discharge Plan Permit Renewal of UIC-I-9.

In the OCD's view, there are two separate issues raised by the March 25, 2010 letter: the procedural issue of WRSW's notice obligations pursuant to WQCC Rules, and the substantive issue relating to what the appropriate maximum surface injection pressure is for this well should the permit be renewed by the OCD under WQCC Regulations. Vague reference was made to "other" substantive issues with the permit, but these were not specifically identified and are therefore not being addressed at this time. Each of the two issues specified in the March 25th letter is addressed in further detail, below.

PUBLIC NOTICE ISSUE:

As WRSW notes in its March 25th letter, WQCC Regulations require operators to provide public notice within 30 days of the OCD deeming an application for discharge permit renewal "administratively complete." 20.6.2.3108(C) NMAC. As you are aware, the OCD deemed WRSW's application for renewal of UIC-I-9 "administratively complete" on February 25, 2010, meaning WRSW's deadline to provide public notice was March 27, 2010. The OCD notes that WRSW waited until two days prior to its deadline to raise concerns regarding the notice.

WRSW's statement that it would be "impossible" to provide public notice in this case is incorrect. Despite WRSR's assertion to the contrary, WRSW is not required to specify a maximum surface injection pressure in the public notice made pursuant to WQCC Rules 20.6.2.3108(C) and (F). The Rules require only that it include the following:

- (1) the name and address of the proposed discharger;
- (2) the location of the discharge, including a street address, if available, and sufficient information to locate the facility with respect to surrounding landmarks;



- (3) a brief description of the activities that produce the discharge described in the application;
- (4) a brief description of the expected quality and volume of the discharge;
- (5) the depth to and total dissolved solids concentration of the ground water most likely to be affected by the discharge;
- (6) the address and phone number within the department by which interested persons may obtain information, submit comments, and request to be placed on a facility-specific mailing list for future notices; and
- (7) a statement that the department will accept comments and statements of interest regarding the application and will create a facility-specific mailing list for persons who wish to receive future notices.

See 20.6.2.3108(F) NMAC. Public notice made by the applicant does not need to "match" that made by the department. Indeed, the notice provided by the department is required by the WQCC Regulations to be more detailed as, when it is made in the way it was in this case, it constitutes *combined public notice* for purposes of Subsections "E" and "H" as provided by 20.6.2.3108(J) NMAC. While Subsection "E" only requires the department to provide the same above-enumerated information that the applicant is required to provide in its notice (as set out in Subsection "F"), Subsection "H" imposes an additional obligation on the department to provide more detailed and technically specific public notice than that required by Subsection "E" (or that which is required of the applicant) because the department must also make available a draft of the proposed permit. In this context, the department chooses to make the substance of its notice provided in this case by the department for WRSW's waste disposal well was technically detailed and included specifications such as the maximum surface injection pressure. In contrast, WRSW can (and could have) issue(d) public notice in this case <u>without</u> specifying the maximum surface injection pressure and will still meet the requirements of 20.6.2.3108(C) and (F) NMAC.

SUBSTANTIVE PERMIT ISSUES:

The March 25, 2010 correspondence goes into great detail regarding WRSW's objection to the reduction of the pressure limit for this well. As you know, the increased pressure of the reservoir is an issue of which WRSW has been aware since before the 2007 fall-off test (FOT), and which was specifically brought to the attention of WRSW by the OCD after the 2007 FOT. The OCD was assisted in the FOT data software evaluation by the EPA at the OCD's request in October of 2008. Further discussions continued into 2009 between the WRSW and OCD with the OCD discussing with WRSW the concerns of the OCD and the EPA regarding propagation of existing fractures and potential for new fractures at the current discharge permit limit. WRSW will recall that in June of 2009 a telephone conference call was conducted between WRSW and the OCD at which time this issue was specifically discussed. At that time WRSW informed the OCD that it felt that the pressure increase was due to a well bore "skin effect" problem and that it would like an opportunity to attempt stimulation of the well to address and overcome the "skin effect." The OCD advised WRSW at that time that neither it nor the EPA felt the problem was attributable to a wellbore "skin effect" as the FOT results were representative of the formation outward, away from the wellbore. However, the OCD agreed to give WRSW an opportunity to at least try the acid stimulation approach to see if it would be successful in remedying the situation. Also, during the June 2009 conference call with the OCD, WRSW acknowledged that if the acid stimulation was not successful it would then have to consider drilling another well for disposal.

In an email on June 18, 2009, the OCD further informed WRSW regarding additional concerns it had discussed with the EPA, and options for addressing those concerns. Also at that time the OCD informed WRSW that it appeared that WRSW was operating in violation of the conditions of its permit because, by continuing to inject at 1150 psig, <u>WRSW was causing existing fractures to increase or actively inducing new fractures</u> to grow or develop (a violation of the permit).

It appears that WRSW first attempted an acid stimulation in July 2009, which WRSW deemed unsuccessful, and that a second acid stimulation was then performed in September 2009. Our understanding is that the acid stimulation(s) yielded at best a short-lived and/or marginal improvement in the reduction of pressure and increase in injection rate, and that as of early February 2010, even at a reduced 50% rate of injection due to what WRSW has referred to as "idling of the facility," (which occurred in December of 2009) the well was again operating at a pressure approaching the maximum discharge permit limit. In fact, OCD reviewed the pressure, flow rate v. time chart from 1995 to 2010 and noticed that the operating pressure was approaching the 1150 psig discharge permit limit regardless of what the injection rate into the well was, indicating the formation was over-pressured or filled up. The radioactive survey and fall-off testing were conducted in September and October, 2009 with the FOT report being completed on November 18, 2009. An annual report was provided to the OCD by WRSW on January 29, 2010.

The OCD reviewed the FOT report results and annual report and concluded that the concerns regarding pressure were not assuaged by the data presented therein. On February 3, 2010 the OCD advised WRSW by email that it would be calculating the maximum allowable surface injection pressure for this well for purposes of the permit renewal by using the *pressure, flow rate v. time chart* from 1995 to 2010 for the history of the well operations and the FOT data completed in 2009, and requested some additional data from WRSW for purposes of performing these calculations. At that time, the OCD specifically informed WRSW that the new limit was likely to be significantly less than the current assigned limit. WRSW responded to the email by providing some of the requested materials for the calculations (the OCD was able to obtain the rest from OCD files), but at no time did WRSW comment regarding either the OCD's means for calculating the new maximum surface injection pressure limit or the fact that it was anticipated to be significantly less than before.

On February 22, 2010 the OCD informed WRSW via email that the OCD anticipated having a draft permit ready for dissemination later in the week and that it had completed the calculations for the maximum allowable surface injection pressure. The OCD advised that the new injection pressure limit for the UIC-I-9 renewal "...has been reduced to 600 psig in the discharge permit in order to prevent the half-fractures from growing in the present injection formation." On February 23, 2010, the OCD spoke with WRSW by telephone to further discuss the reduction in maximum surface injection pressure limit. The OCD advised WRSW regarding how the OCD arrived at the 600 psig figure and referred to and discussed a previously issued order under which WRSW was required to monitor and report fracturing, a step-rate test and a historical flow-rate, pressure v. time chart for the well, as well as the OCD's persisting concerns (including the concerns regarding fracturing). The OCD advised WRSW that the 600 psig was a final determination and that if WRSW disagreed, it could request a hearing on the matter.

Discharge permits for Class I nonhazardous waste disposal wells are issued and, when appropriate, renewed pursuant to Sections 20.6.2.3000-3999 (addressing discharge permits, generally) as well as

Sections 20.6.2.5000-5299 (addressing underground injection wells, specifically) of the WQCC Regulations, and must comply with both. Section 20.6.2.3109 NMAC sets out the basic framework for the approval, disapproval, renewal, modification and termination of discharge permits, and provides that "[t]he secretary shall, within 30 days after the administrative record is complete and all required information is available, approve, <u>approve with conditions</u> or disapprove the proposed discharge permit, modification or <u>renewal</u> based on the administrative record." *Emphasis added*. In order to be approved, in addition to meeting all other requirements, <u>an operator seeking renewal of a Class I permit must establish in its application for renewal that "neither a hazard to public health nor undue risk to property will result" if approved. Id. at (C). *Emphasis added*. Subsection "H" specifically prohibits the approval of a discharge plan renewal which "may result in a hazard to public health." Id. at (H).</u>

Indeed, even where an operator's permit is not on review for renewal, the department has the authority – and the duty – to require a modification of the permit (or if that is not adequate, to *terminate* that permit), where data submitted to the department reveals that the WQCC discharge permit regulations are being violated, or that continued operation under the current permit conditions may result in a hazard to public health or undue risk to property. Subsection "E" of Section 20.6.2.3109 NMAC provides in relevant part:

If data submitted pursuant to any monitoring requirements specified in the discharge permit or other information available to the secretary indicates that this part is being or may be violated

(3) The secretary may require modification, or may terminate a discharge permit for a class I nonhazardous waste injection well, ...pursuant to the requirements of Subsection I of 20.6.2.5101 NMAC.

20.6.2.3109(E) NMAC. Emphasis added.

Subsection I of 20.6.2.5101, referenced above, provides in relevant part:

If data submitted pursuant to any monitoring requirements specified in the discharge permit or other information available to the secretary <u>indicate that this Part are being or</u> <u>may be violated</u>, the secretary may require modification or, if it is determined by the secretary that the modification may not be adequate, may terminate a discharge permit for a Class I non-hazardous waste injection Well, or Class III well or well field, that was approved pursuant to the requirements of this under Sections 20.6.2.5000 through 20.6.2.5299 NMAC for the following causes:

- (1) Noncompliance by the discharger with any condition of the discharge permit; or
- (2) The discharger's failure in the discharge permit application or during the discharge permit review process to disclose fully all relevant facts, or the discharger's misrepresentation of any relevant facts at any time; or
- (3) <u>A determination that the permitted activity may cause a hazard to public health or undue risk to property and can only be regulated to acceptable levels by discharge permit modification or termination.</u>

20.6.2.5101(I) NMAC. *Emphasis added*. Section 20.6.2.5206(A)(1) provides that "the maximum injection pressure at the wellhead shall not initiate new fractures or propagate existing fractures in the confining zone...," and Section 20.6.2.5206(B)(1) provides that "[e]xcept during well stimulation, the maximum

injection pressure shall not initiate new fractures or propagate existing fractures in the injection zone." Section 20.6.2.5206(A)(1) and (B)(1) NMAC.

The regulatory duties of the department include ensuring that any discharge permit issued or renewed meets the specific requirements set out in the WQCC regulations. This includes ensuring that any permit issued or renewed will not create a hazard to public health or an undue risk to property. If such circumstances exist with regard to a currently in-force permit, these duties include the duty to impose modifications – or if appropriate, to terminate the permitted activity - in order to "regulate the risk to acceptable levels." *Id.*

In this case, with regard to the application for renewal of UIC-I-9, the record reflects that WRSW is in fact violating Part 2 of the WQCC regulations. Specifically, the maximum injection pressure being used at the wellhead at this well (the 1150 psig for which it is currently permitted) is initiating new fractures and/or propagating existing fractures in the confining and/or injection zones at this location. Further, this poses a concern to all wells within one mile of the injection well that lack cement in the injection zone(s). WRSW was advised long ago that this was an issue and of concern for both the EPA and the OCD, and WRSW was given an opportunity to see if could remedy the pressure issue through well stimulation. The OCD has reviewed the most recent FOT data and has concluded that continued surface injection pressure greater than 637 psig may create a hazard to public health and/or an undue risk to property because continued injection at a rate above this parameter will result in continued fracturing, fracture growth, and possibly vertical fracturing to occur upward into regional aquifer systems, protectable ground water, and possibly even surface water discharges along the San Juan River. This continued fracturing will also constitute an ongoing violation of WQCC Section 20.6.2.5206 NMAC, as well as of the conditions of the discharge permit (which also prohibit injection at a rate that results in fracture creation or propagation).

The OCD has reviewed the current and historical data for this well and, applying a reasonable safety factor range to the upper-threshold determination of 637 psig as noted above, has determined that a safe surface injection pressure for this well would 600 psig or less, such that the risk of fracture propagation/creation would be cease if maintained at or below this level, but would be unacceptable above this pressure limit. This modification to the permit draft was made pursuant to the OCD's regulatory obligations and authority, and WRSW's request for a renewal of its permit was approved with conditions pursuant to Section 20.6.2.3109 NMAC. The OCD notes that based upon the most recent data for this well and the fact that WRSW is currently operating in violation of Section 20.6.2.5206 NMAC, even if the permit were not on review for renewal at this time, the department would be requiring a permit modification or termination pursuant to Sections 20.6.2.3109(E) and 20.6.2.5101(I) for the purpose of regulating this well to acceptable levels (such that the growth/creation of new fractures has ceased and the potential for a hazard to public health and/or undue risk to property has been minimized).

WRSW has proposed that the OCD withdraw the notice issued on February 25, 2010 so that it and the OCD can "meet and discuss any issues concerning an appropriate maximum injection pressure." However, it is important to recognize that, as discussed above, discharge permits are issued pursuant to this agency's regulatory authority and obligations. Permits are not contractual agreements between operators and the department, and do not represent the memorialization of a compromise between two parties. Rather, the OCD is obliged to review data and information submitted by parties within very specifically defined

parameters, to apply specific standards to that information, and to issue, decline to issue or issue modified versions of permits or even terminate the permit accordingly. Thus we respectfully decline WRSW's suggestion to meet to further discuss this matter.

That being said, the OCD feels that the matter has already been discussed in full between it and WRSW over the course of the past year, that it understands WRSW's position with regard to its perception that a higher injection pressure is justified, and, as the OCD has already advised WRSW, the OCD disagrees with the findings and conclusions of WRSW regarding this well. As you know, the OCD issued public notice regarding the draft permit. The public notice not only invited comments from interested parties, but also included a statement that interested parties could request a hearing regarding the proposed permit, and specification that such requests should be submitted in writing and should specify the basis for the request.

At this time, if WRSW feels that it would like to further address the contents of the proposed permit renewal for UIC-I-9, the appropriate course of action would be for WRSW to submit a written request for hearing as provided in the OCD's public notice. If WRSW has data or expert testimony it feels that the OCD has not considered or has failed to consider adequately in its review of the application for permit renewal, it can present such evidence at the hearing. WRSW also mentioned in the 3/25/10 letter, although not with any specificity, that there are "other" issues of concern with the permit draft. A hearing would also allow WRSW to address those concerns. Of course, WRSW will be required to take immediate steps to provide the public notice for which it has already technically missed the deadline.

If upon further reflection WRSW opts not to request a hearing, and prefers to simply allow the permit renewal process to proceed, if WRSW immediately remedies the applicant notice issue, the OCD will recalculate the public notice time period accordingly and proceed with issuance of the final permit thereafter. Conversely, if WRSW does not request a hearing and continues to refuse to fulfill its obligations for public notice, and <u>if no public notice has been provided by WRSW by **Friday April 16, 2010**, the OCD will consider the application for renewal **withdrawn**, and the current permit, UIC-I-9, **expired**.</u>

If WRSW is still concerned regarding meeting its obligations under the notice regulations and would like the OCD to review its public notice prior to publication, the OCD would be happy to review a draft and provide feedback regarding whether it appears to meet the requirements of the WQCC regulations. Please let us know if this is something with which WRSW would like assistance.

Sincerely,

ShO Ce

Mikal Altomare OCD Attorney

EC: Carl Chavez, <u>carl.chavez@state.nm.us</u> William Jones, <u>William.v.jones@state.nm.us</u> Gail MacQuesten, <u>Gail.macquesten@state.nm.us</u> Glenn von Gonten, <u>glenn.vongonten@state.nm.us</u> Charlie Perrin, <u>Charlie.perrin@state.nm.us</u>



RECEIVED OCD

2的 4月 ~7 户 1:14

and shall a start of the base of the second start of

NNR

April 5, 2010

Mr. Carl Chavez New Mexico Oil Conservation Division 1220 South St. Frances Dr. Santa Fe, New Mexico 87505

Re: Response to OCD February 3, 2010 Email UIC Class 1 Disposal Well UICI-009 Western Refining Southwest, Inc. Class I Non-Hazardous Disposal Well Waste Disposal Well No. 1, API No. 30-045-29002 2442 FSL and 1250 FEL UL: I Section 27, T29N, R11W

Dear Carl,

Western has prepared the following response to the issues listed in your email dated February 3, 2010.

FOT Issues:

Issue #1: First, the OCD alerted Western in a prior e-mail that the bottom hole gauges for the 2009 FOT should have been installed at least 48 hours before cessation of injection instead of two hours before shut-off.

<u>Response #1:</u> Western acknowledges this issue and will incorporate this change in future Fall Off tests.

Issue #2: OCD notices that fracture half-lengths were on the order of 3,000 ft, which is greater than the ½ mile that the UIC Class II Disposal Well was originally designed for. The well later became a UIC Class I Well and the AOR that OCD requires is 1 mile unless the operator can demonstrate an AOR less than 1 mile from actual formation hydrogeologic properties, etc. The OCD is aware of at least one well located at just greater than ½ mile from the Class I well, which lacks cement across the Mesa Verde Group.

<u>Response #2:</u> The report does calculate a fracture half length but does not attempt to describe the geometry of the fracture. The fracture half length or total length of all fractures in communication with the wellbore along with the effects of lenticular sands is calculated to describe the injection behavior of the well. Since the simple fracture half

length does not tell how many fractures nor the orientation of the fractures, there is no basis to deviate from the designated formula for estimating a radius to the edge of the injected fluid. The "Evaluation of Disposal Well #1" report prepared by William M. Cobb & Associates, Inc. also calculates the radius to the edge of the injected fluid (R_{waste}) which is 1,220 feet.

In calculating the radius to the edge of the injected fluid and the fracture half length, net pay (also known as the injection zone) of 106 feet was used. The actual radius will vary based on the net feet occupied by the injected fluid. The 106 feet used in the report is a conservative number causing the radius of the waste to be overstated at 1,220 feet. If any fluid moves into the Menefee formation immediately below the Cliff House injection zone, or if the effective net pay is more than 106 feet as indicated by the 1992 geologic report, then the radius would be further reduced and the requirement is still met.

The 1992 geologic report indicates that the Cliff House formation has an expected net thickness of 114 feet in the vicinity of the injection well. This zone consists of northwest trending shoreline type benches which contribute to the linear flow character seen in Disposal Well #1 and to the long fracture length. The report shows that expected net pay varies from a low of 107 feet to a high of 155 feet. Using these net pay numbers would reduce the calculated radius to the edge of the injected fluid (R_{waste}).

The 1992 geologic report notes that the Menefee, immediately below the Cliff House has an expected thickness of 600 feet and consists of sands deposited in channel or deltaic environments. This depositional environment would account for the linear flow observed and for fracture half lengths longer than expected based on the size of the 1996 frac job.

<u>Issue #3:</u> Well bore diagrams with cement evaluation were not provided by Western as required by the OCD in the June 24, 2009 e-mail with path forward based on formation pressure issues.

<u>Response #3:</u> Well bore diagrams that are available are attached. Although the Calvin #1 well construction diagram was not available, the information stated on Form C-103 dated December 17, 1962 shows that the 2nd stage cement was placed from 1,916 feet to approximately 916 feet. Thus, there is a good cement plug isolating the injection zone from the lower most groundwater aquifer. The Form C-103 is attached.

<u>Issue #4:</u> Western proposes to fracture the lower interval, install a filtration system, and stimulate the well again in the FOT report.

<u>Response #4:</u> Western has stimulated the well, and has installed the filtration system. Due to the results, the fracturing of the lower interval is not being considered at this time.

<u>Issue #5:</u> The operator did not provide the EPA 40 CFR 146.6(a)(2) formula and calculations to determine the radium of endangering influence from the injection well to ensure that it has not surpassed the 1-mile AOR.

<u>Response #5:</u> The radius of endangering influence was calculated using the 40 C.F.R. § 146.6 equations. Using the 556,032,672 gallon cumulative injection volume as of the 2009 Fall Off Test, the radius of endangering influence is 541 feet. When the cumulative injection volume reaches 1,200 million gallons, the radius of endangering influence will be 794 feet. The calculations are attached.

UIC Class 1 Disposal well Renewal Issues:

<u>Issue #6:</u> Based on the fracture ½ lengths from the FOT and lack of depressurization (~19 psig) during the 12 day fall-off, the OCD has alerted the operator that the formation appears to be overpressured at the permitted maximum injection pressure of 1150 psig. The OCD with the assistance of the EPA who evaluated the 2009 FOT, indicated that fractures would continue to grow under the existing OCD permit.

<u>Response #6:</u> In Western's opinion, there is no engineering basis to reduce the injection pressure. Based on actual data collected by Western, it is not possible for the fractures to be growing at this time.

Figure 1



Fracture Treatment Data

BHTP – Bottom Hole Treating Pressure BPM – Barrels Per Minute SLR – Slurry Rate



Figure 2 Fracture Treatment Data

Figures 1 and 2, above, were generated using the same data from the March 1, 1996 Postfrac Treatment Summary. Figure 1 depicts the pressure and slurry rate versus time. To enhance detail, Figure 2 has a larger scale than Figure 1. These figures show the following:

1) the formation pressure at initiation of treatment was 2,091 psig (0.64 psi/ft) as seen in Figure 1;

2) the formation parting pressure was 2,866 psig (0.88 psi/ft) as seen in Figures 1 and 2; and

3) the propagation pressure is approximately 2,775 psig (0.85 psi/ft) as seen in Figures 1 and 2.



Figure 3, above, depicts bottom hole pressure and injection pressure history versus cumulative injection volume from initiation of injection to near present. The figure also depicts the formation pressure change from cumulative injection (black line), formation parting pressure (red line), propagation pressure (green) and permitted maximum injection pressure (blue line).

At approximately 530 million cumulative gallons, the corresponding pressures from the graph are:

•	Formation Parting Pressure	2,866 psig
ø	Propagation Pressure	2,775 psig
٠	Bottom Hole Pressure	2,450 psig
0	Injection Pressure	~1,150 psig

To propagate a fracture, bottom hole pressure would have to be in excess of the propagation pressure. The bottom hole pressure, which corresponds to the permitted maximum injection pressure (1,150 psig), is approximately 2,450 psig. When approaching the permitted maximum injection pressure, there is an approximate 325 psi cushion between the bottom hole pressure and the propagation pressure. This confirms that historical bottom hole pressures are below 2,500 psig and cannot be propagating fractures. It is not possible for the fractures to be growing at this time.

When fluid is injected into a zone, the pressure will increase unless the zone is frictionless and infinitely large. As such, Western recognizes that some increase in average reservoir pressure has occurred and/or will occur. The formation pressure change from the cumulative injection curve shows that the predicted formation pressure at 1,200 million gallons will be less that 2,500 psig. This curve confirms that formation pressure will not approach progagation pressure within the Discharge Plan Renewal permit period (5 years).

The formation pressure of 2,091 psig at the initiation of the May 1, 1996 fracture treatment is indicative of a tight formation. Due to the tight formation, the 0.2 psi per foot "rule of thumb" does not logically apply. If the maximum injection pressure is reduced to 600 psi, flow to the formation is not possible because formation pressure would be higher than the combined injection pressure plus hydrostatic pressure.

The "lack of depressurization (\sim 19 psig)" is a function of final flow rate prior to test, of the reservoir geometry, and of total injected fluid pad size. With linear flow systems, the expected pressure change will normally be less than for a radial flow system. It is possible to generate a higher pressure drop during a fall off test. To do so, would require that flow rates prior to the fall off test be increased significantly in excess of normal water disposal rates. Examination of the linear flow pressure buildup equation,

$$X_{f}\sqrt{k} = \frac{4.064\,qB}{m_{L}h}\sqrt{\left(\frac{\mu}{\phi c_{t}}\right)}$$

shows this to be the case. In this equation, all variables are constant except for the flow rate, q, and the linear build-up slope, $m_{L_{\rm L}}$ To increase the pressure drop, the flowrate must increase so that $m_{\rm L}$ will increase. With the gauges used, high quality pressure data is obtained and can be adequately analyzed. As such, Western Refining sees no purpose in increasing injection rates prior to conducting fall off tests.

<u>Issue #7:</u> Western has attempted to stimulate the well a couple of times to improve the injection flow rate and lower the injection pressure, which helped, but after reviewing the annual report when operations were idled during the month of December 2009, the flow rate decreased by about 50% to 36 gpm from about 90 gpm at an average injection pressure of 957 psig, which indicates even at a 50% reduction in flow, the pressure is still near 1000 psig (close to the permit pressure). Western added a filtration system in December of 2009 and in the annual report for 2009 wants to continue under the discharge permit as it exists. This may work during the idling of the plant? The operator acknowledges that it would still be required to comply with the discharge permit and run annual FOTs. The annual FOTs may continue to show over pressurization of the formation with negative skin and increased fracture ½ lengths?

<u>Response #7:</u> In Western's opinion, there is no engineering basis to reduce the injection pressure because the formation is not and has not been over-pressured. Thus, the fracture $\frac{1}{2}$ lengths have not increased. See the discussion above in Response #6.

Path Forward:

<u>Issue #8:</u> OCD requires ASAP the injection flow rate vs. pressure vs. time plot for the entire history of well operations for UIC Class I Disposal Well by COB next week. OCD will use this to derive the maximum allowable surface injection pressure for the UIC Class I Disposal Well discharge permit renewal. However, the pressure will likely be significantly less; however, the proposed work below may solve the problem. If the operator is displeased with the allowable pressure, it may seek an OCD hearing to divulge the technical basis for allowing the existing permit pressure to remain. The operator may want to perform another Step-Rate Test to determine if a higher pressure may be allowed?

<u>Response #8:</u> Western has provided this information in the "Evaluation of Disposal Well # 1", report, Figure 7 and again in the "2009 Annual Bottomhole Pressure Surveys and Pressure Falloff Tests for Waste Disposal Well #1", Figure 11. See discussion above. The plot has been updated to show parting pressure and propagation pressure.

<u>Issue #9:</u> Western will need to proceed with the recommendations made in the 2009 FOT Report, of which, the filtration system has already been installed.

<u>Response #9</u>: No recommendations were made in the 2009 FOT report, however recommendation were made in the "Evaluation of Disposal Well #1" report. Western has installed the filtration system, and has re-stimulated the well as recommended. Due to the results, Western is not considering the fracture treatment at this time.

If you need more information, please contact me at (505) 632-4171.

Sincerely,

James R. Schmaltz Environmental Manager Western Refining Southwest, Inc. – Bloomfield Refinery

cc: Allen Hains – Western Refining El Paso

WELL BORE DIAGRAMS

SERVOIR	'ERDE	×	ţA	£	RED CLIFFS	AND COAL		AND COAL		A		· ,	RED CLIFFS	AND SAND	A ⁻	A	R	1	AND COAL		AND COAL	Ā	Ē.	AND COAL	3A	\$A	RED CLIFFS
뀖	MESAV	DAKOT	CHACR	GALLU	PICTUF	FRUITL		FRUITL		CHACE		N CO	PICTUF	FRUITL	DAKOT	DAKOT	CHACE	N CO	FRUITL		FRUITL	DAKOT	GALLU	FRUITL	CHACF	CHACF	PICTU
OPERATOR	WESTERN REFINING	BP AMERICA	XTO ENERGY, INC	XTO ENERGY, INC	Pre-Ongard	HOLCOMB O&G	PRE-ONGARD WELL OPERATOR	HOLCOMB O&G	Pre-Ongard	XTO ENERGY, INC	HOLCOMB OIL & GAS INC	AMOCO PRODUCTIO	Burlington	MANANA GAS INC	Burlington	Burlington	MANANA GAS INC	AMOCO PRODUCTIO	Burlington	Pre-Ongard	HOLCOMB O&G	XTO ENERGY, INC	Burlington	Burlington	Burlington	ENERGEN	Pre-Ongard
ULSTR	I-27-29N-11W	I-27-29N-11W	I-27-29N-11W	I-27-29N-11W	I-27-29N-11W	I-27-29N-11W	H-27-29N-11W	H-27-29N-11W	H-27-29N-11W	H-27-29N-11W	F-27-29N-11W	E-26-29N-11W	K-27-29N-11W	F-27-29N-11W	F-27-29N-11W	M-26-29N-11W	F-27-29N-11W	F-26-29N-11W	L-27-29N-11W	C-27-29N-11W	F-26-29N-11W	F-26-29N-11W	A-34-29N-11W	N-26-29N-11W	A-34-29N-11W	N-26-29N-11W	M-27-29N-11W
P&A Date		Jan-94			Oct-82				Aug-55			•								Nov-78							Jun-75
<u>Total</u> Depth	3514	6298	2839	6177	1717	1714	0	1689	1800	6262	0	. 0	5808	1354	6160	6348	2710	0	6214	800	4030	6242	6148	1760	2857	2869	1747
<u>Perf</u> Bottom	3514	6298	2839	5646		1714	0	1689		2810	0		1770	1354	6160	6348	2710		1661		1645	6242	6148	1760	2857	2869	1747
Perf Top	3276	6157	2827	5314		1543	0	1483		2701	0		1680	1326	6024	6176	2578		1388		1462	6086	6086	1468	2747	2746	1664
Notes	Cement to surface	Cement to surface	Cement to surface	TOC @ 1388 ft	plugged & abandoned	Above injection zone	abandoned location	Above injection zone	plugged & abandoned	Cement to surface	abandoned location	abandoned location	Cement to surface	Above injection zone	Cement to surface	TOC @ 5400' and 1916' to surface	865 cuft cement	abandoned location	TOC 4950' then 1830' to surface	plugged & abandoned	Cement to surface	Cement to surface	2962 cuft - circ to surface	Above injection zone	Above injection zone	Above injection zone	plugged & abandoned
Source		5/31/68 Pan Am Ltr	C-103	C-103			C-103			C-103	C-103	6/20/84 htr	C-103		C-103	C-103	C-105	C-103			C-105	C-103	C-104				
Darm Darm	Yes	Yes	Yes	٩	Ŷ	٩	٩	Ŷ	Ŷ	Yes	°Ž	٩	Yes	٩	Yes	Yes	٩	۶	Yes	Ŷ	Yes	٩	Ŷ	٩	Yes	۶	٩
<u>Pen.</u> Zone	Yes	Yes	۶ ۷	Yes	٩	å	Š	Ŷ	Å	/ Yes	Ŷ	Š	/ Yes	°N N	Yes	Yes	Ŷ	å	Yes	Ŷ	Yes	Yes	Yes	Š	°Z	٩ ۷	Ŷ
Status	R	P&A	Shallow	Deep	P&A	CBM	Aban Loc	CBM	P&A	Shallow	Aban Loc	Aban	Shallow	Shallow	Deep	Deep	Shallow	Aban Loc	CBM	P&A	CBM	Deep	Deep	CBM	Shallow	Shallow	P&A
APINO	30-045-29002	30-045-07825	30-045-23554	30-045-30833	30-045-07812	30-045-34463	30-045-23553	30-045-34409	30-045-07883	30-045-24084	30-045-34266	30-045-25745	30-045-25673	30-045-27361	30-045-24673	30-045-12003	30-045-27365	30-045-23552	30-045-07835	30-045-07896	30-045-25329	30-045-24083	30-045-25657	30-045-31118	30-045-24574	30-045-24572	30-045-07903
#		_	_	с	-	-	_	0	~	ш	1S	· <u> </u>	8	-	щ	-	-			-	-	ш	9	8	ი	თ	~
	-	•	•	=			•			-	8	1	-									-	-	Ę			
WELLINAME	DISPOSAL 1	DAVIS GAS COM F	DAVIS GAS COM G	DAVIS GAS COM F 11	Davis Pooled Unit	JACQUE	DAVIS GAS COM H	JACQUE	Davis PU/FB Umbarger	DAVIS GAS COM F	MANGUM	AUSTIN A DAVIS	CONGRESS	LAUREN KELLY	MANGUM	CALVIN	MARIAN S	DAVIS GAS COM I	MANGUM	Black Diamond	DAVIS GAS COM J	SULLIVAN GAS COM D	CONGRESS 1	CALVIN 10	SUMMIT	CONGRESS	Garland "B"
<u>Miles to</u> <u>WELLINAME</u> <u>DW1</u>	0.00 DISPOSAL 1	0.11 DAVIS GAS COM F	0.12 DAVIS GAS COM G	0.15 DAVIS GAS COM F 11	0.16 Davis Pooled Unit	0.18 JACQUE	0.22 DAVIS GAS COM H	0.23 JACQUE	0.23 Davis PU/FB Umbarger	0.24 DAVIS GAS COM F	0.33 MANGUM 00	0.35 AUSTIN A DAVIS	0.41 CONGRESS	0.49 LAUREN KELLY	0.49 MANGUM	0.51 CALVIN	0.52 MARIAN S	0.54 DAVIS GAS COM I	0.55 MANGUM	0.56 Black Diamond	0.57 DAVIS GAS COM J	0.58 SULLIVAN GAS COM D	0.60 CONGRESS 1	0.64 CALVIN 10	0.64 SUMMIT	0.64 CONGRESS	0.64 Garland "B"

Wells within One Mile of Disposal Well #1

Page 1 of 3

#
Well
isposal
کر ا
Mile o
One
within
Wells

-

													1				т	Ĩ	1			ż		í.			'
RESERVOIR	GALLUP	CHACRA	GALLUP	PICTURED CLIFFS	CHACRA	FRUITLAND SAND	DAKOTA	(N/A)	CHACRA	FRUITLAND COAL	DAKOTA	FRUITLAND SAND	PICTURED CLIFFS	FARMINGTON	ракота	DAKOTA	FARMINGTON,NORTH	DAKOTA	FARMINGTON	CHACRA	GALLUP	MORRISON BLUFF EI	PICTURED CLIFFS	DAKOTA		PICTURED CLIFFS	GAS CO
OPERATOR	ENERGEN	ENERGEN	Burlington	/ Burlington	MANANA GAS INC	JOHN C PICKETT	MANANA GAS INC	/ Pre-Ongard	MANANA GAS INC	MANANA GAS INC	MANANA GAS INC	MANANA GAS INC	/ CHAPARRAL O&G	/ Pre-Ongard	Burlington	Y XTO ENERGY, INC	MCELVAIN 0&G	Burlington	/ Pre-Ongard	Burlington	/ Burlington	/ XTO ENERGY, INC	/ CHAPARRAL 0&G	/ Burlington	Pre-Ongard	/ Pre-Ongard	CHAPARRAL OIL &
ULSTR	C-34-29N-11W	M-27-29N-11M	K-26-29N-11W	M-27-29N-11W	P-22-29N-11W	O-22-29N-11W	P-22-29N-11W	M-26-29N-11W	N-22-29N-11M	N-22-29N-11M	N-22-29N-11W	N-22-29N-11M	G-34-29N-11M	M-23-29N-11W	J-26-29N-11W	B-26-29N-11W	D-34-29N-11M	F-34-29N-11W	0-23-29N-11W	E-35-29N-11W	C-35-29N-11M	B-26-29N-11W	E-35-29N-11W	G-34-29N-11V	P-28-29N-11W	G-26-29N-11V	F-34-29N-11W
P&A Date						Mar-00	Jun-99	Nov-58															Dec-90	4		Jun-55	
<u>Total</u> Depth	5970	2790	5870	1678	2754	1466	6274	1917	2732	1608	6226	1410	1736	2335	6430	6160	1525	6347	2015	6328	5943	7382	1790	6340	870	006	o
Perf Bottom	5970	2790	5870	1678	2754	1466	6274		2732	1608	.6226	1410	1736		6430	6160	1064	6347		2906	5943	7070	1790	6340			I.
<u>Per</u> Top	5326	2668	5295	1648	2627	1380	6072		2622	1440	6052	1390	1726		6172	6047	1060	6202		2784	5369	6952	1776	6171			- - -
Notes	2389 cuft cement (2 stages)	Above injection zone	circulated cement on 2nd stage to surf.	Above injection zone	Above injection zone	plugged & abandoned	plugged & abandoned	Above injection zone	Above injection zone	Above injection zone	Cement to surface	Above injection zone	Above injection zone	Above injection zone	Cement to surface	Cement to surface	Above injection zone	3 stages; TOC 250'	Above injection zone	Cement circulated to surface	Cement to surface	TOC 3300'	Above injection zone	TOC 4424' & 1957' to surface	Above injection zone	Above injection zone	location
Source	C-104		C-103				P&A rpt				5/21/04 rpt				3160-05	C-103		WB dia.	2 8 6 1		9-331	C-101					
Nam Dar	°	۶	Yes	Yes	۶	Yes	Yes	٩	Yes	٩	Yes	Å	۶	Ŷ	٩	Yes	٩	Yes	٩	Yes	Yes	Yes	٩	Yes	Ŷ	Å	ž
<u>Pen.</u> Zone	Yes	۶	Yes	Ŷ	Ŷ	Ŷ	Yes	Ŷ	Ŷ	Å	Yes	۶ ۷	°N N	z	Yes	Yes	Ŷ	Yes	2	/ Yes	Yes	Yes	Å	Yes	Å	ę	ž
<u>Status</u>	Deep	Shallow	Deep	Shallow	Shallow	Р&А	P&A	P&A	Shallow	CBM	Deep	Shailow	Shallow	Δ	Deep	Deep	Shallow	Deep	Ď	Shallov	Deep	R	P&A	Deep	δ	P&A	С С
APINO	30-045-25707	30-045-24573	30-045-25612	30-045-21732	30-045-26721	30-045-07959	30-045-07961	30-045-07776	30-045-26731	30-045-34312	30-045-07940	30-045-13089	30-045-20755	30-545-02123	30-045-33093	30-045-07733	30-045-24834	30-045-24835	30-545-02124	30-045-24837	30-045-25675	30-045-30788	30-045-20752	30-045-07672	30-045-07751	30-045-29107	30-045-33570
# I	15	e	e	Я †	0	-	-	-	-	-	-	7	0	ю	Ë 🗜	-	1	7E	4	Å	15	-	-	ŝ	-	ź	, U
WELLNAME	SUMMIT	GARLAND	CALVIN	GARLAND B	NANCY HARTMAN	GRACE PEARCE	HARTMAN	Davis	MARY JANE	ROYAL FLUSH	COOK	cook	SHELLY	HARE	CALVIN	SULLIVAN GAS COM E	ELLEDGE FEDERAL 34	CONGRESS	HARE	CONGRESS	CONGRESS	ASHCROFT SWD	LEA ANN	CONGRESS	Viles EE	Sullivan	CHAPARRAL
<u>Miles to</u> DW1	0.65	0.65 (0.67	0.68	0.70	0.71	0.72	0.73	0.75	0.76	0.79	0.79	0.82	0.82	0.84	0.85	0.85	0.89	0.90	0:90	06.0	06.0	06.0	0.94	0.94	0.95	96.0
<u>Map</u> Seq.	24	25	26	27	28	29	8	31	32	33	34	35	36	37	8	39	8	4	42	\$	4	45	6	47	8	49	: ' ,
															-												

Page 2 of 3

Wells within One Mile of Disposal Well #1

RESERVOIR	PICTURED CLIFFS		DAKOTA	PICTURED CUFFS	IN PICTURED CLIFFS	CHACRA	FRUITLAND COAL	DAKOTA	PICTURED CLIFFS		FRUITLAND SAND	
<u>OPERATOR</u>	Pre-Ongard	Pre-Ongard	XTO ENERGY, INC	Pre-Ongard	Congress Oil Compar	XTO ENERGY, INC	HOLCOMB O&G	BP AMERICA	CHAPARRAL 0&G	/ Pre-Ongard	/ Pre-Ongard	
ULSTR	A-28-29N-11W	A-28-29N-11W	A-28-29N-11W	G-26-29N-11W	J-34-29N-11W	B-26-29N-11W	K-23-29N-11W	K-23-29N-11W	E-34-29N-11W	-34-29N-11W	-34-29N-11M	
P&A Date	May-78	Jun-78		Aug-53	Oct-53			Mar-97		i		
<u>Total</u> Depth	1600	600	6125	1420	с С	2861	2761	6182	1731		Frtind	
Perf Bottom			6125			2761	1648	6182	1731			
Per Top			6023			2750	1470	6154	1712			
Notes	Above injection zone	Above injection zone	Cement circulated to surface	piugged & abandoned	plugged & abandoned	335 SX @ 2860' did not circ. 100 SX down braidenhead	Above injection zone	Cement to surface	Above injection zone	Above injection zone	Above injection zone	
Source			C-103	C-103	ltr	C-105		C-101				
Darm Darm	٩	Ŷ	۴	٩	٩	۶	Yes	°	£	۶	۶	
Pen. Zone	Å	å	Yes	å	å	Ŷ	₽	Yes	Ŷ	Ŷ	۶	
<u>Status</u>	P&A	P&A	Deep	Р&А	Р&А	Shallow	CBM	Ρ&Α	Shallow	Dry	Dry	
APINO	30-045-07895	30-045-07762	30-045-07894	30-045-07870	30-045-07674	30-045-23163	30-045-23550	30-045-07985	30-045-20609	30-045-02152	30-545-02151	
#1	2	e	-	-		-	-	-	-	8	7	
WELLNAME	Madsen Selby Pooled Unit	Masden-Selby	MASDEN GAS COM	Sullivan	CONGRESS	EARL B SULLIVAN	STATE GAS COM BS	PEARCE GAS COM	CHAPARRAL	SUMMIT	CONGRESS	
<u>Ailes to</u> DW1	0.97	0.97	0.97	0.97	0.98	96.0	66.0	1 66.0	0.99	66.0	66.0	
<u>Map</u> Seq.	22	51	52	ß	2	55	56	57	ŝ	61	83	

-		_									
Ailes	nj. Zone	No	10	1	1	5	0	8	12	1	55
2 to 1 M	Penl	Yes	2	0	ο	0	1	2	1	11	17
1	1/2 to	<u>Wells</u>	12	-	1	5	1	5	13	12	50
		٩	2	3	0	0	0	2	2	0	6
0 to 1/2 Miles	Pen Inj. Zone	Yes	1	0	0	0	1	0	2	2	9
	0 to 1/2	mile Wells	3	3	0	0	1	2	4	2	15
s	i. Zone	ଥ	12	4	٢	5	0	5	14	0	41
tal Well	<u>Pen In</u>	Yes	3	0	0	0	2	2	3	14	24
Tot	<u>Total</u>	<u>Wells</u>	15	4	1	5	2	7	17	14	65
		<u>Status</u>	P&A	Aban Loc	Loc	Dry	ſNI	CBM	Shallow	Deep	Total

/

Page 3 of 3





UNIT K, SEC 27, T29N, R11W, SAN JUAN COUNTY, NM 8-5 /8 " 24# J-55 CSG SET @ 315 ' CMT w / 354 cu ft. CIRC. TO SURFACE OJO ALAMO @ 390' KIRTLAND @ 560' FRUITLAND @ 1140' PICTURED CLIFFS @ 1680 ' LEWIS @ 1730' CHACRA @ 2300' DV TOOL @ 2595' CMT TO SURFACE 2-3/8 " 4.7 # TBG. SET @ 5938 ' 0.7 \mathbf{C} $r: {\mathfrak q}$ **C**____ ٢... **.** · CLIFF HOUSE @ 3120' . . . <u>_</u>____ POINT LOOKOUT @ 4020' رغ **MANCOS @ 4400** r .) GALLUP @ 5250' PRF'D 5419' - 5585' FRAC'D w/ 42,546 GALS KCL WTR, 160,000# SND, 2000 GALS 15% HCL, & 1,611,806 SCF N2 PRF'D 5640' - 5808' FRAC'D w/ 35,952 GALS KCL WTR, 60,000# SND, 1250 GALS 15% HCL, & 1,972,628 SCF N2 FLOAT COLLAR @ 6110' 5-1/2" 17# & 15.5# J-55 CSG SET @ 6150' CIRC CMT. TO SURFACE

CONGRESS #18 CURRENT ARMENTA GALLUP

TD 6150'

.

Bind Initial Initial <thinitial< th=""> <thinitial< th=""> <thinit< th=""><th>Con</th><th>ocoPhillips</th><th>RUS</th><th>RENTISCHEMATIC</th><th></th><th></th></thinit<></thinitial<></thinitial<>	Con	ocoPhillips	RUS	RENTISCHEMATIC		
1 2	District SOUTH Original	Field Name ARMENTA GALL Spud Date Surface Legal Location (7/1/983 2127/FSL & 1931/FWI	UP #3188	API / UWI 3004525673	County SAN JUAN EAW Dist (ft) EAW Ref 1.931.00 W	State/Province Edi NEW MEXICO N/S Dist (ft) N/S Ref 2 127 00 S
Chemical Scillar Content Could Surface Casing Centert, 12-309, 5691983, Could edd 0 12 Surface Casing Centert, 12-309, 5691983, Could edd 309 Surface Casing Centert, 12-309, 5691983, Could edd Surface, Surface Casing, 8 569, 8 097n, 12 ft/k9, 305 ft/s9 309 Itubing Joint 2, 2869, 4 7086/n, Joint 4, 1008, 120 ft/s9 Itubing Joint 2, 2869, 4 7086/n, Joint 4, 1008, 120 ft/s9 1100 Jack 12, 1069, 1720 ft/s9 Itubing Joint 2, 2869, 4 7086/n, Joint 4, 1008, 1720 ft/s9 120 Frect w/ 73, 0008 of 2040 Arizona FRUITLAND, 514 121 Public Joint 2, 2869, 4 7086/n, Joint 4, 1068, 1720 ft/s9 FRUITLAND, 114 122 Frect w/ 73, 0008 of 728 ft/s9 FRUITLAND, 114 123 Frect w/ 73, 7086 ft/s9 FRUITLAND, 114 124 Frect w/ 73, 7086 ft/s9 LEWIS, 1, 730 125 J.726 ft/s9 J.758 ft/s9 Frect w/ 730, 58635, poz 125 J.726 ft/s9 J.758 ft/s9 Frect w/ 730, 58635, poz 126 J.726 ft/s9 Frect w/ 730, 58635, poz CHACRA, 2,300 126 J.726 ft/s9 J.726 ft/s9 CHACRA, 2,300 1270 Lewis 1, 706 ft/s9 <th></th> <th></th> <th>/ell/Config.52/300</th> <th>)45256730000§7/10/2009</th> <th>6.50.13/AM</th> <th></th>			/ell/Config.52/300)45256730000§7/10/2009	6.50.13/AM	
0 0 Surface Casing Cernett, 12-395, 589,983, 0 308 Conert w/ 300 ax Class B. Circulated to surface Casing, 8 581n, 8.097n, 12 ftKB, 303 ftKB 309 Surface Casing, 8 581n, 8.097n, 12 ftKB, 303 ftKB 300 Conert w/ 300 ax Class B. Circulated to surface Casing, 8 581n, 8.097n, 12 ftKB, 303 ftKB 301 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,003 140 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,003 141 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,003 142 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,003 143 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,003 144 Fred W/ 73,000 2x00 km Class, 12 ftKB, 1280,000 ftKB, 1280,0000 ftKB, 1280	ttKB (MD)		Schema	tic Actual		Frm Final
12 Surface Casing Cenert, 12:309, 56/1983, Cenert W/300 ax Class B. Circulated to Surface. 399 Surface Casing, 8 5/81, 8.097n, 12 ftK9, 309 ftCe. 391 Conert W/300 ax Class B. Circulated to Surface. 392 Surface. 393 Surface. 394 Surface. 395 Surface. 396 Conert W/300 ax Class B. Circulated to Surface. 140 L55,12 ftK8,1700 ftK8 1740 Fedured Cliffs,1280-1770,124/2003 1740 Fedured Cliffs,1280-1770,124/2003 1741 Potured Cliffs,1680-1770,124/2003 1745 Inclusted Liffs,1720 ftK8,1720				· · · · ·		
100 Cenert W 300 sx Class B. Croutated to 300 Surface. Surface. 301 Surface. Surface. 302 Surface. Surface. 303 Streace. Surface. 304 Streace. Surface. 305 Surface. Surface. 306 Streace. Surface. 140 Streace. Surface. 140 Streace. Surface. 140 Streace. Surface. 141 Streace. Surface. 142 Pictured Citring. Surface. 1430 Surface. Surface. 1441 Surface. Surface. 1451 Surface. Surface. 1461 Surface. Surface. 1472 Surface. Surface. 14730 Surface. Surface. 1474 Surface. Surface. 1476 Lined. Surface. 1476 Surface. Surface.		ى ئەركەر ئەركە بەركە بەركە بەركە بەركە بەركە بەركە بەركە	- <u> </u>	Surface Casing	Cement, 12-309, 5/8/1983,	
399 Surface Casing, 8 56in, 8 087in, 12 ft/RB, 309 ft/RB 390 Out of the second secon	308			Cement w/ 300 s	sx Class B. Circulated to	
315 JUS RKD 326 JUB RKD 336 JUB RKD 337 JUB RKD 338 JUB RKD 339 JUB RKD 339 JUB RKD 330 International State Sta	309			Surface Casing,	8 5/8in, 8.097in, 12 ftKB,	
330 OJO ALAMO, 39 1140 J-55, 12 ft/61, 1/20 ft/61 KRTLAND, 580 1700 Fredured Cliffs, 1/20 ft/61, 1/20 ft/61 FRUTLAND, 1/14 1860	315			309 TIKB		
560 Ubing Joints, 2.38in, 4.70bs/ft, J-55, 12 ftKB, 1.250 ftKB KRTLAND, 580 1140 J-55, 12 ftKB, 1.250 ftKB FRUITLAND, 1,14 1260 Freduced Cittle, 12/46/2003, Freduction Casing Canada FRUITLAND, 1,14 1730 sand, 24.300 pairs of 200 linear sand, 24.300 pairs, 126.11 FRUITLAND, 1,14 1740 pairs, 126.11,126.11 Frequencies Frequencies 1750 pairs, 126.11,126.11 Frequencies Frequencies 1751 Jost, 172.61 KR, 1726 ftKB, 1726 ftKB, 1726 ftKB Frequencies Frequencies 1766 Tooling, 2.36in, 4.70bs/ft, 1726 ftKB, 1726 ft	2 3 390					
1.140 Jobs 12 Molt, 720 Mt0; KRTLAND, 560 1.660 Pictured Cliffs, 12/8 A2003, FRUTUAND, 1,14 1.760 Send 24,340 gais of 200 linear gel, and 183,800 sct N2, (700) Pictured Cliffs, 1,800-1,770, 129/2003] Pictured Cliffs, 1,800-1,770, 129/2003] 1.760 Jobs 12, 125, 1750 Ht61, 125 Ht61, 126 Ht62 Production Casing Cenert, 12-2,595, 07 Sh15H303, Cenart W/ 550 St 56,355 poz Tof Sh15H303, Cenart W/ 550 St 56,555 poz Tof Sh15H303, Cenart W/ 550 St 56,555,512 Pictured Upper Callup, 5419-5,325,527 gals of 28, KCL water, and 1, 811,008 sct N2, Flush included, (700) File Fi	560	Tubing Joints 23/8in 470lbs//t		<u></u>	······	OJO ALAMO, 390
1,660 Pictured Cliffs, 1248/2003, Pract w/ 73,000# 2040 Arizona .get, and 183,000 scf N2. (700) Pictured Cliffs, 1,680-1,770,126/2003. PictURED CLIFFS, 1 1,748 .get, and 183,000 scf N2. (700) A 2004 slickline states that seating nipple is at 1748. Pictured Cliffs, 1,680-1,770,126/2003. PictURED CLIFFS, 1 1,750 ILoss, 1,750 mich, 1,752 mich, 1708 mich, 1,553 mich, 1708 mich, 1755 mich, 1708 mich, 1755 mich, 1708 mich, 1756 mich, 1708 mich, 1756 mich, 1708 mich, 1755 mich, 1708 mich, 1756 mich, 1756 mich, 1757 mich, 1766 mich, 1756 mich, 1757 mich, 1766 mich, 1767 mich, 1766 mic	5 1,140					KIRTLAND, 560
1.730 Fract w/ 73,000# 2040 Arizona send; 24,340 gets 07 20 lines of 720 lines get, and 183,800 scr N2. (700) Pictured Cliffs, 1,680-1,770, 12,92,0003 Pictured cliffs, 1,680-1,770, 12,92,0003 1.749	3 1,680	Pictured Cliffs, 12/18/2003,				FRUITLAND, 1,140
1748 Jeel, and 183,800 act N2. (700) 1750 Just 1720 1751 Just 1720 1752 Just 1720 1754 Jest 1720 rtkB 1.725 rtkB 1755 Jist 1.720 rtkB 1.725 rtkB 1756 Tuting Joint 2.36in, 4.70ins/rt. 1757 Jist 1.720 rtkB 1.725 rtkB 1756 Tuting Joint 2.36in, 4.70ins/rt. 1766 Muleshoe, 2.36in, 4.70ins/rt. 1766 Just 1.726 rtkB, 1.726 rtkB 1767 Jist 1.725 rtkB, 1.726 rtkB 1768 Muleshoe, 2.36in, 4.70ins/rt. 1769 Just 1.726 rtkB, 1.726 rtkB 1761 Jist 1.725 rtkB, 1.726 rtkB 1762 Just 1.726 rtkB, 1.726 rtkB 1764 Jest 1.726 rtkB, 1.726 rtkB 1765 Fill 1963, Cemert w/ 650 sx 65/35 poz 1761 Jost 1863, Cemert w/ 650 sx 65/35 poz 1761 Fill 1963, Cemert w/ 650 sx 65/35 poz 1761 Just 180 scr 12, Fill 1963, Fract 1811 605 scr 12, Fill 1963, Fract	1,730	Frac'd w/ 73,000# 20/40 Arizona		Pictured Cliffs, 1	,680-1,770, 12/9/2003	PICTURED CLIFFS, 1,680
1,750 Pup Joint, 2:36in, 4.700s.ft, J.55, 1.720 mKB, 1.725 mKB Image: Constraint of the second	2 1,748	. gel, and 183,800 scf N2. (70Q)		A 2004 slickline s	states that seating nipple is	
1,752 L55, 1750 HKB, 1,752 HKB 1,770 L55, 1752 HKB, 1,784 HKB 1,781 J55, 1784 HKB, 1785 HKB 1,785 J55, 1784 HKB, 1785 HKB 1,786 Muleshoe, 238in, 4.70bs:rtl, 1,786 J55, 1784 HKB, 1785 HKB 1,786 J55, 1784 HKB, 1785 HKB 1,786 Muleshoe, 238in, 4.70bs:rtl, 1,786 J55, 1784 HKB, 1,785 HKB 1,786 J55, 1784 HKB, 1,785 HKB 1,786 J55, 1784 HKB, 1,785 HKB 1,81 J55, 1784 HKB, 1,785 HKB 2,595 Froduction Casing Cement, 12-2,595, 574 5/1983, Cenent W/ 505 xs 56/35 poz 1,120 Fill, 5,226,5325, Tagged by 5/809 wireline. 1,252 Fill, 5,226,5325, Tagged by 5/809 wireline. 1,252 Fill, 5,226,5325, Tagged by 5/809 wireline. 1,81,200 // 20/40 sand, 42,546 Galup, 6/18/1983, Fracti w/ 160,000 // 20/40 sand, 35,952 Galup, 6/18/1987, Fracti y/ 160,000 // 20/40 sand, 35,952 Galup, 6/18/93, Fracti y/ 60,000 // 20/40 sand, 35,952 Galup, 6/18/93, Fracti y/ 60,000 // 20/40 sand, 35,952 Galup, 6/18/93, Fracti y/ 60,000 // 20/40 sand, 35,952 Galup, 6/18/93, Fracti	1,750	Pup Joint, 2 3/8in, 4,70tbs/ft.				
1.770 [Tubing Joint, 2 38in, 4.70isstift, J-55, 1726 HKB, 174 HKB, 1725 HKB, 174 HKB, 1725 HKB, 174 HKB, 1725 HKB, 1776 LEWNS, 1,730 1.764 [Seating Nipple, 2 38in, 4.70isstift, J-55, 1726 HKB, 1726 HKB, J-55, 1726 HKB, J-726 HKB, J-	1,752	J-55, 1,750 ftKB, 1,752 ftKB				
1,784 Seating Mipple, 2 38in, 470bs/ft, J-55, 1,786 ftKB, 1,785 ftKB 1,785 Muleshoe, 2 38in, 470bs/ft, J-55, 1,785 ftKB, 1,785 ftKB, 1,785 ftKB 2,300 Production Casing Cement, 12-2,595, 5/15/1983, Cement W/ 550 sx 65/35 poz followed by 100 sx Class B. Circulated 3,120 Production Casing Cement, 12-2,595, 5/15/1983, Cement W/ 550 sx 65/35 poz followed by 100 sx Class B. Circulated 4,020 POINT LOCKOUT, 44 4,400 POINT LOCKOUT, 44 5,226 Lipper Gallup, 6/18/1983, Fract 4,4100 for 08, fract W/ 60,000# 20/40 send, 35,952 9als of 2% KCL weter, and 1,872,828 set N2. Flush 1,872,828 s	1,770	Tubing Joint, 2 3/8in, 4.70/bs/ft, J-55, 1.752 ftKB, 1.784 ftKB				LEWIS, 1,730
1.765 J.555, 1.768 ftKB, 1.765 ftKB 1.766 Muleshoe, 2.360, 4.700 stKB 2.300 Production Casing Cement, 12-2,595, 5/15/1983, Cement w/ 650 sx 65/35 poz 2.592 S/15/1983, Cement w/ 650 sx 65/35 poz 3.120 Followed by 100 sx Class B. Circulated 3.120 Included, 100 sx 14,256 4.020 PONT LOCKOUT, 4,1 4.400 PONT LOCKOUT, 4,1 4.401 PONT LOCKOUT, 4,1 4.402 PONT LOCKOUT, 4,1 5.226 Pont LOCKOUT, 4,1 5.227 Pont LOCKOUT, 4,1 5.228 Pont LOCKOUT, 4,1 5.226 Pont LOCKOUT, 4,1 5.227 Pont LOCKOUT, 4,1 5.237 Pont LOCKOUT, 4,1 5.241 CEP, 5,325, Tagged by 5/809 wireline.1 1.511,806 sct N2. Flush Pont Lockot Casing Cement 4,100-6,150, 515/1983 1.542 Lower Gallup, 5,648-5,808,6/15/1983 GALLUP, 5,250 5,081 1,972,628 sct N2. Flush Pont Casing Cement 4,100-6,150, 515	1,784	Seating Nipple, 2 3/8in, 4.70lbs/ft,				
1,786 L55, 1,785 ftKB, 1,786 ftKB 2,300 Production Casing Cement, 12-2,595, 5/15/1983, Cement w/ 650 sx 65/35 poz 2,592 S/120 3,120 Followed by 100 sx Class B. Croulated 10-12 bbls to surface CLIFF HOUSE, 3,12 4,020 POINT LOOKOUT, 4,4 4,400 POINT LOOKOUT, 4,4 4,495 MANCOS, 4,400 5,226 POINT LOOKOUT, 4,4 5,226 POINT LOOKOUT, 4,4 5,327 Upper Callup, 6/18/1983, Fract w/ 160,000# 20/40 sand, 42,546 gals of 2% KCL water, and 1,611,806 scf N2. Flush Lower Callup, 5/19-5,585, 6/16/1983 Lower Callup, 6/18/1933, Fract Lower Callup, 5/1983 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and 5,648 w/ 60,000# 20/40 sand, 35,952 1,972,628 scf N2. Flush Junk, 6,039-6,110 9 Production Casing Cement, 4,100-6,150, 5,110 Followed by 165 sx 50/50 poz. ToC (2) 4,100 Followed by 165 sx 50/50 poz. ToC (2) 4,110 Followed by 15 sx 50/50 poz. ToC (2) 4,110 How the 6/14/1983 CBL. 10 How then 6/14/1983 cBL.	1,785	J-55, 1,784 ftKB, 1,785 ftKB Muleshoe, 2 3/8in, 4.70lbs/ft,				
2,300 Production Casing Cement, 12-2,595, 5/15/1983, Cement w/ 650 sx 65/35 poz CHACRA, 2,300 2,595 5/15/1983, Cement w/ 650 sx 65/35 poz CHACRA, 2,300 3,120 10-12 bbls to surface. CLIFF HOUSE, 3,12 4,020 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,495 MANCOS, 4,400 5,226 POINT LOOKOUT, 4,1 5,250 Imper Gallup, 6/16/1983, Frac'd 1,811,805 scf N2. Flush CIEP, 5,325,5327 5,325 Jupper Gallup, 6/16/1983, Frac'd w/ 100,000# 20/40 sand, 35,952 gals of 2%, KCL water, and 1,811,805 scf N2. Flush Lower Gallup, 5,648-5,808, 6/15/1983 5,648 w/ 00,000# 20/40 sand, 35,952 gals of 2%, KCL water, and Jupper Gallup, 5,648-5,808, 6/15/1983 5,608 1,972,628 scf N2. Flush 1,0cluded. (70Q) Production Casing Cement, 4,100-6,150, 5/15/1983 6,039 Included. (70Q) 6,110 Production Casing Cement w/ 550 sx 50/50 poz. ToC @ 6,113 Uptores C4154 082	1,786	J-55, 1,785 ftKB, 1,786 ftKB				
2,592 Production Casing Cement, 12-2,595, 5/1 5/1 993, Cement W/ 650 sx 65/35 poz followed by 100 sx Class B. Circulated CHACRA, 2,300 3,120 10-12 bbls to surface. CLIFF HOUSE, 3,12 4,000 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,495 MANCOS, 4,400 5,250 [PBT0, 5,325, CIBP] 1,525 Upper Gallup, 6/16/1983, Fractd v/ 160,000# 20/40 sand, 42,546 CIBP, 5,325-5,327 gais of 2% KCL water, and Upper Gallup, 5,648-5,808, 6/15/1983 Lower Gallup, 6/16/1983, Fractd Upper Gallup, 5,648-5,808, 6/15/1983 Lower Gallup, 6/16/1983, Fractd Upper Gallup, 5,648-5,808, 6/15/1983 6,648 w/ 60,000# 20/40 sand, 35, 952 gais of 2% KCL water, and Upper Gallup, 5,648-5,808, 6/15/1983 6,039 Included. (700) 6,110 Fush 6,110 Followed by 165 sx 50/50 poz. TOC (@ 1010 web 161 8/1983 CEL.	2,300			4		
2,595 5/5/1983, Cement W/ 650 sx 65/35 poz CHACKA, 2,300 3,120 10-12 bibls to surface CLIFF HOUSE, 3,12 4,000 10-12 bibls to surface CLIFF HOUSE, 3,12 4,400 POINT LOCKOUT, 4,1 4,400 POINT LOCKOUT, 4,1 4,495 MANCOS, 4,400 5,226 POINT LOCKOUT, 4,1 5,226 CIEP, 5,325, CIEP 5,327 Upper Gallup, 6/16/1983, Frac'd w/160,000# 20/40 sand, 42,546 CIEP, 5,325-5,327 gais of 2% KCL water, and Lower Gallup, 5,419-5,585, 6/16/1983 Lower Gallup, 6/16/1983, Frac'd Upper Gallup, 5,648-5,808, 6/15/1983 6,419 1,972,628 scf N2. Flush 5,648 1,972,628 scf N2. Flush 6,039 Included. (700) 6,110 Frid, 6,039-6,110 6,110 Frid, 6,039-6,110 6,110 Frid, 1933, Cement w/ 560 sx 56/35 poz 6,110 Fridowed by 165 sx 50/50 poz. TOC @ 6,111 Cluberberk 6 ±10,6 150, 616/1983 CEL.	2,592			Production Casin	g Cement, 12-2,595;	CLIACEA 2 200
3,120 10-12 bbls to surface. 4,020 POINT LOOKOUT, 4,1 4,400 POINT LOOKOUT, 4,1 4,495 POINT LOOKOUT, 4,1 5,226 POINT LOOKOUT, 4,1 5,227 POINT LOOKOUT, 4,1 w/ 160,000# 20/40 sand, 42,546 CIEP, 5,325-5,325, Tagged by 5/8/09 wireline. 5,327 CIEP, 5,325-5,327 Lower Gallup, 6/16/1983, Frac'd POINT LOOKOUT, 4,1 w/ 160,000# 20/40 sand, 42,546 CIEP, 5,325-5,327 Lower Gallup, 6/16/1983, Frac'd POINT LOOKOUT, 4,1 w/ 60,000# 20/40 sand, 35,952 CIEP, 5,325-5,327 gals of 2% KCL water, and Point Loeked, 7200 Lower Gallup, 5/648-5,808, 6/16/1983 GALLUP, 5,250 5,648 1,972,628 scf N2. Flush Production Casing Cement w/ 560 sx 65/35 poz 6,039 Included. (700) Fridowed by 165 sx 50/50 poz. TOC @ 6,110 A100' from 6/14/1983 CBL. Point 6/14/1983 CBL. 6,111 Fridowed by 165 sx 50/50 poz. TOC @ 6,112	2,595			5/15/1983, Ceme followed by 100	nt w/650 sx 65/35 poz sx Class B. Circulated	CHACKA, 2,300
4,020 4,400 4,495 5,226 5,226 5,226 5,227 Upper Gallup, 5/18/1983, Frac'd w/ 160,000# 20/40 sand, 42,546 gals of 2% KCL water, and 1,811,806 scf N2. Flush 5,585 5,585 5,648 5,41983 6,110 5,	3,120			10-12 bbis to sur	face	
4,400 Form Economy (1, 1, 1) 4,495 5,226 5,226 (PBTD, 5,325, CIBP) 5,325 Upper Gallup, 6/18/1983, Frac'd w/ 160,000# 20/40 sand, 42,546 (CIBP, 5,325,5,327) gais of 2% KCL water, and (CIBP, 5,325,5,327) 5,327 Included, (700) 5,328 Lower Gallup, 6/16/1983, Frac'd w/ 160,000# 20/40 sand, 35,952 Upper Callup, 5,419-5,585, 6/16/1983) 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Upper Callup, 5,648-5,808, 6/15/1983) 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Upper Callup, 5,648-5,808, 6/15/1983) 6,039 Included. (700) 6,110 Frid, 6,039-6,110 6,113 Included. (700)	4,020		 KX			PONTLOOKOUT 4 020
4,495 MANCOS, 4,400 5,226 Fill, 5,226-5,325, Tagged by 5/8/09 wireline. 5,325 Upper Gallup, 6/16/1983, Frac'd w/ 160,000# 20/40 sand, 42,546 Gals of 2% KCL water, and 5,327 Isola of 2% KCL water, and 5,419 1,611,806 sct N2. Flush 5,585 Lower Gallup, 6/16/1983, Frac'd w/ 60,000# 20/40 sand, 35,952 Upper Gallup, 5,419-5,585, 6/16/1983 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Upper Gallup, 5,419-5,585, 6/16/1983 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Upper Gallup, 5,648-5,808, 6/15/1983 6,039 Lower Gallup, 5,648-5,808, 6/15/1983 6,039 Included. (700) 6,110 Frill, 5,250 6,110 Frill B, 10, 6/14/1983 CBL. 6,111 Frill B, 10, 6/14/1983 CBL. 6,113 Frill B, 10, 6/14/1983 CBL.	4,400			<u> </u>		
5,226 Image: Signature of the state o	4,495					MANCOS 4 400
5,250 PBTD, 5,325, CIEP 5,325 Upper Gallup, 6/18/1983, Frac'd w/160,000# 20/40 sand, 42,546 CIEP, 5,325-5,327 5,327 gals of 2% KCL water, and 5,419 1,611,806 scf N2. Flush 5,585 Lower Gallup, 6/16/1983, Frac'd w/ 60,000# 20/40 sand, 35,952 Upper Gallup, 5,419-5,585, 6/16/1983 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Lower Gallup, 5,648-5,808, 6/15/1983 5,808 1,972,628 scf N2. Flush 6,039 Included. (700) 6,110 Frill, 5,226-5,325, Tagged by 5/8/09 wireline. 6,110 CIEP, 5,325-5,327 GALLUP, 5,250 CIEP, 5,325-5,327	5,226					
5,325 Upper Gallup, 6/16/1983, Frac'd 5,327 w/160,000# 20/40 sand, 42,546 gais of 2% KCL water, and 1,611,806 sct N2. Flush 5,419 1,611,806 sct N2. Flush 5,585 Lower Gallup, 6/16/1983, Frac'd 5,648 w/60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Lower Gallup, 5,648-5,808, 6/15/1983 5,648 u/60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Lower Gallup, 5,648-5,808, 6/15/1983 6,039 Junk, 6,039-6,110 6,039 Included. (70Q) 6,110 String S, cement w/ 560 sx 65/35 poz 6,110 Fraction Grift M1983 CBL. 6,113 Diverset 6 st10, 6150, 510, 510, 510, 510, 510, 510, 510,	5,250	PBTD, 5,325, CIBP		Fill, 5,226-5,325,	Tagged by 5/8/09 wireline.	
5,327 gals of 2% KCL water, and 1,611,806 scf N2. Flush 5,419 1,611,806 scf N2. Flush 5,585 Lower Gallup, 6/16/1983, Frac'd 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and 5,608 Lower Gallup, 5,648-5,808, 6/15/1983 6,039 Included. (70G) 6,110 Froduction Casing Cement, 4,100-6,150, 5/15/1983, Cement w/ 560 sx 65/35 poz 6,110 Followed by 165 sx 50/50 poz. TOC @ 4100' from 6/14/1983 CBL. 6,113 Diverset, 6,110, 6,150, 6/150, 6/150, 5/15/1983	5,325	Upper Gallup, 6/18/1983, Frac'd w/ 160 000# 20/40 send, 42 546		CIBP, 5,325-5,32	7	
5,419 1,511,806 Sct N2. Flush 5,585 Included.(70Q) 5,585 Lower Gallup, 6/1 6/1 983, Frac'd 5,585 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Lower Gallup, 5,648-5,808, 6/15/1 983 5,808 1,972,628 scf N2. Flush 6,039 Included. (70Q) 6,110 String Cement, 4,100-6,150, 5/15/1 983, Cement w/ 560 sx 65/35 poz 6,110 Full String	5,327	gals of 2% KCL water, and				
5,585 Lower Gallup, 6/16/1983, Frac'd 5,648 w/ 60,000# 20/40 sand, 35,952 gals of 2% KCL water, and Lower Gallup, 5,648-5,808, 6/15/1983 5,808 1,972,628 scf N2. Flush 6,039 Included. (70G) 6,110 S/15/1983, Cement w/ 560 sx 65/35 poz 6,113 Gallup, 6/16/1983, Cement w/ 560 sx 65/35 poz	5,419	1,511,806 scf N2. Flush		Upper Gallup, 5,4	19-5,585, 6/16/1983	
5,548 wv.ou.uuv.20/40/sailal, 53,552 Lower Gallup, 5,648-5,808, 6/15/1983 GALLUP, 5,250 5,808 1,972,628 scf N2. Flush Junk, 6,039-6,110 Production Casing Cement, 4,100-6,150, 5/15/1983, Cement w/ 560 sx 65/35 poz 6,039 Included. (70Q) Fillowed by 165 sx 50/50 poz. TOC @ 4100' from 6/14/1983 CBL. 6,113 Display the state of the state	5,585	Lower Gallup, 6/16/1983, Frac'd				
5,808 1,972,628 scf N2. Flush Included. (70Q) 6,039 Included. (70Q) 6,110 5/15/1983, Cement w/ 560 sx 65/35 poz followed by 165 sx 50/50 poz. TOC @ 4100' from 6/14/1983 CBL. 6,113 Display the state of t	5,648	gals of 2% KCL water, and		Lower Gallup, 5,6	648-5,808, 6/15/1983	GALLUP, 5,250
6,039 Included. (Fold) 6,039 St/ 5/1983, Cement, 4,100-6,150, 5/15/1983, Cement, 5/	5,808	1,972,628 scf N2. Flush		Junk, 6,039-6,110		
6,110 6,113 6,113 6,113 6,110 6,100 6,	6,039	nougeu. (ruaj)		5/15/1983, Cemer	g сетеп, 4,100-6,150, nt w/ 560 sx 65/35 poz	
6,113	6,110			followed by 165 :	sx 50/50 póz. TOC @	
	6,113			Plugback, 6,110-6	983 CBL. 5,150, 5/15/1983	
6,149 Production Casing, 51/2in, 4.892in, 12 ftKB,	6,149			Production Casing	g, 5 1/2in, 4.892in, 12 ftKB,	
6,150 TD, 6,150, 5/14/1983 To match TD., 6,150 ftKB	6,150	TD, 6,150, 5/14/1983	114191416	to match TD., 6,15	50 ftKB	

Ì

; , |

32454A CALVIN 3 CURRENT ARMENTA GALLUP Unit K, Section 26, 029N, 011W, SAN JUAN, NM







CONGRESS #7E

CURRENT - 11-4-94

CH---DK Commingle

1615' FNL, 1760' FWL, Section 34, T-29-N, R-11-W, San Juan County, NM

Spud: 3-10-81 Completed : 6-25-81

> 8-5/8" 24# H-40 Csg set @ 291' Circulated 220 sx cmt to surface Top of Cmt @ 250' (TS) Ojo Alamo (Base) @ 535' Kirtland @ 712 Fruitland @ 1441' Pictured Cliffs @ 1706' Stage Collar @ 2391' Cmt 3rd stage w/600 sx Chacra Perforations 2723' - 2845' Chacra @ 2718' Packer @ 2857' Stg. 1 TOC @ 2953' (est.) Cliff House @ 3295' Point Lookout @4015' Stage Collar @ 4324' Cmt 2nd stage w/ 300 sx Stg. 1 TOC @ 4942' (est.) ì Gallup @ 5324' 2-7/8", £-5#, J-55,set @,3272' 14.4 LU DATE 2 10 4.7 6263 And a の理想が A STATE Greenhorn @ 6142' Dakota @ 6181' Dakota Perforations 6202' - 6347' TELEVISION 4 1/2", 10.5#, K55, Csg set @ 6461' cemented w/ 350 sx - stg. 1

TD 6461'

Mangum #1-E Current

١.

Today's Date: 7/19/04

Basing Dakota / AIN #3236701

1520' FNL & 1735' FEL, Sec. 27, T-29-N, R-11-W, San Juan County, NM Long: N:36^ 42.03' / Lat: W:107^ 58.902' / API #30-045-24673

Spud: 2/27/81 TOC @ Surface Completed: 4/21/81 Elevation: 5422' GL 5434' KB 12-1/2" hole 8-5/8" 24# H-40 Casing set @ 365' Cement with 275 sxs, circ to surface Ojo Alamo @ 375' WELL HISTORY Kirtland @ 490' No workovers reported. Fruitland @ 1320' Pictured Cliffs @ 1580' 2-3/8" Tubing @ 6104' Chacra @ 2590' DV Tool @ 2748' Cement with 650 sxs, circulated to surface TOC @ 2766 ' (Calc 75%) Mesaverde @ 3158' DV Tool @ 4180' Cement with 300 sxs (429 cf) TOC @ 4752' (Calc 75%) Gallup @ 5175' Dakota Perforations: Dakota @ 6020' 6024' - 6160' 7-7/8" Hole 4-1/2" 10.5# K-55 Casing set @ 6240' Cement with 350 sxs (452 cf)

> TD 6240' PBTD 6224'




.





Garland B 1R

Section 27M, T-29-N, R-11-W San Juan County, NM FULCHER KUTZ PICTURED CLIFFS WELLBORE SCHEMATIC



Hartman #1

Current

Basin Dakota SE, Section 22, T-29-N, R-11-W, San Juan County, NM





Cook #1

Current

Basin Dakota API #30-045-07940 SW Section 22, T-29-N, R-11-W, San Juan County, NM





MANGUM #1 FRTC

×.,

UNIT L SECTION 27 T29N R11W SAN JUAN COUNTY, NEW MEXICO



Davis Gas Com. "F" No. 1 Lisin Dako - Field San Juan Co., New Mexico Elev. 5565 RDB 5554 GL 8-5/8" CSA 332' w/225 SX Cmt. 1 Circ. Cmt. to Surface. -Cemented to Surface 13 4.0.1.4 -Est. Top Cmt. 900' (second stage) : 4 Stage cementing tool @ 1898' in 4-1/2" 14 いいたいい 1 casing cmt. w/300 SX. 1 2 1 -7-7/8" drilled hole 3 ٩, 4 Casing corrosion 3628' to 4-1/2" casing 3803'. Casing leak 3303' ÷ 5 squeezed w/200 SX cmt. う į. 2-7/8" Tubing for casing. Cemented to surface w/200 SX cement. Å ż 4 -Est. top cmt. @ 5200' (first stage) 1 Ā 4 1. 51 3 4 6 Swage to 2-3/8" Hydril flush Jt. for stinger thru Packer 1 Baker Model "P" Packer. Set @ 6022'. New Dakota Perfs. 5159-54 Ported Nipple & Bull plug @ 5033'-Original Dakota Perfs. 6215-19, 6227-29 and 6236-40 -New Dakota Perfs. 6286-98. PBTD 6332' ----4-1/2" casing set @ 6365'. Cmt. w/375 SX in first stage and 500 SX in second stage TD 6365'-

Pan American Petroleum Corporation



Figure 3. Wellbore diagram of the present day Amoco Davis Gas Com "F" No. 1 well and corresponding stratigraphy. Producing zones in the immediate area are also shown along the stratigraphic column.



Spud	0
1st Delivered	(
Elevation	

09/05/62 01/18/63 600" (GL) 5511' (KB)

Workevers 4/15/80 Ran wireline in tubing, tagged btm @
 4/15/80
 Ran wretine in tubing, tagged btm @

 6257' (KB)
 Tried to set tubing stop at tubing perf top, could not set stop. Stop did set @ 6142', too high to be effective w/plunger

 7/8/80:
 Attempt to POOH w/tbg (60,000# on tbg, stnng), tbg, would not come out. ND BOP, NUWH, MOL. 3/27/37'.

 Wireline run, 1 901 GR to 6269', 1 50''

 impression block to 6269'

CONGRESS #5

ŧ

Current -- 4/17/97 DPNO: 32208A

2510' FNL, 1570' FEL Unit G, Sec. 34, T29N, R11W, SJC, NM Lat/Long: 36°40.97", 107°58.49"



APPENDIX A

SUBSURFACE

1000

HOUSTON, TX

FIGURE 1

SOUTH BEND, IN BATON ROUGE, LA

WESTERN REFINING DISPOSAL WELL #1 NW, SW SECTION 26, T29N, R11W

4 NO.: 30-045-29002



TOC: Surface Hole Size: 7-7/8"

ASHCROFT SWD #1 WELLBORE DIAGRAM	DATA LOCATION: 998' FNL & 2,114' FEL, UNIT B, SEC 26, T29N, R11W COUNTY(STATE: SAN JUAN CO., NM FIELD: ENTRADA FORMATION: FUTRADA	APPENDIX XTO WELL #: 72320 APPE 30.465-30788 XTO WELL #: 72320 SPUD DATE: 12/19/01 COMPLETION DATE: IP: NA PRODUCTION METHOD: NA PRODUCTION METHOD: NA PROUCTION METHOD: NA PRODUCTION METHOD: NA PROUCTION METHOD: NA	12/20/01 BEARCAT DRLG CO. RIG #2 SPUDDED HOLE FOR XTO ENERGY, CO. ON 12/19/01. 12/20/01 BIT #1 DRLD 9-7/8" PILOT HOLE THROUGH BOULDERS TO 165'. BIT #2 DRLD 12- 14" PILOT HOLE THROUGH BOULDERS TO 165'. BIT #3 STD DRLG 17-1/2" HOLE. 12/22/01 DRLD 17-1/2" HOLE TO 341'. SET 13-3/8", 48.04, H-40 CSG @ 341'. CMT'D W/400 12/22/01 DRLD 17-1/2" HOLE TO 341'. SET 13-3/8", 48.04, H-40 CSG @ 341'. CMT'D W/400 SX TYPE III CMT W/3% CaCl2 + 1/4#/SX CELLOFLAKE. MIXED @ 14.6 PPG & 1.41 12/22/01 DRLD 12-14" HOLE TO 355'. HIT 50 BPH WTR FLOW. 12/228/01 DRLD 12-14" HOLE TO 3555'. HIT 50 BPH WTR FLOW. VEIGHTED UP MUD TO 11.9 PPG. UT (65)35/6) W/2% KCL & 1/4 #/SX 01/04/02 DRLD 12-14" HOLE TO 2.556'. SET 9-5/8" 36.0#, J-55, STC CSG @ 2.553'. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556'. SET 9-5/8" 36.0, J-55, STC CSG @ 2.553'. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556'. SET 9-5/8" 36.0, J-55, STC CSG @ 2.553''. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556''. SET 9-5/8" 36.0, J-55, STC CSG @ 2.553''. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556''. SET 9-5/8" 36.0, J-55, STC CSG @ 2.553''. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556''. SET 9-5/8" 36.0, J-55, STC CSG @ 2.553''. BJ 01/04/02 DRLD 12-14" HOLE TO 2.556''. SET 9-5/8" SO P, J-55, STC CSG @ 2.553''. BJ 01/04/02 DRLD 12-14	 THENDERL (MIXED @ 13.0 FPG & 1.21 CUF 1/3X.) TAIL SLUKRY. UID NOT CIKC CMT TO SURF. REL RIG 01/22/02. TOC @ 3300 BY TEMP SURVEY. 04/07/02 PRESS TSTD 7" PROD CSG TO 1,000 PSIG FOR 30". HELD OK. 04/09/02 COMPUTALOG RAN GR/CCL LOG FR/7,462" (WLM PBTD) - 7,050". PERF'D ENTRADA 4 JSPF FR/7,382'-7,330" (TTL 208 - 0.43" HOLES). 04/10/02 TH W/PKR TO 7,394". SPOTTED 250 GALS 7-1/2% HCL ACID ACROSS PERF'S. PUH & SET PKR @ 7,108". BD ENTRADA PERF'S @ 2.653 PSIG. EIR W/WTR 2.6 BPM @ 1,750 PSIG. PPD 10 BW. SD. ISIP 1,400 PSIG. ACIDIZED ENTRADA PERF'S FR/7,330"-82" W/1,450 GALS 7-1/2% HCL ACID. AIR 7.3 BPM. ATP 3,500 PSIG. ISDP 1,550 PSIG. 15" SIP 1,226 PSIG.
KB: 5,452' GL: 5,440' CORR: 12'	13-3/8" 48.0#, H-40 CSG @ 341'. CMT'D W/400 SX CMT. CIRC 26 BBLS TO SURF.	9-5/8" 36.0#, J-55 CSG @ 2,553'. CMT'D W/850 SX CMT, CIRC'D 54 BBLS CMT TO SURF.		7,224' - 7,382' ENTRADA 7" 23.0#, J-55 CSG @ 7,510' CMT'D W/1,035 SX CMT. TOC @ 3,300' BY TS
HOLE	2-114" HOLE	8-3/4" HOLE	© 3.300'	7,462'WLM

\\FARNT01\projects\Farm WB Diagrams\doc\Ashcroft SWD #1.doc

Page 1 of 2

RFM 04/11/02

CALVIN #1 FORM C-103 December 17, 1962

										1
		N	EW MEXIC	0 01L (CONSERV	ATION	COMMISSI	ON	FO (Re	RM C-103
			MISCELL	ANEO	US REP	ORTS DI	N WELLS	5		
		(Submii	to appropri	ate Distr	ict Office	as per Com	mission R	ule 1106)		
Name of Com	pany				Add	ress				
Seath	m Datas	Producti	M Compan	ell No	Linit Lett	P. O. Ba	Township	"afiling con	Best Mex	
LCASE	Celvin			1	N N	26	29	lorth	11 Veet	
Date Work Pe	rformed	Pool	nin Detroit				County	Sen Juan		
	<u>p 12, 1909</u>		THIS IS /	REPORT	OF: (Che	ck appropria	te block)	-1-100 (1-10)(2010)		
🔲 Beginnit	ng Drilling Op	erations	Casi	ing Test a	nd Cement	ob	Other (Explain):	49	
Plugging	8		Rem Rem	edial Work			CONDINE	510H 146		
A. Contra Pla 5. Rana 6. Perri 620 7. Sana 8. Rana	ested 2nd ag down 5: cessent bi fo 1 shot, Ok, 6211, d-Mater fi 193 jts.	stage w/ : JO P.H. and log. /ft. 6176 6258, 62 ras w/100 2" thg.	209 mx b0 11/12/64 Top good , 6184, 6 65, 6272, ,0007 20- Landed at	2 Diac - - - - - - - - - - - - -	el "D", t 3 5400 210, 626 6275, 6 d and 20 en 11/21	12-1/2# • on lst 2, 6268, 339 & 6; 2,500 gt /62,	gilseni stage (28%), (2%) (%) (%) (%) (%) (%) (%) (%) (%) (%) (te/sk, 2% cament en 6289, 6334 % ACL wate	C.C. 11-12-02-1 HEDE DEC1 OIL CO DIS	7 1962 N. COM.
Witnessed by	s R. Yena	<u></u>								
				Position	. Drlg.	Supta	Company Southo	ra Union I	roduction	Ce.
		FI	LL IN BEL	Position Anti t	• Drlg. REMEDIAL	Supte	Company Souther PORTS 0	rn Union i NLY	Production	Ce.
DF Elev.		FI	LL IN BEL	Position Ann ¹ OW FOR ORIG	• Drlg. REMEDIAN	Supta WORK RI	Company Souther PORTS O	rn Unice i NLY	roduction Completio	Co.
D F Eley, 5567	······	F1	LL IN BELI	Position Ann ¹ OW FOR ORIG PBT	• Drlg. REMEDIAL INAL WEL	Supt. WORK RI	Company Souther PORTS 0 Producing	rn Union i NLY Interval	Completio	Co.
D F Eley, 5507 Tubing Diame	-3/8ª	FI T D Tubin	LL IN BELI	Position And C OW FOR ORIG PBT	• Drlg. REMEDIAL UNAL WEL 011 S	Supta WORK RIL DATA	Company Souther PORTS 0 Producing OLTS ter	Interval	Completio II-ZI ng Depth	Co.
D F Eley, 5567 Tubing Diame Perforated Int	ter 	FI T D Tubin B hole on 6201 A	S 8 Depth 6250 251001 904 4911	Position Amp ¹ t OW FOR ORIG PBT	o Drlg. REMEDIAL INAL WEL D 011 S 011 S	Supta WORK RI DATA	Company Souther PORTS 0 Producing CL79 ter	Interval Oil String	Completion II-II- ng Depth	Co.
D F Eley, 5567 Tubing Diame R Perforated Int 61.79, 5 Open Hole Int	erval(s) Ora 181, 6199	FI T D 645 Tubin 9 hole on , 6201, 6	LL IN BELI 5 8 Depth 6250 251981 2014, 6210	Position Amp t OW FOR PBT I, 6256	• Drlg. REMEDIAL INAL WEL D 011 S • 6262, Prod	Supt. WORK RI DATA String Diame 5258, 5 5255, 5 G255, 5 ucing Forms	Company Souther PORTS 0 Producing CL7S- ter 2019 028 Ko79 027 ttion(s)	nLY Interval Oil Strin 9, 6336, 6 5, 6295, 6	Completion Completion IIIII ng Depth	Co.
D F Eley, 5567 Tubing Diame R Perforated Int 61.79, 5 Open Hole Int	erval	FI T D 645 Tubin 9 hole on , 6201, 6	LL IN BELI 5 8 Depth 6250 751981 2014, 6210	Position Amp t OW FOR ORIG PBT	• Drlg. REMEDIAL INAL WEL OILS OILS • 6262. Prod	Supt. WORK RI DATA	Company Southar PORTS 0 Producing Colling ter 2011, 020 Ko7, 027 ktion(s)	Interval Oil Striv 5, 6295, 6	roduction Campletio II-21 ng Depth	Co. Date 4: 6345
D F Eley, 5587 Tubing Diame Rerforated Int 61.79, 55 Open Hole Int	ter -3/80 terval(s) Or 181, 6199 terval Date of	FI T D (145 Tubin 6 hole en 6201, 6 NONE	LL IN BELI 5 8 Depth 6250 6250 6210 8 Depth 8 Dept	Position Amp ¹ OW FOR ORIG PBT L, 6250 RESUL Gas	• Drlg. REMEDIAL INAL WEL OII S 011 S • 6262, Prod TS OF WO Production	Supt. WORK R DATA tring Diame S268, 6 6265, 6 G265, 6 RKOVER Water F	Company Souther PORTS 0 Producing 0179- ter 2013, 020 107, 027 ation(s) Detector	TA URICA I NLY Oil Stri 9, 5336, 6 5, 6295, 6	Completio Completio II 21 ang Depth	Co. Date At 6345
D F Eley, 5567 Tubing Diame R Perforated Int 61.79 Open Hole Int Test Before	terval(s) Ora 181, 6199 terval Date of Test	FI T D 645 Tubin e hele en , 6201, 6 NONE	LL IN BELO S Depth 250 Cries: 204, 6210 Production BPD	Position Amp to OW FOR PBT I, 6256 RESUL Gas M	• Drlg. REMEDIAL INAL WEL D 011 S 011 S 011 S Prod Prod CF P D	Supt. WORK RI DATA tring Diame 5255, 5 G255, 5 ucing Forms RKOVER Water F B	Company Souther PORTS 0 Producing CL75 ter CC175 ter CC175 C	Cubic feet/	Completio II-2I ng Depth 535 5339, 6342 Bbl Gas W	Co. Date
D F Elev, 5567 Tubing Diame R Perforated Int 61.79, 5 Open Hole Int Test Before Workover	ter 3/8 ^{:3} terval(s) One 181, 6199 terval Date of Test	FI T D 645 Tubin e hole ett , 6201, 6 NONE Oil	LL IN BELI S Bepth S S S S S S S S S S S S S S S S S S S	Position Amp t OW FOR PBT I 6258 RESUL Gas M	• Drlg. REMEDIAL INAL WEL 011 S 011 S • 6262. Prod CFPD	Supta WORK RI DATA tring Diame S265, 6 6265, 6 6265, 6 6265, 6 6 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Company Southar PORTS 0 Producing Cal7> ter 204, 020 KoT; 027 Ation(s) Control PD	GOR Cubic feet/	roduction Completio IIII ag Depth 335 5339, 6342 Bbl M	Co. Date & 6345 ell Potential CFPD
D F Eley, 5507 Tubing Diame R - Perforated Int 6179 , 53 Open Hole Int Test Before Workover After Workover	terval 181, 6199 terval Date of Test	FI T D Subin Tubin e hole ext , 6201, 6 NONE Oil	LL IN BEL 5 8 Depth 20th 20th 6210 Production BPD	Position Amp ¹ OW FOR PBT I 6250 RESUL Gas M	• Drlg. REMEDIAL INAL WEL 011 S 011 S • 6262, Prod TS OF WO Production CFPD	Supte WORK RI DATA String Diame S265, 6 6265, 6 G265, 6 G265, 6 Water F B	Company Souther PORTS 0 Producing OL79 ter 2013, 020 Ko7, 027 Ation(s) Descent	Interval Oil String, 6295, 6 GOR Cubic feet/	roduction Completio IIIII ag Depth	Co. Date At 6345 Cell Potential CFPD
D F Eley, 5567 Tubing Diame Rerforated Int 61.79, 53 Open Hole Int Test Before Workover After Workover	oil CONS	FI T D Subin Tubin e hole en , 6201, 6 NONE Oil	LL IN BEL 5 8 Depth 20th 20th BPD Commission	Position Amp ¹ OW FOR PBT I 6250 RESUL Gas M	• Drlg. REMEDIAL INAL WEL Dul8 Oil S • 6262, Prod TS OF WO Production CFPD	Supte WORK RI DATA String Diame S208, 0 6265, 0 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Company Souther PORTS 0 Producing OL79- ter Cols, O27 Ation(s) Descent Production PD	GOR Cubic feet/	roduction Completio IIIII ag Depth SJ39, 6342 Bbl Gas W Bbl Mt	Co. Date At 6345 Cell Potential CFPD
D F Eley, 5567 Tubing Diame Reforated Int 61.79 5 Open Hole Int Test Before Workover After Workover	oiL CONS Original A. R. K	FI T D Ga5 Tubin e hole en , 6201, 6 NONE Oil ervation o Signed By ENDRICK	LL IN BEL S B Depth CS CS CS CS CS CS CS CS CS CS	Position Amp ¹ OW FOR PBT L, 6256 RESUL Gas M	• Drlg. REMEDIAL INAL WEL Doll S 011 S 011 S Prod TS OF WO Production CFPD	Supt. WORK RI DATA tring Diame S268, 64 G265, 64	Company Souther PORTS 0 Producing Classes ter Classes ter Classes Company ter Classes Company ter Classes Company Classes Company Classes Company Classes Company Classes Company Classes Company ter Classes Company Classes Company ter Company ter	GOR Cubic feet/	roduction Completio IIIII ag Depth 335 5339, 6312 Bbl Gas W Bbl M M	Co. Date
D F Eley, 5567 Tubing Diame R Perforated Int 61.79 5 Open Hole Int Test Before Workover After Workover Approved by Title FET	oil cons Original A. R. K	FI T D Tubin e hole en , 6201, 6 NONE iervation o Signed By ENDRICK	LL IN BELI S B Depth C250 C51951 2011, 6210 Production B P D COMMISSION	Position Amp to OW FOR PBT I, 6256 RESUL Gas M	• Drlg. REMEDIAN INAL WELL D Call Oil S • 6262. Prod Production CFPD I h to Nat Pos	Supt. WORK RI DATA String Diame S265, 6 G255, 6 ucing Forms RKOVER Water F B Water F B ereby certification the best of ne T	Company Souther PORTS O Producing CL79 ter CCL9 CC CCL9 CC CCL9 CC CCL9 CC PD Value CCL9 CCL9 CC PD Value CCL9 CCL9 CCL9 CCL9 CCL9 CCL9 CCL9 CCL9	Cubic feet/	roduction Campletio IIIII ng Depth 335 5339, 6342 Bbl Gas W Mu	Co. Date

RADIUS OF ENDANGERING INFLUENCE CALCULATIONS

Western Refining Disposal Well #1 2009 Annual Fall-Off Test Radius of Endangering Influence Calculation Using 40 C.F.R. § 146.6 equations

1. $r = \sqrt{\frac{2.25KHt}{S10^{X}}}$ radius of endangering influence equation

2.
$$X = \frac{4\pi K H (h_w - h_{bo}) (S_p G_b)}{2.3Q}$$

3. $K = \frac{Q}{4\pi sr_a}$ hydraulic conductivity equation

Where:

r	Radius of endangering influence from injection well (length - feet)
Κ	the hydraulic conductivity (length/time - ft/day)
Н	Thickness of the injection zone (length - feet)
\mathbf{h}_{bo}	Observed original hydrostatic head of injection zone (length - feet) measured from the base of the lowermost underground source of drinking water)
h_w	Hydrostatic head of underground drinking water (length - feet) measured from the base of the lowest underground source of drinking water
π	3.142 (dimensionless)
Q	Injection rate (volume/time - cuft/day)
r _w	the radius of the well (length - ft). Include fracture half length as equivalent wellbore radius for linear flow in a fractured well.
t	time of injection (time - days)
s	the drawdown (length - ft)
S	Storage coefficient (dimensionless), nominally 0.1 if unconfined or 0.001 if confined
S_pG_b	Specific gravity of fluid in the injection zone (dimensionless)
t	Time of injection (dime – days)
X_{f}	Fracture half length (length – feet) – for well with linear flow

Assumptions:

- 1. The injection zone is homogenous and isotropic
- 2. The injection zone has infinite areal extent
- 3. The injection well penetrates the entire thickness of the injection zone
- 4. The well diameter is a fractured well with linear flow properties. R_w becomes the fracture half length, X_f .
- 5. The emplacement of fluid into the injection zone crates instantaneous increase in pressure

- 6. Specific gravity of the injected fluid is 1.00 (water).
- 7. The lowermost source of drinking water is the base of the Ojo Alamo formation at 734 feet depth with a normal pressure gradient. Ojo Alamo formation is 165 feet thick and assumed to be saturated with water
- 8. The observed original hydrostatic head of the injection zone is 320 psig surface pressure or 1473 feet of head at the depth of the lower most underground source of drinking water.

Radius of Endangering Influence at 556,032,672 Gallons of Injection Fluids

Q 69.1 GPM - Average Injection Rate
Q 2369.143 BWPD
Q 13301.75 cuft/day
gradient 0.433 psi/ft
p_i 4199 feet - original head lowest perforation
p_{wf} 2344.6 psi - final bottom-hole flowing pressure @ 3250 feet
p_{wf} 5625 feet - final bottom-hole head
s 1426 feet - (final head less original head)
r_w 3480 ft (r_w = x_f - fractured well with linear flow)

$$K = \frac{Q}{4\pi s r_w} = \frac{13301.75}{4\pi (1426)(3480)} = 0.00021328$$

K 0.00021328 ft/day - from equation 3
H 106 feet (njection interval)
h_w 165 feet (165 feet thick Ojo Alamo - assume formation is saturated with
water - from 16 Sep 1992 report)
h_{bo} 1473 feet (320 psi - surface pressure plus 734 feet of head to lowermost
source of drinking water - Ojo Alamo)
 $X = \frac{4\pi K H (h_w - h_{bo}) (S_p G_b)}{2.3Q} = \frac{4\pi (0.00021328) (106) (165 - 1473) (1.0)}{2.3 (13301.75)} = -0.01215$
X -0.01215 from equation 2
V 556,032,672 gallons (injected fluid as of 2009 falloff test)
t 5588 days at final injection rate
S 0.001 confined dimensionless storage (Heath, 1989)
 $r = \sqrt{\frac{2.25K/Hi}{510^X}} = \sqrt{\frac{2.25(0.00021328)(106)(5588)}{(0.001)10^{-0.01215}}} = 541 feet$

r = 541 feet - from equation 1 when confined

Radius of Endangering Influence at 1,200,000,000 Gallons of Injection Fluids

X-0.01215from equation 2V1,200,000,000 gallonst12,060S0.001confined dimensionless storage (Heath, 1989)

-

$$r = \sqrt{\frac{2.25KHt}{S10^{X}}} = \sqrt{\frac{2.25(0.00021328)(106)(12060)}{(0.001)10^{-0.01215}}} = 794 \text{ feet}$$

r = 794 feet - from equation 1 when confined



EDMUND H. KENDRICK Direct: (505) 986₇2527 Email: ekendrick@montand.com ()() Reply To: Santa Fe Office www.montand.com 2010 MAR 25 A 10: 46

March 25, 2010 VIA EMAIL AND HAND DELIVERY

Mr. Glenn von Gonten Acting Environmental Bureau Chief New Mexico Oil Conservation Division 1220 South St. Francis Drive Santa Fe, New Mexico 87505

Re: Request to Withdraw Public Notice Discharge Plan Permit (UICI-009 [I-009]) Western Refining Southwest, Inc. Class I Non-Hazardous Disposal Well Waste Disposal Well No. 1, API No. 30-045-29002 2442 FSL and 1250 FEL UL: I Section 27, T29N, R11W San Juan County, New Mexico

Dear Mr. von Gonten,

Western Refining Southwest, Inc. (Western) respectfully requests that the public notice be withdrawn in this matter because the Notice of Publication, Draft Discharge Plan Permit and the New Mexico Oil Conservation Division (OCD) letter dated February 25, 2010 determining "administrative completeness" do not accurately reflect Western's application. The letter states "The New Mexico Oil Conservation Division (OCD) has received Western Refining Southwest, Inc's application for Disposal Well No. 1 to inject oil field exempt/non-exempt non-hazardous wastes into the Cliff House and Menefee Formations at the intervals from 3276 to 3408 feet and 3435 to 3460 feet, respectively at a maximum injection pressure of 600 psig." (Emphasis added.) The 600 psig maximum injection pressure is also referenced in the Notice of Publication and Draft Discharge Plan Permit. The letter is presented for reference in Attachment A.

Western's application, dated October 2, 2008, did not reduce the injection pressure from 1,150 to 600 psig. Furthermore, Western was not notified of the reduction to 600 psig until February 23, 2010, when Western received an email to that effect from OCD. Western was unable to respond to the email before OCD issued the public notice, two days later. The OCD email is also included in Attachment A.

REPLY TO:

325 Paseo de Peralta Santa Fe, New Mexico 87501 Telephone (505) 982-3873 • Fax (505) 982-4289

Post Office Box 2307 Santa Fe, New Mexico 87504-2307 6301 Indian School Road NE, Suite 400 Albuquerque, New Mexico 87110 Telephone (505) 884-4200 • Fax (505) 888-8929

Post Office Box 36210 Albuquerque, New Mexico 87176-6210

Permitted Maximum Injection Pressure History

According to available records, the initial discussions with the OCD Aztec Office indicated that the injection pressure would be limited initially to 0.2 psi/ft or about 690 psi, "the rule of thumb" for estimating reservoir parting (i.e., fracture) pressure. Western understands that OCD requires additional testing before the agency can allow the maximum injection pressure to be increased above the initial "rule of thumb" level. That, in fact, is what happened. Upon completion of additional testing on two occasions, OCD approved the permitted maximum injection pressure to increase to 955 psig in 1994 and to 1,150 psig in 1996. Presently, the permitted maximum injection pressure is 1,150 psig.

Below is a brief history of the permitted maximum injection pressure.

0	June 28, 1994	Increase Pressure Increase to 955 psig.
0	July 16, 1996	Increase Pressure Increase to 1150 psig.
C	September 16, 1999	Discharge Plan Renewal Application - No Change
0	June 30, 2003	Discharge Plan Renewal Application – No Change
0	March 23, 2004	Discharge Plan Renewal – 1150 psig
Ð	October 2, 2008	Discharge Plan Renewal Application - No Change

The pressure history documents are included in Attachment B.

Engineering Basis for 1,150 psig Maximum Injection Pressure

In Western's opinion, there is no engineering basis to reduce the injection pressure. Based on actual data collected by Western, it is not possible for the fractures to be growing at this time.



BHTP – Bottom Hole Treating Pressure BPM – Barrels Per Minute

SLR - Slurry Rate



Figures 1 and 2, above, were generated using the same data from the March 1, 1996 Postfrac Treatment Summary. Figure 1 depicts the pressure and slurry rate versus time. To enhance detail, Figure 2 has a larger scale than Figure 1. These figures show the following:

- the formation pressure at initiation of treatment was 2091 psig (0.64 psi/ft) as seen in Figure 1;
- the formation parting pressure was 2866 psig (0.88 psi/ft) as seen in Figures 1 and 2; and
- 3) the propagation pressure is approximately 2775 psig (0.85 psi/ft) as seen in Figures 1 and 2.



Figure 3, above, depicts bottom hole pressure and injection pressure history versus cumulative injection volume from initiation of injection to near present. The figure also depicts the formation pressure change from cumulative injection (black line), formation parting pressure (red line), propagation pressure (green) and permitted maximum injection pressure (blue line).

At approximately 530 million cumulative gallons, the corresponding pressures from the graph are:

0	Formation Parting Pressure	2,866 psig
0	Propagation Pressure	2,775 psig
•	Bottom Hole Pressure	2,450 psig
0	Injection Pressure	~1,150 psig

To propagate a fracture, bottom hole pressure would have to be in excess of the propagation pressure. The bottom hole pressure, which corresponds to the permitted maximum injection pressure (1,150 psig), is approximately 2,450 psig. When approaching the permitted maximum injection pressure, there is an approximate 325 psi cushion between the bottom hole pressure and the

propagation pressure. This confirms that historical bottom hole pressures are below 2,500 psig and cannot be propagating fractures. It is not possible for the fractures to be growing at this time.

When fluid is injected into a zone, the pressure will increase unless the zone is frictionless and infinitely large. As such, Western recognizes that some increase in average reservoir pressure has occurred and/or will occur. The formation pressure change from the cumulative injection curve shows that the predicted formation pressure at 1,200 million gallons will be less that 2,500 psig. This curve confirms that formation pressure will not approach progagation pressure within the Discharge Plan Renewal permit period (5 years).

The formation pressure of 2,091 psi at the initiation of the May 1, 1996 fracture treatment is indicative of a tight formation. Due to the tight formation, the 0.2 psi per foot "rule of thumb" does not logically apply. If the maximum injection pressure is reduced to 600 psi, flow to the formation is not possible because formation pressure would be higher than the combined injection pressure plus hydrostatic pressure.

Request to Withdraw the Current Public Notice

Western is concerned that applicable Water Quality Control Commission (WQCC) regulations may require Western to provide public notice of its application for a permit renewal within 30 days of OCD deeming the application to be administratively complete. However, it is impossible for Western to provide such public notice for two reasons. First, if Western's public notice matches OCD's February 25, 2010 public notice, Western's public notice would be inaccurate. Western's public notice would contain a maximum surface injection pressure of 600 psig, which does not match Western's application. Second, if Western's public notice matches its application and contains a maximum surface injection pressure of 1,150 psig, Western's public notice would not match OCD's public notice and would create needless confusion.

Consequently, Western respectfully requests that OCD withdraw its February 25, 2010 public notice. Such withdrawal of the public notice would enable OCD and Western to meet and discuss any issues concerning an appropriate maximum injection pressure. Western has other concerns with the draft permit renewal that it would like to discuss with OCD. Western's goal is to resolve any such issues with OCD so that OCD could then reissue a public notice that reflects an agreement of the parties.

If you have any questions about this request, please contact me at (505) 986-2527.

Sincerely

Edmund H. Kendrick

EHK/dho Attachments

cc: Mr. Carl Chavez (via email w/encl.); <u>carlj.chavez@state.nm.us</u> Gail MacQuesten (via email w/encl); <u>gail.macquesten@state.nm.us</u>

Attachment A

- 2010-02-25 OCD Discharge Permit Renewal Admin Complete
- 2010-02-22 OCD Email

New Mexico Energy, Minerals and Natural Resources Department

Bill Richardson

Jon Goldstein Cabinet Secretary Mark Fesmire Division Director Oil Conservation Division



February 25, 2010

Mr. James R. Schmaltz Western Refining Southwest, Inc. #50 Road 4990, P.O. Box 159 Bloomfield, New Mexico 87413

Re: Discharge Plan Permit (UICI-009 [I-009]) Western Refining Southwest, Inc. Class I Non-Hazardous Oil Field Waste Disposal Well Waste Disposal Well No. 1, API No. 30-045-29002 2442 FSL and 1250 FEL UL: I Section 27, T29 N, R 11 W San Juan County, New Mexico

Dear Mr. Schmaltz:

The New Mexico Oil Conservation Division (OCD) has received Western Refining Southwest, Inc's application for Waste Disposal Well No. 1 to inject oil field exempt/non-exempt non-hazardous wastes into the Cliff House and Menefee Formations at the intervals from 3276 to 3408 feet and 3435 to 3460 feet, respectively at a maximum surface injection pressure of 600 psig. The Class I waste disposal injection well is located in the NE/4 SE/4 of Section 27, Township 29 North, Range 11 West, NMPM, San Juan County, New Mexico. The initial submittal provided the required information in order to deem the application "administratively" complete.

Therefore, the New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the OCD. OCD will provide public notice pursuant to the WQCC notice requirements of 20.6.2.3108 NMAC to determine if there is any public interest.

Please contact me at (505) 476-3490 or <u>carlj.chavcz@state.nm.us</u> if you have questions. Thank you for your cooperation during this discharge permit review.

Sincerely,

Carl J. Chavez

Environmental Engineer

CJC/cjc

xc: OCD District III Office, Aztec

Attachment A Page 1



Chavez, Carl J, EMNRD

From:	Chavez, Carl J, EMNRD
Sent	Monday, February 22, 2010 1.201 M
To:	Schmaltz, Randy
Cc:	'Allen.Hains@wnr.com'; Monzeglio, Hope, NMENV; Cobrain, Dave, NMENV; Sanchez, Daniel J., EMNRD; Jones, William V., EMNRD; VonGonten, Glenn, EMNRD; Perrin, Charlie, EMNRD
Subject:	Re: Western Refining Southwest, Inc. Status of OCD Discharge Permits: Bloomfield Refinery (GW-001) & UIC Class I Disposal Well (UICI-009)

Randy, et al.:

FYI, the OCD will likely be processing Western Refining Southwest, Inc.'s (WRSWI) two OCD Discharge Permit Applications (see above subject) this week.

The landfill issues for GW-001 are resolved in the discharge permit along with the active status and closure plan issues.

The maximum allowable surface injection pressure for UICI-009 has been reduced to 600 psig in the discharge permit in order to prevent the half-fractures from growing in the present injection formation. WRSWI will likely need to change its dewatering w/ SVE remediation project at the river terrace as a result of this pressure reduction in order to comply with the change.

Please contact me if you have questions. Thank you.

Carl J. Chavez, CHMM New Mexico Energy, Minerals & Natural Resources Dept. Oil Conservation Division, Environmental Bureau 1220 South St. Francis Dr., Santa Fe, New Mexico 87505 Office: (505) 476-3490 Fax: (505) 476-3462 E-mail: <u>CarlJ.Chavez@state.nm.us</u> Website: <u>http://www.emnrd.state.nm.us/ocd/</u>index.htm (Pollution Prevention Guidance is under "Publications")

1

Attachment B

- 1994-06-28 OCD Injection Pressure Increase
- 1996-07-16 OCD Injection Pressure Increase
- 1999-09-16 Giant Renewal Application
- 2003-06-30 Giant Renewal Application
- 2004-03-23 OCD Discharge Permit Renewal
- 2008-10-02 Western Renewal Application

STATE OF NEW MEXICO



ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

NRIIG FREE

BRUCE KING GOVERNOR

ANITA LOCKWOOD CABINET SECRETARY

June 28, 1994

POST OFFICE BOX 2088 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87504 (505) 827-5800

Tierra Environmental Corporation 909 W. Apache Farmington, NM 87401

Attention: Connie Dinning

RE:

Injection Pressure Increase Bloomfield Refining SWD Well No. 1, San Juan County, New Mexico

Dear Ms. Dinning:

Reference is made to your request dated May 13, 1994 to increase the surface injection pressure on the Bloomfield Refining SWD Well No. 1. This request is based on a step rate test conducted on this well on January 22, 1994. The results of the test have been reviewed by my staff and we feel an increase in injection pressure on this well is justified at this time.

You are therefore authorized to increase the surface injection pressure on the following well:

Well and Location	Maximum Injection Surface Pressure
Bloomfield Refining SWD No. 1 Unit I, Section 27, Township 29 North, Range 11 West, San Juan County, New Mexico.	955 PSIG

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Page 1

Sincerely. William J. LeMay Director WJL/DRC/amg Oil Conservation Division - Aztec cc: SWD-528 File: D. Catanach Attachment B



July 16, 1996

Giant Refining Company P.O. Box 159 Bloomfield, New Mexico 87413-0159

Attn: Mr. Lynn Shelton

RE: Injection Pressure Increase, Bloomfield Refining Well No.1 San Juan County, New Mexico

Dear Mr. Shelton:

Reference is made to your request dated May 3, 1996 to increase the surface injection pressure on the above referenced well. This request is based on a step rate test conducted on March 1, 1996. The results of the test have been reviewed by my staff and we feel an increase in injection pressure on this well is justified at this time.

You are therefore authorized to increase the surface injection pressure on the following well:

Well and Location	Maximum Surface Injection Pressure				
Bloomfield Refining Well No.1	1150 PSIG				
Located in Unit Letter 'I', Section 27, Township 29 North, Range 11 West, San Juan County, New Mexico.					

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Sincerely, William J. L May Director WJL/BES Oil Conservation Division Aztec cc:

Files:SWD-528; PSI-X 1st QTR-97



111 Road 4990 Bloomfield, New Mexico 87413

505 632.8006

1	h.	R	C	ß	ſ	M	3	R
Contraction of the local division of the loc			SEP	2	0	199	9	
	OIL	CU	NSE	RV/	ATI	ON :) Noi	3:0N

September 16, 1999

Mr. Wayne Price NMOCD 2040 S. Pacheco Santa Fe, New Mexico 87505

Re: Discharge Plan GW-130 Renewal SWD Well #WD-1 San Juan County, New Mexico

Dear Mr. Price:

Giant Refining Company – Bloomfield submits this notice of application for renewal of Discharge Plan GW-130, SWD Well #WD-1 at this site.

No elements of the discharge plan have been changed.

Enclosed is a check for \$50.00 to cover the filing fee.

If you need additional information, please contact me at (505) 632 4168.

Sincerely: CL

Lynn Shelton Environmental Manager Giant Refining Company – Bloomfield

Enclosure

Cc: John Stokes, Vice President, Giant Refining Company Sarah Allen, Corporate Counsel, Giant Industries, Inc. Denny Foust, NMOCD, Aztec
Mr. Wayne Price New Mexico Oil Conservation Division 1220 South St. Frances Dr. Santa Fe, New Mexico 87505

June 30, 2003

Via: Certified Mail # 7099 3220 0010 2242 6225

Re: Discharge Plan GW-130 Renewal SWD Well #WD-1 San Juan County, New Mexico

Dear Mr. Price,

Giant Refining Company – Bloomfield Refinery submits this notice of application for renewal of Discharge Plan GW-130, SWD Well #WD-1 at this site.

No elements of the discharge plan have been changed.

Enclosed is s check for \$100.00 to cover the filing fee.

If you need more information, please contact me at (505) 632-4171.

Sincerely,

Randy Schmaltz Environmental Supervisor Giant Refining Company – Bloomfield

Cc: Chad King, Bloomfield Refinery Manager Ed Riege, Giant Refining Environmental Superintendent Denny Foust, New Mexico Oil Conservation Division – Aztec

PHONE 505-632-8013 FAX 505-632-3911

Attachment B Page 4 50 ROAD 4990 P.O. BOX 159 BLOOMFIELD NEW MEXICO 87413



NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON Governor

March 23, 2004

Joanna Prukop Cabinet Secretary Acting Director Oil Conservation Division

CERTIFIED MAIL RETURN RECEIPT NO. 7923 4399

Mr. James (Randy) Schmaltz Environmental Supervisor Giant Refining Co. P.O. Box 159 Bloomfield, NM 87413

RE: Discharge Permit Renewal Bloomfield Refinery Class I (Non-Hazardous) Disposal Well UIC-CL1-009 (GW130) San Juan County, New Mexico

Dear Mr. Schmaltz:

The groundwater discharge permit renewal application for the Bloomfield Refinery Class I (Non-Hazardous) Disposal Well operated by Giant Refining Co. located in the NE/4, SE/4 of Section 27, Township 29 North, Range 11 West, NMPM, San Juan County, New Mexico is hereby approved under the conditions contained in the enclosed attachment. Enclosed are two copies of the conditions of approval. Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 days of receipt of this letter.

The original discharge permit application was submitted on September 16, 1992 and approved on November 05, 1993. The discharge permit renewal application, dated June 30, 2003 submitted pursuant to Sections 5101 of the New Mexico Water Quality Control Commission (WQCC) Regulations also includes all earlier applications and all conditions later placed on those approvals. The discharge permit is renewed pursuant to Section 5101 and 3109 Please note Section 3109.G., which provides for possible future amendment of the permit. Please be advised that approval of this permit does not relieve Giant Refining Company of liability should operations result in pollution of surface or ground waters, or the environment.

Please be advised that all exposed pits, including lined pits and open top tanks (exceeding 16 feet in diameter) shall be screened, netted, or otherwise rendered nonhazardous to wildlife including migratory birds.

Please note that Section 3104. of the regulations requires that "when a permit has been approved discharges must be consistent with the terms and conditions of the permit." Pursuant to Section 3107.C., Giant Refining Company is required to notify the Director of

Oil Conservation Division * 1220 South St. Francis Drive * Santa Fe, New Mexico 87505 Phone: (505) 476-3440 * Fax (505) 476-3462 * <u>http://www.emmrd.state.nm.us</u>

any facility expansion, production increase, or process modification that would result in any change in the discharge of water quality or volume.

Pursuant to Section 3109.H.4., this approval is for a period of five years. This approval will expire November 04, 2008 and an application for renewal should be submitted in ample time before that date. Pursuant to Section 5101.F. of the regulations, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved.

The discharge permit application for the Giant Refining Company Bloomfield Refinery Class I (Non-Hazardous) Disposal Well is subject to the WQCC Regulation 3114. Every billable facility submitting a discharge permit will be assessed a fee equal to the filing fee of \$100 plus a renewal fee of \$4500.00 for class I wells. The OCD has not received the \$4500.00 flat fee. The flat fee may be paid in a single payment due on the date of the discharge permit approval or in five equal installments over the expected duration of the discharge permit. Installment payments shall be remitted yearly, with the first installment due on the date of the discharge permit approval and subsequent installments due on this date of each calendar year.

و وجو ورو ا	 Statutes 	and a me	an an the state of the	a haana ka sana kareek	والروار مايتم تشريق المستجد تسريكون				1.423466
ാ	10000	1 11	aboalco a	wable tot	Watar	Quality Ma	nagement F	and second	1.2.1
r	lease ma	ке ап	checks p	ayable to:	yraici y	Quanty bia	magement r	unu kasalah sadar	1997 (Mar)
1973		1.1.40.00.00				전 경험 전 가슴 관람을 수 없는 것이			
- 3913	1.				C/n O	il Conserve	ation Divisio	n	
	一日の時代に	a di tetta del		haisti teksentis					1.00
	1 1942/1961				1 2 2 2 2	and Calad	Turnete Date		
					1220 3	outh Saint	Francis Driv	/e	. SA 11 -
				영영에 잘 가 있는 것은 것을 했다.		An Age of Age and the			- 10 A
- 03/31					Santa	Fo Now M	ovico 27585		1.720
1999 B. S.	1. A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A.A				Dania	F.C. 11C11 111	CAICO 07.50.5.	방법 방법을 위한 것 수 있는 것 같은 것 같	
< 1800.									142.11
1.74.7									1. S. M.

If you have any questions, please contact Wayne Price of my staff at (505-476-3487) or Email wprice@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Roger Anderson Environmental Bureau Chief RCA/lwp Attachment-1 xc: OCD Aztec Office

ATTACHMENT TO THE DISCHARGE PERMIT UIC-CL1-009 (old GW-130) Giant Refining Company Bloomfield Refinery Class I (Non-Hazardous) Disposal Well DISCHARGE PERMIT APPROVAL CONDITIONS March 23, 2004

- 1. <u>Payment of Discharge Permit Fees:</u> The \$100.00 filing fee has been received by OCD. The \$4500.00 flat fee shall be submitted upon receipt of this approval. The required flat fee may be paid in a single payment due at the time of approval, or in equal annual installments over the duration of the permit, with the first payment due upon receipt of this approval.
- 2. <u>Giant Refining Company Commitments</u>: Giant Refining Company will abide by all commitments submitted in the discharge permit renewal application dated June 30, 2003 and these conditions for approval.
- 3. <u>Authorization to Inject and Maximum Injection Pressure</u>: Giant Refining Company is authorized to inject subject to the discharge permit commitments and conditions contained within. The maximum operating injection pressure at the wellhead will be 1150 psi as allowed in the amended Administrative Order SWD-528. The injection well or system shall be equipped with a pressure limiting device which will limit the wellhead pressure on the injection well to no more than 1150 psi. The pressure limiting device shall monthly be demonstrated to operate to the satisfaction of the OCD.

Giant Refining Company shall take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface.

- 4. <u>Mechanical Integrity Testing</u>: In accordance with OCD testing procedures, a mechanical integrity test will be conducted on the well annually and any time the tubing is pulled or the packer is reseated. A pressure recorder will be used and copies of the chart submitted to the OCD Santa Fe Office and the OCD Aztec District Office within 30 days following the test date. The OCD will be notified prior to the test so that they may witness the test. Mechanical integrity testing charts will be maintained at Giant Refining Company for the life of the well
- 5. <u>Annulus:</u> The casing-tubing annulus will be filled with an inert fluid and a minimum pressure of 100 psi maintained. Fluid levels shall be checked and reported at the time of performing the mechanical integrity test.

- 6. <u>Continuous Monitoring and Recording</u>: Continuous monitoring and recording devices will be installed and mechanical charts made of injection pressure, flow rate, flow volume, annular pressure and nitrogen usage. Mechanical charts are to be maintained at Giant Refining Company for the life of the well.
- 7. <u>Maintenance Records</u>: All routine maintenance work on the well will be recorded and maintained at Giant Refining Company for the life of the well.
- 8. <u>Wastes Permitted for Injection</u>: Injection will be limited to exempt and non-hazardous oilfield wastes generated exclusively by Giant Refining Company Refining Company. All non-exempt non-hazardous oil field waste will be tested for the constituents listed below in number 9.
- 9. <u>Chemical Analysis of Injection Fluids</u>: The following analyses of injection fluids will be conducted on a quarterly basis:
 - a. Aromatic and halogenated volatile hydrocarbon scan by EPA method 8260C GC/MS including MTBE. Semi-Volatile Organics GC/MS EPA method 8270B including 1 and 2-methylnaphthalene.
 - b. General water chemistry to include calcium, potassium, maguesium, sodium, bicarbonate, carbonate, chloride, sulfate total dissolved solids (TDS), pH, and conductivity.
 - c. Total heavy metals using the ICAP scan (EPA method 6010/ICPMS) and Mercury using Cold Vapor (EPA method 7470).
 - d. EPA RCRA Characteristics for Ignitability, Corrosivity and Reactivity.

Records of all analyses will be maintained at Giant Refining Company for the life of the well.

- 10. <u>Quarterly Reporting</u>: The following reports will be signed and certified in accordance with WQCC section 5101.G. and submitted quarterly to both the OCD Santa Fe and Aztec Offices:
 - a. Results of the chemical analysis of the injection fluids (number 9).
 - b. Monthly average, maximum and minimum values for injection pressures; flow rate and flow volume; and, annular pressure.
 - c. Monthly volumes of injected fluids.

- 11. Drum Storage: All drums containing materials other than fresh water must be stored on an impermeable pad with curbing. All empty drums will be stored on their sides with the bungs in and lined up on a horizontal permitees. Chemicals in other containers such as sacks or buckets will also be stored on an impermeable pad and curb type containment.
- 12. <u>Process Areas:</u> All process and maintenance areas which show evidence that leaks and spills are reaching the ground surface must be either paved and curbed or have some type of spill collection device incorporated into the design.
- 13. Above Ground Tanks: All above ground tanks which contain fluids other than fresh water must be bermed to contain a volume of one-third more than the total volume of the largest tank or of all interconnected tanks. All new tanks or existing tanks that undergo a major modification, as determined by the Division, must be placed within an impermeable bermed enclosure.
- 14. <u>Above Ground Saddle Tanks</u>: Above ground saddle tanks must have impermeable pad and curb type containment unless they contain fresh water or fluids that are gases at atmospheric temperature and pressure.
- 15. Labeling: All tanks, drums and containers should be clearly labeled to identify their contents and other emergency notification information.
- 16. Below Grade Tanks/Sumps/Pits/Ponds: All below grade tanks, sumps, pits and ponds must be approved by the OCD prior to installation or upon modification and must incorporate secondary containment and leak-detection into the design, unless approved otherwise. All below grade tanks, sumps and pits must be tested annually or as specified below, see additional conditions, except systems that have secondary containment with leak detection. These systems with leak detection shall have a monthly inspection of the leak detection to determine if the primary containment is leaking. Results of tests and inspections shall be maintained at the facility covered by this discharge plan and available for NMOCD inspection. Any system found to be leaking shall be reported pursuant to Item # 20. Permit holders may propose various methods for testing such as pressure testing to 3 pounds per square inch above normal operating pressure and/or visual inspection of cleaned out tanks and/or sumps, or other OCD approved methods. The OCD will be notified at least 72 hours prior to all testing.

- 17. <u>Underground Process/Wastewater Lines:</u> All underground process/wastewater pipelines must be approved by the OCD prior to installation and must be tested to demonstrate their mechanical integrity every five (5) years. Results of such tests shall be maintained at the facility covered by this discharge plan and available for NMOCD inspection. Permit holders may propose various methods for testing such as pressure testing to 3 pounds per square inch above normal operating pressure or other means acceptable to the OCD. The OCD will be notified at least 72 hours prior to all testing.
- 18. <u>Well Workover Operations:</u> OCD approval will be obtained from the Director prior to performing remedial work or any other workover. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Aztec District Office.
- 19. <u>Housekeeping:</u> All systems designed for spill collection/prevention will be inspected weekly and after each storm event to ensure proper operation and to prevent overtopping or system failure. A record of inspections will be retained on site for a period of five years.
- 20. <u>Spill Reporting:</u> All spills/releases shall be reported pursuant to OCD Rule 116. and WQCC 1203. to the OCD Aztec District Office.

Giant Refining Company shall immediately notify the Supervisor of the Aztec District Office and the Environmental Bureau of the Division of the failure of the tubing, casing, or packer in said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

- 21. <u>Transfer of Discharge Permit</u>: The OCD will be notified prior to any transfer of ownership, control, or possession of the well and associated facilities. A written commitment to comply with the terms and conditions of the previously approved discharge permit and a bond must be submitted by the purchaser and approved by the OCD prior to transfer.
- 22. <u>Closure:</u> The OCD will be notified when operations of the well are discontinued for a period in excess of six months. Prior to closure of the well and associated facilities a closure permit will be submitted for approval by the Director. Closure and waste disposal will be in accordance with the statutes, rules and regulations in effect at the time of closure.

- 23. Plugging Bond and /or Letter of Credit: Giant Refining Company shall have in effect a Division approved plugging bond and/or letter of credit for the estimated amount required to plug the well according to the proposed closure permit and adjusted for inflation. The required plugging bond and/or letter of credit shall be adjusted at the time of discharge permit renewal. Please submit the new estimate before November 04, 2008.
- 24. Training: All personnel associated with operations at the Giant Refining Company Class I disposal well will have appropriate training in accepting, processing, and disposing of Class I non-exempt non-hazardous oil field waste to insure proper disposal. All training documentation shall be maintained at Giant Refining Company for the life of the well.
- OCD Inspections: Additional requirements may be placed on the well and associated 25. facilities based upon results from OCD inspections.
- 27. Giant Refining Company by the officer whose signature appears Certification: below, accepts this permit and agrees to comply with all terms and conditions contained herein. Giant Refining Company further acknowledges that these conditions and requirements of this permit modification may be changed administratively by the Division for good cause shown as necessary to protect fresh water, human health and the environment.

Giant Refining Company Conditions accented by:

chad Fing-

Company Representative- print name

<u>Company Representative/Sign</u> Title_<u>Refinery</u> Manager



BLOOMFIELD REFINERY

WNR DISTED NYSE.

RECEIVED

2008 OCT 6 PM 3 33

Carl Chavez New Mexico Oil Conservation Division Environmental Bureau 1220 South St. Francis Dr Santa Fe, NM 87505

Certified Mail: 7006 0810 0003 7020 7148

October 2, 2008

TO APPOVEN THIS CERUNA TO APPOVENT PROCEDUNA T PROFESS & PROCEDUNA T PROFESS & AND RE: Bloomfield Refinery - Western Refining Southwest, Inc. **Renewal Application for Class I** Non-Hazardous Injection Well UICL-9 EPA ID #NMD089416416

Mr. Chavez,

Bloomfield Refinery submits this notice of application for renewal of the Discharge Permit for the Bloomfield Refinery Class I (Non-Hazardous) Disposal Well UICL-9 operated by Western Refining Southwest, Inc. The well is located in the NE/4, SE/4 of Section 27, Township 29 North, Range 11West, NMPM, San Juan County, New Mexico

No elements of the Discharge Plan have been changed.

Enclosed is a check for \$100.00 for the filing fee.

If you need more information, please contact me at (505) 632-4171.

Sincerelv

James R. Schmaltz Environmental Manager Western Refining Southwest, Inc. - Bloomfield Refinery

Cc: Wayne Price- NMOCD Santa Fe Brandon Powell - NMOCD Aztec District Office Todd Doyle - Bloomfield Refinery

> 50 Road 4990, Bloomfield, New Mexico 87413 • 505 632-8013 • www.wnr.com Mail: P.O. Box 159, Bloomfield, New Mexico 87413

Attachment B Page 12

Ved

Attachment C

• 1996-03-01 Giant Postfrac Treatment Summary



Page 1



Attachment C Page 2

WESTERN	

(The Western Company

Treatment Report

Ę.

Page 1 of 1

Date District Familington NM F.Reccipt. 398367 Operator Operator </th <th>Date March 1, 1995 District Farmington NM F.Reccipt, 398367 Operator Glant Refinery Lase Bloomfield WD Well No. 1 Field Blanco Losito SEC27,729N,R11W County State New Mexico Stage Number 1 This Zone SI This Well SI WELL 11ATA OG NG NO OO WD IW Misc. Depth TD/PB 3600° Formation Meas Verde Tubing Size 51/2* Wt. 15.5# Set From SURPACE To TO Liner Size N/A Wt. Liner Set From To Open Hole: Size N/A From To Costing Bit Pole Size 45 Previous Treatment NA Prior Production N/A Prior Production N/A ELOUIDA-GAS PUMPED Treat Fluid Type: Foam Wate ES Acid (10: Vol. 130,410 Gat. EAGPACTITES 1P. PAB Prop Type: Sand Go WP-1 WP-3 Base Fluid Vol. 123,254 Gat. Tubing Cap. N/A Flood Cape Add Tites 20;40 Artona 153,940 Total Prop Qvj. 153,940 Total Cap. N/A Prop Type: Sand</th>	Date March 1, 1995 District Farmington NM F.Reccipt, 398367 Operator Glant Refinery Lase Bloomfield WD Well No. 1 Field Blanco Losito SEC27,729N,R11W County State New Mexico Stage Number 1 This Zone SI This Well SI WELL 11ATA OG NG NO OO WD IW Misc. Depth TD/PB 3600° Formation Meas Verde Tubing Size 51/2* Wt. 15.5# Set From SURPACE To TO Liner Size N/A Wt. Liner Set From To Open Hole: Size N/A From To Costing Bit Pole Size 45 Previous Treatment NA Prior Production N/A Prior Production N/A ELOUIDA-GAS PUMPED Treat Fluid Type: Foam Wate ES Acid (10: Vol. 130,410 Gat. EAGPACTITES 1P. PAB Prop Type: Sand Go WP-1 WP-3 Base Fluid Vol. 123,254 Gat. Tubing Cap. N/A Flood Cape Add Tites 20;40 Artona 153,940 Total Prop Qvj. 153,940 Total Cap. N/A Prop Type: Sand										
Lase Bloomfield WD Well No. 1 Field Blanc Location SEC7 7729/R11W Couny San Jaaa State New Mexto Stage Number I This Zoore Zi This Well Zi WELL TRATA OG NG NG NG OO OO WD WD WD WH Misc. Depth TD/PB 3,600' Formation Mean Verde Type Factor NA Set WIG Casing Site 5 1/2' WL 155# Set From SURFACE To D Liner Site NA Wt. Casing Perforation: Size AS Holes Per Foot 4 Intervals 3,276' 3,514' 316 HOLES From To Percious Treatment N/A Pad Ured: Yer EX No Pad Type Siket Water Tabing Cap. N/A Precious Treatment N/A Pad Ured: Yer EX No Pad Type Siket Water Tabing Cap. N/A Prop Meth Siter, Types and Quantitie Zivide Attaoa 153,940 Touing & Anul. Tubing & Anul. Tubing & Cap. N/A Prop Meth Siter, Types and Quantitie Zivide Attaoa 153,940 Total No. Site Cap. N/A Prop Site As Adamber of Pamps Ured 6 PACESETTER HOOPS Stages of Park 2000 Cap. Pid Volume 514 Total No. Treating Press. Pai Surface Stage Total Stager Total Stager Total No. <tr< td=""><td>Lease Bloomfield WD Well No. 1 Field Blanco Location SEC.27,T29N,R11W County San Juan State New Mexico Stage Number 1 This Zone Ø This Well Ø3 WRLJ. IDATA OC NG OO WD WD Misc. Depth TD/PB 3660° Formation Mex Verde Caring Size Size NA WL NA Set at: NA Type Packer_NA Set at NA Caring Size 51/2 WL ISA Set from SURFACE TO Linetvals 3,276 · 3,514 · 316 HOLES Previous Treatment NA </td></tr<>	Lease Bloomfield WD Well No. 1 Field Blanco Location SEC.27,T29N,R11W County San Juan State New Mexico Stage Number 1 This Zone Ø This Well Ø3 WRLJ. IDATA OC NG OO WD WD Misc. Depth TD/PB 3660° Formation Mex Verde Caring Size Size NA WL NA Set at: NA Type Packer_NA Set at NA Caring Size 51/2 WL ISA Set from SURFACE TO Linetvals 3,276 · 3,514 · 316 HOLES Previous Treatment NA										
County San Jaan State New Mercico Stage Number 1 Thir Zone Cat Thir Xene Cat WELL 13ATA OG NG NG OO WD WC Mise. Depth TD/PB 3.600° Formation Merce Tubing Size NA WL NA Type Packer, NA Set at .NA Set at .NA Cating Size 51/2 WL Set at .NA Type Packer, NA Set at .NA Cating Size 51/2 WL Depth TD/PB 3.600° Form To Cating Size 51/2 WL Depth Hole: Size .NA Form To Cating Perforation: Size AS Holes Per Foot Pad Type Sigkt Water Tating Cap. NA TREACHABLYS PAT Pad Used: Yet SI NO Depth Hole Cap. NA Cating Cap. Treatment N/A Pad Used: Yet SI NO Data Size Cating Cap. Tables Cap. Base Fluid type H2O Treat Pluid Pice Data Treat Pluid Pice Data Cating Cap. NA	County State New Mexico Stage Number 1 This Zone County This Well (2) WRELL DATA OG NG NO OO WD IW Mise. Depth TD/PB 3,600' Formation Meaded Casing Site 5.1/2" WL 15.5# Set From To Liner Site N/A WL X/A Liber Set From To Open Hole: Size NA From To Casing Perforation: Size .45 Holes Per Foot 4 Intervial 3,276'-3,514' 316 HOLES Previous Treatment NA Prior Production N/A Prior Production N/A Prior Production N/A TREEATMERNT DATA Pad Used: Yes (2) No Pad Type Sikek Water IDUID/ GAS PUMPED Too Too Usade: Yes (2) No Pad Type Sikek Water Gain Tubing Cap. N/A Form Type: Stade (2) WP-3 Baux Other Gaing Cap. N/A Forgo Type: Stade (2) WP-3 Baux Other Treating Fluid Stage of Tope Mesh Sizes, Types and Quandtices 20/40 Arizona 153,940 Den Hole Cap. N										
WRLL IDATA OG NG OO WID IW Misc. Depth TD/PB_3.600* Formation_Meta Verde Casing Size 51/2 WL_INA Set at: IVA Type Packet IVA Set at: IVA Type Packet IVA Set at: IVA Casing Size 51/2 WL_IS.54 Set From SURFACE To TD Liker Size IVA Wt Liker Size 700 To Open Hole: Size IVA From To Casing Participation: Size 45 Holes Per Foot Intervals 3.276' - 3.514' 316 HOLES Previous Treatment IVA Pad Used: Yer 20 NO Pad Type Size K Water Casing Cap. NA Date Fluid type HO Base Fluid Vol. 122,354 Cat Cat Carge Cap. NA Date Fluid type HO Treat Fluid Type: Foam Uwater (2 Add Dationa 153,940 Dati Scaler: N/A Casing Cap. Tanular Cap. NA Date Caded Whit H2O Treat True True Tibing Control Casing S0 Anul. Tubing & Anul. Fluid to Recover 2397 Tanular Cap. NA Discaler: N/A In Stages of Treating Fluid Zsid Treating Fluid Zsid	WRLL DATA OG NG NO OO WI IW Misc. Depth TD/PB 3.600 Formation Mease Verde Tubing Size N/A Wt. N/A Set at: N/A Type Packer N/A Set at N/A Caring Size 51/2 Wt. 155# Set From To Liner Size N/A Wt. Liner Set From To Open Hole: Size N/A From To Caring Size 51/2 Wt. 15.5# Holes Per Foot 4 Intervals 3.276' - 3.514' 316 HOLES Previous Treatment. N/A Prior Production N/A Prior Production N/A Treat, Fluid Type: Foam Pat type Sick Water L1QUISDATE AS PUMPED Treat Fluid Type: Foam Pat CP Sick Water Treat, Fluid Type: Sourd Covenbole Total Prop Qty. 130,410 Gal. Tubing Cap. N/A Prop Type: Sand SUP-1 WP-3 Baux Other Tobing & Anul. Tubing Cap. N/A Prop Mesh Sites, Types and Quantities 20/40 Arizona 153,940 Foat Water Cap. N/A Open Hole Cap. N/A Ball Scalert: N/A In Stages of Treating Fluid Z316 Fluid t										
Type Packer (VA Set RVA Type Packer (VA Set RVA Casing Site S1/2 Wit_ Casing Site S1/2 Wit_ To Dimensities N/A Wit_ Casing Perforation: Site AS Holes Per Foot 4 Intervals 3276 · 3514 '316 HOLES Previous Treatment NA Previous Treatment NA Previous Treatment NA Treat, Fluid Type: Foan Water 2d Acid Oti 20, 4130.0 Call Base Fluid Vp: Foan Water 2d Acid Oti 20, 123,940 Caracterization (Caracterization (Caracterizati	Instrume Stree N/A WA WA Set at N/A Type Packer N/A Set at N/A Casing Size 5 1/2 Wt. 155# Set From To Diner Size N/A Wt. Liner Size From To Open Hole: Size N/A From To Casing Perforation: Size AS Holes Per Foot 4 Intervals 3276'-3514' 316 HOLES Previous Treatment N/A Pad Used: Yes S No Pad Type Slick Water LiQUID/CAS PUNPED Treat. Fluid Type: Foam Water Acid OU Vol. 130,410 Gat. Base Fluid type H2O Base Fluid Vol. 123,254 Gat. Gat. Foam Qual. N/A % Mitchell Surry Surface Downhole Total Prop Qry. 153,940 Los. Prop Type: Sand Sizer, Types and Quantities 20/40 Arizona 153,940 Oher Prop Mork Sizer, Types and Number of Pumps Used 6 PACESETTER 1000'S Fluid N/A Pluid Pluid Surry Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Pluid Zile Pluid 75 PUMP:21588 G. PAO/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2#										
Caling Size 51/2 WL 15.5# Set From SUBPACE To TO To TO Uher Set From To Open Hole: Size N/A From To Caling Perforation: Size .4S Holes Per Foot 4 Intervals 3276'-3,514' 316 HOLES Previous Treatment, NA Prior Production N/A THERATMERT DATA Pad Used: Yer S3 No Pad Type Silek Water Tubing Cap. N/A Gara Qual, N/A ** Surface Downhole Total 123,544 Gala Carag Cap. N/A Prop Mitchell C Slurry Surface Downhole Total 72,753,940 Lot. Carag Cap. N/A Prop Meth Sites, Types and Quantities 20,40 Arizona 153,940 Surges of Anul. Cap. N/A Pad Volume 5,514 Types and Number of Pumps Used 6 PACESETTER 1000'S Stages of Pad Volume 5,514 Total 02 N/A Pad Volume 5,514 PROCEDURED Surface Surface CO2 N/A Fush N/A PROCEDURED Surface Surface CO2 N/A Total CO2 N/A PROCEDURED Surface Surface Surfa	Casing Size 5.1/2* Wt. 155# Set From SURRACE To Liner Size NA Wt. Liner Ster From To Open Hole: Size NA From To Casing Perforation: Size AS Holes Per Foot 4 Intervals 3.276'-3.514'316 HOLES Previous Treatment NA Prior Production N/A Prior Production N/A TECRATMENT DATA Pad Used: Yes S No Pad Type Sick Water LIQUID/C AS PUMPED Base Fluid type H2 Base Fluid Vol. 123.54 Gat. Tubing Cap. N/A Foam Qual. N/A % Mitchell Slurry Surface Downhole Total Prop Qry. 153.940 Ubr Casing Cap. N/A Prop Type: Sand S WP-1 WP-3 Baux Other Total Prop Qry. 153.940 Doe Anaula: Raing Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing Casing Casing Anul. Treating Prior Side G PACESETTER 1000'S Treating Prior Side G PACESETTER 1000'S Treating Prior Production N/A Fluid to Recover _2037 Types and Number of Pumps Used 6 PACESETTER 1000'S Surface Surface Surface Surface										
Liner Ser From To To Casing Perforation: Size AS Holes Per Foot Intervals 3276'-3514'316HOLES Casing Perforation: Size AS Prior Production N/A Prior Production N/A TIREATMENT IDATA Pad Used: Yes 62 No Pult Type Sick Water LIQUID/CAS PIIMPED AND Base Fluid type H20 Base Fluid Vol. 123,254 Gat. Gate Gap. NA Prop Type: Sand Q3 WP-1 WP-3 Baue: Downhole Total Prop Qy. 153,940 Lbs. Casing Cap. NA Prop Type: Sand Q3 WP-1 Baue: Downhole Total Prop Qy. 153,940 Casing Cap. NA Prop Mesh Site: Types and Quantics 20/40 Adzeoa 153,940 Other Annular Cap. NA Ball Scalers: IV/A Ia Stages of Pad Volume. S14 Types and Number of Pumps Used 6 PACESETTER 10007S Treating Fluid to Load NA Audilary Materials Stage Total Stage Surface Surface Surface Surface Comments SUMMARY Treating Pluinpedi Surface Surface	Liber Set From To To To Casing Perforation: Size AS Holes Per Foot 4 Intervals 3,276 · 3,514 ' 316 HOLES Previous Treatment NA Prior Production N/A Prior Production N/A TREEATMENT DATA Pad Used: Yes ⊠ No □ Pad Type Slick Water ELOUTD/GAS PUMPED Comparison of the state of										
Casing Perforation: Size _45	Casing Perforation: Size_AS Holes Per Foot_4 Intervals 3,276' - 3,514' 316 HOLES Previous Treatment_NA Prior Production_NA Prior Production_NA TEREATMERNT_DATA Pad Used: Yes Ø No Pad Type_Slick Water L20111b/C.AS. PTIMPED Gase Fluid type_H2O Base Fluid Vol123,354 Gal. Foam Qual_N/A = % Mitchell © Surface © Downhole © Total Prop Qty153,940 Lbs. Tubing Cap										
Previous Treatment N/A Prior Production N/A TRECATMERNT DATA Treat. Fluid Type: Foam water Acid Ol Vol, 130,410 Gai Base Fluid type H2O Dad Used: Yes S No Pad Type Sick Water Direction Sick PLINPED AND CARACTINES IN BIALS. Base Fluid type H2O Base Fluid Vol. 123,354 Gai Casing Cap. N/A Gai Casing Cap. 78 Tubing Cap. N/A Proor Meth Sizes, Types and Quantities 20/40 Arizona 153,940 Other N/A Casing Cap. 78 Annual Cap. N/A Proor Meth Sizes, Types and Quantities 20/40 Arizona 153,940 Other N/A Casing Cap. 78 Annual Cap. N/A Prop Meth Sizes, Types and Quantities 20/40 Arizona 153,940 Tubing C Casing Q Anul. Tubing & Anul. Proper and Number of Pumps Used 6 ACCESTTER 10000S Tubing Casing C Pruber 2015 Pruber 2015 Pruber 2015 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Fluid to Laad. N/A Pruber 2037 Pruber 2037 PUMP21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2037 Total YCO N/A Starting Press.Psi Surrace Surrace Surrace Rate Surface ROV BM Surface BPM Surface BPM Surface Surface Surface Surface Surface Surface Start 1/2# Staret 1/2# <td>Prior Production N/A Treatment N/A Pad Used: Yes No Pad Type Slick Water Treat. Fluid Type: Foam Water Acid OII Vol. 130.410 GAPACITIES IN Blaz Base Fluid Vye H2O Base Fluid Vol. 123.354 GaPACITIES IN Blaz Tubing Cap. N/A Foam Qual. V/A % Mitchell Slurry Surface Downhole Total Prop Qry. 153.940 Lbs. Tubing Cap. N/A Prop Type: Sand & WP-1 WP-3 Baux Other MAL Tubing Cap. N/A Caring Cap. 78 Prop Mesh Stees, Types and Quantities 20/40 Arizona 153.940 Treat Via: Tubing Casing Anul. Tubing & Anul. Pop Mesh Stees, Types and Quantities 20/40 Arizona 153.940 Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 1000S Treating Fluid O Load N/A Autiliary Materials 54# XCIDE 207 / 89 G. FRW 30 Treating Fluid Ca Cacing Ca P. Treating Fluid Cacing C</td>	Prior Production N/A Treatment N/A Pad Used: Yes No Pad Type Slick Water Treat. Fluid Type: Foam Water Acid OII Vol. 130.410 GAPACITIES IN Blaz Base Fluid Vye H2O Base Fluid Vol. 123.354 GaPACITIES IN Blaz Tubing Cap. N/A Foam Qual. V/A % Mitchell Slurry Surface Downhole Total Prop Qry. 153.940 Lbs. Tubing Cap. N/A Prop Type: Sand & WP-1 WP-3 Baux Other MAL Tubing Cap. N/A Caring Cap. 78 Prop Mesh Stees, Types and Quantities 20/40 Arizona 153.940 Treat Via: Tubing Casing Anul. Tubing & Anul. Pop Mesh Stees, Types and Quantities 20/40 Arizona 153.940 Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 1000S Treating Fluid O Load N/A Autiliary Materials 54# XCIDE 207 / 89 G. FRW 30 Treating Fluid Ca Cacing Ca P. Treating Fluid Cacing C										
Patter Miller Treat Pad Used: Yes (2) No Pad Type Sitek Water Treat, Fluid Type: Foam Water (2) ARD CARACTTERS IN PHAS. Fluid Type: Foam Water (2) ARD CARACTTERS IN PHAS. Base Fluid type H2O Base Fluid Vol. 120,410 Gat. Foam Qual. NA % Mitchell Slurry Surface Downhole Total Prop Qry. 153,940 User. Tabing Cap	TREATMENT DATA Pad Used: Yes (S) No Pad Type Sick Water Treat. Fluid Type: Foam Water (Acid OII Vol. 130,410 Gal, Foam Qual. NA 6 Mitchell Slurry Surface Downhole Total Prop Qry. 153,940 L1OUID/CAS PUMPED GAPACITIES IN BILE CAPACITIES IN BIL										
Procession Procession Surface	Treat Fluid Type: Foam Water A cid Oil, 130,410 Gal. CAPACTTIPES IN BILL Base Fluid type H20 Base Fluid Vol. 123,254 Gal. Tubing Cap. N/A Foam Qual. N/A % Mitchell Slurry Surface Downhole Total Prop Qty. 153,940 Lbs. Casing Cap. 78 Prop Type: Sand Sizes, Types and Quantities 20/40 Arizona 153,940 Los. Casing Cap. N/A Prop Mest Sizes, Types and Quantities 20/40 Arizona 153,940 Casing Cap. N/A Casing Cap. N/A Hole Loaded With H20 Treat Via: Tubing Casing Anul. Tubing & Anul. Tubing & Anul. Treating Fluid to Load N/A Fluid to Load N/A In Stages of Padockapter Padock										
Base Fluid type H2O Base Fluid Vol. 123,354 Gal. Foam Qual. N/A % Mitchell Surry Surface Downhole Total Prop Qty. 153,940 Lbr. Prop Type: Sad Ø WP-1 WP-3 Baux Other Annula: Casing Cap. N/A Prop Type: Sad Ø WP-1 WP-3 Baux Other Annula: Casing Cap. N/A Prop Mest Sizes; Types and Quantides 20/40 Arizona 153,940 Lbr. Annula: Puble Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing Ø Anul. Tubing & Anul. Puble Cap. N/A Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid 2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Flush N/A PROCENDERE Pumped Surface Surface CO2 Rate Surface N/A Surface Slurry Surface Surface Surface Surface Safety Meeting/Test Lines Surface Surface BPM Pumped Stag	Base Fluid type H2O Base Fluid Vol. 123,354 Gal. Foam Qual. NA 96 Mitchell Slurry Surface Downhole Total Prop Qty. 153,940 Libs. Prop Type: Sand & WP-1 WP-3 Baux Other Total Prop Qty. 153,940 Casing Cap. N/A Prop Mesh Sizes, Types and Quantities 20/40 Arizona 153,940 Other Annular Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing & Anul. Tubing & Anul. Public Cap. N/A Ball Sealers: N/A In Stages of Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 1000S Treating Fluid 2516 Public 21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 PUMP:21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 Total N2 N/A Time AMVPM Treating PressPsi Surface Surface Surface STP Annulus Stage Total Stage Total Stage 0 0 60 Stage Total Stage Stage Total Stage Total Stage Stage Total Pumped Pumped Pumped Surface Stage Stage Total Stage Tot										
Foam Qual. NA % Mitchell Surry Surry Surry Surry Total Prop Qty. 153,940 Lbs. Casing Cap. N/A Prop Type: Sand & WP-1 WP-3 Baux Other Annular Cap. N/A Prop Meets Sizes, Types and Quantities 20/40 Arizona 153,940 Open Hole Cap. N/A Prop Meets Sizes, Types and Quantities 20/40 Arizona 153,940 Open Hole Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing & Anul. Tubing & Anul. Fluid to Load N/A Pipes and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid 2516 Plust. Treating Fluid 2516 Auxiliary Materials 54# XCIDE 207 / 89 G. FRW-30 Pumped N/A Over Flusb N/A PINOCRDPURE 75 Over Flusb N/A Total 202 N/A Stiff Add G. 2#/ 3,150 G. FLUSH. Surface N/A Sizes Total 202 N/A Time Surface Surface N/A Sizes Total CO2 N/A Stiff Add G. 2#/ 3,150 G. FLUSH. Surface N/A Materials Sizes Total CO2 N/A Stiff Add G. 2#/ 3,150 G. FLUSH. Surface N/A Materials Sizes <	Foam Qual. N/A 96 Mitchell Slurry Surface Downhole Total Prop Qty. 153,940 Lbs. Casing Cap. 78 Prop Type: Sand & WP-1 WP-3 Baux. Other Annular Cap. N/A Prop Type: Sand & WP-1 WP-3 Baux. Other Annular Cap. N/A Prop Mesh Sizes, Types and Quantities 20/40 Arizona 153,940 Open Hole Cap. N/A Open Hole Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing Anul. Tubing & Anul. Fluid to Load N/A Ball Sealers: N/A In Stages of Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 10000'S Treating Fluid 2516 Flush 75 Auxilliary Materials 54# XCIDE-207 / 89 G. FRW-30 Treating Fluid 2516 Flush 75 Auxilliary Materials 54# XCIDE-207 / 89 G. FRW-30 Treating Fluid 216 Fluid to Recover _ 2937 Total N2 N/A Fluid to Recover _ 2937 47,040 G. 2#/ 3,150 G. FLUSH. Total PC2 N/A Fluid to Recover _ 2937 Total N2 N/A Stage Treating PressPsi Surface Surface Surface Surface Surface										
Prop Type: Stad & WP-1 WP-3 Baux Other Casing Cap. 78 Prop Mesh Sizes, Types and Quantities 20/40 Arizona 153,940 Open Hole Cap. N/A Hole Loaded With H20 Treat Via: Tubing Casing SI Anul. Tubing & Anul. Tubing & Anul. Fluid to Load N/A Ball Sealers: N/A in Stages of Pad Volume	Prop Type: Sand & WP-1 WP-3 Baux Other Casing Cap. 78 Prop Type: Sand & WP-1 WP-3 Baux Other Annular Cap. N/A Prop Mesh Sizes, Types and Quantities 20/40 Arizona 153,940 Open Hole Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing Casing Anul. Tubing & Anul. Open Hole Cap. N/A Ball Sealers: N/A In Stages of Pad Volume S14 Types and Number of Pumps Used 6 PACESETTER 1000S Treating Fluid 2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Fluid to Load N/A PRIOCKDEIRE PUMP:21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Treating Fluid 2516 Fluid to Recover 2937 Total N2 N/A Fluid to Recover 2937 Total CO2 N/A V/A Total CO2 N/A Fluid to Recover 2937 Total CO2 N/A Surface Surface N2 MSCF N2 Rate Comments SUMPA Surface Surface N2 MSCF N2 Rate ScFM Safety Meeting/Test Line M/PM <t< td=""></t<>										
Anoular Cap. NA Anoular Cap. NA Open Hole Cap. NA Hole Loaded With H20 Treat Via: Tubing Casing & Anul. Tubing & Anul. Ball Sealers: N/A In Stages of Stages of Types and Number of Pumps Used 6 PACESETTER 1000S Anxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 PUMP:21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2037 Total N2 MA PUMP:21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2037 Total N2 N/A Surface Surface Surface Surface Surface Surface Surface	Prop Mesh Sizes, Types and Quantities 20/40 Arizona 153,940 Annular Cap. N/A Hole Loaded With H2O Treat Via: Tubing Casing Anul. Tubing & Anul. Tubing & Anul. Tubing & Anul. Pad Volume_514 Ball Sealers: N/A In Stages of Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid_2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Flush_ 75 PROCKDURE PUMP:21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# PROCKDURE PUMP:21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover_2937 Total N2_ N/A Time Surface Surface M/PM Treating PressPsi Surface Surface Slurry Surface Surface N2 Rate STP Annulus Stage Total Stage PM:550 0 0 660 Stage Stage Stage Total Stage Stage Total Stage Stage Total Stage Stage Total Stage Pumped BPM Pumped Stage Total Stage Stage Total Stage S										
Hele Loaded With H20 Treat Via: Tubing Casing Z Anul. Tubing & Anul. Fullying & Anulying & Anul. Fullying & Anul. Fullying & Anul.	Hole Loaded With H20 Treat Via: Tubing Casing Anul. Tubing Anul. Tubing & Anul. Open Hole Cap. N/A Ball Sealers: N/A In Stages of Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid 2516 Fluid to Load N/A Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Treating Fluid 2516 Fluid to Recover 2937 PROCKDURE PUMP:21:588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 Total Surface Surface CO2 Rate Surface N/A Fluid to Recover Surface Surface CO2 bbis Pumped N/A Total N2 N/A Time Treating PressPsi Surface Slurry Surface CO2 bbis Pumped Pumped N/A Safety Meeting/Test Line M/PM Treating PressPsi Surface Stage Total Stage Total Stage Surface N/A Stage 1700 514 514 65 Stage Total Stage Stage Total Stage Stage Total										
Ball Sealers: NA in Stages of Pad Volume 514 Types and Number of Pumps Used 6 PACESETTER 1000'S Freating Fluid 2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Freating Fluid 2516 PHOCKEDURE PUMP:21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 47,040 G. 2#/ 3,150 G. FLUSH. Total N2 N/A Time Surface Surface N/A SUMMARY Surface Surface N/A Time Treating PressPsi Surface Surface Surface STP Annulus Stage Total Stage Total Stage Stage 1700 514 S14 65 Stage Total Stage Stage 1700 514 S14 65 Stage Stage Total Stage 1700 514 S14 65 Stage Stage Total Stage 1700 526 165 Stage Total Stage Stage Stage Stage Stage <t< td=""><td>Ball Sealers: N/A In Stages of Pad Volume Stage Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid 2516 Pad Volume 514 Treating Fluid 2516 Pad Volume 514 75 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Fluids to Recover 2937 Over Flush N/A Fluids to Recover 2937 PHOCKDUTRE PUMP-21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 Total N2 N/A Fluids to Recover 2937 Total N2 N/A Total N2 N/A Time Auxiliary PressPsi Surface Slurry Surface CO2 bils BPM Pumped N2 MSCF N2 Rate Comments Stage Total Stage Total Stage Total Stage Stage Total Stage</td></t<>	Ball Sealers: N/A In Stages of Pad Volume Stage Types and Number of Pumps Used 6 PACESETTER 1000'S Treating Fluid 2516 Pad Volume 514 Treating Fluid 2516 Pad Volume 514 75 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Fluids to Recover 2937 Over Flush N/A Fluids to Recover 2937 PHOCKDUTRE PUMP-21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid to Recover 2937 Total N2 N/A Fluids to Recover 2937 Total N2 N/A Total N2 N/A Time Auxiliary PressPsi Surface Slurry Surface CO2 bils BPM Pumped N2 MSCF N2 Rate Comments Stage Total Stage Total Stage Total Stage										
Types and Number of Pumps Used 6 PACESETTER 1000'S 74 75 Auxiliary Materials 54# XCIDE 207 / 89 G. PRW-30 75 76 PROCEDUIRE PUMP:21:588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Flush 75 Over Flush N/A Fluid 75 Over Flush N/A Fluid to Recover 2937 Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Total N2 N/A Stage Total Stage Stage Stage Stage <	Types and Number of Pumps Used 6 PACESETTER 1000'S File Treating Fluid 2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Flush 75 PHOCKIPIRE PUMP:21:588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11;214 G. 1 1/2# Flush 75 Over Flush N/A Fluid to Recover 2937 Time 47,040 G. 2#/ 3,150 G. FLUSH. Total N2 N/A Time Surface Slurry Surface CO2 Rate Surface N2 Rate Comments SIL Surface Slurry bbls Rate CO2 2 bbls Pumped N2 Rate Comments STP Annulus Stage Total Stage Total Stage Total Stage Total Staft 1/2# PM5:50 0 0 0 60 Stage Total Stage Staft 1/2# 6:05 1580 486 1000 65 START 1/2# START 1/2# 6:18 1500 285 1810 65 START PLUSH START PLUSH 6:37 1470 220 3030 65 START FLUSH <										
Prior Auxiliary Materials 54# XCIDE.207 / 89 G. FRW-30 Iteating Pluid 75 Auxiliary Materials 54# XCIDE.207 / 89 G. FRW-30 Fluid 75 PUMP21588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Fluid_ to Recover 2937 47,040 G. 2#/ 3,150 G. FLUSH. Total N2 N/A Time MM/PM Treating PressPsi Treating PressPsi Surface Surface Surface CO2 blis BPM CO2 Rate BPM Surface N2 MSCF N2 Rate SCFM Comments Safety Meeting/Test Lines STP Annulus Stage Total Stage Total Stage Total Stage Total Stage Total Stage Total Stage Total Stage 1700 S14 S14 65 Stage Stage Stage 6:31 1	Treating Pluid 2516 Auxiliary Materials 54# XCIDE-207 / 89 G. FRW-30 Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Puble: 2037 Total N2 N/A Surface Surface N2 Rate CO2 N/A Total Surface Surface N2 Rate SCFM Safety Meeting/Test Line Treating PressPsi Surface Surface N2 Rate SCFM Safety Meeting/Test Line M/PM Surface SUSTATT PAD STP Annulus Stage Total Stage Start 1/2# <th colsp<="" td=""></th>										
Number of the second s	PHOCKEDURY: PUMP:21:588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# PUMP:21:588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# Over Flush N/A Fluid to Recover 2937 Total N2 N/A Stummary Annulus Surface Surface Surface CO2 Rate Surface N/A Time Am/PM Treating PressPsi Surface Slurry Surface CO2 Rate Surface N2 MSCF N2 Rate Comments STP Annulus Stage Total Stage Stafety Meeting/Test Line <t< td=""></t<>										
PHOCKNITHE SUMMARY PUMP:21,588 G. PAD/19,824 G. 1/2#/21,000 G. 1#/11,214 G. 1 1/2# 47,040 G. 2#/ 3,150 G. FLUSH. Fluid to Recover2937 Total N2Total C02N/ATotal C02N/ATOTAL	PHOCKNULL Surface Surface Surface Surface CO2 Rate Surface N2 Rate Comments Safety Meeting/Test Line Time A/.PM Treating PressPsi Surface Surface Surface CO2 Rate Surface N2 Rate Comments Safety Meeting/Test Line STP Annulus Stage Total Stage Stage Stage Stage										
PROCRATURE SUMMARY PUMP 21,258 G, PAU/19,224 G, 17,27,21,000 G, 1#/11,214 G, 117,24 Fluid to Recover _ 2937 47,040 G, 2#/ 3,150 G, FUJSH. Total N2Total N2	PHOCKINERE SUMMARY Pumped Surface Surface Surface Surface Surface Surface CO2 bbls Pumped CO2 Rate BPM Surface N2 MSCF N2 Rate SCFM N2 Rate ScFM Comments Safety Meeting/Test Line 517 Annulus Stage Total Stage Stage Total Stage Stage Stage <td< td=""></td<>										
SUMMARY 47/040 G. 2#/ 3,150 G. PLDSR. Total CO2 N/A Time M/PM Treating PressPsi Surface Slurry bbls Surface Rate Pumped Surface CO2 bbls Surface BPM Surface N2 MSCF N2 Rate SCFM Comments Safety Meeting/Test Lines STP Annulus Stage Total Stage Total Stage Total Stage Co2 bbls Pumped N2 MSCF N2 Rate SCFM Comments Safety Meeting/Test Lines PM5:50 0 0 0 660	Stimm 47,040 G. 2.#/ 3,150 G. PLDSH. Iotal N2T N/A Time AM/PM Treating PressPsi Surface Slurry bbls Pumped Slurry Rate BPM Surface CO2 bbls Pumped CO2 Rate BPM Surface N2 MSCF Pumped N2 Rate SCFM N2 Rate SCFM Comments Safety Meeting/Test Line STP Annulus Stage Total Stage Stage Total Stage Stage Stage Stage Stage Stage St										
Time MM/PM Treating PressPsi Surface Surry bbls Pumped Surface Rate BPM CO2 Rate BPM Surface N2 MSCF Pumped N2 Rate SCFM Comments Safety Meeting/Test Lines 5TP Annulus Stage Total Stage <td>Time AM/PM$Treating PressPsi$Surface Slurry bbls PumpedSlurry Rate BPMSurface CO2 bbls PumpedCO2 Rate BPMSurface N2 MSCF PumpedN2 Rate SCFMComments Safety Meeting/Test LineSTPAnnulusStageTotalStageTotalStageTotalStageTotalPM5:50000660StageTotalStageTotalPM5:50000660StageTotalStageTotal5:581700514514655START PADSTART 1/2#6:051580486100065START 1/2#6:181500285181065START 2#6:371470220303065SHUT DOWN 5 MINS-7206:3810007531054010 MINS-710</td>	Time AM/PM $Treating PressPsi$ Surface Slurry bbls PumpedSlurry Rate BPMSurface CO2 bbls PumpedCO2 Rate BPMSurface N2 MSCF PumpedN2 Rate SCFMComments Safety Meeting/Test LineSTPAnnulusStageTotalStageTotalStageTotalStageTotalPM5:50000660StageTotalStageTotalPM5:50000660StageTotalStageTotal5:581700514514655START PADSTART 1/2#6:051580486100065START 1/2#6:181500285181065START 2#6:371470220303065SHUT DOWN 5 MINS-7206:3810007531054010 MINS-710										
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Time AM/PMSurface Treating PressPsiSurface Slurry bbls PumpedSurface Rate BPMSurface CO2 bbls PumpedCO2 Rate BPMSurface N2 MSCF PumpedN2 Rate SCFMComments Safety Meeting/Test LineSTPAnnulusStageTotalStageStageTotalStageStageTotalStageTotalStageTotalStageTotalStage <t< td=""></t<>										
AM/PM Treading PressPsi Pumped Shift if yons Pumped Rate BPM Correct Pumped BPM Pumped SCFM Safety Meeting/Test Lines STP Annulus Stage Total Stage Stage Total Stage Total Stage<	AM/PM Ifeating Press.Psi Binity bits Rate Course BPM Pumped BPM Pumped BPM Pumped Stage Total ScFM Safety Meeting/Test Line STP Annulus Stage Total Stage Stage Total Stage Stage Stage Stage Stage Stage										
STP Annulus Stage Total Stage Total Stage Total PM5:50 0 0 0 60 Stage Total Stage Stage Total 5:58 1700 514 514 65 START 1/2# START 1/2# 6:05 1580 486 1000 65 START 1/2# 6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START PLUSH 6:37 1470 220 3030 65 SHUT DOWN 5 MINS-720 6:38 1000 75 3105 40 6:38 1000 75 3105 40 6:38 1000 75 3105	STP Annulus Stage Total Stage Stage Total Stage Stage <th< td=""></th<>										
PM5:50 0 0 0 60 START PAD 5:58 1700 514 514 65 START 1/2# 6:05 1580 486 1000 65 START 1/2# 6:14 1510 525 1525 66 START 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START PLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 MINS-710 10 10	PM5:50 0 0 0 60 START PAD 5:58 1700 514 514 65 START 1/2# 6:05 1580 486 1000 65 START 1/2# 6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10										
5:58 1700 514 514 65 START 1/2# 6:05 1580 486 1000 65 START 1# 6:14 1510 525 1525 66 START 1/2# 6:18 1500 285 1810 65 START 1 1/2# 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10 10 10 10 10 10 10	5:58 1700 514 514 65 START 1/2# 6:05 1580 486 1000 65 START 1/2# 6:14 1510 525 1525 66 START 1/2# 6:18 1500 285 1810 65 START 1/2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10										
6:05 1580 486 1000 65 START 1# 6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START PLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 MINS-710 10 10 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 11 </td <td>6:05 1580 486 1000 65 START 1# 6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10</td>	6:05 1580 486 1000 65 START 1# 6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10										
6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10	6:14 1510 525 1525 66 START 1 1/2# 6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 MINS-710										
6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 </td <td>6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 MINS-710</td>	6:18 1500 285 1810 65 START 2# 6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 MINS-710										
6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 MINS-710 10 MINS-710 10 10 10 MINS-710 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10	6:37 1470 220 3030 65 START FLUSH 6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 10 10 10 10 10 10										
6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 Image: Second se	6:38 1000 75 3105 40 SHUT DOWN 5 MINS-720 Image: Structure of the										
	└──┼──┼──┼──┼──┼──┼──┼──┼──┼										
Ireating Pressure: Min 1470 Max. 1700 Avg. 1500 Customer Representative Paul Thomson	Ireating Pressure: Min 1470 Max. 1700 Avg. 1500 Customer Representative Paul Thomson										
mi, naie ou rieaung rieid 😎 naie ou riusii 👧 westerii representauve narry Mitchell	Ave ini Bate 65 ISDP 750 Flush Dens lbs/eal 8.34 Distribution NORMAL										
Ave Ini Rate 65 ISD P. 750 Flush Dens. Ibs/oal 8.34 Distribution NORMAL											
Avg. Inj. Rate 65 I.S.D.P. 750 Flush Dens. Ibs/gal 8.34 Distribution NORMAL	Final Shut-in Pressure 700 In 15 Minutes										
Avg. Inj. Rate 65 I.S.D.P. 750 Flush Dens. lbs/gal 8.34 Distribution NORMAL Final Shut-in Pressure 700 In 15 Minutes SOD: Number: Operator's Maximum Pressure (psi) 3500	Final Shut-in Pressure 700 In 15 Minutes SOL Number Operator's Maximum Pressure (psi) 3500 3500										

--



Operator: GIANT Well Information: BLOOMFIELD WD#1

. °.

۰. ۱

Date: 3/1/96 GIANTWD1

Addi	tive: FR	W-30	r	Planned Additive Rates							
PPG	VOLUME	LOAD	AMOUNT	50 BPM	55 BPM	60 BPM	65 8PM	70 8PM	GONE		
0.00	26000	0.75	19.50	1.58	1.73	1.89	2.05	2.20	19.50		
0.50	20000	0.75	15.00	1.54	1.69	1.85	2.00	2.16	34.50		
1.00	20000	0.75	15.00	1.51	1.66	1.81	1.96	2.11	49.50		
1.50	20000	0.75	15.00	1.47	1.62	1.77	1.92	2.06	64.50		
2.00	45000	0.75	33.75	1.44	1.59	1.73	1.88	2.02	98.25		
0.00	3150	0.75	2.36	1.58	1.73	1.89	2.05	2.20	100.61		
		• -						······································			
								· · · ·			

BJ Services Company Additive Schedule THE WESTERN COMPANY OF SORTH AMERICA - REAL TIME MODITORING SYSTEM

GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
0.11	770	2091	591	771	13.2	0.0	6	0
0.22	799	2078	578	798	14.9	0.0	7	0
0.30	844	2040	540	844	17.8	0.0	7	0
0.38	877	1969	469	878	20.9	0.0	7	0
0.55	923	1895	395	922	24.1	0.0	14	0
0.64	958	1851	351	959	26.0	0.0	14	0
0.72	973	1818	318	973	27.1	0.1	14	0
0.87	1212	1849	349	1207	31.4	0.1	23	0
0.98	1326	1424	100	1327	40.7	0.0	27	0
1.09	1338	133/	100	1338 1419	42.2	0.0	36	0
1 20	1520	1165	100	1410	44.4	0.1	41	100
1 11	1643	837	100	1639	53.0	0.0	47	100
1.52	1645	630	100	1640	55.4	0.0	53	100
1.63	1633	590	100	1628	55.8	0.1	59	100
1.74	1670	455	100	1660	57.7	0.0	65	200
1.85	1660	400	100	1654	59.9	0.0	71	200
1.96	1626	400	100	1619	60.3	0.0	78	200
2.08	1586	400	100	1578	60.4	0.0	85	200
2.19	1554	400	100	1543	60.5	0.0	92	200
2.31	1586	400	100	1576	61.0	0.0	99	200
2.44	1638	400	100	1625	64 9	0.1	11/	300
2.00	1607	400	100	1693	65 0	0.1	115	300
2.03	1097	400	100	1704	65.3	0.1	115	300
2.71	1724	632	132	1709	65.4	0.1	135	400
2.98	1724	911	411	1710	65.5	0.0	142	400
3.09	1730	1197	697	1711	65.5	0.1	149	400
3.23	1729	1543	1043	1712	65.6	0.1	157	400
3.34	1728	1832	1332	1709	65.6	0.0	165	500
3.45	1722	2111	1611	1706	65.6	0.0	172	500
3.56	1730	2398	1898	1714	65.8	0.0	179	500
3.67	1728	2688	2188	1714	65.7	0.0	180	500
3./8	1721	2800	2365	1709	65.5	0.0	201	600
4 00	1716	2859	2359	1699	65.6	0.1	208	600
4.11	1716	2860	2360	1697	65.5	0.1	216	600
4.22	1720	2866	2366	1699	65.5	0.1	222	700
4.33	1714	2857	2357	1699	65.7	0.0	230	700
4.44	1710	2855	2355	1698	65.5	0.1	237	700
4.55	1712	2857	2357	1696	65.5	0.0	244	700
4.66	1712	2858	2358	1693	65.4	0.0	251	800
4.77	1711	2857	2357	1693	65.5 CE E	0.1	258	800
4.88	1709	2856	2350	1690	65.5	0.1	200	800
4.99	1708	2834	2304	1690	65.6	0.1	272	900
5.22	1701	2049	2345	1690	65-5	0.0	287	900
5.33	1702	2848	2348	1689	65.5	0.1	294	900
5.44	1703	2848	2348	1690	65.6	0.0	301	900
5.54	1702	2847	2347	1690	65.6	0.0	308	1000
5.65	1700	2845	2345	1684	65.6	0.0	315	1000
5.76	1699	2844	2344	1686	65.5	0.0	322	1000
5.85	1699	2845	2345	1684	65.5	0.1	324	1000
·· ·· ·		C C 1 🛱	ግግ ላ ፍ	1684	65.5	0.1	324	1000

THE WESTERN COMPANY OF SORTH AMERICA - REAL TIME I TORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm Proppant
m111.	ps1.	psr.	psr.	psr.	Dpm.	ID/Gai	VOLUME	roppane
c 00	1700	2045	2245	1600	65 G	0 1	344	1100
6.09	1600	2040	2343	1696	65 6	0.1	351	1100
6.20	1090	2044	2344	1600	65 6	0.1	320	1100
0.32	1701	204/	2347	1690	65 5	0.0	365	1200
6.42	1702	2848	2340	1690	00.0 CE C	0.0	202	1200
6.53	1702	2848	2348	1690	00.0 65.6	0.1	372	1200
6.64	1705	2851	2351	1690		0.1	212	1200
6.75	1702	2849	2349	1690	65.5	0.0	387	1200
6.86	1702	2848	2348	1688	00.0	0.0	394	1300
6.97	1701	2848	2348	1690		0.1	401	1300
7.08	1706	2004	2304	1690	65 5	0.1	400	1300
7.20	1704	2051	2351	1690	65.0	0.0	470	1400
7.31	1705	2001	2351	1690	65 5	0.0	422	1400
7 50	1710	2000	2355	1692	65 5	0.0	429	1400
7.52	1709	2004	2304	1691	65 /	0.0	431	1400
7.03	1710	2057	2357	1696	65 /	0.1	444	1500
7.75	1710	2010	2350	1697	65 /	0.1	459	1500
7 00	1710	2007	2350	1700	65 /	0.1	455	1500
0 10	1717	2009	2359	1700	65 4	0.0	400	1600
0.10	1716	2000	2300	1700	65 5	0.1	491	1600
0.22	1714	2002	2302	1700	65 A	0.0	401	1600
0.00	1710	2001	2301	1700	65 /	0.0	405	1600
0.44 9.55	1717	2055	2365	1700	65.4	0.0	503	1700
8 65	1717	2867	2367	1700	65.4	0.2	510	1700
8 77	1708	2862	2362	1693	65.3	0.5	517	1900
8.87	1701	2859	2359	1689	65.3	0.4	524	2000
8.98	1697	2857	2357	1681	65.4	0.4	531	2100
9.09	1690	2853	2353	1675	65.4	0.5	538	2300
9.20	1682	2849	2349	1668	65.4	0.5	545	2400
9.31	1679	2849	2349	1662	65.4	0.5	552	2600
9.42	1671	2845	2345	1655	65.4	0.5	559	2800
9.53	1665	2843	2343	1649	65.4	0.5	566	2900
9.64	1656	2838	2338	1640	65.4	0.5	573	3100
9.75	1650	2835	2335	1635	65.4	0.5	581	3200
9.86	1644	2831	2331	1627	65.4	0.5	588	3400
9.97	1636	2824	2324	1620	65.4	0.5	595	3600
10.09	1631	2819	2319	1617	65.4	0.5	603	3700
10.20	1630	2819	2319	1614	65.4	0.5	610	3900
10.31	1629	2818	2318	1614	65.4	0.5	617	4000
10.42	1630	2819	2319	1617	65.4	0.5	624	4200
10.53	1630	2819	2319	1611	65.4	0.5	630	4300
10.65	1625	2814	2314	1609	05.4	0.5	039	4500
10.76	1623	2812	2312	1609	65.4	0.5	646	4700
10.87	1622	2811	2311	1605	65.4	0.5	623	4800
10.98	1620	2808	2308	1608	65.5	0.5	660	5000
11.09	1622	2812	2312	1607	65.4	0.0	674	5100
11.20	1620	2809	2309	1603	65.4	0.5	601	5300
11.31	1620	2810	2310	1002	00.4 65 4	0.5	001	5400
11.41	101/	2807	2307	1000	03.4 25 A		000 606	5000
11.53	1614	2803	2303	1001	00.4 65 A	0.5	020	5000
11.05	1018	2808	2308	1601	65.4 65.5		703	6100
11.00	1600	2003	2303	1001	65.5 68 A	0.5	717	6100
11.0°	TOUA	2800	2300	1500	65.4 65.4	0.5	7 1	6500
		7 - 1 - K	1. 242.3	エンドウ	C + M	0.0	الاستالة ال	

Attachment C Page 6

.

THE WESTERN COMPANY OF JRTH AMERICA - REAL TIME

GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NETP	PRESS 2	SLR RATE	PROP	Cumm	Cumm
min.	psi.	psi.	psi.	psi.	bpm.	lb/gal	Volume	Proppant
12.08	1609	2801	2301	1597	65.5	0.6	732	6600
12.19	1609	2801	2301	1593	65.5	0.5	739	6800
12.30	1610	2802	2302	1592	65.4	0.5	746	7000
12.41	1604	2795	2295	1591	65.5	0.5	753	7100
12.54	1603	2793	2293	1589	65.6	0.5	761	7300
12.64	1599	2789	2289	1582	65.6	0.5	768	7500
12.76	1599	2789	2289	1581	65.6	0.5	775	7600
12.86	1597	2786	2286	1581	65.6	0.5	782	7800
12.97	1600	2789	2289	1581	65.5	0.5	790	8000
13.08	1600	2789	2289	1581	65.5	0.5	797	8100
13.19	1595	2784	2284	1581	65.5	0.6	804	8300
13.31	1592	2781	2281	1580	65.6	0.6	811	8500
13.42	1592	2780	2280	1579	65.6	0.5	818	8600
13.53	1589	2779	2279	1580	65.5	0.5	825	8800
13.64	1591	2779	2279	1580	65.7	0.5	833	8900
13.76	1591	2779	2279	1580	65.7	0.5	840	9100
13.87	1590	2779	2279	1579	65.6	0.5	84/	9300
13.98	1583	2771	22/1	1572	65.7	0.5	855	9400
14.09	1502	2769	2269	1572	DD./	0.5	802	9600
14.19	1500	2/0/	2207	1570	65.0	0.5	009	10000
14.51	1590	2760	2200	1560	65 7	0.0	670	10100
14.41	1570	2700	2200	1569	65 7	0.0	800	10100
14.63	1578	2766	2266	1566	65.7	0.5	897	10500
14.74	1579	2768	2268	1567	65.7	0.6	904	10600
14.85	1580	2771	2271	1568	65.6	0.6	912	10800
14.97	1580	2771	2271	1569	65.7	0.7	919	11000
15.08	1579	2774	2274	1569	65.5	0.7	926	11200
15.19	1579	2774	2274	1567	65.6	0.7	933	11400
15.29	1577	2775	2275	1566	65.5	0.8	940	11700
15.41	1574	2775	2275	1566	65.5	0.8	947	11900
15.53	1573	2774	2274	1562	65.7	0.8	955	12200
15.63	1573	2776	2276	1561	65.7	0.8	962	12400
15.74	1571	2777	2277	1558	65.6	0.8	969	12600
15.85	1569	2778	2278	1559	65.6	0.8	977	12900
15.96	1566	2777	2277	1552	65.6	0.9	984	13100
16.0/	1560	2//4	22/4	1549	65 5	0.9	991	13400
16 27	1555	2115	22/3	1531	65 5	0.8	1000	13700
16.40	1553	2771	2272	1543	65.5	0.9	1012	14200
16.51	1550	2768	2268	1540	65.6	0.9	1019	14400
16.62	1550	2768	2268	1540	65.7	0.9	1026	14700
16.73	1550	2770	2270	1540	65.6	0.9	1033	15000
16.84	1551	2772	2272	1540	65.6	1.0	1041	15300
16.95	1550	2773	2273	1540	65.7	1.0	1048	15500
17.06	1545	2771	2271	1537	65.5	1.0	1055	15800
17.17	1545	2771	2271	1535	65.5	1.0	1062	16100
17.28	1544	2770	2270	1536	65.5	0.9	1069	16400
17.38	1545	2771	2271	1533	65.6	0.9	1076	16700
17.49	1544	2770	2270	1535	65.6	0.9	1083	16900
17.60	1547	2774	2274	1538	65.6	0.9	1090	17200
17.71	1546	2772	2272	1536	65.6	0.9	1097	17500
17.82	1545	2772	2272	1539	65.7	1.0	1104	17800
17.93	1541	2770	2270	1533	65.5	1.0	1111	18100

THE WESTERN COMPANY OF WORTH AMERICA - REAL TIME MODITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bom.	PROP lb/gal	Cumm Volume	Cumm Proppant
	F	Fart	F =	F				
18.04	1540	2767	2267	1532	65.7	1.0	1118	18400
18.15	1541	2769	2269	1532	65.6	1.0	1126	18700
18.26	1540	2769	2269	1531	65.5	1.0	1133	19000
18.37	1540	2769	2269	1530	65.5	1.0	1140	19200
18.48	1540	2769	2269	1530	65.6	0.9	1147	19500
18.58	1539	2768	2268	1532	65.6	1.0	1154	19800
18.69	1539	2768	2268	1530	65.7	1.0	1161	20100
18.80	1540	2771	2271	1530	65.5	1.0	1168	20400
18.91	1535	2766	2266	1528	65.6	1.0	1175	20700
19.03	1535	2766	2266	1527	65.6	1.0	1183	21000
19.16	1534	2765	2265	1525	65.7	1.0	1191	21300
19.27	1536	2768	2268	1526	65.5	1.0	1198	21600
19.38	1537	2769	2269	1527	65.5	1.0	1205	21900
19.49	1536	2768	2268	1525	65.5	1.0	1212	22200
19.60	1534	2766	2266	1524	65.6	1.0	1219	22500
19.70	1535	2766	2266	1526	65.6	1.0	1227	22800
19.81	1535	2/6/	2267	1525	65.6	1.0	1234	23100
19.93	1537	2769	2269	1527	03.0	1.0	1241	23400
20.04	1525	2766	2200	1529	65 7	1.0	1240	23700
20.15	1535	2100	2200	1525	65 7	1.0	1255	23900
20.20	1530	2769	2207	1527	65 6	1.0	1270	24200
20.37	1530	2700	2200	1530	65 6	1 0	1270	24900
20.59	1539	2769	2269	1528	65.6	0.9	1284	25100
20.70	1536	2767	2267	1528	65.6	1.0	1292	25400
20.82	1535	2766	2266	1526	65.6	1.0	1299	25700
20.94	1533	2763	2263	1527	65.6	1.0	1307	26000
21.07	1530	2760	2260	1525	65.7	1.0	1315	26400
21.18	1530	2760	2260	1521	65.7	1.0	1322	26600
21.29	1529	2760	2260	1522	65.6	1.0	1330	26900
21.40	1529	2760	2260	1520	65.6	1.0	1337	27200
21.52	1530	2762	2262	1522	65.5	1.0	1344	27500
21.63	1529	2760	2260	1522	65.6	1.0	1351	27800
21.74	1532	2763	2263	1526	65.6	1.0	1359	28100
21.85	1533	2764	2264	1525	65.6	1.0	1366	28400
21.93	1533	2764	2264	1524	65.7	1.0	1368	28500
22.06	1535	2767	2267	1526	65.6	1.0	1380	29000
22.17	1536	2767	2267	1529	65.6	1.0	1387	29300
22.28	1538	2768	2268	1530	65.7	1.0	1394	29600
22.39	1536	2/0/	2207	1527	65.6	1.0	1401	29900
22.50	1540	2113	22/3	1531	65 7	1 2	1400	30200
22.01	1540	2114	22/4	1531	65 7	1 2	1410	30000
22.12	1540	2770	2270	1521	65 9	1 2	1422	31300
22.03	1535	2//0	2270	1520	65 7	1.2	1430	31500
22.94	1533	2114	22/4	1520	65 7	1.3	1437	32000
23.03	1522	2119	2219	1529	65 7	1.2 1.2	1444 1151	32400
23.27	1530	2777	2210	1523	65 6	1 7	1458	32400
23.38	1527	2777	2277	1520	65.5	1.3	1465	33100
23.49	1525	2776	2276	1517	65.6	1_3	1472	33500
23 60	1519	2773	2273	1512	65.5	1.3	1480	33900
23.71	1519	2773	2273	1511	65.7	1.3	1487	34300
23.82	1520	2775	2275	1513	65.6	1.3	1491	34500
00 A.S	n general	: 777	77 77	1511	65.6	1.3	1502	35100

THE WESTERN COMPANY OF ______ RTH AMERICA - REAL TIME ______ ... ITORING SYSTEM

GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
min.	psı.	psı.	ps1.	ps1.	bpm.	lb/gal	Volume	Proppant
24.06	1519	2777	2277	1512	65.6	1.4	1509	35500
24.16	1517	2775	2275	1510	65.7	1.4	1516	35900
24.27	1519	2778	2278	1510	65.6	1.4	1523	36300
24.38	1517	2778	2278	1510	65.6	1.4	1531	36700
24.49	1518	2781	2281	1511	65.6	1.6	1538	37100
24.60	1513	2777	2277	1509	65.6	1.5	1545	37600
24.71	1513	2779	2279	1506	65.6	1.4	1552	38000
24.82	1510	2776	2276	1503	65.6	1.4	1559	38400
24.94	1508	2775	2275	1503	65.6	1.4	1567	38800
25.05	1505	2773	2273	1500	65.6	1.5	1574	39200
25.16	1504	2775	2275	1498	65.5	1.5	1581	39700
25.27	1503	2774	2274	1500	65.5	1.5	1588	40100
25.38	1505	2777	2277	1498	65.5	1.5	1595	40500
25.49	1505	2777	2277	1500	65.6	1.5	1602	40900
25.60	1505	2777	2277	1499	65.6	1.5	1609	41400
25.72	1501	2772	2272	1498	65.6	1.4	1617	41800
25.85	1503	2775	2275	1496	65.5	1.5	1626	42300
25.96	1501	2773	2273	1498	65.6	1.5	1633	42700
26.05	1501	2774	2274	1497	65.6	1.5	1633	42700
26.13	1503	2777	2277	1496	65.5	1.5	1633	42700
26.22	1500	2773	2273	1497	65.6	1.5	1633	42700
26.31	1500	2773	2273	1496	65.6	1.5	1633	42700
26.40	1500	2773	2273	1493	65.6	1.5	1633	42700
26.52	1501	2774	2274	1496	65.6	1.5	1633	42700
26.61	1500	2774	2274	1497	65.6	1.5	1633	42700
26.91	1500	2775	2275	1493	65.5	1.5	1694	46400
27.01	1500	2774	2274	1491	65.6	1.5	1701	46800
27.12	1501	2775	2275	1495	65.6	1.5	1708	47300
27.24	1500	2775	2275	1491	65.5	1.5	1716	47700
27.35	1497	2773	2273	1494	65.5	1.6	1723	48100
27.46	1500	2779	2279	1496	65.4	1.9	1730	48700
27.57	1500	2782	2282	1497	65.4	1.9	1737	49200
27.08	1497	2781	2281	1490	65.4	1.8	1744	49700
27.70	1494	2110	22/0	1480	65.5 65.5	1./	1751	50100
27.09	1490	2/13	2215	1487	65 5	1.0	1758	50600
20.01	1409	2779	2277	1404	65.6	1.0	1700	51100
28 24	1486	2779	2270	1405	65 5	1.0	1781	52200
28.35	1485	2780	2280	1478	65 5	1 9	1788	52700
28.46	1483	2782	2282	1478	65.5	1.9	1795	53200
28.57	1480	2780	2280	1476	65.5	1.9	1802	53800
28.68	1479	2778	2278	1476	65.7	1.9	1810	54300
28.79	1476	2777	2277	1470	65.5	1.9	1817	54900
28.90	1477	2779	2279	1471	65.6	1.9	1824	55400
29.01	1475	2779	2279	1472	65.5	1.8	1831	55900
29.12	1476	2782	2282	1471	65.5	1.9	1838	56400
29.23	1477	2784	2284	1469	65.6	2.0	1845	57000
29.34	1477	2786	2286	1472	65.5	2.0	1852	57500
29.46	1476	2786	2286	1471	65.5	2.0	1860	58200
29.57	1471	2781	2281	1470	65.6	2.0	1867	58700
29.68	1474	2786	2286	1470	65.5	2.0	1874	59300
29.79	1474	2786	2286	1471	65.5	2.0	1882	59900
29.90	1471	2782	2282	1466	65.6	1.9	1889	60400
30.01	1468	2780	2280	1462	65.6	2.0	1896	60900

THE WESTERN COMPANY OF 1.3 RTH AMERICA - REAL TIME M_{\odot} ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

•

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
min.	psi.	psı.	psi.	psi.	opm.	1D/gal	volume	Proppant
30.12	1470	2783	2283	1468	65.5	2.0	1903	61500
30.23	1470	2782	2282	1468	65.7	2.0	1910	62000
30.34	1470	2784	2284	1466	65.6	2.0	1917	62600
30.45	1471	2784	2284	1467	65.6	1.9	1924	63100
30.56	1470	2782	2282	1469	65.6	1.9	1931	63700
30.67	1471	2782	2282	1467	65.6	1.9	1938	64200
30.78	1470	2782	2282	1469	65.6	2.0	1946	64800
30.89	1473	2784	2284	1471	65.6	2.0	1953	65300
31.00	1470	2781	2281	1470	65.6	2.0	1960	65900
31.11	1472	2784	2284	1468	65.6	2.0	1967	66400
31.23	1471	2783	2283	1468	65.7	2.0	1975	67000
31.33	1473	2786	2286	1470	65.5	2.0	1982	67600
31.44	1470	2782	2282	1467	65.7	2.0	1989	68100
31.56	1468	2781	2281	1464	65.6	2.0	1996	68700
31.66	1468	2781	2281	1462	65.6	2.0	2003	69200
31.79	1467	2780	2280	1464	65.7	2.0	2011	69800
31.89	1468	2783	2283	1460	65.5	2.0	2018	70400
32.01	1464	2779	2279	1459	65.5	2.0	2026	71000
32.12	1467	2781	2281	1460	65.6	2.0	2033	71600
32.23	1400	2780	2280	1460	65.5 65.6	2.0	2040	72100
22.33	1400	2/03	2283	1400	65.5	2.0	2049	72700
32.40	1400	2701	2201	1459	65.5	2.0	2055	73300
32.57	1400	2700	2280	1455	65 6	2.0	2002	73800
32.00	1400	2780	2202	1402	65 6	2.0	2009	74400
32.01	1465	2700	2200	1450	65 6	2.0	2077	75600
33 03	1469	2783	2213	1453	65 5	2.0	2005	75000
33 14	1460	2782	2205	1462	65 5	2.0	2092	76700
33.25	1466	2780	2280	1460	65.7	2.0	2106	77300
33.36	1468	2783	2283	1461	65.6	2.0	2113	77800
33.47	1466	2780	2280	1459	65.6	2.0	2120	78400
33.58	1467	2782	2282	1459	65.6	2.0	2127	78900
33.69	1465	2780	2280	1457	65.6	2.0	2135	79500
33.80	1461	2776	2276	1456	65.6	2.0	2142	80000
33.91	1463	2778	2278	1457	65.6	2.0	2149	80600
34.02	1464	2779	2279	1460	65.6	2.0	2156	81200
34.13	1460	2774	2274	1457	65.6	2.0	2163	81700
34.23	1462	2776	2276	1455	65.6	2.0	2170	82300
34.34	1462	2778	2278	1458	55.5	2.0	2177	82800
34.45	1462	2/7/	2277	1457	65.6	2.0	2184	83400
34.30	1460	2/14	2214	1450	65.6	2.0	2191	83900
34.01	1462	2110	2270	1400	65.5	2.0	2190	94000
34.70	1405	2110	2270	1455	65 5	2.0	2200	85600
35 00	1465	2780	2280	1456	65 6	2.0	2213	86200
35.00	1459	2700	2200	1455	65.5	2.0	2220	86700
35.22	1460	2776	2276	1457	65.5	2.0	2234	87300
35.33	1459	2774	2274	1454	65.5	2.0	2241	87800
35.44	1460	2775	2275	1456	65.6	2.0	2248	88400
35.55	1460	2776	2276	1458	65.5	2.0	2255	89000
35.66	1458	2773	2273	1455	65.5	2.0	2262	89500
35.77	1459	2775	2275	1455	65.5	2.0	2269	90100
35.88	1460	2776	2276	1453	65.5	2.0	2277	90600
35.98	1451	2776	2275	1455	65.5	2.0	2284	91200

THE WESTERN COMPANY OF DRTH AMERICA - REAL TIME (ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP DSi.	BHTP psi.	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm Proppant
	P01.	601.	port	Por.	D pm •	107 gui	VOLUMC	rroppane
36.10	1461	2777	2277	1455	65.4	2.0	2291	91700
36.20	1458	2773	2273	1455	65.5	2.0	2298	92300
36.31	1459	2775	2275	1455	65.5	2.0	2305	92800
36.42	1459	2775	2275	1453	65.5	2.0	2312	93400
36.53	1460	2775	2275	1454	65.5	2.0	2319	94000
36.65	1459	2774	2274	1455	65.6	2.0	2327	94600
36.76	1460	2776	2276	1457	65.5	2.0	2334	95100
36.87	1458	2774	2274	1455	65.5	2.0	2341	95700
36.98	1459	2773	2273	1455	65.6	2.0	2348	96200
37.09	1458	2774	2274	1454	65.5	2.0	2355	96800
37.20	1458	2772	2272	1457	65.6	2.0	2362	97300
37.31	1458	2773	2273	1450	65.6	2.0	2370	97900
37.42	1460	2775	2275	1454	65.5	2.0	2377	98500
37.53	1459	2774	2274	1454	65.5	2.0	2384	99000
37.64	1459	2774	2274	1457	65.5	2.0	2391	99600
37.75	1463	2778	2278	1459	65.5	2.0	2398	100100
37.86	1461	2777	2277	1459	65.4	2.0	2405	100700
37.97	1461	2777	2277	1457	65.5	2.0	2412	101200
38.08	1463	2778	2278	1460	65.5	2.0	2419	101800
38.19	1467	2783	2283	1462	65.5	2.0	2426	102400
38.29	1462	2777	2277	1459	65.5	2.0	2433	102900
38.40	1462	2778	2278	1460	65.5	2.0	2441	103500
38.51	1460	2775	2275	1456	65.5	2.0	2448	104000
38.62	1457	2772	2272	1451	65.5	2.0	2455	104600
38.74	1455	2771	2271	1452	65.5	2.0	2463	105200
38.85	1455	2771	2271	1450	65.5	2.0	2470	105700
38.97	1451	2767	2267	1450	65.4	2.0	2477	106400
39.08	1450	2765	2265	1449	65.5	2.0	2485	106900
30.30	1449	2700	2200	1446	65.5 65.5	2.0	2492	107500
39.30	1449	2704	2204	1440	65.5	2.0	2499	108000
30 52	1452	2707	2207	1445	65 5	2.0	2500	100100
39.52	1450	2765	2200	1445	65.6	2.0	2520	109100
39.74	1445	2760	2260	1442	65.5	2.0	2520	110300
39.85	1442	2758	2258	1440	65.5	2.0	2534	110800
39.96	1448	2764	2264	1444	65.4	2.0	2541	111400
40.07	1449	2764	2264	1444	65.5	2.0	2549	111900
40.18	1449	2765	2265	1440	65.5	2.0	2556	112500
40.29	1444	2759	2259	1440	65.5	2.0	2563	113000
40.40	1448	2765	2265	1441	65.5	2.1	2570	113600
40.51	1449	2765	2265	1444	65.5	2.0	2577	114200
40.63	1448	2763	2263	1442	65.6	2.0	2585	114800
40.74	1452	2768	2268	1448	65.6	2.0	2592	115400
40.86	1451	2766	2266	1449	65.6	2.0	2600	116000
40.97	1451	2766	2266	1447	65.7	2.0	2607	116500
41.08	1452	2767	2267	1449	65.7	2.0	2614	117100
41.19	1455	2770	2270	1450	65.7	2.0	2621	117600
41.31	1453	2768	2268	1448	65.7	2.0	2629	118200
41.42	1451	2767	2267	1449	65.6	2.0	2636	118800
41.54	1450	2764	2264	1450	65.7	2.0	2644	119400
41.65	1451	2766	2266	1446	65.6	2.0	2651	120000
41.70	1450	2764	2264	1449	65.6	2.0	2658	120600
41.00	1450	2/65	2265	1445	65.6	2.0	2666	121100
4T.20	144/	2762	2262	1446	92.9	2.0	2013	121/00

THE WESTERN COMPANY OF ... RTH AMERICA - REAL TIME N ___ ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
111111	psi.	bar.	psr.	har.	DDm.	ID/YAI	vorume	Proppant
42.09	1448	2763	2263	1447	65.5	2.0	2680	122200
42.20	1447	2761	2261	1444	65.6	2.0	2687	122800
42.31	1451	2767	2267	1449	65.5	2.0	2694	123400
42.42	1450	2764	2264	1444	65.7	2.0	2701	124000
42.53	1447	2762	2262	1443	65.6	2.0	2708	124500
42.64	1448	2763	2263	1445	65.5	2.0	2716	125100
42.75	1449	2763	2263	1445	65.6	2.0	2723	125600
42.86	1446	2760	2260	1443	65.6	2.0	2730	126200
42.97	1449	2763	2263	1447	65.7	2.0	2737	126800
43.08	1450	2763	2263	1448	65.7	2.0	2744	127300
43.19	1449	2763	2263	1440	65.7	2.0	2751	127900
43.30	1449	2763	2263	1441	65.6	2.0	2758	128400
43.41	1449	2763	2263	1444	65.7	2.0	2765	129000
43.52	1449	2763	2263	1444	65.6	2.0	2773	129600
43.63	1451	2765	2265	1446	65.7	2.0	2780	130100
43.74	1449	2764	2264	1443	65.6	2.0	2787	130700
43.85	1450	2764	2264	1443	65.7	2.0	2794	131200
43.90	1449	2763	2263	1445	65.7	2.0	2801	131800
44.07	1451	2767	2200	1448	65 7	2.0	2808	132400
44.10	1400	2764	2204	1440	65 6	2.0	2013	132900
44.29	1449	2764	2204	1440	65 6	2.0	2820	133500
44.40	1449	2765	2265	1441	65 6	2.0	2837	134600
44.62	1450	2766	2265	1452	65.6	2.0	2844	135200
44.73	1455	2770	2270	1452	65.6	2.0	2851	135700
44.84	1459	2773	2273	1457	65.6	2.0	2858	136300
44.95	1464	2778	2278	1459	65.6	2.0	2865	136900
45.07	1462	2777	2277	1461	65.6	2.0	2873	137500
45.18	1462	2777	2277	1459	65.5	2.0	2880	138000
45.29	1461	2777	2277	1461	65.5	2.0	2888	138600
45.40	1466	2782	2282	1463	65.5	2.0	2895	139200
45.52	1469	2784	2284	1466	65.5	2.0	2903	139800
45.63	1470	2785	2285	1468	65.6	2.0	2910	140400
45.75	1470	2785	2285	1466	65.6	2.0	2917	140900
45.86	1469	2784	2284	1469	65.5	2.0	2924	141500
45.96	1470	2785	2285	1469	65.5	2.0	2931	142000
46.07	1470	2786	2286	1470	65.4	2.0	2939	142600
46.18	1470	2786	2286	1469	65.4	2.0	2946	143200
46.30	1470	2786	2286	1470	65.4	2.0	2953	143800
46.41	1469	2784	2284	1468	65.5	2.0	2961	144300
40.02	14/1	2780	2280	1470	65.5	2.0	2908	144900
40.03	1470	2/00	2200	1409	65.5 65.5	2.0	2970	145500
40.70	1470	2705	2200	1404	65.6	2.0	2903	146100
40.00	1470	2/03	2200	1400	65.5	2.0	2990	140000
40.90	14/0	2700	2200	1400	65.5	2.0	2990	147200
17 20	1400	2104	2204 7791	1402	65 5	2.0	3003	148400
47.32	1470	2795	2204	1467	65.5	1.9	3019	148900
47.43	1466	2779	2205	1463	65.6	1 8	3027	149500
47.54	1468	2777	2277	1465	65.6	1.6	3034	149900
47.66	1467	2769	2269	1464	65.7	1.3	3042	150300
47.77	1465	2760	2260	1464	65.6	0.9	3049	150600
47.88	1471	2753	2253	1470	65.7	0.6	3056	150800
	-		~~~~	1400	65 0	0.2	3063	150900

THE WESTERN COMPANY OF DRTH AMERICA - REAL TIME (ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bom.	PROP lb/gal	Cumm Volume	Cumm Proppant
	F	F =	E	r	•			
48.10	1506	2761	2261	1498	65.7	0.2	3070	151000
48.21	1515	2755	2255	1509	65.7	0.1	3077	151100
48.33	1384	2645	2145	1377	62.2	0.1	3084	151100
48.44	1297	2594	2094	1295	56.9	0.1	3091	151100
48.54	1161	2501	2001	1159	50.6	0.1	3096	151200
48.65	999	2396	1896	997	41.6	0.1	3101	151200
48.76	780	2245	1745	781	28.8	0.1	3105	151200
48.87	706	2245	1745	710	0.1	0.1	3105	151200
48.98	728	2267	1767	732	0.0	0.1	3105	151200
49.09	730	2269	1769	731	0.0	0.1	3105	151200
49.19	734	2273	1773	735	0.0	0.1	3105	151200
49.30	733	2272	1772	733	0.0	0.1	3105	151200
49.41	731	2270	1770	729	0.0	0.1	3105	151200
49.51	730	2269	1769	730	0.0	0.1	3105	151200
49.63	731	2270	1770	729	0.0	0.1	3105	151200
49.74	727	2266	1766	727	0.0	0.1	3105	151200
49.85	730	2269	1769	729	0.0	0.1	3105	151200
49.97	730	2269	1769	730	0.0	0.1	3105	151200
50.07	730	2269	1769	730	0.0	0.1	3105	151200
50.18	730	2269	1769	730	0.0	0.1	3105	151200
50.29	730	2269	1769	729	0.0	0.1	3105	151200
50.40	730	2269	1769	730	0.0	0.1	3105	151200
50.50	730	2269	1769	730	0.0	0.1	3105	151200
50.61	730	2269	1769	718	0.0	0.1	3105	151200
50.72	730	2209	1769	710	0.0	0.0	3105	151200
50.83	730	2209	1769	713	0.0	0.0	2105	151200
51 04	730	2209	1767	711	0.0	0.0	3105	151200
51 15	720	2207	1769	710	0.0	0.0	3105	151200
51 26	730	2209	1769	710	0.0	0.0	3105	151200
51 37	730	2269	1769	711	0.0	0.0	3105	151200
51.47	729	2268	1768	710	0.0	0.0	3105	151200
51.58	727	2266	1766	710	0.0	0.0	3105	151200
51.69	727	2266	1766	713	0.0	0.0	3105	151200
51.80	729	2268	1768	710	0.0	0.0	3105	151200
51.90	730	2269	1769	710	0.0	0.0	3105	151200
52.01	730	2269	1769	711	0.0	0.0	3105	151200
52.12	727	2266	1766	710	0.0	0.0	3105	151200
52.24	730	2269	1769	710	0.0	0.0	3105	151200
52.35	730	2269	1769	711	0.0	0.0	3105	151200
52.46	730	2269	1769	710	0.0	0.0	3105	151200
52.57	728	2267	1767	710	0.0	0.0	3105	151200
52.68	730	2269	1769	710	0.0	0.0	3105	151200
52.78	728	2267	1/6/	/10	0.0	0.0	3105	151200
52.89	729	2268	1768	710	0.0	0.0	3105	151200
53.00	730	2269	1769	710	0.0	0.0	3105	151200
53.11 53.91	130	2209	1760	710	0.0	0.0	3105	151200
53.41 53.20	730	2209	1769	710	0.0	0.0	3105	151200
53.32	729	2200	1769	710	0.0	0.0	3105	151200
53.51	729	2200	1769	710	0.0	0.0	3105	151200
53.64	720	2259	1759	710	0.0	0.0	3105	151200
53.75	725	2264	1764	710	0.0	0.0	3105	151200
53.86	726	2265	1765	709	0.0	0.0	3105	151200

THE WESTERN COMPANY OF ... TH AMERICA - REAL TIME N. ITORING SYSTEM

GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

$\begin{array}{cccccccccccccccccccccccccccccccccccc$	ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		-	•	-	•	-			
54.09 720 2259 1759 706 0.0 0.0 3105 151200 54.19 721 2260 1760 709 0.0 0.0 3105 151200 54.31 720 2259 1759 705 0.0 0.0 3105 151200 54.51 720 2259 1759 705 0.0 0.0 3105 151200 54.62 720 2259 1759 705 0.0 0.0 3105 151200 54.62 720 2259 1759 700 0.0 0.0 3105 151200 54.62 720 2259 1759 700 0.0 0.0 3105 151200 54.85 720 2259 1759 700 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.18 719 2259 1759 701 0.0 0.0 3105 151200 55.51 715 2254 1757 700 0.0 0.0 3105 151200 55.61 715 2254 1751 700 0.0 0.0 3105 151200 55.61 715 2254 1753 700 0.0 0.0 3105 151200 56.64 714 2253 1753 700 0.0 0.0 3105 151200 56.72 713 <	53.97	721	1 2260	1760	708	0.0	0.0	3105	151200
54.19 721 2260 1760 709 0.0 0.0 3105 151200 54.30 720 2259 1759 705 0.0 0.0 3105 151200 54.41 720 2259 1759 705 0.0 0.0 3105 151200 54.51 720 2259 1759 700 0.0 0.0 3105 151200 54.62 720 2259 1759 700 0.0 0.0 3105 151200 54.73 720 2259 1759 701 0.0 0.0 3105 151200 54.96 720 2259 1759 700 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.40 720 2259 1759 700 0.0 0.0 3105 151200 55.50 718 2257 1757 700 0.0 0.0 3105 151200 55.61 718 2257 1757 700 0.0 0.0 3105 151200 55.61 718 2251 1751 700 0.0 0.0 3105 151200 56.44 714 2253 1753 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 <	54.09	720	0 2259	1759	706	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	54.19	721	1 2260	1760	709	0.0	0.0	3105	151200
54.41720225917597050.00.0310515120054.51720225917597050.00.0310515120054.62720225917597000.00.0310515120054.73720225917597010.00.0310515120054.85720225917597010.00.0310515120055.97719225817597000.00.0310515120055.18719225817597000.00.0310515120055.40720225917597010.00.0310515120055.41720225917597010.00.0310515120055.50718225117577000.00.0310515120055.61715225417547000.00.0310515120055.72713225217527000.00.0310515120056.63712225117517000.00.0310515120056.16715225417537000.00.0310515120056.26713225217507000.00.0310515120056.36711225017507000.00.0310515120056.48714225	54.30	720	0 2259	1759	705	0.0	0.0	3105	151200
54.51 720 2259 1759 705 0.0 0.0 3105 151200 54.62 720 2259 1759 702 0.0 0.0 3105 151200 54.85 720 2259 1759 702 0.0 0.0 3105 151200 54.85 720 2259 1759 700 0.0 0.0 3105 151200 54.85 720 2259 1759 700 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.18 719 2258 1758 700 0.0 0.0 3105 151200 55.40 720 2259 1759 700 0.0 0.0 3105 151200 55.50 718 2257 1757 700 0.0 0.0 3105 151200 55.61 715 2254 1754 700 0.0 0.0 3105 151200 55.83 712 2251 1751 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.37 712 2251 1751 700 0.0 0.0 3105 151200 56.26 713 2252 1753 700 0.0 0.0 3105 151200 56.37 714 <	54.41	720	0 2259	1759	705	0.0	0.0	3105	151200
54.62 720 2259 1759 700 0.0 0.0 3105 151200 54.73 720 2259 1759 702 0.0 0.0 3105 151200 54.85 720 2259 1759 701 0.0 0.0 3105 151200 54.96 720 2259 1759 701 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.18 719 2258 1758 700 0.0 0.0 3105 151200 55.40 720 2259 1759 701 0.0 0.0 3105 151200 55.61 718 2257 1757 700 0.0 0.0 3105 151200 55.61 718 2257 1757 700 0.0 0.0 3105 151200 55.63 712 2251 1751 700 0.0 0.0 3105 151200 55.93 712 2251 1751 700 0.0 0.0 3105 151200 55.64 712 2251 1751 700 0.0 0.0 3105 151200 55.63 712 2251 1751 700 0.0 0.0 3105 151200 56.64 714 2253 1753 700 0.0 0.0 3105 151200 56.77 711 <	54.51	720	0 2259	1759	705	0.0	0.0	3105	151200
54.73 720 2259 1759 702 0.0 0.0 3105 151200 54.85 720 2259 1759 701 0.0 0.0 3105 151200 54.96 720 2259 1759 700 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.18 719 2258 1758 700 0.0 0.0 3105 151200 55.49 720 2259 1759 701 0.0 0.0 3105 151200 55.40 720 2259 1757 700 0.0 0.0 3105 151200 55.40 718 2257 1757 700 0.0 0.0 3105 151200 55.61 718 2251 1751 700 0.0 0.0 3105 151200 55.83 712 2251 1751 700 0.0 0.0 3105 151200 56.15 715 2254 1754 700 0.0 0.0 3105 151200 56.26 713 2252 1750 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 <	54.62	720	0 2259	1759	700	0.0	0.0	3105	151200
54.85 720 2259 1759 701 0.0 0.0 3105 151200 54.96 720 2259 1759 700 0.0 0.0 3105 151200 55.07 719 2258 1758 700 0.0 0.0 3105 151200 55.18 719 2258 1758 700 0.0 0.0 3105 151200 55.29 720 2259 1759 700 0.0 0.0 3105 151200 55.40 720 2259 1757 700 0.0 0.0 3105 151200 55.51 715 2254 1757 700 0.0 0.0 3105 151200 55.61 715 2254 1754 700 0.0 0.0 3105 151200 55.83 712 2251 1751 700 0.0 0.0 3105 151200 56.17 714 2253 1753 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 57.97 714 <	54.73	720	0 2259	1759	702	0.0	0.0	3105	151200
54.96 720 2259 1759 700 0.0 0.0 3105 151200 55.16 719 2258 1756 700 0.0 0.0 3105 151200 55.18 719 2258 1756 700 0.0 0.0 3105 151200 55.29 720 2259 1759 700 0.0 0.0 3105 151200 55.40 720 2259 1757 700 0.0 0.0 3105 151200 55.61 715 2254 1757 700 0.0 0.0 3105 151200 55.61 715 2254 1757 700 0.0 0.0 3105 151200 55.72 713 2252 1757 700 0.0 0.0 3105 151200 55.83 712 2251 1751 700 0.0 0.0 3105 151200 56.04 714 2253 1753 700 0.0 0.0 3105 151200 56.26 713 2252 1750 700 0.0 0.0 3105 151200 56.37 714 2253 1753 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.73 714 <	54.85	720	0 2259	1759	701	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	54.96	720	0 2259	1759	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	55.07	719	9 2258	1758	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	55.18	719	9 2258	1758	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	55.29	720	0 2259	1759	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	55 50	720	0 2259	1759	701	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	55 E1	715	8 2207 5 2254	1754	700	0.0	0.0	3105	151200
55.83 712 2252 1751 700 0.0 0.0 3105 151200 55.83 712 2251 1751 700 0.0 0.0 3105 151200 56.04 714 2253 1753 700 0.0 0.0 3105 151200 56.04 714 2253 1753 700 0.0 0.0 3105 151200 56.15 715 2254 1754 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 57.92 711 <	55 72	713	3 2234	1752	700	0.0	0.0	3105	151200
55.93 712 2251 1751 700 0.0 0.0 3105 151200 56.04 714 2253 1753 700 0.0 0.0 3105 151200 56.15 715 2254 1754 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 57.97 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.97 711 2250 1750 700 0.0 0.0 3105 151200 57.97 711 <	55.83	712	2 2252	1751	700	0.0	0.0	3105	151200
56.04 714 2253 1753 700 0.0 0.0 3105 151200 56.15 715 2254 1754 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.77 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 <	55.93	712	2 2251	1751	700	0.0	0.0	3105	151200
56.15 715 2254 1754 700 0.0 0.0 3105 151200 56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.77 711 2250 1750 700 0.0 0.0 3105 151200 57.77 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.81 710 <	56.04	714	4 2253	1753	700	0.0	0.0	3105	151200
56.26 713 2252 1752 700 0.0 0.0 3105 151200 56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.77 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.79 711 2250 1750 700 0.0 0.0 3105 151200 57.81 710 <	56.15	715	5 2254	1754	700	0.0	0.0	3105	151200
56.36 711 2250 1750 700 0.0 0.0 3105 151200 56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 699 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 <	56.26	713	3 2252	1752	700	0.0	0.0	3105	151200
56.48 714 2253 1753 700 0.0 0.0 3105 151200 56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 699 0.0 0.0 3105 151200 57.27 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.70 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 <	56.36	711	1 2250	1750	700	0.0	0.0	3105	151200
56.59 711 2250 1750 700 0.0 0.0 3105 151200 56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 699 0.0 0.0 3105 151200 57.27 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.70 710 2249 1749 698 0.0 0.0 3105 151200 57.70 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 <	56.48	714	4 2253	1753	700	0.0	0.0	3105	151200
56.71 711 2250 1750 700 0.0 0.0 3105 151200 56.83 714 2253 1753 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 699 0.0 0.0 3105 151200 57.27 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.70 710 2249 1749 698 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 <	56.39	711	1 2250	1750	700	0.0	0.0	3105	151200
50.03 714 2233 1733 700 0.0 0.0 3105 151200 56.93 714 2253 1753 700 0.0 0.0 3105 151200 57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 699 0.0 0.0 3105 151200 57.27 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.59 711 2250 1750 700 0.0 0.0 3105 151200 57.70 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 <	56 93	714	1 2250	1750	700	0.0	0.0	3105	151200
57.04 710 2249 1749 699 0.0 0.0 3105 151200 57.15 711 2250 1750 699 0.0 0.0 3105 151200 57.27 711 2250 1750 700 0.0 0.0 3105 151200 57.37 710 2249 1749 700 0.0 0.0 3105 151200 57.37 710 2249 1749 698 0.0 0.0 3105 151200 57.48 710 2249 1749 698 0.0 0.0 3105 151200 57.59 711 2250 1750 700 0.0 0.0 3105 151200 57.70 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 2249 1749 699 0.0 0.0 3105 151200 58.25 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 <	56.93	714	4 2253	1753	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	57.04	710	0 2249	1749	699	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	57.15	711	1 2250	1750	699	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	57.27	711	1 2250	1750	700	0.0	0.0	3105	151200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	57.37	710	0 2249	1749	700	0.0	0.0	3105	151200
57.59 711 2250 1750 700 0.0 0.0 3105 151200 57.70 710 2249 1749 700 0.0 0.0 3105 151200 57.81 710 2249 1749 700 0.0 0.0 3105 151200 57.92 711 2250 1750 700 0.0 0.0 3105 151200 58.03 710 2249 1749 699 0.0 0.0 3105 151200 58.14 710 2249 1749 699 0.0 0.0 3105 151200 58.25 710 2249 1749 699 0.0 0.0 3105 151200 58.36 710 2249 1749 698 0.0 0.0 3105 151200	57.48	710	0 2249	1749	698	0.0	0.0	3105	151200
57.70710224917497000.00.0310515120057.81710224917497000.00.0310515120057.92711225017507000.00.0310515120058.03710224917496990.00.0310515120058.14710224917496990.00.0310515120058.25710224917496990.00.0310515120058.36710224917496980.00.03105151200	57.59	/11	1 2250	1750	700	0.0	0.0	3105	151200
57.91710224917497000.00.0310515120057.92711225017507000.00.0310515120058.03710224917496990.00.0310515120058.14710224917496990.00.0310515120058.25710224917496990.00.0310515120058.36710224917496980.00.03105151200	57 91	710	0 2249	1749	700	0.0	0.0	3105	151200
58.03710224917496990.00.0310515120058.14710224917496990.00.0310515120058.25710224917496990.00.0310515120058.36710224917496980.00.03105151200	57.92	711	1 2250	1750	700	0.0	0.0	3105	151200
58.14710224917496990.00.0310515120058.25710224917496990.00.0310515120058.36710224917496980.00.03105151200	58.03	710	0 2249	1749	699	0.0	0.0	3105	151200
58.25710224917496990.00.0310515120058.36710224917496980.00.03105151200	58.14	710	0 2249	1749	699	0.0	0.0	3105	151200
58.36 710 2249 1749 698 0.0 0.0 3105 151200	58.25	710	0 2249	1749	699	0.0	0.0	3105	151200
	58.36	710	0 2249	1749	698	0.0	0.0	3105	151200
58.47 710 2249 1749 699 0.0 0.0 3105 151200	58.47	710	0 2249	1749	699	0.0	0.0	3105	151200
58.59 710 2249 1749 700 0.0 0.0 3105 151200 50.71 710 2249 1749 700 0.0 0.0 3105 151200	58.59	710	0 2249	1749	700	0.0	0.0	3105	151200
58.71 710 2249 1749 700 0.0 0.0 3105 151200 59.91 710 2249 1749 600 0.0 0.0 3105 151200	50./L	710	0 2249	1749	700	0.0	0.0	3105	151200
58 92 710 2249 1749 700 0.0 0.0 3105 151200 58 92 710 2249 1749 700 0.0 0.0 3105 151200	58 92	710	0 2249	1749	700	0.0	0.0	3105	151200
59.03 710 2249 1749 698 0.0 0.0 3105 151200	59.03	710	0 2249	1749	698	0.0	0.0	3105	151200
59.14 711 2250 1750 697 0.0 0.0 3105 151200	59.14	711	1 2250	1750	697	0.0	0.0	3105	151200
59.24 710 2249 1749 698 0.0 0.0 3105 151200	59.24	710	0 2249	1749	698	0.0	0.0	3105	151200
59.35 710 2249 1749 695 0.0 0.0 3105 151200	59.35	710	0 2249	1749	695	0.0	0.0	3105	151200
59.46 710 2249 1749 695 0.0 0.0 3105 151200	59.46	710	0 2249	1749	695	0.0	0.0	3105	151200
59.58 710 2249 1749 691 0.0 0.0 3105 151200 50.60 710 2249 1749 691 0.0 0.0 3105 151200	59.58	710	0 2249	1749	691	0.0	0.0	3105	151200
39.00 /10 2249 1/49 692 0.0 0.0 3105 151200 F0 70 710 2210 1749 699 0.0 0.0 3105 151200	20.50	/10	u 2249 	1749	692	0.0		2016 2105	151200

THE WESTERN COMPANY OF SRTH AMERICA - REAL TIME . (ITORING SYSTEM

GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
min.	psi.	psi.	psi.	psi.	bpm.	lb/gal	Volume	Proppant
	L	1	2	•	-			
59.90	710	2249	1749	692	0.0	0.0	3105	151200
60.01	710	2249	1749	695	0.0	0.0	3105	151200
60 11	710	2249	1749	694	0.0	0.0	3105	151200
60 22	710	2240	1749	692	0.0	0.0	3105	151200
60.22	710	2245	1749	693	0.0	0.0	3105	151200
60.33	710	2245	1749	697	0.0	0.0	3105	151200
60.55	710	2245	1749	694	0.0	0.0	3105	151200
60.55	710	2249	1749	692	0.0	0.0	3105	151200
60.77	710	2245	1749	691	0.0	0.0	3105	151200
60.87	709	2248	1748	692	0.0	0.0	3105	151200
60.98	710	2249	1749	694	0.0	0.0	3105	151200
61.09	710	2249	1749	691	0.0	0.0	3105	151200
61.20	710	2249	1749	696	0.0	0.0	3105	151200
61.30	710	2249	1749	693	0.0	0.0	3105	151200
61.42	710	2249	1749	697	0.0	0.0	3105	151200
61.54	710	2249	1749	693	0.0	0.0	3105	151200
61.65	710	2249	1749	693	0.0	0.0	3105	151200
61.75	710	2249	1749	694	0.0	0.0	3105	151200
61.86	710	2249	1749	698	0.0	0.0	3105	151200
61.97	710	2249	1749	696	0.0	0.0	3105	151200
62.08	710	2249	1749	698	0.0	0.0	3105	151200
62.18	710	2249	1749	692	0.0	0.0	3105	151200
62.29	710	2249	1749	696	0.0	0.0	3105	151200
62.40	710	2249	1749	694	0.0	0.0	3105	151200
62.51	710	2249	1749	695	0.0	0.1	3105	151200
62.62	710	2249	1749	693	0.0	0.0	3105	151200
62.73	710	2249	1749	694	0.0	0.0	3105	151200
62.83	710	2249	1749	691	0.0	0.0	3105	151200
62.96	710	2249	1749	698	0.0	0.0	3105	151200
63.07	710	2249	1749	699	0.0	0.0	3105	151200
63.17	710	2249	1749	696	0.0	0.0	3105	151200
63.29	710	2249	1749	692	0.0	0.0	3105	151200
63.41	710	2249	1749	693	0.0	0.0	3105	151200
63.53	709	2248	1748	697	0.0	0.0	3105	151200
63.65	710	2249	1749	693	0.0	0.0	3105	151200
63.75	710	2249	1749	690	0.0	0.0	3102	121700

Chavez, Carl J, EMNRD

From:	David Ortiz [DOrtiz@montand.com]
Sent:	Thursday, March 25, 2010 11:03 AM
То:	VonGonten, Glenn, EMNRD; Chavez, Carl J, EMNRD; Macquesten, Gail, EMNRD
Subject:	Notification: message "Request to Withdraw Public Notice for Western Refining Discharge Plan Permit (UICI-009 [I-009]) "
Attachments:	Attachments - Letter to Glenn von Gonten 3-25-10 (00174259).PDF; Letter to Glenn von Gonten 3-25-10 (00174258).PDF

Mr. von Gonten,

Per yours and Mr. Kendrick's request I am resending you the letter in two parts. Also, below are Mr. Kendrick's initial comments he sent you in his earlier email.

Dear Mr. von Gonten:

I am attaching a copy of the referenced letter that is being hand delivered to you this morning. Western Refining would appreciate the opportunity to meet with you, Mr. Chavez and Ms. Macquesten to discuss the data relevant to a determination of an appropriate injection pressure for the well. Thank you for your consideration.

Sincerely,

Ned Kendrick

David H. Ortiz Assistant to Stephen S. Hamilton, Edmund H. Kendrick & Louis W. Rose Montgomery & Andrews, P.A. P.O. Box 2307 Santa Fe, NM 87504-2307 (505) 986-2641 (direct line) (505) 982-4289 (fax) <u>dortiz@montand.com</u>

THIS MESSAGE CONTAINS INFORMATION WHICH MAY BE CONFIDENTIAL AND PRIVILEGED. UNLESS YOU ARE THE ADDRESSEE (OR AUTHORIZED TO RECEIVE FOR THE ADDRESSEE), YOU MAY NOT USE, COPY OR DISCLOSE TO ANYONE THE MESSAGE OR ANY INFORMATION CONTAINED IN THE MESSAGE. IF YOU HAVE RECEIVED THIS MESSAGE IN ERROR, PLEASE ADVISE THE SENDER BY REPLY E-MAIL TO DOrtiz@montand.com, AND DELETE THE MESSAGE. THANK YOU.

2

.

Attachment A

- 2010-02-25 OCD Discharge Permit Renewal Admin Complete
- 2010-02-22 OCD Email

nergy, Minerals and Natural Resources Department New México

Bill Richardson Governor

Jon Goldstein Cabinet Secretary Mark Fesmire Division Director Oil Conservation Division



February 25, 2010

Mr. James R. Schmaltz Western Refining Southwest, Inc. #50 Road 4990, P.O. Box 159 Bloomfield, New México 87413

Re: Discharge Plan Permit (UIC1-009 [1-009]) Western Refining Southwest, Inc. Class I Non-Hazardous Oil Field Waste Disposal Well Waste Disposal Well No. 1, API No. 30-045-29002 2442 FSL and 1250 FEL UL: I Section 27, T29 N, R 11 W San Juan County, New Mexico

Dear Mr. Schmaltz:

The New Mexico Oil Conservation Division (OCD) has received Western Refining Southwest, Inc's application for Waste Disposal Well No. 1 to inject oil field exempt/non-exempt non-hazardous wastes into the Cliff House and Menefee Formations at the intervals from 3276 to 3408 feet and 3435 to 3460 feet, respectively at a maximum surface injection pressure of 600 psig. The Class I waste disposal injection well is located in the NE/4 SE/4 of Section 27, Township 29 North, Range 11 West, NMPM, San Juan County, New Mexico. The initial submittal provided the required information in order to deem the application "administratively" complete.

Therefore, the New Mexico Water Quality Control Commission regulations (WQCC) notice requirements of 20.6.2.3108 NMAC must be satisfied and demonstrated to the OCD. OCD will provide public notice pursuant to the WQCC notice requirements of 20.6.2.3108 NMAC to determine if there is any public interest.

Please contact me at (505) 476-3490 or <u>carlj.chavez@state.nm.us</u> if you have questions. Thank you for your cooperation during this discharge permit review.

Sincerely,

Carl J. Chavez

Carl J. Chavez Environmental Engineer

CJC/cjc

xc: OCD District III Office, Aztec

Oil Conservation Division * 1220 South St. Francis Drive * Santa Fe, New Mexico 87505 * Phone: (505) 476-3440 * Fax (505) 476-3462* <u>http://www.emnrd.state.nm.us</u>



Chavez, Carl J, EMNRD

From:	Chavez, Carl J, EMNRD
Sent:	Monday, February 22, 2010 1:28 PM
To:	Schmaltz, Randy
Cc:	'Allen.Hains@wnr.com'; Monzeglio, Hope, NMENV; Cobrain, Dave, NMENV; Sanchez, Daniel
	J., EMNRD; Jones, William V., EMNRD; VonGonten, Glenn, EMNRD; Perrin, Charlie, EMNRD
Subject:	Re: Western Refining Southwest, Inc. Status of OCD Discharge Permits: Bloomfield Refinery
,	(GW-001) & UIC Class Disposal Well (UICI-009)

Randy, et al.:

FYI, the OCD will likely be processing Western Refining Southwest, Inc.'s (WRSWI) two OCD Discharge Permit Applications (see above subject) this woek.

The landfill issues for GW-001 are resolved in the discharge permit along with the active status and closure plan issues.

The maximum allowable surface injection pressure for UICI-009 has been reduced to 600 psig in the discharge permit in order to prevent the half-fractures from growing in the present injection formation. WRSWI will likely need to change its dewatering w/ SVE remediation project at the river terrace as a result of this pressure reduction in order to comply with the change.

Please contact me if you have questions. Thank you.

Carl J. Chavez, CHMM New Mexico Energy, Minerals & Natural Resources Dept. Oil Conservation Division, Environmental Bureau 1220 South St. Francis Dr., Santa Fe, New Mexico 87505 Office: (505) 476-3490 Fax: (505) 476-3490 Fax: (505) 476-3462 E-mail: <u>CarlJ.Chavez@state.nm.us</u> Website: <u>http://www.emnrd.state.nm.us/ocd/</u>index.htm (Pollution Prevention Guidance is under "Publications")

> Attachment A Page 2

1

Attachment B

- 1994-06-28 OCD Injection Pressure Increase
- 1996-07-16 OCD Injection Pressure Increase
- 1999-09-16 Giant Renewal Application

ļ

- 2003-06-30 Giant Renewal Application
- 2004-03-23 OCD Discharge Permit Renewal
- 2008-10-02 Western Renewal Application

THE REPORT OF THE PARTY OF THE

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

STATE OF NEW MEXICO

CIL CONSERVATION DIVISION

BRUCE KING GOVERNOR

ANITA LOCKWOOD CABINET SECRETARY

June 28, 1994

POST DFFICE BOX 2088 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87504 15051 827-5800

Tierra Environmental Corporation 909 W. Apache Farmington, NM 87401

Attention: Connie Dinning

RE: Injection Pressure Increase Bloomfield Refining SWD Well No. 1, San Juan County, New Mexico

Dear Ms. Dinning:

Reference is made to your request dated May 13, 1994 to increase the surface injection pressure on the Bloomfield Refining SWD Well No. 1. This request is based on a step rate test conducted on this well on January 22, 1994. The results of the test have been reviewed by my staff and we feel an increase in injection pressure on this well is justified at this time.

You are therefore authorized to increase the surface injection pressure on the following well:

Well and Location	Maximum Injection Surface Pressure
Bloomfield Refining SWD No. 1 Unit I, Section 27, Township 29 North, Range 11 West, San Juan County, New Mexico.	955 PSIG

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Sincerely, William J. LeMa Director WJL/DRC/amg

cc: Oil Conservation Division - Aztec File: SWD-528 D. Catanach



NEW MEXICO ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT

July 16, 1996

Giant Refining Company P.O. Box 159 Bloomfield, New Mexico 87413-0159

Attn: Mr. Lynn Shelton

RE: Injection Pressure Increase, Bloomfield Refining Well No.1 San Juan County, New Mexico

Dear Mr. Shelton:

Reference is made to your request dated May 3, 1996 to increase the surface injection pressure on the above referenced well. This request is based on a step rate test conducted on March 1, 1996. The results of the test have been reviewed by my staff and we feel an increase in injection pressure on this well is justified at this time.

You are therefore authorized to increase the surface injection pressure on the following well:

Well and Location Maximum Surface Injection Pressure						
Bloomfield Refining Well No.1 1150 PSIG						
Located in Unit Letter 'I', Section 27, Township 29 North, Range 11 West, San Juan County, New Mexico.						

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Sincerely, William J. Le May Director WJL/BES Oil Conservation Division - Aztec cc: Files:SWD-528; PSI-X 1st'QTR-97



111 Road 4990 Bloomfield, New Mexico 87413

505 632.8006



September 16, 1999

Mr. Wayne Price NMOCD 2040 S. Pacheco Santa Fe, New Mexico 87505

Re: Discharge Plan GW-130 Renewal SWD Well #WD-1 San Juan County, New Mexico

Dear Mr. Price:

Giant Refining Company – Bloomfield submits this notice of application for renewal of Discharge Plan GW-130, SWD Well #WD-1 at this site.

No elements of the discharge plan have been changed.

. .

znon

11-

Enclosed is a check for \$50.00 to cover the filing fee.

If you need additional information, please contact mc at (505) 632 4168.

Sincerely:

Lynn Shelton Environmental Mänager Giant Refining Company – Bloomfield

Enclosure

Cc: John Stokes, Vice President, Giant Refining Company Sarah Allen, Corporate Counsel, Giant Industries, Inc. Denny Foust, NMOCD, Aztec

REFINING COMPANY

Mr. Wayne Price New Mexico Oil Conservation Division 1220 South St. Frances Dr. Santa Fe, New Mexico 87505

June 30, 2003

Via: Certified Mail # 7099 3220 0010 2242 6225

Re: Discharge Plan GW-130 Renewal SWD Well #WD-1 San Juan County, New Mexico

Dear Mr. Price,

Giant Refining Company – Bloomfield Refinery submits this notice of application for renewal of Discharge Plan GW-130, SWD Well #WD-1 at this site.

No elements of the discharge plan have been changed.

Enclosed is s check for \$100.00 to cover the filing fee.

If you need more information, please contact me at (505) 632-4171.

Sincerely,

Randy Schmaltz Environmental Supervisor Giant Refining Company – Bloomfield

Cc: Chad King, Bloomfield Refinery Manager Ed Riege, Giant Refining Environmental Superintendent Denny Foust, New Mexico Oil Conservation Division – Aztec

PHONE 505-632-8013 FAX \$05-632-3911 50 ROAD 4990 P.O. BOX 159 BLOOMFIELD NEW MEXICO 87413



NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

BILL RICHARDSON Governor

March 23, 2004

......

Joanina Prukop Cabinet Secretary Acting Director Oil Conservation Division

CERTIFIED MAIL RETURN RECEIPT NO. 7923 4399

Mr. James (Randy) Schmaltz Environmental Supervisor Giant Refining Co. P.O. Box 159 Bloomfield, NM 87413

RE: Discharge Permit Renewal Bloomfield Refinery Class I (Non-Hazardous) Disposal Well UIC-CL1-009 (GW130) San Juan County, New Mexico

Dear Mr. Schmaltz:

The groundwater discharge permit renewal application for the Bloomfield Refinery Class I (Non-Hazardous) Disposal Well operated by Giant Refining Co. located in the NE/4, SE/4 of Section 27, Township 29 North, Range 11 West, NMPM, San Juan County, New Mexico is hereby approved under the conditions contained in the enclosed attachment. Enclosed are two copies of the conditions of approval. Please sign and return one copy to the New Mexico Oil Conservation Division (OCD) Santa Fe Office within 30 days of receipt of this letter.

The original discharge permit application was submitted on September 16, 1992 and approved on November 05, 1993. The discharge permit renewal application, dated June 30, 2003 submitted pursuant to Sections 5101 of the New Mexico Water Quality Control Commission (WQCC) Regulations also includes all earlier applications and all conditions later placed on those approvals. The discharge permit is renewed pursuant to Section 5101 and 3109 Please note Section 3109.G., which provides for possible future amendment of the permit. Please be advised that approval of this permit does not relieve Giant Refining Company of liability should operations result in pollution of surface or ground waters, or the environment.

Please be advised that all exposed pits, including lined pits and open top tanks (exceeding 16 feet in diameter) shall be screened, netted, or otherwise rendered nonhazardous to wildlife including migratory birds.

Please note that Section 3104. of the regulations requires that "when a permit has been approved discharges must be consistent with the terms and conditions of the permit." Pursuant to Section 3107.C., Giant Refining Company is required to notify the Director of

> Oil Conservation Division * 1220 South St. Francis Drive * Santa Fe, New Mexico 87505 Phone: (505) 476-3440 * Fax (505) 476-3462 * <u>http://www.eumrd.state.am.us</u>
any facility expansion, production increase, or process modification that would result in any change in the discharge of water quality or volume.

Pursuant to Section 3109.H.4., this approval is for a period of five years. This approval will expire November 04, 2008 and an application for renewal should be submitted in ample time before that date. Pursuant to Section 5101.F. of the regulations, if a discharger submits a discharge permit renewal application at least 120 days before the discharge permit expires and is in compliance with the approved permit, then the existing discharge permit will not expire until the application for renewal has been approved or disapproved.

The discharge permit application for the Giant Refining Company Bloomfield Refinery Class I (Non-Hazardous) Disposal Well is subject to the WQCC Regulation 3114. Every billable facility submitting a discharge permit will be assessed a fee equal to the filing fee of \$100 plus a renewal fee of \$4500.00 for class I wells. The OCD has not received the \$4500.00 flat fee. The flat fee may be paid in a single payment due on the date of the discharge permit approval or in five equal installments over the expected duration of the discharge permit. Installment payments shall be remitted yearly, with the first installment due on the date of the discharge permit approval and subsequent installments due on this date of each calendar year.

Please make all checks payable to: Water Quality Management Fund C/a: Oil Conservation Division 1220 South Saint Francis Drive Santa Fe, New Mexico 87505.

If you have any questions, please contact Wayne Price of my staff at (505-476-3487) or Email wprice@state.nm.us. On behalf of the staff of the OCD, I wish to thank you and your staff for your cooperation during this discharge permit review.

Sincerely,

Roger Anderson Environmental Bureau Chief RCA/lwp Attachment-1 xc: OCD Aztec Office

3.

ATTACHMENT TO THE DISCHARGE PERMIT UIC-CL1-009 (old GW-130) Giant Refining Company Bloomfield Refinery Class I (Non-Hazardous) Disposal Well DISCHARGE PERMIT APPROVAL CONDITIONS March 23, 2004

- 1. <u>Payment of Discharge Permit Fees:</u> The \$100.00 filing fee has been received by OCD. The \$4500.00 flat fee shall be submitted upon receipt of this approval. The required flat fee may be paid in a single payment due at the time of approval, or in equal annual installments over the duration of the permit, with the first payment due upon receipt of this approval.
- 2. <u>Giant Refining Company Commitments</u>: Giant Refining Company will abide by all commitments submitted in the discharge permit renewal application dated June 30, 2003 and these conditions for approval.
 - Authorization to Inject and Maximum Injection Pressure: Giant Refining Company is authorized to inject subject to the discharge permit commitments and conditions contained within. The maximum operating injection pressure at the wellhead will be 1150 psi as allowed in the amended Administrative Order SWD-528. The injection well or system shall be equipped with a pressure limiting device which will limit the wellhead pressure on the injection well to no more than 1150 psi. The pressure limiting device shall monthly be demonstrated to operate to the satisfaction of the OCD.

Giant Refining Company shall take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the ground surface.

- 4. <u>Mechanical Integrity Testing</u>: In accordance with OCD testing procedures, a mechanical integrity test will be conducted on the well annually and any time the tubing is pulled or the packer is rescated. A pressure recorder will be used and copies of the chart submitted to the OCD Santa Fe Office and the OCD Aztee District Office within 30 days following the test date. The OCD will be notified prior to the test so that they may witness the test. Mechanical integrity testing charts will be maintained at Giant Refining Company for the life of the well
- 5. <u>Annulus:</u> The casing-tubing annulus will be filled with an juert fluid and a minimum pressure of 100 psi maintained. Fluid levels shall be checked and reported at the time of performing the mechanical integrity test.

- 6. Continuous Monitoring and Recording: Continuous monitoring and recording devices will be installed and mechanical charts made of injection pressure, flow rate, flow volume, annular pressure and nitrogen usage. Mechanical charts are to be maintained at Giant Refining Company for the life of the well.
- 7. <u>Maintenance Records</u>; All routine maintenance work on the well will be recorded ' and maintained at Giant Refining Company for the life of the well.
- 8. Wastes Permitted for Injection: Injection will be limited to exempt and non-hazardous oilfield wastes generated exclusively by Giant Refining Company Refining Company. All non-exempt non-hazardous oil field waste will be tested for the constituents listed below in number 9.
- 9. <u>Chemical Analysis of Injection Eluids</u>: The following analyses of injection fluids will be conducted on a quarterly basis:
 - Aromatic and halogenated volatile hydrocarbon scan by EPA method 8260C
 GC/MS including MTBE. Semi-Volatile Organics GC/MS EPA method 8270B including 1 and 2-methylnaphthalene.
 - b. General water chemistry to include calcium, potassium, magnesium, sodium, bicarbonate, carbonate, chloride, sulfate total dissolved solids (TDS), pH, and conductivity.
 - c. Total heavy metals using the ICAP scan (EPA method 6010/ICPMS) and Mercury using Cold Vapor (EPA method 7470).
 - d. EPA RCRA Characteristics for Ignitability, Corrosivity and Reactivity.

Records of all analyses will be maintained at Giant Refining Company for the life of the well.

- 10. <u>Quarterly Reporting</u>: The following reports will be signed and certified in accordance with WQCC section 5101.G. and submitted quarterly to both the OCD Santa Fe and Aztec Offices:
 - a. Results of the chemical analysis of the injection fluids (number 9).
 - b. Monthly average, maximum and minimum values for injection pressures; flow rate and flow volume; and, annular pressure.

e. Monthly volumes of injected fluids.

- 11. Drum Storage: All drums containing materials other than fresh water must be stored on an impermeable pad with curbing. All empty drums will be stored on their sides with the bungs in and lined up on a horizontal permitees. Chemicals in other containers such as sacks or buckets will also be stored on an impermeable pad and curb type containment.
- 12. <u>Process Areas:</u> All process and maintenance areas which show evidence that leaks and spills are reaching the ground surface must be either paved and curbed or have some type of spill collection device incorporated into the design.
- 13. Above Ground Tanks: All above ground tanks which contain fluids other than fresh water must be bermed to contain a volume of one-third more than the total volume of the largest tank or of all interconnected tanks. All new tanks or existing tanks that undergo a major modification, as determined by the Division, must be placed within an impermeable bermed enclosure.
- 14. <u>Above Ground Saddle Tanks</u>: Above ground saddle tanks must have impermeable pad and curb type containment unless they contain fresh water or fluids that are gases at atmospheric temperature and pressure.
- 15. Labeling: All tanks, drums and containers should be clearly labeled to identify their contents and other emergency notification information.
- 16. Below Grade Tanks/Sumps/Pits/Ponds: All below grade tanks, sumps, pits and ponds must be approved by the OCD prior to installation or upon modification and must incorporate secondary containment and leak-detection into the design, unless approved otherwise. All below grade tanks, sumps and pits must be tested annually or as specified below, see additional conditions, except systems that have secondary containment with leak detection. These systems with leak detection shall have a monthly inspection of the leak detection to determine if the primary containment is leaking. Results of tests and inspections shall be maintained at the facility covered by this discharge plan and available for NMOCD inspection. Any system found to be leaking shall be reported pursuant to Item # 20. Permit holders may propose various methods for testing such as pressure testing to 3 pounds per square inch above normal operating pressure and/or visual inspection of cleaned out tanks and/or sumps, or other OCD approved methods. The OCD will be notified at least 72 hours prior to all testing.

17. Linderground Process/Wastewater Lines: All underground process/wastewater pipelines must be approved by the OCD prior to installation and must be tested to demonstrate their mechanical integrity every five (5) years. Results of such tests shall be maintained at the facility covered by this discharge plan and available for NMOCD inspection. Permit holders may propose various methods for testing such as pressure testing to 3 pounds per square inch above normal operating pressure or other means acceptable to the OCD. The OCD will be notified at least 72 hours prior to all testing.

18. Well Workover Operations: OCD approval will be obtained from the Director prior to performing remedial work or any other workover. Approval will be requested on OCD Form C-103 "Sundry Notices and Reports on Wells" (OCD Rule 1103.A.) with appropriate copies sent to the OCD Aztec District Office.

19. Housekeeping: All systems designed for spill collection/prevention will be inspected weekly and after each storm event to ensure proper operation and to prevent overtopping or system failure. A record of inspections will be retained on site for a period of five years.

20. <u>Spill Reporting:</u> All spills/releases shall be reported pursuant to OCD Rule 116, and WQCC 1203, to the OCD Aztec District Office.

Giant Refining Company shall immediately notify the Supervisor of the Aztec District Office and the Environmental Bureau of the Division of the failure of the tubing, casing, or packer in said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

- 21. <u>Transfer of Discharge Permit</u>: The OCD will be notified prior to any transfer of ownership, control, or possession of the well and associated facilities. A written commitment to comply with the terms and conditions of the previously approved discharge permit and a bond must be submitted by the purchaser and approved by the OCD prior to transfer.
- 22. <u>Closure:</u> The OCD will be notified when operations of the well are discontinued for a period in excess of six months. Prior to closure of the well and associated facilities a closure permit will be submitted for approval by the Director. Closure and waste disposal will be in accordance with the statutes, rules and regulations in effect at the time of closure.

- 23. Plugging Bond and /or Letter of Credit: Giant Refining Company shall have in effect a Division approved plugging bond and/or letter of credit for the estimated amount required to plug the well according to the proposed closure permit and adjusted for inflation. The required plugging bond and/or letter of credit shall be adjusted at the time of discharge permit renewal. Please submit the new estimate before November 04, 2008.
- 24. Training: All personnel associated with operations at the Giant Refining Company Class I disposal well will have appropriate training in accepting, processing, and disposing of Class I non-exempt non-hazardous oil field waste to insure proper disposal. All training documentation shall be maintained at Giant Refining Company for the life of the well.
- OCD Inspections: Additional requirements may be placed on the well and associated 25. facilities based upon results from OCD inspections.
- 27. Giant Refining Company by the officer whose signature appears Certification: below, accepts this permit and agrees to comply with all terms and conditions contained herein. Giant Refining Company further acknowledges that these conditions and requirements of this permit modification may be changed administratively by the Division for good cause shown as necessary to protect fresh water, human health and the environment.

Conditions accepted by: **Giant Refining Company**

chad King-

Company Representative- print name

<u>Ullel VIIA</u> Date <u>4/6/04</u> Company Representative/Sign Title_<u>[Cefinery</u> Manager



50 Road 4990, Bloomfield, New Mexico 87413 • 505 632-8013 • www.wnr.com

Mail: P.O. Box 159, Bloomfield, New Mexico 87413

Attachment C

· •

4

• 1996-03-01 Giant Postfrac Treatment Summary



Page 1



Attachment C Page 2

WE		The	West	(ern C	ompa	ny	Tre	eatmen	t Repo	e. ert			Page 1 of 1
Date M	larch 1, 19	96	District	Parminet	on NM		F.Receit	ot 398363	7		Operator	Giant Refiners	
Lease P	loomfield	wn	Well No.	1		*****	Field P	lanco			Location	SEC 27 TOON E	11W
County	San Juan		State N	ew Mexic	<u>о</u>		Stage N	umber 1			This Zon	o DS1	This Well 181
and the second				SIT ITCALL	~	······					1115 1.04	~ 8.3	1113 ((6) 25
W/RE	с пата	OG 🗔 Tubing	NG 🗖 Size_N/A		00 □ WtN/A	WD (rw Set a	Mis Mis	e. 🗆	Depth TD Type Pa	/PB_3,60 cker_N//	0"_Formation_1 ASet	Mesa Verde at_N/A
Casing S	ize 5 1/2	. Wt.	15.5#	Set	From SU	RFACE	To	10	Lir	er Size_N	/A	Wt.	
Liner Se	t From		То		Open Ho	ole: Size	N/A		From		To		
Casing P	erforation	Size ,45			Holes Per	Foot 4	-	Inte	ervals 3,2	76' - 3,51	4' 316 Ho	OLES	
Previous	Treatmen	t <u>N/A</u>						Pric	or Produc	tion <u>N/A</u>			
HIEICATEAPPET IPATTA Pad Used: Yes INO Pad Type Slick Water EIQUINT/GAS PURIFED AND Treat. Fluid Type: Foam Water IAcid ID 01 Vol. 130,410 Gal. GAPACTIVES IN BUSS. Base Fluid type H20 Base Fluid Vol. 123,354 Gal. Tubing Cap. N/A													
Foam Qu	al. N/A	96 Mite	hell 🗍 Si		Surface [] Down!	hole 🗋	Total Pr	op Qty	53,940	Lbs.	Casing Cap	<u>N/A</u> 78
Prop Me	ah Sizoa J	Si ₩E-1 ["Vnes and (hantities	20/J0 A	dzona 154	1 0 A A			************	·····		Annular Cap	N/A
Hole Los	adad With	HYO	Zaanerene 2	Traat Via	Tubing [~) Ca	eino 1521	Annt [Tubia	o R. Anni		Open Hole Cap.	<u>N/A</u>
Ball Sea	lers: N/A	1120	1 % an April 2 Martin Capital Capital	in in	1 normg (sing ves Sta	readin (i rabii	g or minin		Fluid to Load	<u>N/A</u>
Types an	nd Number	of Pumps	Ised 6 P/	CESETTE	R 1000'S				······································		[Pad Volume	514
Auxiliary	v Materiałs	54# XCII)E-207 / 8	9 G. FRW	-30					·····	[Finah	<u></u>
	,				- <u></u>			*****	**************************************	······		Over Elush	N/A
	***	PHMP	·21 588 G	. PAD/19	824 G. 1/	2#/21.0	100 G. 1	#/11.214	G. 1 1/2#	f		Eluid to Bacova	- 2017
PROC		47.04	0 G. 2#/	3.150 G.	PLUSH.				<u></u>			Total N2	N/A
. Som	imary			<u></u>				······		*****		Total CO2	N/A
Time	energenegen 		Surf	ace	Slurry	Sur	face	C02 8-11	Su	face	1	1	
АМ/РМ	Treating	PressPsi	Slarry Pum	ped	Rate BPM	CO2 Puu	bbls ped	BPM	N2 Pur	MSCF nped	SCFM	Safety M	eeting/Test Lines
	SIP	Annulus	Stage	Total		Stage	Total		Stage	Total			
PM5:50	0		0	0	60					\		START PAD	
5:58	1700		514	514	65							START 1/2#	
6:05	1580		486	1000	65						••••	START 1#	
6.18	1500		285	1920	<u>60</u> 65	a				•		START 2#	9
6:37	1470		220	3030	65	·····				1	1	START PLUSH	1
6:38	1000		75	3105	40	······						SHUT DOWN	5 MINS-720
	*****											10 MINS-710	······································
					. 						ļ		······································
	`						<u>+</u> ••••				+		
										÷	†		
											[
					·····					<u> </u>	<u> </u>		······································
Treating	Pressure:	Mia 1470			Max. 170	0	L Avg.	1500]	Customer	I Represe	Intative Paul Tho	msoh
Inj. Rate	on Treatin	ng Pluid 65	\$		Rate on F	lush_65				Western I	Represent	atívě Harry Mit	chell
Avg. Inj.	Rate 65			I.S.D.P.	750	FI	ush Den	s. lbs/gal_	8.34	Distributi	on NOR	MAL	······
	u data mangu	Final S	hut-in Pre	ssure 700)		ln	15		Min	utes	······	
	9 A.I. A.I. CAL	Operat	or's Maxir	num Press	ure (psi)_ ococor	3500			••••				
		a necom	mendation	1 11)# <u></u>	030323						~		

•

BJ Services Company Additive Schedule



Operator: GIANT Well Information: BLOOMFIELD WD#1

1

- "m |-

Date: 3/1/96 GIANTWD1

Addi	tive: FRI	1-30	ſ	Planned Additive Rates					
PPG	VOLUME ;	LOAD	AHOUNT	50 BPM	55 BPH	60 BPH	65 BPH	70×8PM	GONE
0.00	26000	0.75	19.50	1.58	1.73	1.89	2.05	2.20	19.50
0.50	20000	0.75	15.00	1.54	1.69	1.85	2.00	2.16	34.50
1.00	20000	0.75	15.00	1.51	1.66	1.61	1.96	2.11	49.50
1.50	20000	0.75	15.00	1.47	1.62	1.77	1.92	2.06	64.50
2.00	45000	0.75	33.75	1.44	1.59	1.73	1.88	2.02	98.25
0.00	3150	0.75	2.36	1.58	1.73	1.89	2.05	2.20	100.61

THE WESTERN COMPANY OF ... JRTH AMERICA - REAL TIME M MITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

~

	ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
$ 0.11 770 2091 591 771 13.2 0.0 6 0 0 7 0 0 \\ 0.22 799 2078 578 796 14.9 0.0 7 0 0 \\ 0.30 844 2040 540 844 17.8 0.0 7 0 0 \\ 0.38 877 1969 469 878 20.9 0.0 7 0 0 \\ 0.55 923 1895 395 922 24.1 0.0 144 0 \\ 0.64 958 1851 351 959 26.0 0.0 14 0 0 \\ 0.72 973 1818 318 973 27.1 0.1 14 0 \\ 0.87 1212 1849 349 1207 31.4 0.1 23 0 \\ 0.98 1326 1424 100 1327 40.7 0.0 27 0 \\ 1.90 1338 1337 100 1338 42.2 0.0 31 0 \\ 1.20 1338 1337 100 1518 47.2 0.1 41 100 \\ 1.30 1520 1165 100 1514 47.2 0.1 41 100 \\ 1.41 1643 837 100 1649 55.4 0.0 53 100 \\ 1.520 1165 100 1514 47.2 0.1 41 100 \\ 1.41 1643 837 100 1640 55.4 0.0 53 100 \\ 1.63 1520 1100 1654 55.8 0.1 59 100 \\ 1.63 1633 590 100 1654 55.8 0.1 59 100 \\ 1.63 1653 100 100 1654 59.9 0.0 71 200 \\ 1.85 1660 400 100 1654 59.9 0.0 71 200 \\ 1.85 1660 400 100 1576 60.4 0.0 85 200 \\ 2.19 1554 400 100 1576 61.0 0.0 92 200 \\ 2.31 1586 400 100 1576 61.0 0.0 99 200 \\ 2.19 1554 400 100 1657 65.4 0.1 114 300 \\ 2.63 1697 400 100 1657 65.4 0.1 114 300 \\ 2.63 1697 400 100 1657 65.4 0.1 155 300 \\ 2.71 1716 400 100 1576 65.4 0.1 114 300 \\ 2.63 1697 400 100 1667 64.8 0.1 114 300 \\ 2.63 1697 400 100 1667 65.6 0.1 157 400 \\ 3.4 1724 1832 132 1709 65.5 0.1 149 400 \\ 3.9 1724 911 411 1710 65.5 0.1 149 400 \\ 3.9 1724 1832 132 1709 65.6 0.0 179 500 \\ 149 1697 1711 65.5 0.1 149 400 \\ 3.9 1724 1832 132 1709 65.6 0.0 179 500 \\ 1.49 400 \\ 109 1197 697 1711 65.6 0.0 172 500 \\ 3.4 1728 1832 1332 1709 65.6 0.0 122 700 \\ 3.4 1728 1832 1332 1709 65.6 0.0 1242 400 \\ 3.9 1197 122 556 2356 1699 55.5 0.1 228 700 \\ 3.4 1728 1832 1332 1709 65.6 0.0 1368 500 \\ 0.73 172 2066 2366 1709 65.6 0.0 1368 $		-							
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.11	770	2091	591	771	13.2	0.0	6	· 0
	0.22	799	2078	578	798	14.9	0.0	7	0
	0.30	844	2040	540	844	17.8	0.0		0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.38	877	1969	469	878	20.9	0.0	7	0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.55	923	1895	395	922	24.1	0.0	14	0
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.64	958	1851	351	959	26.0	0.0	14	0
	0.72	973	1818	318	973	27.1	0.1	14	0
	0.87	1212	1849	349	1207	31.4	0.1	23	0
	1.09	1320	1227	100	1778	40.7	0.0	27	0
	1.20	1421	1278	100	1418	44.2	0.1	36	ŏ
	1.30	1520	1165	100	1514	47.2	0.1	41	100
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.41	1643	837	100	1639	53.0	0.0	47	100
1.63 1633 590 100 1628 55.8 0.1 59 100 1.74 1670 455 100 1660 57.7 0.0 65 200 1.96 1626 400 100 1654 59.9 0.0 71 200 2.06 1586 400 100 1578 60.3 0.0 78 200 2.19 1554 400 100 1576 61.0 0.0 99 200 2.31 1586 400 100 1576 61.0 0.0 99 200 2.44 1638 400 100 1667 64.8 0.1 114 300 2.63 1697 400 100 1667 64.8 0.1 115 300 2.71 1716 400 100 1663 65.0 0.1 115 300 2.71 1724 632 132 1709 65.4 0.1 135 400 2.98 1724 911 411 1710 65.5 0.1 149 400 3.09 1730 1197 697 1711 65.5 0.1 149 400 3.23 1722 1543 1043 1712 65.6 0.0 175 500 3.45 1722 2111 1611 1706 65.6 0.0 179 500 3.67 1728 2668 2365 1703 65.5 <td>1.52</td> <td>1645</td> <td>630</td> <td>100</td> <td>1640</td> <td>55.4</td> <td>0.0</td> <td>53</td> <td>100</td>	1.52	1645	630	100	1640	55.4	0.0	53	100
	1.63	1633	590	100	1628	55.8	0.1	59	100
1.851660400100161459.90.0712002.081586400100157860.40.0852002.191554400100157860.50.0922002.441638400100162563.10.11073002.631697400100166764.80.11143002.631697400100166764.80.11153002.711716400100170465.30.11153002.871724632132170965.40.11354002.981724911411171065.50.01424003.23172915431043171265.60.11574003.34172218321332170965.60.01655003.45172221111611170665.60.01725003.67172828682188171465.70.01865003.90172128652365170365.50.12086004.11171628692359169965.50.12086004.22172028662366170965.50.12086004.31171428572357169965.50.1<	1.74	1670	455	100	1660	57.7	0.0	65	200
1.951.62.64001001.61.960.30.0782002.191554400100157860.40.0852002.311586400100157661.00.0992002.441638400100162563.10.11073002.551684400100166764.80.11143002.671724632132170965.40.11354002.871724632132170965.40.11354002.981724911411171065.50.11424003.23172915431043171265.60.11574003.43172218321332170965.60.01795003.55173023981089171465.70.01865003.767172826682165170365.50.12086004.00171628592359169965.60.12086004.11171228652365170365.50.12166003.90172128652365170365.50.12277004.33171428572357169965.50.12377004.33171428572357169965.5<	1.85	1660	400	100	1654	59.9	0.0	71	200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.90 2.00	1595	400	100	1579	60.3	0.0	70 95	200
2.31 1586 400 100 1675 61.5 61.6 0.0 99 200 2.44 1638 400 100 1625 63.1 0.1 107 300 2.55 1684 400 100 1667 64.8 0.1 114 300 2.63 1697 400 100 1704 65.3 0.1 115 300 2.71 1716 400 100 1704 65.3 0.1 115 300 2.87 1724 632 132 1709 65.4 0.1 135 400 3.09 1730 1197 697 1711 65.5 0.1 149 400 3.23 1729 1543 1043 1712 65.6 0.1 157 400 3.45 1722 2111 1611 1706 65.6 0.0 172 500 3.45 1722 2111 1611 1706 65.6 0.0 179 500 3.67 1728 2688 2366 1709 65.6 0.0 194 600 3.90 1721 2865 2366 1703 65.5 0.1 208 600 4.11 1716 2860 2360 1697 65.5 0.1 208 600 4.22 1720 2866 2366 1699 65.5 0.1 208 600 4.11 1716 2857 2357 <td>2.00</td> <td>1554</td> <td>400</td> <td>100</td> <td>1543</td> <td>60.5</td> <td>0.0</td> <td>92</td> <td>200</td>	2.00	1554	400	100	1543	60.5	0.0	92	200
2.441638400100162563.10.11073002.551684400100166764.60.11143002.631697400100168365.00.11153002.711716400100170465.30.11153002.871724632132170965.40.11354002.981724911411171065.50.11494003.23172915431043171265.60.11574003.43172218321332170965.60.01725003.45172221111611170665.60.01725003.56173023981898171465.70.01865003.78172228662366170965.60.01946003.90172128652365170365.50.12086004.00171628592359169965.50.12227004.33171420572357169965.50.12377004.55171228582358169365.50.12377004.55171228582358169365.50.12377004.33171428572357169665.5 <td>2.31</td> <td>1586</td> <td>400</td> <td>100</td> <td>1576</td> <td>61.0</td> <td>0.0</td> <td></td> <td>200</td>	2.31	1586	400	100	1576	61.0	0.0		200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.44	1638	400	100	1625	63.1	0.1	107	300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.55	1684	400	100	1667	64.8	0.1	114	300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.63	1697	400	100	1683	65.0	0.1	115	300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.71	1716	400	100	1704	65.3	0.1	115	300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.87	1724	632	132	1709	65.4	0.1	135	400
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	2.98	1724	911	411	1710	65.5	0.0	142	400
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.09	1720	1197	1047	1/11	55.5 65.6	0.1	149	400
3.45 1722 2111 1611 1706 65.6 0.0 172 500 3.56 1730 2398 1898 1714 65.6 0.0 179 500 3.67 1728 2688 2188 1714 65.7 0.0 186 500 3.78 1722 2866 2366 1709 65.6 0.0 194 600 3.90 1721 2865 2365 1703 65.5 0.0 201 600 4.00 1716 2859 2359 1699 65.6 0.1 208 600 4.11 1716 2860 2360 1697 65.5 0.1 208 600 4.22 1720 2866 2366 1699 65.7 0.0 230 700 4.33 1714 2857 2357 1699 65.7 0.0 230 700 4.44 1710 2857 2357 1696 65.5 0.1 237 700 4.55 1712 2857 2357 1696 65.5 0.1 237 700 4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 228 900 5.22 1701 2847 2347 1690 65.6 </td <td>3.34</td> <td>1728</td> <td>1832</td> <td>1332</td> <td>1709</td> <td>65.6</td> <td>0.0</td> <td>165</td> <td>500</td>	3.34	1728	1832	1332	1709	65.6	0.0	165	500
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.45	1722	2111	1611	1706	65.6	0.0	172	500
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.56	1730	2398	1898	1714	65.8	0.0	179	500
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.67	1728	2688	2188	1714	65.7	0.0	186	500
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	3.78	1722	2866	2366	1709	65.6	0.0	194	600
4.00 1716 2859 2359 1699 65.6 0.1 208 600 4.11 1716 2860 2360 1697 65.5 0.1 216 600 4.22 1720 2866 2366 1699 65.5 0.1 212 700 4.33 1714 2857 2357 1699 65.7 0.0 230 700 4.44 1710 2855 2355 1698 65.5 0.1 237 700 4.55 1712 2857 2357 1696 65.5 0.0 244 700 4.66 1712 2858 2358 1693 65.4 0.0 251 600 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 265 800 4.88 1709 2856 2356 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.1 294 900 5.33 1702 2848 2348 1689 65.6 0.0 308 1000 5.44 1702 2847 2347 1690 65.6 0.0 315 1000 5.65 1700 2845 2345 1684 65.6 </td <td>3.90</td> <td>1721</td> <td>2865</td> <td>2365</td> <td>1703</td> <td>65.5</td> <td>0.0</td> <td>201</td> <td>600</td>	3.90	1721	2865	2365	1703	65.5	0.0	201	600
4.11 1710 2866 2360 1697 65.5 0.11 210 000 4.33 1714 2857 2357 1699 65.5 0.1 222 700 4.44 1710 2855 2357 1699 65.5 0.1 230 700 4.44 1710 2855 2355 1690 65.5 0.1 237 700 4.44 1710 2857 2357 1696 65.5 0.0 244 700 4.55 1712 2857 2357 1696 65.5 0.0 244 700 4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.80 1709 2856 2356 1690 65.5 0.1 265 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2847 2347 1690 65.5 0.1 294 900 5.33 1702 2848 2348 1689 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 315 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.65 1699 2844 2344 <	4.00	1716	2859	2359	1699	65 5	0.1	208	600
4.33 1714 2857 2357 1699 65.7 0.0 230 700 4.44 1710 2855 2355 1698 65.5 0.1 237 700 4.55 1712 2857 2357 1696 65.5 0.0 244 700 4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 265 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.1 294 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 <	4.22	1720	2866	2366	1699	65.5	0.1	222	700
4.44 1710 2855 2355 1698 65.5 0.1 237 700 4.55 1712 2857 2357 1696 65.5 0.0 244 700 4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 265 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 <	4.33	1714	2857	2357	1699	65.7	0.0	230	700
4.55 1712 2857 2357 1696 65.5 0.0 244 700 4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 258 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	4.44	1710	2855	2355	1698	65.5	0.1	237	700
4.66 1712 2858 2358 1693 65.4 0.0 251 800 4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 265 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	4.55	1712	2857	2357	1696	65.5	0.0	244	700
4.77 1711 2857 2357 1693 65.5 0.1 258 800 4.88 1709 2856 2356 1690 65.5 0.1 265 800 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.33 1702 2848 2348 1690 65.6 0.0 301 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	4.66	1712	2858	2358	1693	65.4	0.0	251	800
4.88 1709 2856 2356 1690 65.5 0.1 285 300 4.99 1708 2854 2354 1690 65.6 0.1 272 800 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1690 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.6 0.1 324 1000	4.77	1711	2857	2357	1693	65.5	0.1	258	800
4.99 1708 2854 2354 1690 05.6 0.11 272 000 5.11 1702 2849 2349 1690 65.6 0.1 280 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.6 0.1 324 1000	4.88	1709	2855	2355	1690	60.0 65.6	0.1	200	800 800
5.11 1702 2849 2349 1690 65.5 0.0 287 900 5.22 1701 2847 2347 1690 65.5 0.0 287 900 5.33 1702 2848 2348 1690 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	4.99	1700	2004	2304	1690	65.6	0.1	280	900
5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.33 1702 2848 2348 1689 65.5 0.1 294 900 5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.0 322 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	5 22	1702	2049	2349	1690	65.5	0.0	287	900
5.44 1703 2848 2348 1690 65.6 0.0 301 900 5.54 1702 2847 2347 1690 65.6 0.0 308 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.0 322 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	5.33	1702	2848	2348	1689	65.5	0.1	294	900
5.54170228472347169065.60.030810005.65170028452345168465.60.031510005.76169928442344168665.50.032210005.85169928452345168465.50.132410005.85169928452345168465.50.13241000	5.44	1703	2848	2348	1690	65.6	0.0	301	900
5.65 1700 2845 2345 1684 65.6 0.0 315 1000 5.76 1699 2844 2344 1686 65.5 0.0 322 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	5.54	1702	2847	2347	1690	65.6	0.0	308	1000
5.76 1699 2844 2344 1686 65.5 0.0 322 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000 5.85 1699 2845 2345 1684 65.5 0.1 324 1000	5.65	1700	2845	2345	1684	65.6	0.0	315	1000
5.85 1699 2845 2345 1684 65.5 0.1 324 1000 	5.76	1699	2844	2344	1686	65.5	0.0	322	1000
	5.85	1699	2845	2345	1684	05.D 65 6	0.1	324 391	1000

THE WESTERN COMPANY OF (\cdot, \cdot) The America - Real time t'_{i+1} (itoring system giant refinery bloomfield wd #1 mesa verde formation slick water 3-1-96

	ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
	6.09	1700	2845	2345	1690	65.6	0.1	344	1100
	6.20	1698	2844	2344	1686	65.6	0.1	351	1100
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6.32	1701	2847	2347	1690	65.6	0.0	358	1100
	6.42	1702	2848	2348	1690	65.5	0.0	365	1200
	6.53	1702	2848	2348	1690	65.6	0.1	372	1200
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6.64	1705	2851	2351	1690	65.6	0.1	379	1200
	6.75	1702	2849	2349	1690	65.5	0.0	387	1200
	6.86	1702	2848	2348	1688	65.5	0.0	394	1300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	6.97	1701	2848	2348	1690	65.5	0.1	401	1300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.08	1706	2854	2354	1690	65.4	0.1	408	1300
7.41 1710 2851 2351 1690 65.4 0.0 422 1400 7.52 1709 2854 2354 1691 65.5 0.0 437 1400 7.63 1711 2857 2357 1696 65.4 0.1 451 1500 7.75 1710 2857 2357 1696 65.4 0.1 451 1500 7.87 1710 2857 2357 1697 65.4 0.1 459 1500 8.10 1712 2859 2359 1700 65.4 0.1 474 1600 8.22 1716 2862 2362 1700 65.4 0.0 489 1600 8.44 1712 2859 2359 1700 65.4 0.0 489 1600 8.55 1717 2867 2367 1700 65.4 0.0 496 1600 8.55 1717 2867 2367 1700 65.4 0.1 503 1700 8.77 1708 2862 2362 1693 65.3 0.5 517 1900 8.77 1708 2857 2357 1689 65.4 0.4 531 2100 9.09 1690 2853 2353 1675 65.4 0.5 545 2400 9.31 1679 2849 2349 1662 65.4 0.5 545 2400 9.31 1679 2849 2345 1655	7.20	1704	2851	2351	1690	65.5	0.0	415	1300
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1.31	1705	2851	2351	1690	65.4	0.0	422	1400
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.41	1710	2855	2355	1692	65.5	0.0	429	1400
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.52	1711	2054	2354	1691	03.5	0.0	431	. 1400
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	7.03	1710	2007	2307	1690 1606	65 /	0.1	444	1400
7.98171228592359170065.40.046615008.10171328602360170065.40.147416008.22171628622362170065.50.048116008.33171428612361170065.40.048916008.44171228592359170065.40.048916008.55171728672367170065.40.150317008.65171728672367170065.40.251017008.77170828622359168965.30.452420008.98169728572357168165.40.453121009.20168228492349166265.40.554524009.31167928492349166265.40.555226009.42167128452345165565.40.555928009.64165628382335163565.40.559536009.75165028432335163565.40.559536009.86165428312331162765.40.559536009.75165028432335163565.40.559536009.75165028432335 </td <td>7.87</td> <td>1710</td> <td>2050</td> <td>2350</td> <td>1697</td> <td>65 /</td> <td>0.1</td> <td>44 D L 45 G</td> <td>1500</td>	7.87	1710	2050	2350	1697	65 /	0.1	44 D L 45 G	1500
1.100 1.713 2.860 2.360 1.700 65.4 0.1 4.74 1600 8.22 1.714 2.862 2.362 1.700 65.5 0.0 4.81 1.600 8.33 1.714 2.861 2.361 1.700 65.4 0.0 4.89 1.600 8.44 1.712 2.859 2.359 1.700 65.4 0.0 4.96 1.600 8.65 1.717 2.867 2.367 1.700 65.4 0.1 503 1.700 8.65 1.717 2.867 2.367 1.700 65.4 0.1 503 1.700 8.67 1.701 2.859 2.359 1.689 65.3 0.4 524 2000 8.98 1.697 2.857 2.357 1.681 65.4 0.5 538 2300 9.09 1.690 2.853 2.353 1.675 65.4 0.5 545 2400 9.31 1.679 2.849 2.349 1.662 65.4 0.5 559 2800 9.33 1.665 2.843 2.345 1.655 65.4 0.5 559 2800 9.53 1.665 2.843 2.343 1.649 65.4 0.5 581 3200 9.97 1.650 2.832 2.335 1.635 65.4 0.5 581 3200 9.97 1.650 2.832 2.335 1.635 65.4 0.5 595 <td< td=""><td>7.98</td><td>1712</td><td>2859</td><td>2359</td><td>1700</td><td>65.4</td><td>0.0</td><td>455</td><td>1500</td></td<>	7.98	1712	2859	2359	1700	65.4	0.0	455	1500
8.25 1716 2862 2362 1700 65.5 0.0 481 1600 8.33 1714 2861 2361 1700 65.4 0.0 489 1600 8.44 1712 2859 2359 1700 65.4 0.0 489 1600 8.55 1717 2865 2365 1700 65.4 0.1 503 1700 8.65 1717 2867 2367 1700 65.4 0.2 510 1700 8.77 1708 2862 2362 169 65.3 0.4 524 2000 8.98 1697 2857 2357 1681 65.4 0.5 538 2300 9.09 1690 2853 2353 1675 65.4 0.5 545 2400 9.42 1682 2849 2349 1662 65.4 0.5 559 2800 9.42 1671 2845 2345 1655 65.4 0.5 559 2800 9.53 1665 2843 2331 1649 65.4 0.5 581 3200 9.75 1650 2824 2324 1620 65.4 0.5 581 3200 9.97 1636 2824 2324 1620 65.4 0.5 581 3200 9.97 1636 2824 2324 1620 65.4 0.5 613 3700 10.09 1631 2819	8.10	1713	2860	2360	1700	65.4	0.1	400 A7A	1600
8.33 1714 2861 2361 1700 65.4 0.0 489 1600 8.44 1712 2859 2359 1700 65.4 0.0 496 1600 8.55 1717 2865 2365 1700 65.4 0.1 503 1700 8.65 1717 2867 2367 1700 65.4 0.2 510 1700 8.77 1708 2862 2362 1693 65.3 0.4 524 2000 8.87 1701 2859 2359 1689 65.3 0.4 521 2100 9.99 1690 2853 2353 1675 65.4 0.5 538 2300 9.20 1682 2849 2349 1666 65.4 0.5 552 2600 9.42 1671 2845 2345 1655 65.4 0.5 556 2900 9.53 1655 2843 2343 1649 65.4 0.5 566 2900 9.64 1656 2838 2335 1635 65.4 0.5 581 3200 9.97 1636 2824 2349 1617 65.4 0.5 595 3600 10.20 1631 2819 2319 1617 65.4 0.5 611 3900 10.20 1630 2819 2319 1617 65.4 0.5 617 4000 10.21 1630 2819 </td <td>8.22</td> <td>1716</td> <td>2862</td> <td>2362</td> <td>1700</td> <td>65.5</td> <td>0.0</td> <td>481</td> <td>1600</td>	8.22	1716	2862	2362	1700	65.5	0.0	481	1600
8.44 1712 2859 2359 1700 65.4 0.0 496 1600 8.55 1717 2865 2365 1700 65.4 0.1 503 1700 8.65 1717 2867 2367 1700 65.4 0.2 510 1700 8.77 1701 2859 2359 1689 65.3 0.5 517 1900 8.98 1697 2857 2357 1681 65.4 0.4 531 2100 9.09 1690 2853 2353 1675 65.4 0.5 538 2300 9.20 1682 2849 2349 1662 65.4 0.5 5552 2600 9.31 1679 2849 2349 1662 65.4 0.5 5559 2800 9.42 1671 2843 2343 1649 65.4 0.5 566 2900 9.44 1656 2838 2338 1640 65.4 0.5 581 3200 9.75 1650 2835 2335 1635 65.4 0.5 588 3400 9.75 1650 2832 2331 1627 65.4 0.5 588 3400 9.75 1636 2842 2324 1620 65.4 0.5 610 3900 10.09 1631 2819 2319 1617 65.4 0.5 610 3900 10.20 1630 2819 <	8.33	1714	2861	2361	1700	65.4	0.0	489	1600
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.44	1712	2859	2359	1700	65.4	. 0.0	496	1600
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.55	1717	2865	2365	1700	65.4	0.1	503	1700
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.65	1717	2867	2367	1700	65.4	0.2	510	1700
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.77	1708	2862	2362	1693	65.3	0.5	517	1900
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.87	1701	2859	2359	1689	65.3	0.4	524	2000
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	8.98	1697	2857	2357	1681	65.4	0.4	531	2100
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	9.09	1690	2000	2223	1660	65.4 65.4	0.5	530	2300
9.42167128452345165265.40.555928009.53166528432343164965.40.555629009.64165628382338164065.40.557331009.75165028352335163565.40.558132009.86164428312331162765.40.559834009.97163628242324162065.40.5595360010.09163128192319161765.40.5613370010.20163028192319161465.40.5617400010.42163028192319161765.40.5631430010.53163028192319161165.40.5639450010.65162528142314160965.40.5639450010.76162328122312160965.40.5653480010.87162228112311160565.40.5653480010.98162028082309160365.40.5674530011.31162028102310160265.40.5681540011.31162028102303160165.40.5696580011.5316142803 <td>9.31</td> <td>1679</td> <td>2849</td> <td>2345</td> <td>1662</td> <td>65.4</td> <td>0.5</td> <td>552</td> <td>2400</td>	9.31	1679	2849	2345	1662	65.4	0.5	552	2400
9.53166528432343164965.40.556629009.64165628382338164065.40.557331009.75165028352335163565.40.558132009.86164428312331162765.40.559834009.97163628242324162065.40.5595360010.09163128192319161765.40.5610390010.20163028192319161465.40.5611390010.31162928182318161765.40.5631430010.42163028192319161165.40.5631430010.53163028192319161165.40.5639450010.65162528142314160965.40.5639450010.76162328122312160965.40.5653480010.98162028082308160865.50.5660500011.99162028092309160365.40.5681540011.41161728072307160065.40.5696580011.53161428032303160165.40.5696580011.5116182808 <td>9.42</td> <td>1671</td> <td>2845</td> <td>2345</td> <td>1655</td> <td>65.4</td> <td>0.5</td> <td>559</td> <td>2800</td>	9.42	1671	2845	2345	1655	65.4	0.5	559	2800
9.64165628382338164065.40.557331009.75165028352335163565.40.558132009.86164428312331162765.40.559834009.97163628242324162065.40.5595360010.09163128192319161765.40.5603370010.20163028192319161465.40.5610390010.31162928182319161765.40.5617400010.42163028192319161765.40.5631430010.65162528142314160965.40.5631430010.65162528142314160965.40.5639450010.76162328122312160965.40.5653480010.98162028082308160865.50.5660500011.09162228122312160765.40.5681540011.20162028092309160365.40.5681540011.31162028102310160265.40.5681540011.41161728072307160065.40.5681540011.5316142808 </td <td>9.53</td> <td>1665</td> <td>2843</td> <td>2343</td> <td>1649</td> <td>65.4</td> <td>0.5</td> <td>566</td> <td>2900</td>	9.53	1665	2843	2343	1649	65.4	0.5	566	2900
9.75 1650 2835 2335 1635 65.4 0.5 581 3200 9.86 1644 2831 2331 1627 65.4 0.5 598 3400 9.97 1636 2824 2324 1620 65.4 0.5 595 3600 10.09 1631 2819 2319 1617 65.4 0.5 603 3700 10.20 1630 2819 2319 1617 65.4 0.5 610 3900 10.31 1629 2818 2318 1614 65.4 0.5 617 4000 10.42 1630 2819 2319 1617 65.4 0.5 631 4300 10.53 1630 2819 2319 1611 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 631 4300 10.65 1622 2811 2311 1605 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1603 65.4 0.5 674 5300 11.20 1620 2809 2309 1603 65.4 0.5 681 5400 11.31 1620 2807 2307 1600 65.4 0.5 681 5400 11.41 1617 2803	9.64	1656	2838	2338	1640	65.4	0.5	573	3100
9.86164428312331162765.40.559834009.97163628242324162065.40.5595360010.09163128192319161765.40.5603370010.20163028192319161465.40.5610390010.31162928182318161465.40.5617400010.42163028192319161765.40.5631430010.53163028192319161165.40.5631430010.65162528142314160965.40.5639450010.76162328122312160965.40.5653480010.87162228112311160565.40.5653480010.98162028082308160865.50.5660500011.09162228122312160765.40.5681540011.31162028092309160365.40.5681540011.41161728072307160065.40.5681540011.41161728032303160165.40.5696580011.53161428032303160165.40.5717630011.6516182803	9.75	1650	2835	2335	1635	65.4	0.5	581	3200
9.971636 2824 2324 162065.40.5595360010.091631 2819 2319 161765.40.5603370010.201630 2819 2319 161465.40.5610390010.311629 2818 2318 161465.40.5617400010.421630 2819 2319 161765.40.5624420010.531630 2819 2319 161765.40.5631430010.651625 2814 2314 160965.40.5639450010.651625 2814 2311 160965.40.5646470010.671623 2812 2312 160965.40.5653480010.98162028082308160865.50.5660500011.09162228122312160765.40.6667510011.20162028092309160365.40.5681540011.31162028102310160265.40.5696580011.41161728072307160065.40.5696580011.41161428032303160165.50.5710610011.41161828082308160265.40.67036000 <t< td=""><td>9.86</td><td>1644</td><td>2831</td><td>2331</td><td>1627</td><td>65.4</td><td>0.5</td><td>588</td><td>3400</td></t<>	9.86	1644	2831	2331	1627	65.4	0.5	588	3400
10.09 1631 2819 2319 1617 65.4 0.5 603 3700 10.20 1630 2819 2319 1614 65.4 0.5 610 3900 10.31 1629 2818 2318 1614 65.4 0.5 617 4000 10.42 1630 2819 2319 1617 65.4 0.5 624 4200 10.53 1630 2819 2319 1617 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 631 4300 10.65 1625 2814 2312 1609 65.4 0.5 639 4500 10.76 1623 2812 2312 1609 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1608 65.5 0.5 660 5000 11.09 1622 2812 2312 1607 65.4 0.5 681 5400 11.20 1620 2809 2309 1603 65.4 0.5 681 5400 11.41 1617 2807 2307 1600 65.4 0.5 681 5400 11.41 1617 2803 2303 1601 65.4 0.5 696 5800 11.53 1614	9.97	1636	2824	2324	1620	65.4	0.5	595	3600
10.20 1630 2819 2319 1614 65.4 0.5 610 3900 10.31 1629 2818 2318 1614 65.4 0.5 617 4000 10.42 1630 2819 2319 1617 65.4 0.5 624 4200 10.53 1630 2819 2319 1611 65.4 0.5 624 4200 10.53 1630 2819 2319 1611 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 639 4500 10.76 1623 2812 2312 1609 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1608 65.5 0.5 660 5000 11.09 1622 2812 2312 1607 65.4 0.6 667 5100 11.20 1620 2809 2309 1603 65.4 0.5 681 5400 11.31 1620 2810 2310 1602 65.4 0.5 688 5600 11.41 1617 2807 2307 1600 65.4 0.5 696 5800 11.53 1614 2803 2303 1601 65.5 0.5 710 6100 11.75 1613	10.09	1631	2819	2319	1617	65.4	0.5	603	3700
10.31 1629 2818 2318 1614 65.4 0.5 617 4000 10.42 1630 2819 2319 1617 65.4 0.5 624 4200 10.53 1630 2819 2319 1611 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 639 4500 10.76 1623 2812 2312 1609 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1608 65.5 0.5 660 5000 11.09 1622 2812 2312 1607 65.4 0.6 667 5100 11.20 1620 2809 2309 1603 65.4 0.5 681 5400 11.31 1620 2810 2310 1602 65.4 0.5 681 5400 11.41 1617 2807 2307 1600 65.4 0.5 688 5600 11.53 1614 2803 2303 1601 65.4 0.5 696 5800 11.65 1618 2808 2308 1602 65.4 0.6 703 6000 11.75 1613 2803 2303 1601 65.5 0.5 717 6300 11.86 1609	10.20	1630	2819	2319	1614	65.4	0.5	610	3900
10.53 1630 2819 2319 1617 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 631 4300 10.65 1625 2814 2314 1609 65.4 0.5 639 4500 10.76 1623 2812 2312 1609 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1608 65.5 0.5 660 5000 11.09 1622 2812 2312 1607 65.4 0.6 667 5100 11.20 1620 2809 2309 1603 65.4 0.5 681 5400 11.31 1620 2810 2310 1602 65.4 0.5 681 5400 11.41 1617 2807 2307 1600 65.4 0.5 688 5600 11.53 1614 2803 2303 1601 65.4 0.5 696 5800 11.65 1618 2808 2308 1602 65.4 0.6 703 6000 11.75 1613 2803 2303 1601 65.5 0.5 710 6100 11.86 1609 2800 2300 1597 65.4 0.5 717 6300 11.61 161 <	10.31	1630	2810	2310	1617	00.4 65 A	0.5	61/	4000
10.65162528142314160965.40.5639450010.76162328122312160965.40.5646470010.87162228112311160565.40.5653480010.98162028082308160865.50.5560500011.09162228122312160765.40.6667510011.20162028092309160365.40.5681540011.31162028102310160265.40.5681540011.31162028102310160265.40.5681540011.41161728072307160065.40.5696580011.53161428032303160165.40.5696580011.65161828082308160265.40.6703600011.75161328032303160165.50.5710610011.86160928002300159765.40.5717630011.65161928002300159765.40.57176300	10.53	1630	2819	2319	1611	65.4	0.5	631	4300
10.76 1623 2812 2312 1609 65.4 0.5 646 4700 10.87 1622 2811 2311 1605 65.4 0.5 653 4800 10.98 1620 2808 2308 1608 65.5 0.5 660 5000 11.09 1622 2812 2312 1607 65.4 0.6 667 5100 11.20 1620 2809 2309 1603 65.4 0.6 667 5100 11.31 1620 2810 2310 1602 65.4 0.5 681 5400 11.31 1620 2810 2310 1602 65.4 0.5 681 5400 11.41 1617 2807 2307 1600 65.4 0.5 696 5800 11.53 1614 2803 2303 1601 65.4 0.5 696 5800 11.65 1618 2808 2308 1602 65.4 0.6 703 6000 11.75 1613 2803 2303 1601 65.5 0.5 710 6100 11.86 1609 2800 2300 1597 65.4 0.6 725 6500	10.65	1625	2814	2314	1609	65.4	0.5	639	4500
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	10.76	1623	2812	2312	1609	65.4	0.5	646	4700
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10.87	1622	2811	2311	1605	65.4	0.5	653	4800
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	10.98	1620	2808	2308	1608	65.5	0.5	660	5000
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11.09	1622	2812	2312	1607	65.4	0.6	667	5100
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	11.20	1620	2809	2309	1603	65.4	0.5	674	5300
11.41 1617 2807 2307 1600 65.4 0.5 688 5600 11.53 1614 2803 2303 1601 65.4 0.5 696 5800 11.65 1618 2808 2308 1602 65.4 0.6 703 6000 11.75 1613 2803 2303 1601 65.5 0.5 710 6100 11.86 1609 2800 2300 1597 65.4 0.6 725 6500	11.31	1620	2810	2310	1602	65.4	0.5	681	5400
11.53161428032303160165.4 0.5 696580011.65161828082308160265.4 0.6 703600011.75161328032303160165.5 0.5 710610011.86160928002300159765.4 0.5 717630011.611601159865.4 0.6 7256500	11.41	1617	2807	2307	1600	65.4	0.5	688	5600
11.05 1618 2808 2308 1602 65.4 0.6 703 6000 11.75 1613 2803 2303 1601 65.5 0.5 710 6100 11.86 1609 2800 2300 1597 65.4 0.5 717 6300 11.86 1609 2800 2300 1597 65.4 0.6 725 6500	11 66	1014	2803	2303	1601	00.4 CE A	0.5	696	5800
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	11 75	1613	2000	2308 2303	1601	00.4 65 5	0.0	703	6000
11.60 1009 2000 2000 1097 00.6 725 6500 11.61 (P)	11 96	1600	2003	2303	1607	GE A	0.0 A A	717	6100
	5.1 G -		> 1	101	1598	65.4	0.6	725	6500

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
111 J. I I +	bar.	bar.	bar.	har.	م الما لية قسط	in/dar	vorume	Proppane
12.08	1609	2801	2301	1597	65.5	0.6	732	6600
12.19	1609	2801	2301	1593	65.5	0.5	739	6800
12.30	1610	2802	2302	1592	65.4	0.5	746	7000
12.41	1604	2795	2295	1591	65.5	0.5	753	7100
12.54	1603	2793	2293	1589	65.6	0.5	761	7300
12.64	1599	2789	2289	1582	65.6	0.5	768.	7500
12.76	1599	2789	2289	1581	65.6	0.5	775	7600
12.86	1597	2786	2286	1581	65.6	0.5	782	7800
12.97	1600	2789	2289	1581	65.5	0.5	790	8000
13.08	1600	2789	2289	1581	65.5	0.5	797	8100
13.19	1595	2784	2284	1581	65.5	0.6	804	8300
13.31	1592	2781	2281	1580	65.6	0.6	811	8500
13.44	1592	2780	2280	1579		0.5	818	8000
13.33	1289	2119	2279	1580	65.7	0.5	823	8000
13.04	1091	21/9	2279	1580	65.7	0.5	033	0100
13.70	1291	2119	2279	1580	65 6	0.5	040	9100
13.07	· 1590	4113	22/9	1579	65.7	0.5	047	9300
14 00	1203	2760	2260	1572	65 7	0.5	0000 862	9400
14.09	1502	2709	2209	1572	65.9	0.5	960	9000
14.13	1500	2101	2207	1570	65.0	0.5	009 976	10000
14 · JI	1580	2760	2200	1569	65 7	0.0	883	10100
14 52	1579	2767	2200	1569	65.7	0,0	890	10300
14 63	1578	2766	2266	1566	65.7	0.5	897	10500
14.74	1579	2768	2268	1567	65.7	0.6	904	10600
14.85	1580	2771	2271	1568	65.6	0.6	912	10800
14.97	1580	2771	2271	1569	65.7	0.7	919	11000
15.08	1579	2774	2274	1569	65.5	0.7	926	11200
15,19	1579	2774	2274	1567	65.6	0.7	933	11400
15.29	1577	2775	2275	1566	65.5	0.8	940	11700
15.41	1574	2775	2275	1566	65.5	0.8	947	11900
15.53	1573	2774	2274	1562	65.7	0.8	955	12200
15.63	1573	2776	2276	1561	65.7	0.8	962	12400
15.74	1571	2777	2277	1558	65.6	0.8	969	12600
15.85	1569	2778	2278	1559	65.6	0.8	977	12900
15.96	1566	2777	2277	1552	65.6	0.9	984	13100
16.07	1560	2774	2274	1549	65.5	0.9	. 991	13400
16.18	1560	2775	2275	1551	65.5	0.8	998	13700
16.27	1555	2772	2272	1546	65.5	0.9	1000	13700
16.40	1553	2771	2271	1543	65.5 65.6	0.9	1012	14200
10.51	1550	2768	2208	1540	60.0 65.7	0.9	1019	14700
16.02	1550	2700	2200	1540	65 6	0.9	1020	15000
10./3	1550	2770	2270	1540	65.6	1 0	1035	15300
10.04	1551	2114	2212	1540	65 7	10	1041	15500
17 06	1500	2113	2213	1540	65 5	1.0	1055	15800
17 17	1545	2771	2211	1535	65.5	1.0	1062	16100
17 29	1543	2770	2270	1535	65.5	0.9	1069	16400
17 28	1545	2777	2071	1533	65.6	0.9	1076	16700
17 10	- 1.5 <i>11</i>	2770	2271	1575	65.6	0.9	1083	16900
17 60	1547	2771	2271	1539	65.6	0.9	1090	17200
17.71	1546	2777	2070	1536	65.6	0.9	1097	17500
17.82	1545	2772	2070	1519.	65.7	1.0	1104	17800
17.93	1541	2770	2270	1533	65.5	1.0	1111	18100

THE WESTERN COMPANY OF LORTH AMERICA - REAL TIME MONITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P	PRESS 2	SLR RATE	PROP	Cumm Volume	Cumm Proppant
	In the set of	From .	P	2		<i>,</i> 902	4 100 an 100 an 11	T T O P Putto
18.04	1540	2767	2267	1532	65.7	1.0	1118	18400
18.15	1541	2769	2269	1532	65.6	1.0	1126	18700
18.26	1540	2769	2269	1531	65.5	1.0	1133	19000
18.37	1540	2769	2269	1530	65.5	1.0	1140	19200
18.48	1540	2769	2269	1530	65.6	0.9	1147	19500
18.58	1539	2768	2268	1532	65.6	1.0	1154	19800
18.69	1539	2768	2268	1530	65.7	1.0	1161	20100
18.80	1540	2771	2271	1530	65.5	1.0	1168	20400
18.91	1535	2766	2266	1528	65.6	1.0	1175	20700
19.03	1535	2766	2266	1527	65.6	1.0	1183	21000
19.16	1534	2765	2265	1525	65.7	1.0	1191	21300
19.27	1536	2768	2268	1526	65.5	1.0	1198	21600
19.38	1537	2769	2269	1527	65.5	1.0	1205	21900
19.49	1536	2768	2268	1525	65.5	1.0	1212	22200
19.60	1534	2766	2266	1524	65.6	1.0	1219	22500
19.70	1535	2766	2266	1526	65.6	1.0	1227	22800
19.81	1535	2767	2267	1525	65.6	1.0	1234	23100
19.93	1537	2769	2269	1527	65.6	1.0	1241	23400
20.04	1536	2766	2266	1529	65.7	1.0	1248	23700
20.15	1535	2766	2266	1525	65.7	1.0	1255	23900
20.26	1536	2767	2267	1527	65.7	1.0	1262	24200
20.37	1537	2768	2268	1527	65.6	1.0	1270	24500
20.48	1539	2770	2270	1530	65.6	1.0	1277	24800
20.39	1038	2769	2269	1528	65.6	0.9	1284	25100
20.70	1030	2101	2267	1528	00.0 65.0	1.0	1292	25400
20.02	1000	2/00	2200	1520	00.0	1.0	1299	25700
20.94	1630	2103	2203	1527	00.0	1.0	1307	26000
21.07	1530	2700	2200	1525	65.7 65.7	1.0	1322	20400
21.10	1520	2700	2200	1522	65 6	1.0	1330	26000
21 40	1520	2760	2200	1520	65 6	1 0	1337	27200
21.52	1530	2762	2200	1520	65 5	1.0	1344	27500
21.63	1529	2760	2260	1522	65.6	1.0	1351	27800
21.74	1532	2763	2263	1526	65.6	1.0	1359	28100
21.85	1533	2764	2264	1525	65.6	1.0	1366	28400
21.93	1533	2764	2264	1524	65.7	1.0	1368	28500
22.06	1535	2767	2267	1526	65.6	1.0	1380	29000
22.17	1536	2767	2267	1529	65.6	1.0	1387	29300
22.28	1538	2768	2268	1530	65.7	1.0	1394	29600
22.39	1536	2767	2267	1527	65.6	1.0	1401	29900
22.50	1540	2773	2273	1531	65.6	1.1	1408	30200
22.61	1540	2774	2274	1531	65.7	1.2	1415	30600
22.72	1541	2776	2276	1530	65.7	1.2	1422	30900
22.83	1540	2776	2276	1531	65.8	1.2	1430	31300
22.94	1535	2774	2274	1528	65.7	1.3	1437	31600
23.05	1538	2779	2279	1529	65.7	1.3	1444	32000
23.16	1533	2776	2276	1529	65.7	1.3	1451	32400
23.27	1530	2777	2277	1523	65.6	1.3	1458	32800
86.62	1527	2777	2277	1520	65.5	1.3	1465	33100
23.49	1525	2776	2276	1517	65.6	1.3	1472	33500
23.00	1519	2773	2273	1512	65.5	1.3	1480	33900
23.11	1520	2/13	2273	1211	00.7		1487	34300
23.02 33.01	7250	2//5	2215	1513	00.0	1.j	1600	34500
		<i>;</i>		15	0.7 - 0	1.3	T.2.0.5	72100

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
	£	*	*	*	**			
24.06	1519	2777	2277	1512	65.6	1.4	1509	35500
24.15	1.517	2775	2275	1510	65.7	1.4	1516	35900
24.27	1519	2778	2278	1510	65.6	1.4	1523	3.6300
24.38	1517	2778	2278	1510	65.6	1.4	1531	36700
24.49	1518	2781	2281	1511	65.6	1.6	1538	37100
24.60	1513	2777	2277	1509	65.6	1.5	1545	37600
24.71	1513	2779	2279	1506	65.6	1.4	1552	38000
24.82	1510	2776	2276	1503	65.6	1.4	1559	38400
24.94	1508	2775	2275	1503	65.6	1.4	1567	38800
25.05	1505	2773	2273	1500	65.6	1.5	1574	39200
25.16	1504	2775	2275	1498	65.5	1.5	1581	39700
25.27	1503	2774	2274	1500	65.5	1.5	1588	40100
25.38	1505	2777	2277	1498	65.5	1.5	1595	40500
25.49	1505	2777	2277	1500	65.6	1.5	1602	40900
25.60	1505	2777	2277	1499	65.6	1.5	1609	41400
25.72	1501	2772	2272	1498	65.6	1.4	1617	41800
25.85	1503	2775	2275	1496	65.5	1.5	1626	42300
25.96	1501	2773	2273	1498	65.6	1.5	1633	42700
26.05	1501	2774	2274	1497	65.6	1.5	1633	42700
26.13	1503	2777	2277	1496	65.5	1.5	1633	42700
26.22	1500	2773	2273	1497	65.6	1.5	1633	42700
26.31	1500	2773	2273	1496	65.6	1.5	1633	42700
26.40	1500	2773	2273	1493	65.6	1.5	1633	42700
26.52	1501	2774	2274	1496	65.6	1.5	1633	42700
26.61	1500	2774	2274	1497	65.6	1.5	1633	42700
26.91	1500	2775	2275	1493	65.5	1.5	1694	46400
27.01	1500	2774	2274	1491	65.6	1.5	1701	46800
27.12	1501	2775	2275	1495	65.6	1.5	1708	47300
27.24	1500	2775	2275	1.491	65.5	1.5	1716	47700
27.35	1497	2773	2273	1494	65.5	1.6	1723	48100
27.46	1500	2779	2279	1496	65.4	1.9	1730	48700
27.97	1500	2782	2282	1497	03.4	1.9	1/3/	49200
27.00	1497	2770	2201	1490	65 5	1.0	1751	49700
27.00	1494	2770	2210	1400	65 5	1.6	1759	50600
29.03	1490	2173	2213	1407	65 5	1.0	1766	51100
28.01	1/90	2779	2278	1404	65.6	1.8	1773	51600
28.24	1486	2779	2279	1481	65.5	1.8	1781	52200
28.35	1485	2780	2280	1478	65.5	1.9	1788	52700
28.46	1483	2782	2282	1478	65.5	1.9	1795	53200
28.57	1480	2780	2280	1476	65.5	1.9	1802	53800
28.68	1479	2778	2278	1475	65.7	1.9	1810	54300
28.79	1476	2777	2277	1470	65.5	1.9	1817	54900
28.90	1477	2779	2279	1471	65.6	1.9	1824	55400
29.01	1475	2779	2279	1472	65.5	1.8	1831	55900
29.12	1476	2782	2282	1471	65.5	1.9	1838	56400
29.23	1477	2784	2284	1469	65.6	2.0	1845	57000
29.34	1477	2786	2286	1472	65.5	2.0	1852	57500
29.46	1476	2786	2286	1471	65.5	2.0	1860	58200
29.57	1471	2781	2281	1470	65.6	2.0	1867	58700
29.68	1474	2786	2286	1470	65.5	2.0	1874	59300
29.79	1474	2786	2286	1471	65.5	2.0	1000	59900
29.90	1471	2782	2282	1466	05.0	7.9	100C T00A	60000
30.01	1464	2780	2280	1402	03.0	2.0	T020	00000

THE WESTERN COMPANY OF $\frac{1}{10}$ RTH AMERICA - REAL TIME M_{10} ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

'.

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
411.A. I I a	har.	har.	har.	har.	DDur.	.co/yax	VOLUME	rroppane
30 10	1 1 7 7 0	2702	2202	1469	6 5 5	2.0	1000	61500
20.22	1470	2703	2203	1400	65.3	2.0	1903	61000
30.23	1470	2702	2202	1400	00.7	2.0	1910	62000
30.34	1470	2704	2204	1400	05.0	2.0	1004	62000
30.40 30 SC	1471	2704	2284	1467	00.0	1.9	1924	63700
30.50	1470	2702	2282	1409	65.6	1.9	1931	63700
30.07	1470	2702	2202	1407	00.0	7.9	1930	64200
30.78	1470	2102	2202	1409	65.6	2.0	1053	65300
31 00	1470	2/04	2204	1471	05.0 65.6	2.0	1060	65300
31 11	1470	2701	2201	14/0	65.6	2.0	1067	66100
31.73	1476	2704	2204	1400	65.7	2.0	1075	67000
31 33	1471	2703	2203	1400	65 F	2.0	1002	67600
31 44	1470	2700	2200	14/0	65 7	2.0	1000	69100
31 56	14/0	2/02	2202	1407	05.7	2.0	1909	69700
31.50	1400	2701	2201	1404	65.6	2.0	1990	60200
31 70	1400	2701	2201	1402	65.7	2.0	2003	69200
31 89	1468	2700	2200	1460	65 5	2.0	2011	70400
32 01	1460	2705	2203	1400	65 5	2.0	2026	71000
32.12	1467	2781	2279	1455	65 6	2.0	2020	71600
32.23	1465	2780	2280	1460	65.5	2.0	2040	72100
32.35	1468	2783	2283	1460	65.6	2.0	2049	72700
32.46	1466	2781	2281	1459	65.5	2.0	2055	73300
32.57	1465	2780	2280	1459	65.5	2.0	2062	73800
32.68	1468	2782	2282	1462	65.6	2.0	2069	74400
32.81	1465	2780	2280	1460	65.6	2.0	2077	75000
32.92	1464	2779	2279	1459	65.6	2.0	2085	75600
33.03	1468	2783	2283	1463	65.5	2.0	2092	76100
33.14	1467	2782	2282	1462	65.5	2.0	2099	76700
33.25	1466	2780	2280	1460	65.7	2.0	2106	77300
33.36	1468	2783	2283	1461	65.6	2.0	2113	77800
33.47	1466	2780	2280	1459	65.6	2.0	2120	78400
33.58	1467	2782	2282	1459	65.6	2.0	2127	78900
33.69	1465	2780	2280	1457	65.6	2.0	2135	79500
33.80	1461	2776	2276	1456	65.6	2.0	2142	80000
33.91	1463	2778	2278	1457	65.6	2.0	2149	80600
34.02	1464	2/19	2279	1460	65.6 6F 6	2.0	2156	81200
24 22	1460	2/14	22/4	1407	65.0	2.0	2103	81700
34.23	1402	2110	22/0	1455	65 5	2.0	2170	82900
34 45	1462	2110	2210	1450	65.6	2.0	2194	83400
34 56	1460	2771	2277	1458	65.6	2.0	2104	83900
34.67	1462	2776	2276	1458	65.6	2.0	2198	84500
34.78	1463	2778	2270	1459	65.5	2.0	2206	85100
34.89	1462	2777	2277	1460	65.5	2.0	2213	85500
35.00	1465	2780	2280	1456	65.6	2.0	2220	86200
35.11	1459	2774	2274	1455	65.5	2.0	2227	86700
35.22	1460	2776	2276	1457	65.5	2.0	2234	87300
35.33	1459	2774	2274	1454	65.5	2.0	2241	87800
35.44	1460	2775	2275	1456	65.6	2.0	2248	88400
35.55	1460	2776	2276	1458	65.5	2.0	2255	89000
35.66	1458	2773	2273	1455	65.5	2.0	2262	89500
35.77	1459	2775	2275	1455	65.5	2.0	2269	90100
35.88	1460	2776	2276	1453	65.5	2.0	2277	90600
35.98	1.157	0776	2276	1455	65.5	2.0	2284	91200

THE WESTERN COMPANY OF DRTH AMERICA - REAL TIME (ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
111.1.11 •	har.	har.	par.	hor.	Dp.u.	TD/Gar	VOLUME	rroppane
		0000	0077	* 4 5 1*	CF A	2.0	0001	01700
36.10	1461	2///	2211	1455	65.4	2.0	2291	91700
36.20	1458	2//3	2273	1455	65.5	2.0	2298	92300
36.31	1459	2775	2275	1455	65.5	2.0	2305	92800
36.42	1459	2775	2275	1453	65.5	2.0	2312	93400
36.53	1460	2775	2275	1454	65.5	2.0	2319	94000
36.65	1459	2774	2274	1455	65.6	2.0	2327	94600
36.76	1460	2776	2276	1457	65.5	2.0	2334	95100
36.87	1458	2774	2274	1455	65.5	2.0	2341	95700
36,98	1459	2773	2273	1455	65.6	2.0	2348	96200
37.09	1458	2774	2274	1454	65.5	2.0	2355	96800
37.20	1458	2772	2272	1457	65.6	2.0	2362	97300
37.31	1458	2773	2273	1450	65.6	2.0	2370	97900
37.42	1460	2775	2275	1454	65.5	2.0	2377	98500
37.53	1459	2774	2274	1454	65.5	2.0	2384	99000
37.64	1459	2774	2274	1457	65.5	2.0	2391	99600
37.75	1463	2778	2278	1459	65.5	2.0	2398	100100
37.86	1461	2777	2277	1459	65.4	2.0	2405	100700
37.97	1461	2777	2277	1457	65.5	2.0	2412	101200
38.08	1463	2778	2278	. 1460	65.5	2.0	2419	101800
38.19	1467	2783	2283	1462	65.5	2.0	2426	102400
38.29	1462	2777	2277	1459	65.5	2.0	2433	102900
38.40	1462	2778	2278	1460	65.5	2.0	2441	103500
38.51	1460	2775	2275	1456	65.5	2.0	2448	104000
38.62	1457	2772	2272	1451	65.5	2.0	2455	104600
38.74	1455	2771	2271	1452	65.5	2.0	2463	105200
38.85	1455	2771	2271	1450	65.5	2.0	2470	105700
38.97	1451	2767	2267	1450	65.4	2.0	2477	106400
39.08	1450	2765	2265	1449	65.5	2.0	2485	1.06900
39.19	1449	2765	2265	1446	65.5	2.0	2492	107500
39.30	1449	2764	2264	1446	65.5	2.0	2499	108000
39.41	1452	2767	2267	1445	65.5	2.0	2506	108600
39.52	1450	2766	2266	1445	65.5	2.0	2513	109100
39.63	1450	2765	2265	1444	65.6	2.0	2520	109700
39.74	1445	2760	2260	1442	65.5	2.0	2521	110300
39.85	1442	2758	2258	1440	65.5	2.0	2534	110800
39.96	1448	2764	2264	1444	00.4 CF F	2.0	2041	111000
40.07	1449	2764	2264	1444	C - CO	2.0	2049	112500
40.18	1449	2765	2265	1440	00.0	2.0	2000	112000
40.29	1444	2759	. 2259	1440	00.0	2.0	2000	113600
40.40	1448	2765	2265	1441	65.5	2.1	2570	114200
40.51	1449	2700	2200	1444	65.5	2.0	2577	114200
40.63	1448	2763	2263	1442	65.6	2.0	2505	115/00
40.74	1452	2768	2200	1440	65 6	2.0	2552	116000
40.86	1451	2766	2200	1449	65.7	2.0	2607	116500
40.97	1451	2766	2200	144/	65 7	2.0	2611	117100
41.08	1404	2101	2201	1467 1760	65.7	2.0	2621	117600
41.19	1450	2770	2610	1400	65 7	2.0	2620	118200
41.31	1453	2/08	2200	1440	65 6	2.0	2025	118900
41.42	1451	2/0/	2201	1449	65.0	2.0	2030	110/00
41.54	1450	2/04	2204	1400	65.7	2.0	2044	120000
41.65	1451	2/66	2200	1440	65.0 65.0	2.0	2001 7680	120600
41.70	1450	2/64	2204	1449	0.00	2.0	2656	121100
41.87	1450	2/65	2200	1440 1440	65.0	2.0	2673	121700
41.98	199/	2/62	6202	1440	00.0	£	2013	J. K. J. / U.V.

THE WESTERN COMPANY OF . JRTH AMERICA - REAL TIME \mathbf{M}_{P} ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
42.09	1448	2763	2263	1447	65.5	2.0	2680	122200
42.20	1447	2761	2261	1444	65.6	2.0	2687	122800
42.31	1451	2767	2267	1449	65.5	2.0	2694	123400
42.42	1450	2764	2264	1444	65.7	2.0	2701	124000
42.53	1447	2762	2252	1443	65.6	2.0	2708	124500
42.64	1448	2763	2263	1.445	65.5	2.0	2716	125100
44.10	1449	2763	2263	1445	65.6	2.0	2723	125600
42.97	1440	2763	2263	1443	65 7	2.0	2/30	126200
43.08	1450	2763	2263	1448	65.7	2.0	2737	127300
43.19	1449	2763	2263	1440	65.7	2.0	2751	127900
43.30	1449	2763	2263	1441	65.6	2.0	2758	128400
43.41	1449	2763	2263	1444	65.7	2.0	2765	129000
43.52	1449	2763	2263	1444	65.6	2.0	2773	129600
43.63	1451	2765	2265	1446	65.7	2.0	2780	130100
43.74	1449	2764	2264	1443	65.6	2.0	2787	130700
43.05	1430	2704	2204	1443	05.7	2.0	2794	131200
44.07	1449	2765	2203	1445	65 7	2.0	2808	132400
44.18	1450	2764	2264	1446	65.7	2.0	2815	132900
44.29	1449	2764	2264	1446	65.6	2.0	2823	133500
44.40	1449	2764	2264	1441	65.6	2.0	2830	134100
44.51	1450	2765	2265	1448	65.6	2.0	2837	134600
44.62	1451	2766	2266	1452	65.6	2.0	2844	135200
44./J 11 91	1455	2770	2270	1452	65.6	2.0	2851	135700
44.04	1409	2113	2273	1457	65.6	2.0	2858	136300
45.07	1462	2777	2270	1455	65.6	2.0	2873	137500
45.18	1462	2777	2277	1459	65.5	2.0	2880	138000
45.29	1461	2777	2277	1461	65.5	2.0	2888	138600
45.40	1466	2782	2282	1463	65.5	2.0	2895	139200
45.52	1469	2784	2284	1466	65.5	2.0	2903	139800
45.63	1470	2785	2285	1468	65.6	2.0	2910	140400
45.75	1470	2/85	2285	1460	65.6 65.5	2.0	2917	140900
45,96	1470	2785	2285	1469	65.5	2.0	2924	142000
46.07	1470	2786	2286	1470	65.4	2.0	2939	142600
46.18	1470	2786	2286	1469	65.4	2.0	2946	143200
46.30	1470	2786	2286	1470	65.4	2.0	2953	143800
40.41	1469	2784	2284	1468	65.5	2.0	2961	144300
46.63	1471	2786	2280	1470	65 5	2.0	2900	145500
46.75	1470	2785	2200	1464	65.5	2.0	2983	146100
46.86	1470	2785	2285	1466	65.6	2.0	2990	146600
46.98	1470	2786	2286	1468	65.5	2.0	2998	147200
47.09	1468	2784	2284	1462	65.5	2.0	3005	147800
47.20	1468	2784	2284	1462	65.5	2.0	3012	148400
47.32	1470	2785	2285	1467	65.5	1.9	3019	148900
41.43	1466	2779	2279	1463	65.6 65.6	1.8	3027	149500
47.56	1400 1767	2111	2211	1400 1464	03.0 65 7	1.0	3034	149900
47.77	1465	2760	2209	1464	65.6	0.9	3042	150600
47.88	1471	2753	2253	1470	65.7	0.6	3056	150800
	-			, , , m m	<i>C</i> F Ω	ົ່າ	3063	150900

.

THE WESTERN COMPANY OF DRTH AMERICA - REAL TIME (ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
48.10	1506	2761	2261	1498	65.7	0.2	3070	151000
48.21	1515	2755	2255	1509	65.7	0.1	3077	151100
48.33	1384	2645	2145	1377	62.2	0.1	3084	151100
48.44	1297	2594	2094	1295	56.9	0.1	3091	151100
48.54	1161	2501	2001	1159	50.6	0.1	3096	151200
48.65	999	2396	1896	997	41.6	0.1	3101	151200
48.76	780	2245	1745	781	28.8	0.1	3105	151200
48.87	706	2245	1745	710	0.1	0.1	3105	151200
48.98	728	2267	1767	/32	0.0	0.1	3105	151200
49.09	730	2269	1769	/31	0.0	0.1	3105	151200
49.19	734	2273	1//3	735	0.0	0.1	3105	151200
49.30	733	2272	1772	733	0.0	0.1	3105	151200
49.41	131	2270	1//0	129	0.0	0.1	3105	151200
49.51	730	2269	1/69	730	0.0	0.1	3105	151200
49.63	731	2270	1//0	729	0.0	0.1	3105	151200
49.14	121	2200	1766	727	0.0	0.1	3105	151200
49.83	730	2209	1769	729	0.0	0.1	3105	151200
49.97	730	2209	1769	730	0.0	0.1	3105	151200
50.07	730	2209	1769	730	0.0	0.1	3105	151200
50.10	730	2209	1769	730	0.0	0.1	3105	151200
50.29	730	2209	1769	730	0.0	0.1	3105	151200
50 50	730	2209	1769	730	0.0	0.1	3105	151200
50.61	730	2269	1769	718	0.0	0.1	3105	151200
50.72	730	2269	1769	710	0.0	0.0	3105	151200
50.83	730	2269	1769	713	0.0	0.0	3105	151200
50.93	730	2269	1769	711	0.0	0.0	3105	151200
51.04	728	2267	1767	711	0.0	0.0	3105	151200
51.15	730	2269	1769	710	0.0	0.0	3105	151200
51.26	730	2269	1769	710	0.0	0.0	3105	151200
51.37	730	2269	1769	711	0.0	0.0	3105	151200
51.47	729	2268	1768	710	0.0	0.0	3105	151200
51.58	727	2266	1766	710	0.0	0.0	3105	151200
51.69	727	2266	1766	713	0.0	0.0	3105	151200
51.80	729	2268	1768	710	0.0	0.0	3105	151200
51.90	730	2269	1769	710	0.0	0.0	3105	151200
52.04	730	2269	1769	710	0.0	0.0	3105	151200
52.14	727	2200	1760	710	0.0	0.0	3105	151200
52.24	730	2209	1769	711	0.0	0.0	3105	151200
52.33	730	2209	1769	710	0.0	0.0	3105	151200
52 57	728	2267	1767	710	0.0	0.0	3105	151200
52.57	720	2269	1769	710	0.0	0.0	3105	151200
52.78	728	2267	1767	710	0.0	0.0	3105	151200
52.70	720	7768	1768	710	0.0	0.0	3105	151200
53.00	730	2269	1769	710	0.0	0.0	3105	151200
53.11	730	2269	1769	710	0.0	0.0	3105	151200
53.21	730	2269	1769	710	0.0	0.0	3105	151200
53.32	729	2268	1768	710	0.0	0.0	3105	151200
53.43	729	2268	1768	710	0.0	0.0	3105	151200
53.54	729	2268	1768	710	0.0	0.0	3105	151200
53.64	720	2259	1759	710	0.0	0.0	3105	151200
53.75	725	2264	1764	710	0.0	0.0	3105	151200
53.86	726	2265	1765	709	0.0	0.0	3105	151200

THE WESTERN COMPANY OF ... JRTH AMERICA - REAL TIME N. ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

.

ET min.	STP psi.	BHTP psi.	NET P psi.	PRESS 2 psi.	SLR RATE bpm.	PROP lb/gal	Cumm Volume	Cumm Proppant
E 2: 0 7	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0000	4 19 6 19		0.0	<u> </u>		4 = 4 0 0 0
53.97	721	2260	1760	708	0.0	0.0	3105	151200
54.09 57 10	720	2259	1760	706	0.0	0.0	3105	151200
5/ 20	721	2200	1760	705	0.0	0.0	2105	151200
54 41	720	2250	1750	705	0.0	0.0	3105	151200
54.51	720	2209	1750	705	0.0	0.0	3105	151200
54.62	720	2259	1759	700	0.0	0.0	3105	151200
54.73	720	2259	1759	702	0.0	0.0	3105	151200
54.85	720	2259	1759	701	0.0	0.0	3105	151200
54.96	720	2259	1759	700	0.0	0.0	3105	151200
55.07	719	2258	1758	700	0.0	0.0	3105	151200
55.18	719	2258	1758	700	0.0	0.0	3105	151200
55 40	720	2239	1759	700	0.0	0.0	3105	151200
55.50	718	2257	1759	701	0.0	0.0	3105	151200
55.61	715	2254	1754	700	0.0	0.0	3105	151200
55.72	713	2252	1752	700	0.0	0.0	3105	151200
55.83	712	2251	1751	700	0.0	0.0	3105	151200
55.93	712	2251	1751	700	0.0	0.0	3105	151200
56.04	714	2253	1753	700	0.0	0.0	3105	151200
55,15	715	2254	1754	700	0.0	0.0	3105	151200
56 36	713	2252	1750	700	0.0	0.0	3105	151200
56.48	714	2253	1753	700	0.0	0.0	3105	151200
56.59	711	225.0	1750	700	0.0	0.0	3105	151200
56.71	711	2250	1750	700	0.0	0.0	3105	151200
56.83	714	2253	1753	700	0.0	0.0	3105	151200
56.93	714	2253	1753	700	0.0	0.0	3105	151200
57.04	710	2249	1749	699	0.0	0.0	3105	151200
57 27	711	2250	1750	699 700	0.0	0.0	3105	151200
57.37	710	2200	1749	700	0.0	0.0	3105	151200
57.48	710	2249	1749	698	0.0	0.0	3105	151200
57.59	711	2250	1750	700	0.0	0.0	3105	151200
57.70	710	2249	1749	700	0.0	0.0	3105	151200
57.81	710	2249	1749	700	0.0	0.0	3105	151200
58 03	711	2250	1740	700	0.0	0.0	3105	151200
58.14	710	2249	1749	699	0.0	0.0	3105	151200
58.25	710	2249	1749	699	0.0	0.0	3105	151200
58.36	710	2249	1749	698	0.0	0.0	3105	151200
58.47	710	2249	1749	699	0.0	0.0	3105	151200
58.59	710	2249	1749	700	0.0	0.0	3105	151200
58.71	710	2249	1749	700	0.0	0.0	3105	151200
28.81	710	2249	1749	699	0.0	0.0	3105	151200
59.03	710	2249	1749	698	. 0.0	0.0	3105	151200
59.14	711	2250	1750	697	0.0	0.0	3105	151200
59.24	710	2249	1749	698	0.0	0.0	3105	151200
59,35	710	2249	1749	695	0.0	0.0	3105	151200
59.46	710	2249	1749	695	0.0	0.0	3105	151200
59.58	710	2249	1749	691	0.0	0.0	3105	151200
39.68	710	2249	1749	692	0.0	0.0	3105	151200
		• ··· \$	1.1.0	501	., .,	0.0	3195	121700

THE WESTERN COMPANY OF DRTH AMERICA - REAL TIME . /ITORING SYSTEM GIANT REFINERY BLOOMFIELD WD #1 MESA VERDE FORMATION SLICK WATER 3-1-96

ET	STP	BHTP	NET P	PRESS 2	SLR RATE	PROP	Cumm	Cumm
min.	psi.	psi.	psi.	psi.	bpm.	lb/gal	Volume	Proppant
59.90	710	2249	1749	692	0.0	0.0	3105	151200
60.01	710	2249	1749	695	0.0	0.0	3105	151200
60.11	710	2249	1749	694	0.0	0.0	3105	151200
60.22	710	2249	1749	692	0.0	0.0	3105	151200
60.33	710	2249	1749	693	0.0	0.0	3105	151200
60.44	710	2249	1749	697	0.0	0.0	3105	151200
60.55	710	2249	1749	694	0.0	0.0	3105	151200
60.66	710	2249	1749	692	0.0	0.0	3105	151200
60.77	710	2249	1749	691	0.0	0.0	3105	151200
50.87	709	2248	1748	692	0.0	0.0	3105	151200
60,98	710	2249	1749	694	0.0	0.0	3105	151200
61.09	710	2249	1749	691	0.0	0.0	3105	151200
61.20	710	2249	1749	696	0.0	0.0	3105	151200
61.30	710	2249	1749	693	0.0	0.0	3105	151200
61.42	710	2249	1749	697	0.0	0.0	31.05	151200
61.54	710	2249	1749	693	0.0	0.0	3105	151200
61.65	710	2249	1749	693	0.0	0.0	3105	151200
61.75	710	2249	1749	694	0.0	0.0	3105	151200
61.86	710	2249	1749	698	0.0	0.0	3105	151200
61.97	710	2249	1749	696	0.0	0.0	3105	151200
62.08	710	2249	1749	698	0.0	0.0	3105	151200
62.18	710	2249	1749	692	0.0	0.0	3105	151200
62.29	710	2249	1749	696	0.0	0.0	3105	151200
62.40	710	2249	1749	694	0.0	0.0	3105	151200
62.51	710	2249	1749	695	0.0	0.1	3105	151200
62.62	710	2249	1749	693	0.0	0.0	3105	151200
62.73	710	2249	1749	694	0.0	0.0	3105	151200
62.83	710	2249	1749	691	0.0	0.0	3105	151200
62.96	710	2249	1749	698	0.0	0.0	3105	151200
63.07	/10	2249	1749	699	0.0	0.0	3105	151200
63.17	710	2249	1749	696	0.0	0.0	3105	151200
62.29	710	2249	1749	692	0.0	0.0	3105	151200
67.41	710	2449	1749	693	0.0	0.0	3105	121200
63.55	709	2240	1740	603	0.0	0.0	3105	151200
63.75	710	2249	1710	690	0.0	0.0	3105	151200
~~~~	1.1.0	Ka 64 12 I	よ ( ** ブ	0.20	v. v	0.0	0100	ようよないい



EDMUND H. KENDRICK Direct: (505) 986-2527 Email: ekendrick@montand.com Reply To: Santa Fe Office www.montand.com

# March 25, 2010 VIA EMAIL AND HAND DELIVERY

Mr. Glenn von Gonten Acting Environmental Bureau Chief New Mexico Oil Conservation Division 1220 South St. Francis Drive Santa Fe, New Mexico 87505

Re: Request to Withdraw Public Notice Discharge Plan Permit (UICI-009 [I-009]) Western Refining Southwest, Inc. Class I Non-Hazardous Disposal Well Waste Disposal Well No. 1, API No. 30-045-29002 2442 FSL and 1250 FEL UL: I Section 27, T29N, R11W San Juan County, New Mexico

Dear Mr. von Gonten,

Western Refining Southwest, Inc. (Western) respectfully requests that the public notice be withdrawn in this matter because the Notice of Publication, Draft Discharge Plan Permit and the New Mexico Oil Conservation Division (OCD) letter dated February 25, 2010 determining "administrative completeness" do not accurately reflect Western's application. The letter states "The New Mexico Oil Conservation Division (OCD) has received Western Refining Southwest, Inc's application for Disposal Well No. 1 to inject oil field exempt/non-exempt non-hazardous wastes into the Cliff House and Menefee Formations at the intervals from 3276 to 3408 feet and 3435 to 3460 feet, respectively at a maximum injection pressure of 600 psig." (Emphasis added.) The 600 psig maximum injection pressure is also referenced in the Notice of Publication and Draft Discharge Plan Permit. The letter is presented for reference in Attachment A.

Western's application, dated October 2, 2008, did not reduce the injection pressure from 1,150 to 600 psig. Furthermore, Western was not notified of the reduction to 600 psig until February 23, 2010, when Western received an email to that effect from OCD. Western was unable to respond to the email before OCD issued the public notice, two days later. The OCD email is also included in Attachment A.

## REPLY TO:

325 Paseo de Peralta Santa Fe, New Mexico 87501 Telephone (505) 982-3873 • Fax (505) 982-4289

Post Office Box 2307 Santa Fe, New Mexico 87504-2307 6301 Indian School Road NE, Suite 400 Albuquerque, New Mexico 87110 Telephone (505) 884-4200 • Fax (505) 888-8929

Post Office Box 36210 Albuquerque, New Mexico 87176-6210

## Permitted Maximum Injection Pressure History

According to available records, the initial discussions with the OCD Aztec Office indicated that the injection pressure would be limited initially to 0.2 psi/ft or about 690 psi, "the rule of thumb" for estimating reservoir parting (i.e., fracture) pressure. Western understands that OCD requires additional testing before the agency can allow the maximum injection pressure to be increased above the initial "rule of thumb" level. That, in fact, is what happened. Upon completion of additional testing on two occasions, OCD approved the permitted maximum injection pressure to increase to 955 psig in 1994 and to 1,150 psig in 1996. Presently, the permitted maximum injection pressure is 1,150 psig.

Below is a brief history of the permitted maximum injection pressure.

٠	June 28, 1994	Increase Pressure Increase to 955 psig.
0	July 16, 1996	Increase Pressure Increase to 1150 psig.
٩	September 16, 1999	Discharge Plan Renewal Application - No Change
•	June 30, 2003	Discharge Plan Renewal Application - No Change
•	March 23, 2004	Discharge Plan Renewal - 1150 psig
٠	October 2, 2008	Discharge Plan Renewal Application - No Change

The pressure history documents are included in Attachment B.

#### Engineering Basis for 1,150 psig Maximum Injection Pressure

In Western's opinion, there is no engineering basis to reduce the injection pressure. Based on actual data collected by Western, it is not possible for the fractures to be growing at this time.



.

BHTP – Bottom Hole Treating Pressure BPM – Barrels Per Minute SLR – Slurry Rate





Figures 1 and 2, above, were generated using the same data from the March 1, 1996 Postfrac Treatment Summary. Figure 1 depicts the pressure and slurry rate versus time. To enhance detail, Figure 2 has a larger scale than Figure 1. These figures show the following:

- 1) the formation pressure at initiation of treatment was 2091 psig (0.64 psi/ft) as seen in Figure 1;
- 2) the formation parting pressure was 2866 psig (0.88 psi/ft) as seen in Figures 1 and 2; and
- 3) the propagation pressure is approximately 2775 psig (0.85 psi/ft) as seen in Figures 1 and 2.



Figure 3, above, depicts bottom hole pressure and injection pressure history versus cumulative injection volume from initiation of injection to near present. The figure also depicts the formation pressure change from cumulative injection (black line), formation parting pressure (red line), propagation pressure (green) and permitted maximum injection pressure (blue line).

At approximately 530 million cumulative gallons, the corresponding pressures from the graph are:

<b>,</b>	Formation Parting Pressure	2,866 psig
,	Propagation Pressure	2,775 psig
)	Bottom Hole Pressure	2,450 psig
•	Injection Pressure	~1,150 psig

To propagate a fracture, bottom hole pressure would have to be in excess of the propagation pressure. The bottom hole pressure, which corresponds to the permitted maximum injection pressure (1,150 psig), is approximately 2,450 psig. When approaching the permitted maximum injection pressure, there is an approximate 325 psi cushion between the bottom hole pressure and the

propagation pressure. This confirms that historical bottom hole pressures are below 2,500 psig and cannot be propagating fractures. It is not possible for the fractures to be growing at this time.

When fluid is injected into a zone, the pressure will increase unless the zone is frictionless and infinitely large. As such, Western recognizes that some increase in average reservoir pressure has occurred and/or will occur. The formation pressure change from the cumulative injection curve shows that the predicted formation pressure at 1,200 million gallons will be less that 2,500 psig. This curve confirms that formation pressure will not approach progagation pressure within the Discharge Plan Renewal permit period (5 years).

The formation pressure of 2,091 psi at the initiation of the May 1, 1996 fracture treatment is indicative of a tight formation. Due to the tight formation, the 0.2 psi per foot "rule of thumb" does not logically apply. If the maximum injection pressure is reduced to 600 psi, flow to the formation is not possible because formation pressure would be higher than the combined injection pressure plus hydrostatic pressure.

## Request to Withdraw the Current Public Notice

Western is concerned that applicable Water Quality Control Commission (WQCC) regulations may require Western to provide public notice of its application for a permit renewal within 30 days of OCD deeming the application to be administratively complete. However, it is impossible for Western to provide such public notice for two reasons. First, if Western's public notice matches OCD's February 25, 2010 public notice, Western's public notice would be inaccurate. Western's public notice would contain a maximum surface injection pressure of 600 psig, which does not match Western's application. Second, if Western's public notice matches its application and contains a maximum surface injection pressure of 1,150 psig, Western's public notice would not match OCD's public notice and would create needless confusion.

Consequently, Western respectfully requests that OCD withdraw its February 25, 2010 public notice. Such withdrawal of the public notice would enable OCD and Western to meet and discuss any issues concerning an appropriate maximum injection pressure. Western has other concerns with the draft permit renewal that it would like to discuss with OCD. Western's goal is to resolve any such issues with OCD so that OCD could then reissue a public notice that reflects an agreement of the parties.

If you have any questions about this request, please contact me at (505) 986-2527.

Sincerely

Edmund H. Kendrick

EHK/dho Attachments

cc: Mr. Carl Chavez (via email w/encl.); <u>carlj.chavez@state.nm.us</u> Gail MacQuesten (via email w/encl); <u>gail.macquesten@state.nm.us</u>

## Chavez, Carl J, EMNRD

From:	Chavez, Carl J, EMNRD
Sent:	Monday, February 22, 2010 1:28 PM
То:	'Schmaltz, Randy'
Cc:	'Allen.Hains@wnr.com'; Monzeglio, Hope, NMENV; Cobrain, Dave, NMENV; Sanchez, Daniel J., EMNRD; Jones, William V., EMNRD; VonGonten, Glenn, EMNRD; Perrin, Charlie, EMNRD
Subject:	Re: Western Refining Southwest, Inc. Status of OCD Discharge Permits: Bloomfield Refinery (GW-001) & UIC Class I Disposal Well (UICI-009)

Randy, et al.:

FYI, the OCD will likely be processing Western Refining Southwest, Inc.'s (WRSWI) two OCD Discharge Permit Applications (see above subject) this week.

The landfill issues for GW-001 are resolved in the discharge permit along with the active status and closure plan issues.

The maximum allowable surface injection pressure for UICI-009 has been reduced to 600 psig in the discharge permit in order to prevent the half-fractures from growing in the present injection formation. WRSWI will likely need to change its dewatering w/ SVE remediation project at the river terrace as a result of this pressure reduction in order to comply with the change.

Please contact me if you have questions. Thank you.

Carl J. Chavez, CHMM New Mexico Energy, Minerals & Natural Resources Dept. Oil Conservation Division, Environmental Bureau 1220 South St. Francis Dr., Santa Fe, New Mexico 87505 Office: (505) 476-3490 Fax: (505) 476-3462 E-mail: <u>CarlJ.Chavez@state.nm.us</u> Website: <u>http://www.emnrd.state.nm.us/ocd/</u>index.htm (Pollution Prevention Guidance is under "Publications")