

**RECR-27**

**Roland Jackson Well  
Plugging Report**

**Date  
2014**



Well Plugging Report  
Maverik Refinery/Jackson Well Site  
Kirtland, San Juan County, New Mexico

**WELL PLUGGING REPORT  
MAVERIK REFINERY/JACKSON WELL SITE  
WATER WELL ISSUE**

**#18 AND #20 COUNTY ROAD 6271  
KIRTLAND, NEW MEXICO  
SW/4 NE/4 SECTION 17-TOWNSHIP 29 NORTH-RANGE 14 WEST  
SAN JUAN COUNTY, NEW MEXICO**

Prepared by:  
Souder, Miller & Associates  
401 W. Broadway  
Farmington, NM 87401  
505-325-7535

Prepared for:  
NMOCD  
Environmental Bureau  
1220 South St. Francis Drive  
Santa Fe, NM 87505

District Copy  
For Scanning Only  
Has NOT been processed.

May 28, 2014



**Souder, Miller & Associates**  
Engineering ♦ Environmental ♦ Surveying

*NMOCD –Maverik Refinery/Jackson Well*



## TABLE OF CONTENTS

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1.0	Executive Summary.....	1
2.0	Background.....	1
3.0	Preliminary Steps.....	2
4.0	Plugging Activities .....	2
5.0	Recommendations.....	3

### List of Figures

Figure 1 – Site Vicinity Map

Figure 2 – Site Map

### List of Appendices

Appendix A – Signed Access Agreements

Appendix B – OSE Well Permits and Plugging Plan

Appendix C – Site-Specific Health and Safety Plan

Appendix D – OSE Plugging Forms from Enviro Drill



## 1.0 EXECUTIVE SUMMARY

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Souder, Miller & Associates (SMA) has completed the plugging of three monitoring wells located on the Gloria Chavez property located at #18 CR 6271, Kirtland area, San Juan County, New Mexico (SW/4, NE/4 Section 17-T29N-R14W). This task was completed in accordance with the State of New Mexico General Services Department Purchasing Division Price Agreement #10-805-00-07208AG and Purchase Order (PO) # 52100-0000043442 issued by the New Mexico Oil Conservation Division (NMOCD). The Roland Jackson-Gloria Chavez properties, #20 and #18 CR 6271, are located approximately 0.5 miles southwest of the former Caribou Four Corners/Maverik Refinery (Figure 1). SMA drilled two soil borings and five new monitoring wells on the Roland Jackson Property to evaluate possible hydrocarbon impacts on Mr. Jackson's existing shallow irrigation well. The borings were completed in the period May 15-18, 2012. Subsequent testing of water from the five monitoring wells in 2012 and 2013 did not reveal any impact from the refinery or other oilfield activities on the groundwater. However, NAPL does exist in the Jackson irrigation well, and appears to have persisted since at least 2005. The NAPL analyzed indicates that it is derived from diesel range hydrocarbons; however, the age and source of the hydrocarbons cannot be determined at this time.

SMA recommended the five monitoring wells located on the Chavez-Jackson properties be plugged:

1. SMA submitted a proposal to plug the five monitoring wells.
2. After offering the wells to the New Mexico Environmental Department for further study, unsuccessfully, NMOCD approved the plugging plan for the five monitoring wells.

## 2.0 BACKGROUND

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The former Caribou Four Corners/Maverik Refinery is located 0.5 miles to the southeast of the Roland Jackson Property, in the NW/4, NE/4 of Section 17-T29N-R14W. Figure 1 is the vicinity map on an aerial photo. The refinery was operated by Caribou Four Corners, Inc/Maverik Country Stores, Inc. from 1963 until April 1982. The refinery had both documented and undocumented releases of petroleum hydrocarbons throughout its operating history. Major releases of refined product occurred as recently as 1981. In 1985, groundwater contamination was noted by inspectors from the New Mexico Environmental Improvement Division (EID). In 1987, EID water quality sampling was conducted on 24 private wells in the area.

Investigations by Maverik showed that ground water flow in the alluvial gravel aquifer overlying basal Kirtland Shale is from the north-northeast to the south-southwest towards the San Juan River. This overall pattern is modified by seepage from irrigation ditches and septic system influx into the ground water. The general gradient is 0.01 ft/ft which mirrors the topographic gradient.



Potential hydrocarbon contamination in the Jackson water wells was first brought to the attention of the NMOCD Aztec office in April 2005 by Roland Jackson, property owner. The NMOCD Environmental Bureau retained Envirotech, Inc. to sample the irrigation well in 2005. Samples were taken August 24, 2005 for laboratory testing. The results are documented in NMOCD files. In 2008, NMOCD again sampled the irrigation well and results are available in NMOCD files. Maverik continues to do annual reports focused on the slurry wall containment area.

NMOCD contracted SMA to conduct a site groundwater investigation in the area of the Jackson irrigation well. SMA drilled five monitoring wells on the Jackson-Chavez properties in 2012. Subsequent groundwater sampling events from the five wells did not reveal any contamination in 2012 and 2013. The Jackson irrigation well continued to show hydrocarbon contamination. (Refer to SMA 2012 and 2013 Jackson-Chavez reports).

### **3.0 PRELIMINARY STEPS**

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At the time of drilling, the monitoring wells were not required to be permitted or registered with the Office of the State Engineer in 2012 (Figure 2). However, in order to submit a plugging plan to perform the current project, SMA personnel needed to permit the five Monitoring Wells J3, J4, J5, J6 and J7 existing on the Jackson-Chavez properties. As part of the same process with the cooperation of the Aztec OSE office, a well plugging plan of operations was submitted for the five wells on February 21, 2014. These applications were approved on February 26, 2014. SMA prepared access agreements for the Jackson and Chavez properties. Gloria Chavez was contacted, and after SMA explained the activities, Ms. Chavez readily signed the access agreement to plug the three monitoring wells (J3, J4, and J5) located on her property at #18 CR 6271 (Appendix A). Brandon Powell of NMOCD-Aztec scheduled a meeting with Roland Jackson on March 03, 2014. The meeting was to discuss access agreements and actual project activities with Mr. Jackson. SMA and Brandon Powell reviewed the project activities with Mr. Jackson. Mr. Jackson was adamant that he did not want MW-J6 plugged and preferred MW-J7 remain open as well.

### **4.0 PLUGGING ACTIVITIES**

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On March 31, 2014, Enviro-Drill, Inc. mobilized a rig onto the site under SMA supervision to plug the monitoring wells J3, J4 and J5. After a short safety meeting with SMA (Denny Foust and Alicia Patterson) and NMOCD (Brandon Powell and Kory Smith) personnel on site Enviro-Drill plugged the three monitoring wells. MW-J3 had been constructed with two inch casing set at 18 feet bg with a static water level of 6 feet bg. The well bore calculated volume of 2.67 gallons was filled with 4.5 gallons of Portland type II/I mixed with water using tremie pipe. The 2" casing was cut off 3 feet below the surface and one foot of Portland was placed on top of the casing. Two feet of soil filled the surface hole left by the manway. MW-J4 had also been constructed with two inch casing set



**Well Plugging Report  
Maverik Refinery/ Jackson Well Site Investigation  
#18 and #20 County Road 6271, San Juan County, New Mexico  
May 28, 2014**

at 18.5 feet bg with a static water level of 5.8 feet bg. The well bore calculated volume of 2.67 gallons was filled with 5.0 gallons of Portland type II/I mixed with water using tremie pipe. The 2" casing was cut off 3 feet below the surface and one foot of Portland was placed on top of the casing. Two feet of soil filled the surface hole left by the manway. MW-J5 had two inch casing set at 18 feet bg with a static water level of 6 feet bg. The well bore calculated volume of 2.67 gallons was filled with 4.5 gallons of Portland type II/I mixed with water using tremie pipe. The 2" casing was cut off 3 feet below the surface and one foot of Portland was placed on top of the casing. Two feet of soil was used to fill the surface hole left by the manway.

Manways and residual concrete from extracting the manways were hauled to SMA's yard for proper disposal.

Enviro-Drill submitted the completed plugging forms (Appendix D) to the Office of the State Engineer (OSE). The plugging records are accepted by the OSE Aztec Office, and no approval is issued. Kimberly Kirby of the Aztec OSE indicated wells MW-J6 and MW-J7 are now registered to NMOCD with the OSE. OSE encourages action on the remaining wells as soon as legally prudent.

## **5.0 RECOMMENDATIONS**

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SMA recommends the following future activities regarding the Jackson site:

1. When the Jackson property changes hands as directed by the court as part of a pending divorce action, NMOCD should approach the new owner to plug the two remaining monitoring wells still registered to NMOCD with the Office of the State Engineer.



Figure 1  
Site Vicinity Map





NOT TO SCALE

KIRTI AND NM

SITE VICINITY PLAN  
JACKSON/CHAVEZ PROPERTY  
KIRTLAND, NM

SOUDER, MILLER & ASSOCIATES

**SOUDER, MILLER & ASSOCIATES**  
401 W BROADWAY AVENUE

FARMINGTON, NM 87401-5907

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Designed DF	Drawn GJF	Checked RAS
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THIS DRAWING IS INCOMPLETE  
AND NOT TO BE USED FOR  
CONSTRUCTION UNLESS IT IS  
STAMPED, SIGNED AND DATED

Date: MAY, 2014

Scale	Horiz	NA
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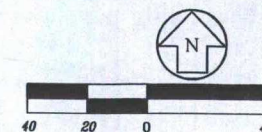
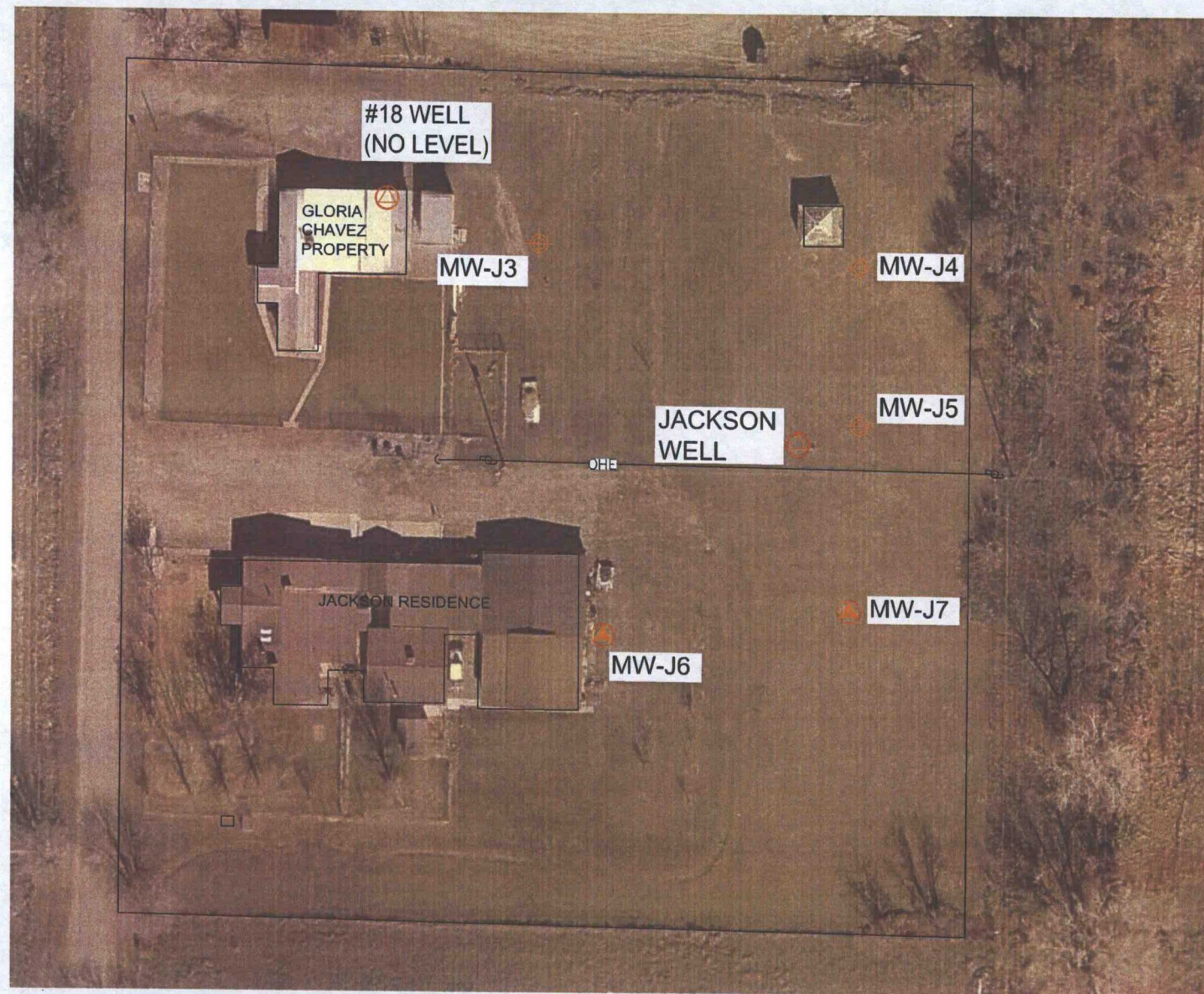
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Project No	512160
Page	4



Figure 2  
Site Map







Appendix A  
Signed Access Agreement





Souder, Miller & Associates ♦ 401 W. Broadway ♦ Farmington, NM 87401  
(505) 325-7535 ♦ (800) 519-0098 ♦ fax (505) 326-0045

**CONSENT FOR ACCESS TO PROPERTY**  
**FOR PURPOSES OF PLUGGING MONITORING WELLS**

Project: Jackson Well Investigation

Project #5121620

Project Location: #18 and #20 CR 6271, Kirtland, New Mexico

Date: March 6, 2014

Name of Property Owner: Gloria Chavez aka Gloria Chavez Jackson

Address of Property Owner: #543 CR 6100, Kirtland, NM 87417

Telephone Number: Home 505-598-4064

Cell ~~505-402-0252~~ BSC 3-6-14  
OR  
Bus ~~505-598-9648~~ LS27 3-6-14

Location of the property on which access is sought: #18 CR 6271 Lots 1, 2, 3 and 4  
#20 CR 6271 Lots 5, 6, 7 and 8  
Kirtland, NM 87417

I hereby consent to allow the employees and contractors of Souder, Miller & Associates (SMA) to enter and have access to the property located at the above address ("the property") for the following purposes:

1. SMA expects to enter onto the property on a minimum of two separate occasions (days) to complete the current contract with the New Mexico Oil Conservation Division (NMOCD).
2. First day: SMA personnel and Enviro Drill will enter onto to the property to plug the five monitor wells drilled in 2012.
3. Second day: SMA and Enviro Drill will enter onto to the property to finish plugging the five wells. The manways and other material removed from the well bores will disposed of at a permitted facility.
4. Casing will be cut off at 3 feet below surface and the well bores filled with cement. Well plugs will be brought to within two feet of the surface. Two feet of fill will be used to cover each cement casing cap.



I understand that SMA is performing this work on behalf of the NMOCD for plugging monitoring wells. I understand that by granting this consent, I am in no way responsible for the actions or the consequences of the persons conducting these investigations. I have also been told that the Project Manager for this site is Denny Foust or Cindy Gray whom I may contact at 505-325-7535, if I have any questions or concerns about this Consent for Access or any work performed as a result of it.

After all access permission has been acquired, SMA will schedule the field activities associated with the well plugging and abandonment.

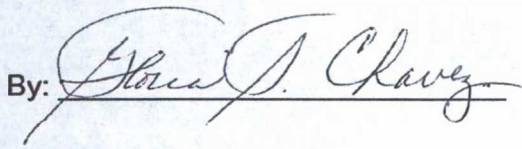
In return for this permission, SMA agrees to the following:

- A. To notify the Property Owner by telephone 24 hours prior to accessing the property. A message left on an answering machine shall constitute notification.
- B. To exercise reasonable professional care to ensure that the property's landscaping and structures are not damaged during plugging activities. In the event of any property damaged as a result of SMA or its subcontractor's activities, the damage will be repaired to original condition, as possible, within 30 calendar days after the damage occurred.
- C. To ensure all equipment is promptly removed from the property.

Property Owner or  
Authorized Representative

Souder, Miller and Associates

By:



Gloria S. Chavez, Owner

Printed Name and Title

By:



Reid S. Allan, Vice President

Printed Name and Title

Denny G. Foust



Appendix B  
OSE Approved  
Well Permits and Plugging Plan





STATE OF NEW MEXICO  
OFFICE OF THE STATE ENGINEER  
AZTEC

Scott A. Verhines, P.E.  
State Engineer

100 Gossett Drive, Suite A  
Aztec, New Mexico 87410

February 26, 2014

Denny Foust, Senior Geologist  
Souder Miller & Associates  
401 West Broadway  
Farmington, NM 87401

**RE: Well Plugging Plan of Operations, monitoring wells MW-J3, MW-J4, MW-J5, MW-J6 and MW-J7, EMNRD: Maverik-Caribou Refinery**

Dear Mr. Foust:

On February 21, 2014, the New Mexico Office of the State Engineer (NMOSE) received a Well Plugging Plan of Operations submitted by Souder Miller & Associates (SMA) on behalf of the New Mexico Energy, Minerals and Natural Resources Department. The plugging plan proposes the plugging and abandonment of five monitoring wells associated with a ground water site investigation for the former Maverik-Caribou Refinery. NMOSE approves the proposed Well Plugging Plan of Operations with the attached Specific Plugging Conditions (enclosed).

Please pay special attention to Specific Plugging Condition 2, which describes the minimum volume of plugging material needed based on the plugging detail described in Section VII of the Well Plugging Plan of Operations and on the auger diameter likely to be used (seven-inch) verbally confirmed by EnviroDrill, Inc., personnel. Also, Condition 3 clarifies that Portland Type I/II cement is to be used as the plugging sealant and, that if used, bentonite will be hydrated with the correct amount of water prior to mixing with the cement slurry. Additionally, minor annotations may have been made on the plugging plan forms submitted.

Within 20 days after completion of well plugging, please submit a completed Well Plugging Report (OSE Form WD-11) describing the actual abandonment process and itemizing the materials used. Also, include with the report a copy of the approved plugging conditions (enclosed).

If you have any questions regarding this correspondence, please feel free to contact me at (505) 334-4282.

Sincerely,

A handwritten signature in black ink, appearing to read "Kimberly D. Kirby".

Kimberly D. Kirby  
Water Resource Specialist  
Water Rights Division - District V

Enclosures

cc: Aztec Reading (w/o enclosures)  
Aztec File  
WATERS





# WELL PLUGGING PLAN OF OPERATIONS



NOTE: A Well Plugging Plan of Operations shall be filed with and accepted by the Office of the State Engineer prior to plugging.

**I. FILING FEE:** There is no filing fee for this form.

## **II. GENERAL / WELL OWNERSHIP:**

Existing Office of the State Engineer POD Number (Well Number) for well to be plugged: MW-J3, J4, J5, J6, J7 \_\_\_\_\_

Name of well owner: EMNRD-Oil Conservation Division represented by Souder, Miller & Associates \_\_\_\_\_

Mailing address: 401 West Broadway \_\_\_\_\_

City: Farmington \_\_\_\_\_ State: NM \_\_\_\_\_ Zip code: 87401 \_\_\_\_\_

Phone number: 505-325-7535 \_\_\_\_\_ E-mail: denny.foust@soudermiller.com \_\_\_\_\_

## **III. WELL DRILLER INFORMATION:**

Well Driller contracted to provide plugging services: Rodney Hammer, EnviroDrill, Inc. \_\_\_\_\_

New Mexico Well Driller License No.: WD-1186 \_\_\_\_\_ Expiration Date: 03/31/2014 \_\_\_\_\_

## **IV. WELL INFORMATION:**

Note: A copy of the existing Well Record for the well to be plugged should be attached to this plan.

- 1) GPS Well Location: Latitude: \_\_\_\_\_ deg, \_\_\_\_\_ min, \_\_\_\_\_ sec  
Longitude: \_\_\_\_\_ deg, \_\_\_\_\_ min, \_\_\_\_\_ sec, NAD 83  
#18 and #20 CR 6271, San Juan County, Kirtland, NM
- 2) Reason(s) for plugging well: The wells are being plugged because the Oil Conservation Division has determined the wells are no longer needed. \_\_\_\_\_
- 3) Was well used for any type of monitoring program? yes \_\_\_\_\_ If yes, please use section VII of this form to detail what hydrogeologic parameters were monitored. If the well was used to monitor contaminated or poor quality water, authorization from the New Mexico Environment Department may be required prior to plugging.
- 4) Does the well tap brackish, saline, or otherwise poor quality water? No \_\_\_\_\_ If yes, provide additional detail, including analytical results and/or laboratory report(s): \_\_\_\_\_
- 5) Static water level: 3.16-7.00 feet \_\_\_\_\_ feet (below land surface)/ feet above land surface (circle one)

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AZTEC, NEW MEXICO



2014 FEB 21 AM 10:37

- 6) Depth of the well: 19-21 feet
- 7) Inside diameter of innermost casing: 2.0 inches.
- 8) Casing material: PVC \_\_\_\_\_
- 9) The well was constructed with:  
\_\_\_\_\_ an open-hole production interval, state the open interval: \_\_\_\_\_  
15 feet a well screen or perforated pipe, state the screened interval(s): 2.5-18.5 feet \_\_\_\_\_
- 10) What annular interval surrounding the artesian casing of this well is cement-grouted? \_\_\_\_\_
- 11) Was the well built with surface casing? NO \_\_\_\_\_ If yes, is the annulus surrounding the surface casing grouted or otherwise sealed? \_\_\_\_\_ If yes, please describe: \_\_\_\_\_
- 12) Has all pumping equipment and associated piping been removed from the well? \_\_\_\_\_ If not, describe remaining equipment and intentions to remove prior to plugging in Section VII of this form.

**V. DESCRIPTION OF PLANNED WELL PLUGGING:**

Note: If this plan proposes to plug an artesian well in a way other than with cement grout, placed bottom to top with a tremie pipe, a detailed diagram of the well showing proposed final plugged configuration shall be attached, as well as any additional technical information, such as geophysical logs, that are necessary to adequately describe the proposal.

- 1) Describe the method by which cement grout shall be placed in the well, or describe requested plugging methodology proposed for the well: Plug and abandon five 2-inch wells by tremming a cement mixture from bottom to top.
- 2) Will well head be cut-off below land surface after plugging? Remove well covers then remove upper 3 feet of casing with a one foot cement cap, buried 2 feet below ground surface.

**VI. PLUGGING AND SEALING MATERIALS:**

Note: The plugging of a well that taps poor quality water may require the use of a specialty cement or specialty sealant

- 1) For plugging intervals that employ cement grout, complete and attach Table A.
- 2) For plugging intervals that will employ approved non-cement based sealant(s), complete and attach Table B.
- 3) Theoretical volume of grout required to plug the well to land surface: 2.67 gallons
- 4) Type of Cement proposed: OSE Notation: Portland Type I/II cement to be used.
- 5) Proposed cement grout mix: 6.0 gallons of water per 94 pound sack of Portland cement.
- 6) Will the grout be: \_\_\_\_\_ batch-mixed and delivered to the site  
XXX mixed on site



7) Grout additives requested, and percent by dry weight relative to cement: None \_\_\_\_\_

8) Additional notes and calculations: \_\_\_\_\_

**VII. ADDITIONAL INFORMATION:** List additional information below, or on separate sheet(s):

Wells were used to check for hydrocarbon contamination. The plugging plan includes removing man-ways, fill 2 inch casing with Portland cement to 6 feet bgs, cut off casing three feet below surface fill hole with Portland cement to within 2 feet bgs, backfill 2 foot hole with soil.

**VIII. SIGNATURE:**

I, Denny G. Foust, say that I have carefully read the foregoing Well Plugging Plan of Operations and any attachments, which are a part hereof; that I am familiar with the rules and regulations of the State Engineer pertaining to the plugging of wells and will comply with them, and that each and all of the statements in the Well Plugging Plan of Operations and attachments are true to the best of my knowledge and belief.

*Denny G. Foust*

February 21, 2014

Signature of Applicant

Date

**IX. ACTION OF THE STATE ENGINEER:**

This Well Plugging Plan of Operations is:

☒ Approved subject to the attached conditions.  
☐ Not approved for the reasons provided on the attached letter.

Witness my hand and official seal this 26th day of February, 2014

Scott A. Verhines, State Engineer

By: *K. Kirby*

Kimberly D. Kirby  
Water Resource Specialist  
Water Rights Division - District V

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AZTEC, NEW MEXICO



**TABLE A - For plugging intervals that employ cement grout. Start with deepest interval.**

	Interval 1 – deepest	Interval 2	Interval 3 – most shallow
			Note: if the well is non-artesian and breaches only one aquifer, use only this column.
Top of proposed interval of grout placement (ft bgl)			2.0 feet
Bottom of proposed interval of grout placement (ft bgl)			18.5 feet
Theoretical volume of grout required per interval (gallons)			2.67
Proposed cement grout mix gallons of water per 94-lb. sack of Portland cement			6.0
Mixed on-site or batch-mixed and delivered?			Mixed on site.
Grout additive 1 requested			
Additive 1 percent by dry weight relative to cement			
Grout additive 2 requested			
Additive 2 percent by dry weight relative to cement			

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**DISTRICT V**  
**Scott A. Verhines, P.E.**  
**NEW MEXICO STATE ENGINEER**

On February 21, 2014, the New Mexico Office of the State Engineer (NMOSE) received a Well Plugging Plan of Operations for five monitoring wells. The plugging plan was submitted by Denny Foust of Souder Miller and Associates on behalf of the New Mexico Energy, Minerals and Natural Resources Department (EMNRD). Five monitoring wells (*no OSE File numbers*), as listed below, will be plugged and abandoned in accordance with 19.27.4 NMAC. The monitoring wells to be plugged are associated with a site investigation concerning the former Maverik-Caribou Refinery, but are no longer needed for site monitoring; closure has been requested by EMNRD. Plugging will be performed by EnviroDrill, Inc., under well driller license WD-1186. The wells have an annular seal beginning at the ground surface to a depth of 1.5 feet below ground surface, which consists of a half-foot grout layer followed below by a bentonite pellet layer. Depth-to-water in the wells ranges from approximately 3.16 to 7.00 feet below land surface.

**Location:** EMNRD: Maverik-Caribou Refinery Investigation Site, SW/4 NE/4 Section 17, T29N, R14W, San Juan County, New Mexico. Approximate coordinates for each monitoring well to be abandoned are listed below.

<u>Well Name</u>	<u>Casing - Inside Diameter (inches)</u>	<u>Depth-to-Water (feet)</u>	<u>Total Well Depth (feet)</u>	<u>Latitude North</u>	<u>Longitude West</u>	<u>Plugging Volume (gallons)</u>
MW-J3	PVC	6	18	36°43'41.24"N	108°19'45.24"W	4.5
MW-J4	PVC	5.8	18.5	36°43'41.22"N	108°19'44.04"W	4.5
MW-J5	PVC	6	18	36°43'40.66"N	108°19'43.89"W	4.5
MW-J6	PVC	5.5	17.8	36°43'39.91"N	108°19'45.18"W	4.4
MW-J7	PVC	5.5	18.5	36°43'39.98"N	108°19'44.20"W	4.5

**Specific Plugging Conditions of Approval, Five Monitoring Wells, ENNRD: Maverik-Caribou Refinery**

1. Water well drilling and other well drilling activities, including well plugging, are regulated under 19.27.4 NMAC, which requires any person engaged in the business of well drilling within New Mexico to obtain a Well Driller License issued by NMOSE. Thus, well plugging shall be performed by a New Mexico licensed Well Driller.
2. The applicant proposed a plan to fill the well casing and surface excavation void with plugging sealant. The method approved to be used is as follows: fill the two-inch casing to within three feet of ground surface, then excavate the well bore-hole to three feet below ground surface to cut-off the casing at three feet below ground surface. The excavated area is then to be filled with sealant to within two feet of ground surface followed by soil backfill to ground surface. The theoretical volume of sealant required for abandonment of two-inch well casing is approximately 0.16 gallon per linear foot. The theoretical volume of sealant required for filling an excavation with a seven-inch diameter is approximately two gallons per linear foot. The plugging plan proposes approximately 76 feet total linear footage of two-inch diameter casing and five linear feet of excavated area for five monitoring wells; therefore the minimum total volume of plugging material should not be less than 22.4 gallons



Based on the reported total depth of each well and the proposed excavation, the minimum theoretical plugging volume for each well should not be less than that noted in the table above; however, the actual plugging volume needed is subject to field verification of the actual pluggable depth and excavation dimensions. Field verification shall include sounding the actual pluggable depth of each borehole/well and multiplying this depth by the correct volume factor for the casing diameter.

3. The Well Plugging Plan of Operations submitted proposes the use of Portland cement as the plugging sealant; Portland Type I/II cement is required. Portland cement has a fundamental water demand of 5.2 gallons of water per 94-lb sack of cement. The mix rate proposed in the plan is approximately six gallons of water per 94-lb sack of cement. The slightly higher amount of cement mixing water proposed (six gallons) is acceptable, because it still falls within the six gallons per 94-lb. sack maximum allowed by NMOSE for pumpability.

This plugging plan does not propose the addition of bentonite powder or other grout additives to the Portland cement slurry. However, if a bentonite additive is used during the actual plugging activities, the following rates and mixing guidelines must be followed and/or the NMOSE District V office must be contacted for pre-approval.

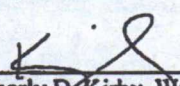
Pure bentonite powder ("90 barrel yield") is allowed as a cement additive by NMOSE and American Water Works Association (AWWA) guidelines. Neither granular bentonite nor extended-yield bentonite shall be mixed with cement for the purpose of this plugging activity. When supplementing a cement slurry with bentonite powder, water demand for the mix increases at a rate of approximately 0.65 gallon of water for each 1% increment of bentonite bdwc (by dry weight cement) above the stated base water demand of 5.2 gallons water per 94-lb sack of cement for neat cement. Bentonite powder must be hydrated separately with its required increment of water before being mixed into the wet neat cement. If water is otherwise added to the combination of dry ingredients or the dry bentonite is blended into wet cement, the alkalinity of the cement will restrict the yield of the bentonite powder, resulting in excess free water in the slurry and excessive cement shrinkage upon curing.

4. Placement of the sealant within the well(s) shall be by pumping through a tremie pipe extended to near the bottom of the well and kept below the top of the slurry column (i.e., immersed in the slurry) as the well is plugged from bottom upwards in a manner that displaces the standing water column.
5. Prior to, or upon completion of plugging, the well casing may be cut-off below grade as necessary to allow for approved construction onsite, provided a minimum six-inch thickness of reinforced abandonment plugging sealant or concrete completely covers the top of the cut-off casing. Any remaining void to the surface maybe filled with native soil, concrete, or asphalt as needed to match the surrounding surface material and blend with the surface topography to prevent ponding.
6. Should NMED or another regulatory agency sharing jurisdiction of the project authorize or by regulation require a more stringent well plugging procedure than herein described, the more stringent procedure shall be followed. This, in part, includes provisions regarding pre-authorization to proceed, contaminant remediation, inspection, pulling/perforating of casing, or prohibition of free discharge of any fluid from the borehole during or related to the plugging process.
7. Witnessing of the plugging work by NMOSE will not be required, but shall be facilitated if an NMOSE observer is onsite. NMOSE witnessing may be requested during normal work hours by calling the NMOSE - District V Office at (505) 334-4571, at least 48 hours in advance. NMOSE inspection will occur depending on personnel availability.
8. Within 20 days after completion of well plugging, a complete Well Plugging Record shall be filed with the State Engineer in accordance with Paragraph (3) of Subsection C of 19.27.4.30 NMAC for each well plugged. The Well Plugging Record(s) shall be filed with the State Engineer at the NMOSE District V



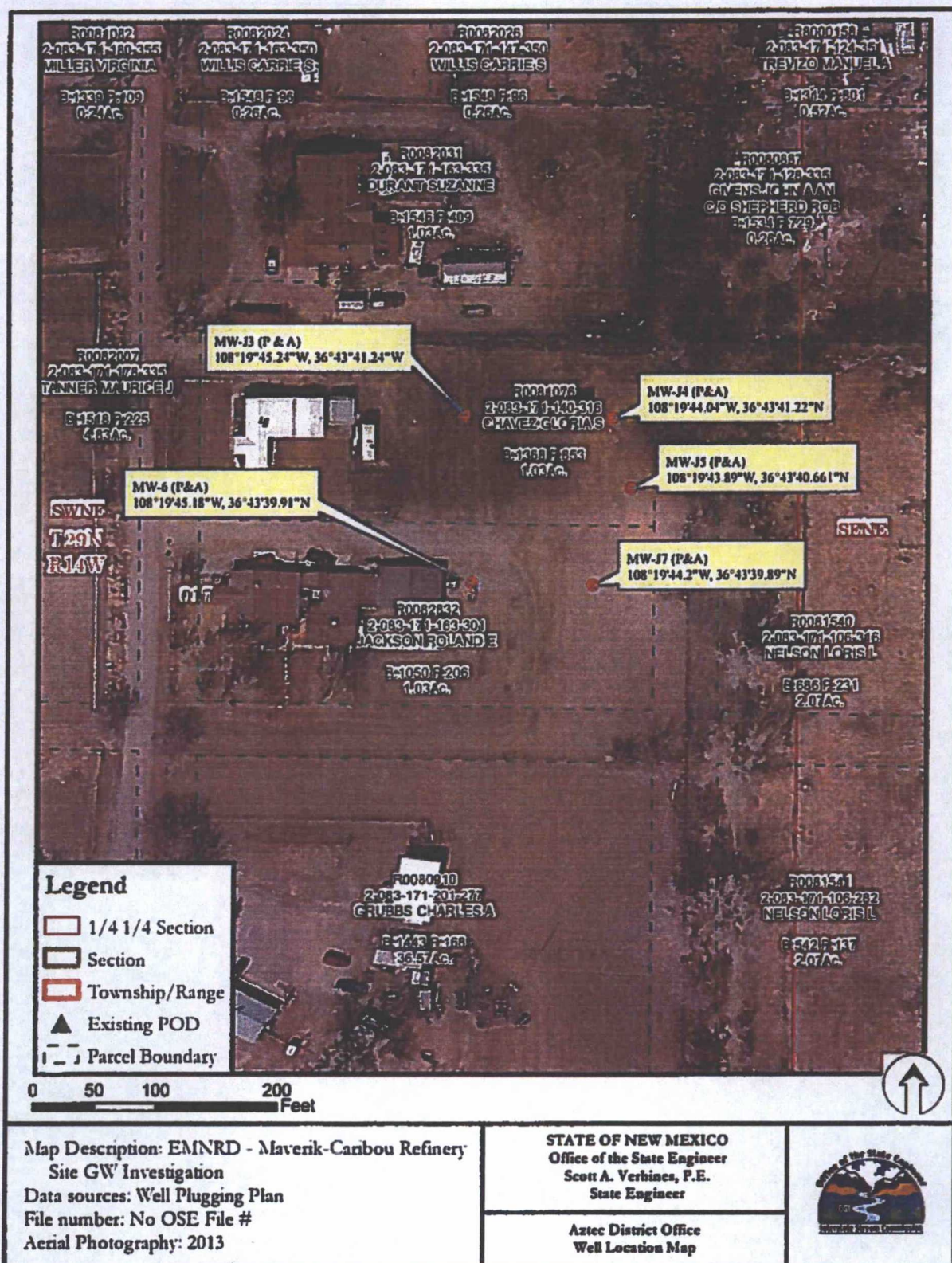
Office, 100 Gossett Drive, Suite A, Aztec, NM 87410. The required well plugging record form is available at <http://www.ose.state.nm.us/PDF/WellDrillers/WD-11.pdf>.

The Well Plugging Plan of Operations dated February 21, 2014, with NMOSE annotations (if applicable) is hereby approved with the aforesaid conditions applied, when signed by an authorized designee of the State Engineer:

  
\_\_\_\_\_  
Kimberly D. Kirby, Water Resource Specialist  
District V, Water Rights Division

Date: 2-26-14









## NEW MEXICO OFFICE OF THE STATE ENGINEER

APPLICATION FOR PERMIT TO DRILL A WELL  
WITH NO CONSUMPTIVE USE OF WATER

(check applicable box):

For fees, see State Engineer website: <http://www.ose.state.nm.us/>

Purpose: ☐ Pollution Control And / Or Recovery ☐ Geo-Thermal  
☐ Exploratory ☐ Construction Site De-Watering ☐ Other (Describe):  
☒ Monitoring ☐ Mineral De-Watering

A separate permit will be required to apply water to beneficial use.

☐ Temporary Request - Requested Start Date: May, 2012

Requested End Date: July, 2014

Plugging Plan of Operations Submitted? ☒ Yes ☐ No

STATE ENGINEER OFFICE  
AZTEC, NEW MEXICO  
2014 FEB 21 AM 10:38

## 1. APPLICANT(S)

Name: New Mexico Energy, Minerals and Natural Resources Department	Name: New Mexico Energy, Minerals and Natural Resources Department
Contact or Agent: Souder, Miller & Associates <input checked="" type="checkbox"/> check here if Agent	Contact or Agent: Souder, Miller & Associates <input checked="" type="checkbox"/> check here if Agent
Mailing Address: 401 West Broadway	Mailing Address: 401 West Broadway
City: Farmington	City: Farmington
State: NM Zip Code: 87401	State: NM Zip Code: 87401
Phone: <input type="checkbox"/> Home <input type="checkbox"/> Cell Phone (Work): 505-325-7535	Phone: 505-801-9727 <input type="checkbox"/> Home <input checked="" type="checkbox"/> Cell Phone (Work): 505-325-7535
E-mail (optional): cindy.gray@soudermiller.com	E-mail (optional): denny.foust@soudermiller.com

OSE Notation: No OSE file # has been assigned to these existing monitoring wells, because all are to be plugged and abandoned per the Well Plugging Plan of Operations. There are no other remaining monitoring wells associated with this location.

FOR OSE INTERNAL USE

Application for Permit, Form wr-07, Rev 4/12/12

File Number: No OSE file #	Tm Number:
Trans Description (optional):	
Sub-Basin:	
PCW/LOG Due Date:	



2. WELL(S) Describe the well(s) applicable to this application.

<b>Location Required: Coordinate location must be reported in NM State Plane (NAD 83), UTM (NAD 83), or Latitude/Longitude (Lat/Long - WGS84).</b> <b>District II (Roswell) and District VII (Cimarron) customers, provide a PLSS location in addition to above.</b>			
<div style="display: flex; justify-content: space-between;"> <div> <input type="checkbox"/> NM State Plane (NAD83) (Feet)  <input type="checkbox"/> NM West Zone  <input type="checkbox"/> NM East Zone  <input type="checkbox"/> NM Central Zone         </div> <div> <input type="checkbox"/> UTM (NAD83) (Meters)  <input type="checkbox"/> Zone 12N  <input type="checkbox"/> Zone 13N         </div> <div> <input type="checkbox"/> Lat/Long (WGS84) (to the nearest 1/10<sup>th</sup> of second)         </div> </div>			
Well Number (if known):	X or Easting or Longitude:	Y or Northing or Latitude:	<b>Provide if known:</b> -Public Land Survey System (PLSS) (Quarters or Halves, Section, Township, Range) OR - Hydrographic Survey Map & Tract; OR - Lot, Block & Subdivision; OR - Land Grant Name
PMW-J3	108°19'45.24"w	36°43'41.24"n	NE/4 Section 17-T29N-R14W
PMW-J4	108°19'44.04"w	36°43'41.22"n	NE/4 Section 17-T29N-R14W
PMW-J5	108°19'43.89"w	36°43'40.661"n	NE/4 Section 17-T29N-R14W
PMW-J6	108°19'45.18"w	36°43'39.91"n	NE/4 Section 17-T29N-R14W
PMW-J7	108°19'44.20"w	36°43'39.89"n	NE/4 Section 17-T29N-R14W
<b>NOTE: If more well locations need to be described, complete form WR-08 (Attachment 1 – POD Descriptions)</b> Additional well descriptions are attached: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      If yes, how many _____			
Other description relating well to common landmarks, streets, or other:			
Well is on land owned by: Private Parties With Signed Access And Drilling Permission Agreements			
Well Information: <b>NOTE: If more than one (1) well needs to be described, provide attachment.</b> Attached? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, how many _____			
Approximate depth of well (feet): 20.00		Outside diameter of well casing (inches): 2.37	
Driller Name: Envirodrill		Driller License Number: WD-1186	

 STATE ENGINEER OFFICE  
 AZIEC, NEW MEXICO  
 2014 FEB 21 AM 10:38

3. ADDITIONAL STATEMENTS OR EXPLANATIONS

All of the monitoring wells will have similar completion depths and casing specifications. Wells will be screened across the water table, which is anticipated to be encountered at 7 to 8 feet below ground surface. The aquifer is unconfined.

The purpose of the monitoring wells is to determine ground water quality in the vicinity of the private Jackson water supply well and down gradient of the former Maverik-Caribou Refinery. Additionally the monitoring wells will provide potentiometric surface elevation data for determining the ground water gradient.

It is anticipated that the wells will be in use for at least five years.

FOR OSE INTERNAL USE

Application for Permit, Form wr-07

File Number: No OSE file #	Tm Number:
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4. **SPECIFIC REQUIREMENTS:** The applicant must include the following, as applicable to each well type. Please check the appropriate boxes, to indicate the information has been included and/or attached to this application:

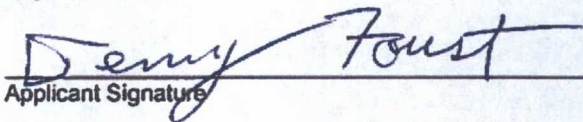
<b>Exploratory:</b> <input type="checkbox"/> Include a description of any proposed pump test, if applicable.	<b>Pollution Control and/or Recovery:</b> <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for the pollution control or recovery operation. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The annual diversion amount. <input type="checkbox"/> The annual consumptive use amount. <input type="checkbox"/> The maximum amount of water to be diverted and injected for the duration of the operation. <input type="checkbox"/> The method and place of discharge.	<b>Construction De-Watering:</b> <input type="checkbox"/> Include a description of the proposed dewatering operation, <input type="checkbox"/> The estimated duration of the operation, <input type="checkbox"/> The maximum amount of water to be diverted, <input type="checkbox"/> A description of the need for the dewatering operation, and, <input type="checkbox"/> A description of how the diverted water will be disposed of.	<b>Mine De-Watering:</b> <input type="checkbox"/> Include a plan for pollution control/recovery, that includes the following: <input type="checkbox"/> A description of the need for mine dewatering. <input type="checkbox"/> The estimated maximum period of time for completion of the operation. <input type="checkbox"/> The source(s) of the water to be diverted. <input type="checkbox"/> The geohydrologic characteristics of the aquifer(s). <input type="checkbox"/> The maximum amount of water to be diverted per annum. <input type="checkbox"/> The maximum amount of water to be diverted for the duration of the operation. <input type="checkbox"/> The quality of the water.
<b>Monitoring:</b> <input checked="" type="checkbox"/> Include the reason for the monitoring well, and, <input checked="" type="checkbox"/> The duration of the planned monitoring.	<input type="checkbox"/> The method of measurement of water produced and discharged. <input type="checkbox"/> The source of water to be injected. <input type="checkbox"/> The method of measurement of water injected. <input type="checkbox"/> The characteristics of the aquifer. <input type="checkbox"/> The method of determining the resulting annual consumptive use of water and depletion from any related stream system. <input type="checkbox"/> Proof of any permit required from the New Mexico Environment Department. <input type="checkbox"/> An access agreement if the applicant is not the owner of the land on which the pollution plume control or recovery well is to be located.	<b>Geo-Thermal:</b> <input type="checkbox"/> Include a description of the geothermal heat exchange project, <input type="checkbox"/> The amount of water to be diverted and re-injected for the project, <input type="checkbox"/> The time frame for constructing the geothermal heat exchange project, and, <input type="checkbox"/> The duration of the project. <input type="checkbox"/> Preliminary surveys, design data, and additional information shall be included to provide all essential facts relating to the request.	<input type="checkbox"/> The method of measurement of water diverted. <input type="checkbox"/> The recharge of water to the aquifer. <input type="checkbox"/> Description of the estimated area of hydrologic effect of the project. <input type="checkbox"/> The method and place of discharge. <input type="checkbox"/> An estimation of the effects on surface water rights and underground water rights from the mine dewatering project. <input type="checkbox"/> A description of the methods employed to estimate effects on surface water rights and underground water rights. <input type="checkbox"/> Information on existing wells, rivers, springs, and wetlands within the area of hydrologic effect.

#### ACKNOWLEDGEMENT

I, We (name of applicant(s)), NM EMNRD, agent: Souder, Miller & Associates  
 Print Name(s)

affirm that the foregoing statements are true to the best of (my, our) knowledge and belief.

  
 Applicant Signature

  
 Applicant Signature

#### ACTION OF THE STATE ENGINEER

This application is:

☐ approved ☐ partially approved ☐ denied

provided it is not exercised to the detriment of any others having existing rights, and is not contrary to the conservation of water in New Mexico nor detrimental to the public welfare and further subject to the attached conditions of approval.

Witness my hand and seal this \_\_\_\_\_ day of \_\_\_\_\_ 20 \_\_\_\_\_, for the State Engineer,

\_\_\_\_\_, State Engineer

No action taken on this application; see OSE Notation on page 1.

By: \_\_\_\_\_  
 Signature Print

Title: \_\_\_\_\_  
 Print

FOR OSE INTERNAL USE

Application for Permit, Form wr-07

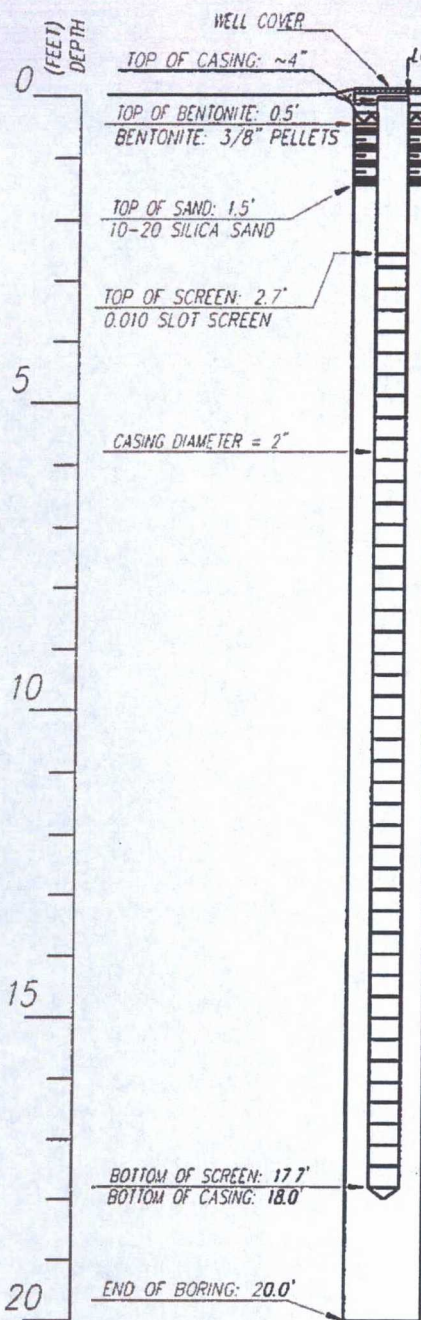
File Number: No OSE file #

Tm Number:

STATE ENGINEER OFFICE  
 ALBUQUERQUE, NEW MEXICO  
 2014 FEB 21 AM 10:38

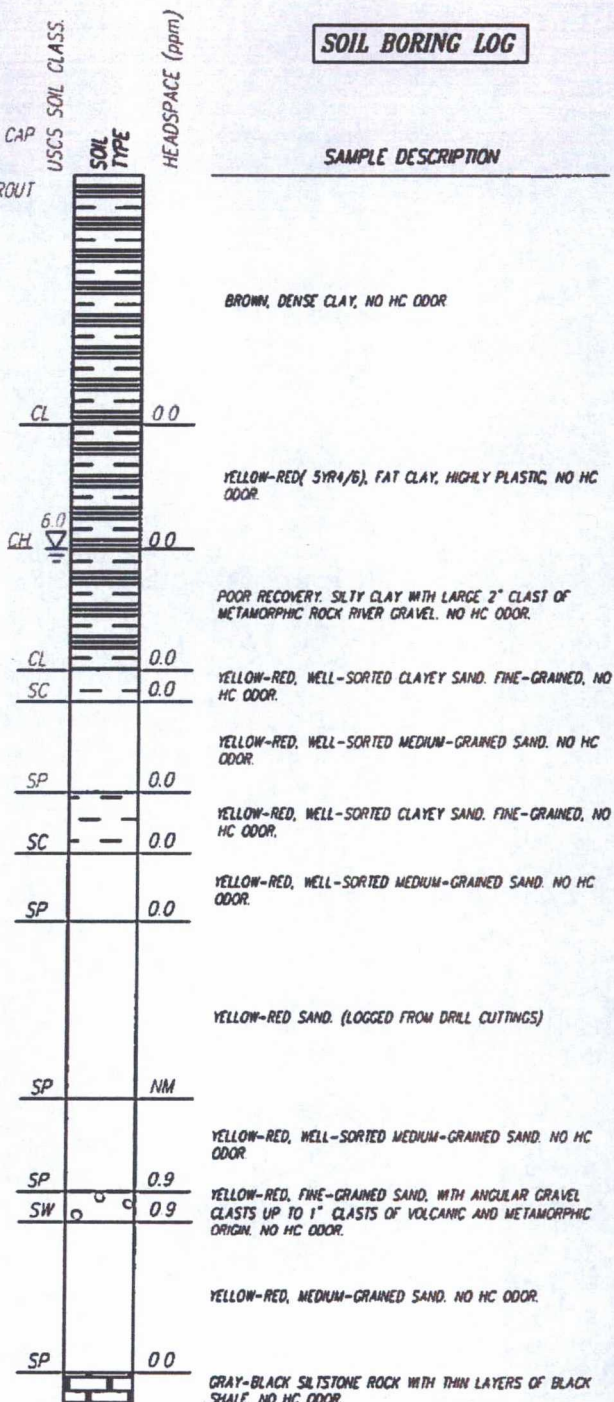


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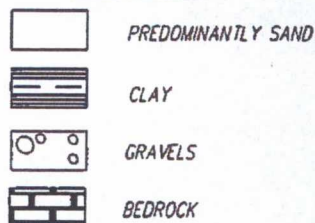


DRILLER: ENVIRO-DRILL, LLC.  
DATE COMPLETED: MAY 17, 2012  
BOREHOLE DIAMETER: 6.5" O.D.  
SAMPLER TYPE: SPLIT SPOON  
DRILLING METHOD: HOLLOW STEM AUGER  
HEADSPACE: OVA WITH PID  
TOTAL BORING DEPTH: 20.0 FT  
DEPTH TO WATER: 6.0' (MAY 17, 2012)  
LOGGED BY: MATT EARTHMAN  
NM: HEADSPACE NOT MEASURED (POOR RECOVERY, FLOWING SANDS, ETC.)

# SOIL BORING LOG



# LOG LEGEND



NW-J3

MONITORING WELL NW-J4 WELL COMPLETION DIAGRAM AND SOIL BORING LOG  
KIRTLAND, NEW MEXICO  
2014 FEB 21 AM 10:37

2101 SAN JUAN BOULEVARD  
FARMINGTON, NEW MEXICO 87401-2247  
(505) 325-7535  
SERVING THE SOUTHWEST AND ROCKY MOUNTAINS



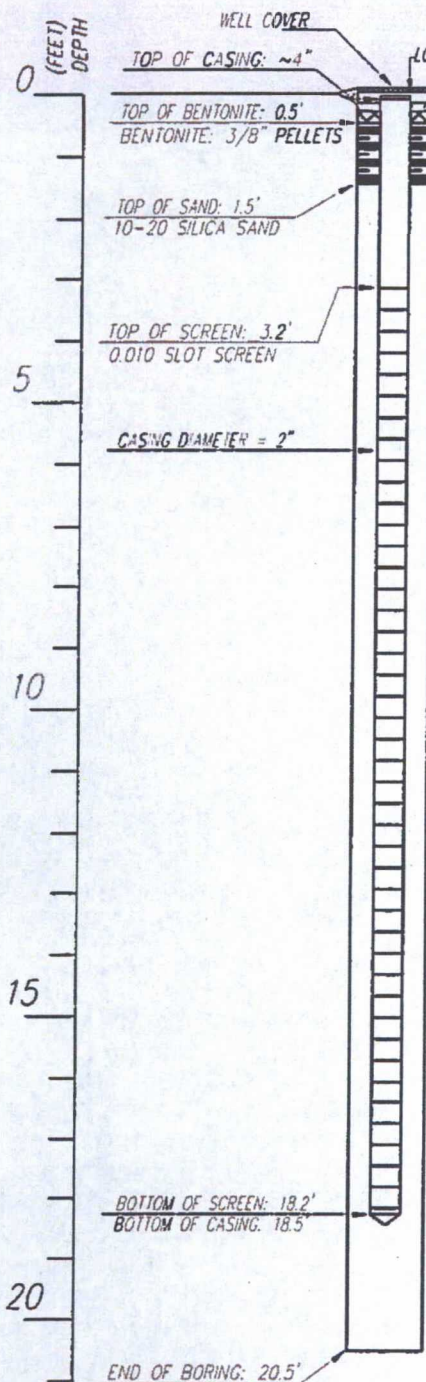
DRAWN JAF  
CHECKED JAF  
APPROVED JAF

ALL RIGHTS RESERVED  
STATE OF NEW MEXICO  
BY MATEO, NEW MEXICO  
COP 1/10/12

06/07/2012  
3114716

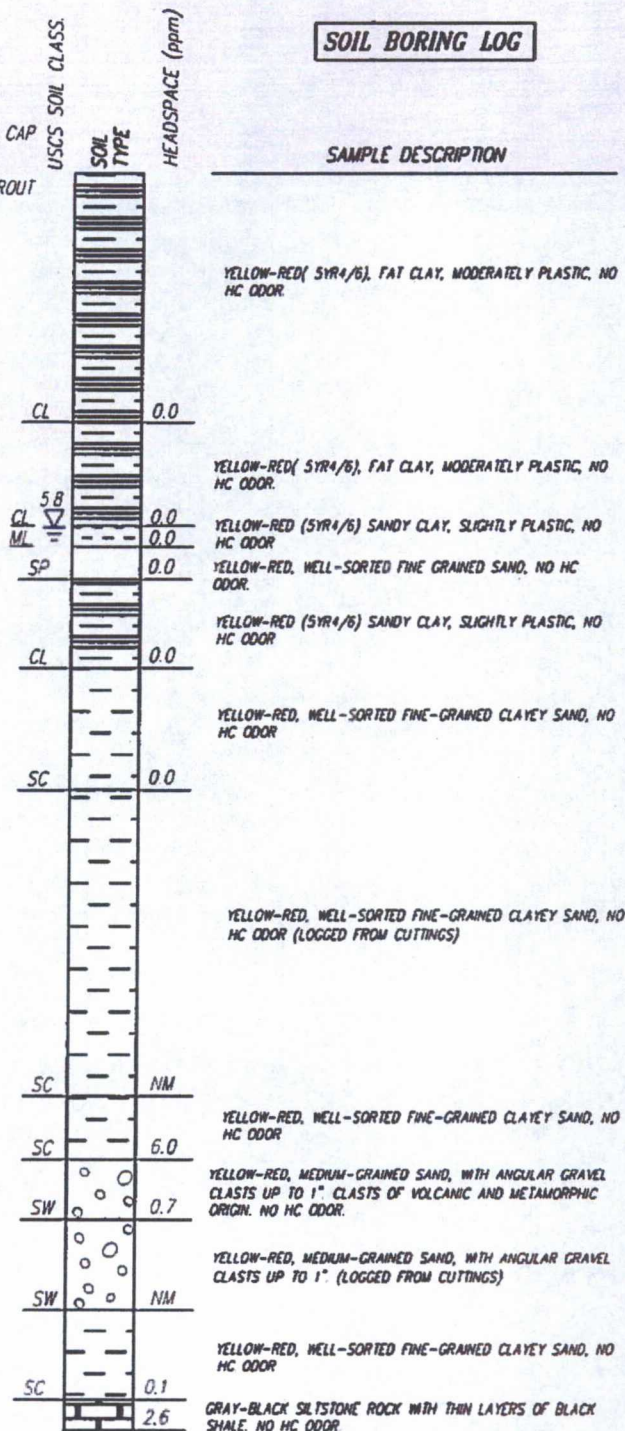


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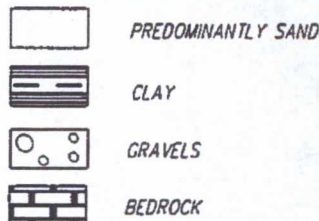


DRILLER: ENVIRO-DRILL, LLC.  
 DATE COMPLETED: MAY 17, 2012  
 BOREHOLE DIAMETER: 6.5" O.D.  
 SAMPLER TYPE: SPLIT SPOON  
 DRILLING METHOD: HOLLOW STEM AUGER  
 HEADSPACE: OVA WITH PID  
 TOTAL BORING DEPTH: 18.5 FT.  
 DEPTH TO WATER: 5.8' (MAY 17, 2012)  
 LOGGED BY: MATT EARTHMAN  
 NM: HEADSPACE NOT MEASURED (POOR RECOVERY, FLOWING SANDS, ETC.)

# SOIL BORING LOG



# LOG LEGEND



MW-J4

MONITORING WELL MW-J4 WELL COMPLETION DIAGRAM AND SOIL BORING LOG  
 MAVERIK REFINERY/ROLAND JACKSON WATER WELL ISSUE  
 KIRTLAND, NEW MEXICO

2014 FEB 21 AM 10:37

2101 SAN JUAN BOULEVARD  
 FARMINGTON, NEW MEXICO 87401-2847  
 (505) 325-7535  
 SERVING THE SOUTHWEST AND ROCKY MOUNTAINS



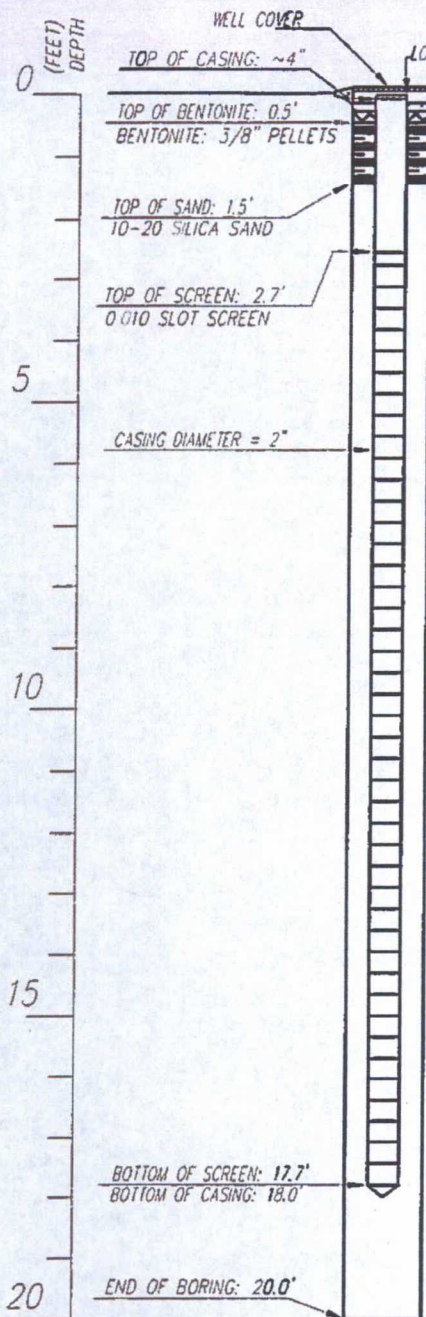
DRAWN: JAE  
 CHECKED: JAE  
 APPROVED: JAE

REVISIONS: 1  
 BY: JAE  
 DATE: 06/07/2012

3114716  
 06/07/2012

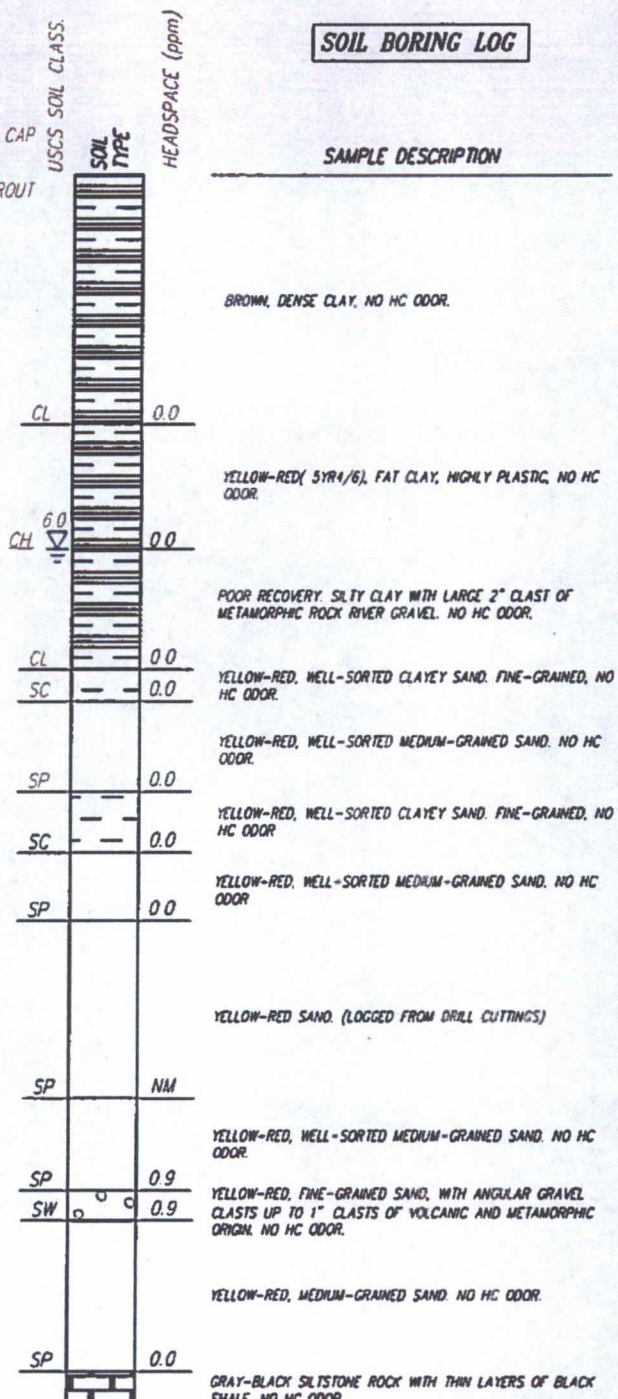


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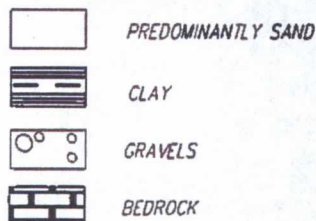


DRILLER: ENVIRO-DRILL, LLC.  
 DATE COMPLETED: MAY 17, 2012  
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 SAMPLER TYPE: SPLIT SPOON  
 DRILLING METHOD: HOLLOW STEM AUGER  
 HEADSPACE: OVA WITH PID  
 TOTAL BORING DEPTH: 20.0 FT.  
 DEPTH TO WATER: 6.0' (MAY 17, 2012)  
 LOGGED BY: MATT EARTHMAN  
 NM: HEADSPACE NOT MEASURED (POOR RECOVERY, FLOWING SANDS, ETC)

# SOIL BORING LOG



# LOG LEGEND



MONITORING WELL MW-J5 WELL COMPLETION DIAGRAM AND SOIL BORING LOG  
 MAVERIK REFINERY/ROLAND JACKSON WATER WELL ISSUE  
 KIRTLAND, NEW MEXICO

MW-J5

2101 SAN JUAN BOULEVARD  
 FARMINGTON, NEW MEXICO 87401-2847  
 (505) 325-7535  
 SERVING THE SOUTHWEST AND ROCKY MOUNTAINS

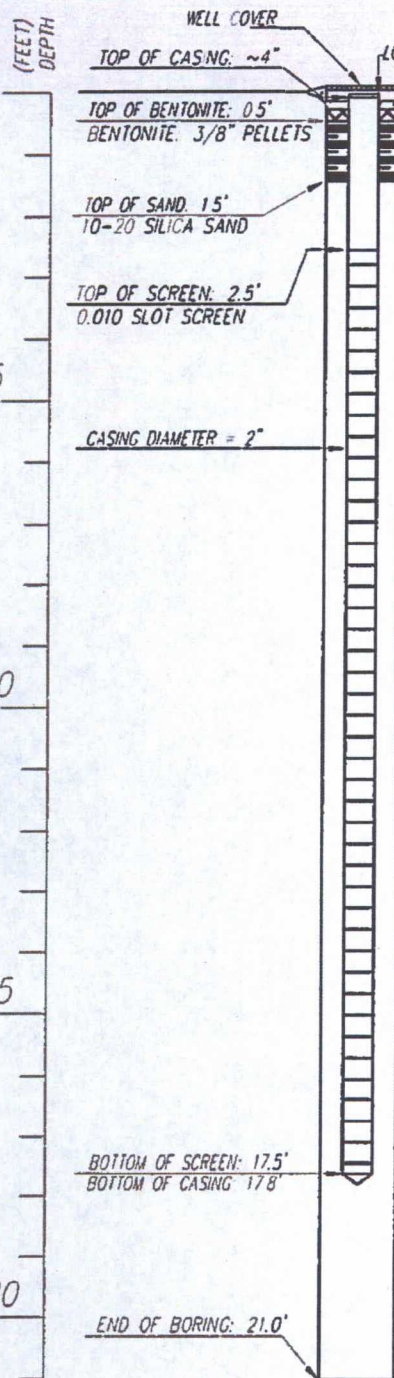


DRAIN JAF  
 CHECKED JAF  
 APPROVED SAM

2014 FEB 21 AM 10:37  
 3114716  
 06/07/2012

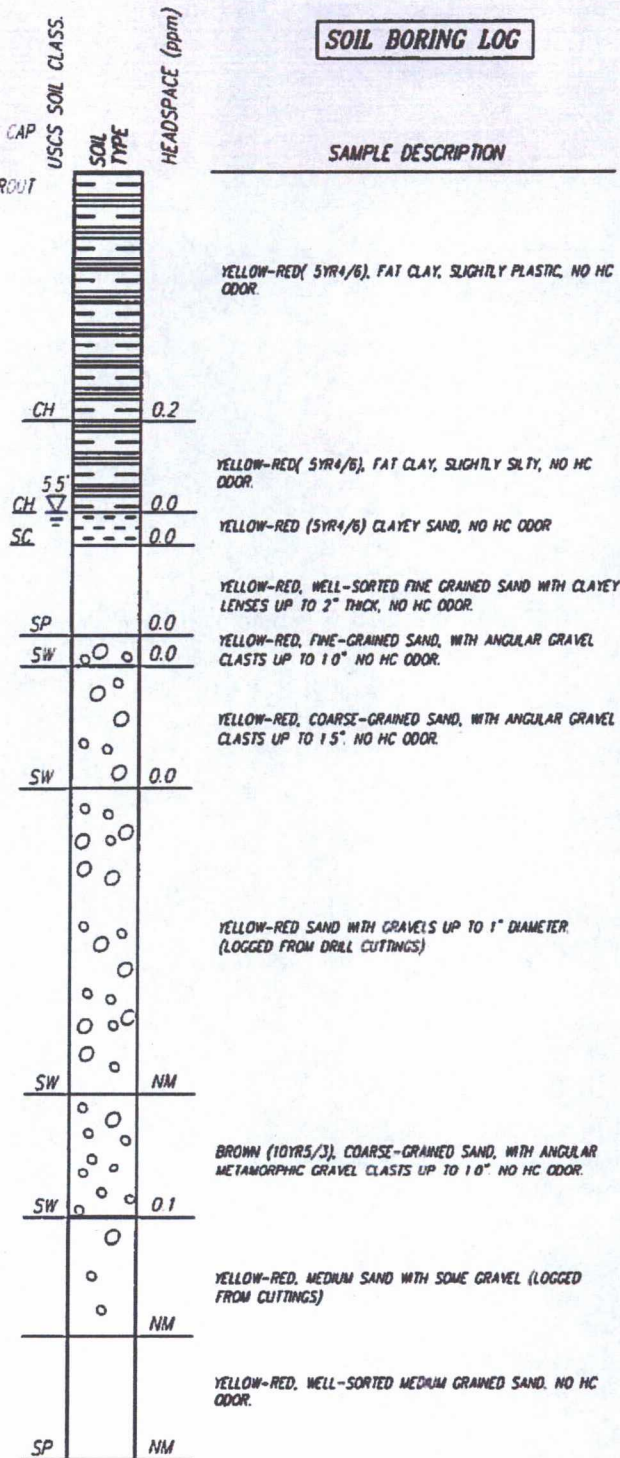


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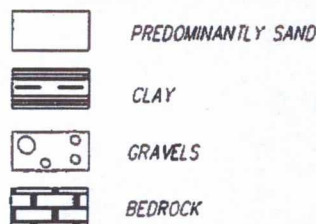


DRILLER: ENVIRO-DRILL, LLC.  
 DATE COMPLETED: MAY 17, 2012  
 BOREHOLE DIAMETER: 6.5" O.D.  
 SAMPLER TYPE: SPLIT SPOON  
 DRILLING METHOD: HOLLOW STEM AUGER  
 HEADSPACE: OVA WITH PID  
 TOTAL BORING DEPTH: 21.0 FT  
 DEPTH TO WATER: 5.5' (MAY 17, 2012)  
 LOGGED BY: MATT EARTHMAN  
 NM: HEADSPACE NOT MEASURED (POOR RECOVERY, FLOWING SANDS, ETC.)

# SOIL BORING LOG



# LOG LEGEND



NW-J6

MONITORING WELL NW-J6 WELL COMPLETION DIAGRAM AND SOIL BORING LOG  
 MAVERIK REFINERY/ROLAND JACKSON WATER WELL ISSUE  
 KIRTLAND, NEW MEXICO

2101 SAN JUAN BOULEVARD  
 FARMINGTON, NEW MEXICO 87401-2217  
 (505) 955-7535  
 SERVING THE SOUTHWEST AND ROCKY MOUNTAINS



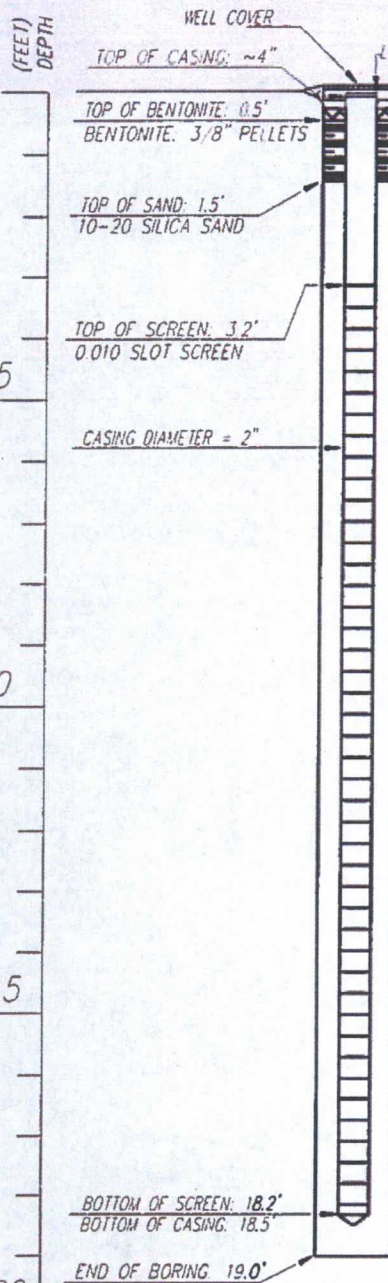
DRAWN: JAE  
 CHECKED: JAE  
 APPROVED: SAM

REVISIONS: 1 - ALL RIGHTS RESERVED  
 2014 FEB 21 AM 10:36  
 BY: [Signature]  
 COPRIGHT: 2012

314276 06/07/2012



# WELL COMPLETION DATA



DRILLER: ENVIRO-DRILL, LLC.  
 DATE COMPLETED: MAY 16, 2012  
 BOREHOLE DIAMETER: 6.5" O.D.  
 SAMPLER TYPE: SPLIT SPOON  
 DRILLING METHOD: HOLLOW STEM AUGER  
 HEADSPACE: OVA WITH PID  
 TOTAL BORING DEPTH: 19.0 FT.  
 DEPTH TO WATER: 5.5' (MAY 16, 2012)  
 LOGGED BY: MATT EARTHMAN  
 NM: HEADSPACE NOT MEASURED (POOR RECOVERY, FLOWING SANDS, ETC.)

# SOIL BORING LOG

USCS SOIL CLASS.	SOIL TYPE	HEADSPACE (ppm)	SAMPLE DESCRIPTION
			YELLOW-RED( 5YR4/6), CLAYEY SILT, SLIGHTLY PLASTIC, NO HC ODOR.
ML	0.7		YELLOW-RED( 5YR4/6), SILTY CLAY, DENSE, NO HC ODOR.
CL	60.5		DARK BROWN, SANDY CLAY, NO HC ODOR.
CL	13.1		DARK BROWN, WELL-SORTED FINE GRAINED SAND, NO HC ODOR.
SP	12.7		AS ABOVE, DARK BROWN, WELL-SORTED FINE GRAINED SAND, NO HC ODOR.
SP	12.7		BROWN SAND (LOGGED FROM DRILL CUTTINGS)
SP	NM		BROWN (10YR5/3), WELL-SORTED MEDIUM-GRAINED SAND, NO HC ODOR.
SP	0.1		BROWN (10YR5/3), MEDIUM-GRAINED SAND, WITH SUB-ANGULAR GRAVEL CLASTS UP TO 1" CLASTS OF VOLCANIC AND METAMORPHIC ORIGIN. NO HC ODOR.
SW	0.1		BROWN (10YR5/3), WELL-SORTED MEDIUM-GRAINED SAND, NO HC ODOR.
SP	0.1		

# LOG LEGEND

	PREDOMINANTLY SAND		SILT
	CLAY		
	GRAVELS		
	BEDROCK		

STATE ENGINEER OFFICE  
 AZTEC, NEW MEXICO  
 2014 FEB 21 AM 10:36

MW-J7

MONITORING WELL MW-J7 WELL COMPLETION DIAGRAM AND SOIL BORING LOG  
 MAVERIK REFINERY/ROLAND JACKSON WATER WELL ISSUE  
 KIRTLAND, NEW MEXICO

2101 SAN JUAN BOULEVARD  
 FARMINGTON, NEW MEXICO 87401-2247  
 (505) 925-7535  
 SERVING THE SOUTHWEST AND ROCKY MOUNTAINS



DRAWN: MAF  
 CHECKED: MAF  
 APPROVED: SAM

REVISIONS  
 BY: DATE: DESCR.  
 BY: DATE: DESCR.  
 COPYRIGHT 2012 SOUBER, MILLER & ASSOCIATES - ALL RIGHTS RESERVED

3114716  
 06/07/2012



Appendix C

Site Specific Health and Safety Plan



**SITE HEALTH AND SAFETY PLAN**

**Location:**  
**Gloria Chavez Property**  
**#18 CR 6172**  
**Kirtland, New Mexico**

**PREPARED FOR:**  
**New Mexico Oil Conservation Division**  
**For 2014 Operations Under State Purchase Order**  
**52100-0000043442**

**PREPARED BY:**  
**SOUDER MILLER & ASSOCIATES**  
*2101 San Juan BLVD*  
*FARMINGTON, NM*  
*(505) 325-7535*  
*Fax (505) 326-0045*

**DATE: March 14, 2014**



## TABLE OF CONTENTS

I. INTRODUCTION:	3
II. SITE DESCRIPTION	3
III. ENTRY OBJECTIVES	3
A. TASK 1	3
IV. ON-SITE ORGANIZATION & COORDINATION	3
V. ON-SITE CONTROL	4
VI. HAZARDS EVALUATION	4
VII. PERSONAL PROTECTIVE EQUIPMENT	6
A. AIR MONITORING	
B. PERSONAL PROTECTIVE EQUIPMENT MATRIX:	6
VIII. PROTOCOL	6
A. CEMENT SAMPLING	6
B. AIR MONITORING:	5
IX. SITE WORK PLAN	6
X. COMMUNICATION PROCEDURES	7
XI. DECONTAMINATION PROCEDURES	7
A. PERSONAL DECONTAMINATION:	7
XII. CONTINGENCIES	7
A. FIRST AID MEASURES/MEDICAL EMERGENCIES	7
B. PETROLEUM PRODUCTS / IRRITATING LIQUIDS:	7
1. Eye contact:	7
2. Skin contact:	7
3. Inhalation:	7
4. Ingestion:	7
C. PHONE LIST:	8
D. ENVIRONMENTAL MONITORING	9
E. EMERGENCY PROCEDURES (TO BE MODIFIED AS REQUIRED FOR INCIDENT)	9
1. Personal Injury in the Exclusion Zone:	9
2. Personal Injury in the Support Zone:	9
3. Fire / Explosion:	9
4. Personal Protective Equipment Failure:	9
5. Other Equipment Failure:	9
XIII. CLOSURES AND SIGNATURES	90



## **I. Introduction:**

The health and safety of *Souder Miller & Associates (SMA)* employees and the general public is of primary importance. The inherent danger involved in the handling of hazardous materials, and danger associated with any job site requires that all participants of this project become familiar with the contents of this Health and Safety plan.

## **II. SITE DESCRIPTION**

**Date:** March 14, 2014

**Location:** Gloria Chavez Property #18 CR 6172  
Kirtland, New Mexico

**Hazards:** Potential hazards in the area include; heavy equipment, exposure to hydrocarbon soil contamination, overhead hazards, overhead power lines and falling tripping hazard.

---

**Area affected:** Gloria Chavez Property NE/4 Section 17-TWP 29 North, RGE 14 West San Juan County, New Mexico. The specific areas of interest are the portions of the property east of the residence where a water supply well and five monitoring wells are located. The monitoring wells were installed in 2012. Activities will be limited to the Chavez Property.

**Surrounding population:** The surrounding area consists of a Rural Residential Community.

## **III. ENTRY OBJECTIVES**

**Task 1:** Enter the property with the necessary equipment from EnviroDrill to plug Monitoring Wells #3, #4 and #5.

## **IV. ON-SITE ORGANIZATION & COORDINATION**

The following personnel are designated to carry out the stated job functions on site. (Note: one person may carry out more than one job function.)

**Souder Miller & Associates:**

PROJECT TEAM LEADER/

ON-SITE COORDINATOR:

Denny Foust

FIELD TEAM LEADER:

Denny Foust/Steve Moskal

ALTERNATES:

Shawna Chubbuck/Alicia Patterson

SUBCONTRACTOR:

EnviroDrill

OWNER:

Gloria Chavez

FEDERAL AGENCIES:

None

STATE or TRIBAL AGENCIES:

NMOCD

Other Agencies:

NONE



## V. ON-SITE CONTROL

The occupancy of the area will be minimal. Only key personnel will be in attendance. Representatives of **Souder Miller & Associates** may include the following: Denny Foust, Steve Moskal, Shawna Chubbuck, and Alicia Patterson. NMOCD personnel will include Brandon Powell and Jonathan Kelly. Control boundaries will be established prior to Task 1.

All personnel involved in the project will be required to adhere to all boundaries and rules regarding the project.

Boundaries to be marked:

Work Area:	Flagging.
Entrance:	Orange Cones

## VI. HAZARDS EVALUATION

*Table 1 and 2 list several potential hazards that might be associated with execution of this project. This list is by no means all inclusive and other unforeseen hazards may exist contingent upon conditions.*

**Table 1**  
**Possible Chemicals**

Substances Involved	Concentration	Fire	Eyes	Skin	Respiratory
Anti-Freeze	Ethylene Glycol Variable				
Used Oil	Petroleum Hydrocarbons Variable				
Gasoline	Variable				
Diesel	Variable				
Grease	Variable				
Natural Gas/Methane	Variable				
Solvent/Cleaners pH Approximate Range 3.5 To 11 (Irritating Liquids)	Variable				
Off-Spec Paint (Liquid/Solid)	Lead And Chromium Variable 8% - 15%				
Tar & MC 250 & MC-70	Variable				
Polychlorinated Biphenyl (PCB)	Variable, Halogens				
Organic Solvents	Variable				
Acids	Variable				
Bases	Variable				
Organic Peroxides	Variable				
Pesticides/Herbicides	Variable				
Other Chemicals	Variable				

Legend :

Slt.	Slight
Mod	Moderate .
Hi.	High
IDLH	Immediately Dangerous to Life and Health
NA	Not Applicable



**Table 2**  
**Potential Health and Safety Hazards**

Hazard	Task 1:	Task 2:	Task 3	Task 4
Inhalation Hazard				
Contaminated Soil/Liquid Contact				
Noise	X			
Heat/Cold Stress	X			
Electrical Transformers and Buried Powerlines				
Potential Fire/Explosion				
High Pressure Petroleum				
Collapsing Of Sidewalls				
Confined Spaces				
Physical Injury	X			
Overhead Powerlines	X			
Buried Piping/Tanks				
Skin Hazards				
Ventilation Problems				
Vandalism				
Heavy Equipment/ Trucking	X			
Level Of Protection	D			
Air Monitoring	NA			
Buried Line Detection	NA			

## VII. PERSONAL PROTECTIVE EQUIPMENT

### A. Air Monitoring:

Based on the lack of potential chemicals and other inhalation hazards, air monitoring will not be required.

### B. Personal Protective Equipment Matrix:

	COVERALL	HARDHAT	GLOVES	SAFETY BOOTS	NOMEX	HEARING PROTECTION	SAFETY GLASSES W/SIDE SHIELDS	LEVEL C	LEVEL B	LEVEL A	OTHER
DAILY ROUTINE		X	X	X							
SAMPLING (OIL FIELD)											1
SAMPLING (NON-OIL FIELD)											
EXCAVATION (OIL FIELD)											1
EXCAVATION (NON OIL FIELD)											
FACILITY INVENTORY											
CHEMICAL INVENTORY											
EMERGENCY RESPONSE											
UNDERGROUND STORAGE TANK REMOVAL											

4. Minimum required will be determined by Client's current policy  
4. MSDS will be consulted to determine proper Personal Protective Equipment.

## VIII. PROTOCOL

Take a sample from the batch of cement mixed to plug each of the three wells.

### A. Cement Samples:

Sample by filling a disposable cup for each batch of cement and observing samples visually to determine when solidification occurs.



## **IX. SITE WORK PLAN**

This project will be completed in the Tasks outlined in Section B. The following outlines the key personnel and their responsibilities:

### **A. Project Team Leader:**

Denny Foust  
**Souder Miller & Associates**  
Farmington, NM (505) 327-1072

Alternates:

Steve Moskal

Shawna Chubbuck

The Project Team Leader will function as the Project Manager, Site Health & Safety Officer, Site Supervisor, and sampler for this Project.

*Tailgate safety meetings will be held and all personnel will be briefed on the contents of this plan prior to initiating any efforts. Tailgates will also cover any safety and/or health issues not anticipated or addressed in this plan. The Project Manager will be responsible for briefing and record keeping.*

### **B. SMA expects to enter onto the property on two separate occasions (days) to complete the current contract with the New Mexico Oil Conservation Division (NMOCD).**

1. First day: SMA personnel and Enviro Drill will enter onto to the property to plug the three monitor wells drilled in 2012.
2. Second day: SMA and Enviro Drill will enter onto to the property to finish plugging the five wells. The manways and other material removed from the well bores will disposed of at a permitted facility.
3. Casing will be cut off at 3 feet below surface and the well bores filled with cement. Well plugs will be brought to within two feet of the surface. Two feet of fill will be used to cover each cement casing cap

## **X. COMMUNICATION PROCEDURES**

Radio communication is not anticipated to be essential for this project. Personnel in the Work Zone should be in visual contact with the Project Team Leader.

The following standard hand signals will be used:

Hand gripping throat	Out of air, can't breathe
Grip partner's wrist or both hands around waist .....	Leave area immediately
Hands on top of head .....	Need assistance
Thumbs up .....	OK, I'm all right, I understand
Thumbs down .....	NO, Negative



Others as needed while handling, moving, or loading materials are acceptable provided that all personnel involved agree to their meaning.

Telephone communication will be available in the Staging Area by mobile phone.

## **XI. DECONTAMINATION PROCEDURES**

The following are a brief summary of decontamination procedures. Common sense should be used at all times.

### **A. Sampling Equipment:**

Plastic gloves and Styrofoam cups. Disposable sampling material to be removed from the site

## **XII. CONTINGENCIES**

### **A. FIRST AID MEASURES/MEDICAL EMERGENCIES**

The nearest hospital is located at:

**San Juan Regional Medical Center**

**801 West Maple Street**

**Farmington, NM 87401**

### **B. PETROLEUM PRODUCTS / IRRITATING LIQUIDS:**

In the event that personnel exposure symptoms occur, the following procedures will be used:

#### **1. Eye contact:**

Flush eye immediately with copious amounts of water and repeat until irritation is eliminated. If prolonged irritation occurs for more than 15 minutes, seek medical attention.

#### **2. Skin contact:**

Wash exposed area with soap and water. If dermatitis or severe reddening occurs, seek medical attention.

#### **3. Inhalation:**

Remove person into fresh air. If symptom occurs for more than 15 minutes, seek medical attention.

#### **4. Ingestion:**

Do not induce vomiting, seek medical attention.

### **C. PHONE LIST:**

AMBULANCE	911
POLICE, FIRE & RESCUE	911
STATE POLICE	Emergency 911, Non-emergency 505-325-7547
POISON CONTROL	1-800-362-0101



CHEMTREC

1-800-424-8802

First aid and emergency fire equipment will be available in company vehicles. ENVIRONMENTAL MONITORING

The following environmental monitoring instruments will be used on site:

The following instruments will be used continuously to monitor air quality.

Combustible gas Indicator: Trigger level will be 10%. The alarm will be audible or vibratory in the event of extreme noise levels.

FID/OVA: Will measure in the parts per million. It will indicate organic volatiles.

pH meter. The pH meter will be used to indicate the pH of each separate sample.

Gas detection meter to detect O<sub>2</sub> and H<sub>2</sub>S levels.

**D. EMERGENCY PROCEDURES (to be modified as required for incident)**

The following standard emergency procedures will be used by on site personnel. The Site Safety Officer shall be notified of any on site emergencies and be responsible for ensuring that the appropriate procedures are followed.

**1. Personal Injury in the Exclusion Zone:**

Upon notification of an injury in the Exclusion Zone, all site personnel shall assemble in the Reduction Zone. The rescue team will enter the Exclusion Zone (if required) to remove the injured person to the hotline. Rescue team and victim will be decontaminated prior to entering the exclusion zone. The Site Safety Officer and Project Team Leader shall evaluate the nature of the injury, prior to movement to the Support Zone. Appropriate first aid will be initiated, and contact should be made for an ambulance and with the designated medical facility (if required). No persons shall reenter the Exclusion Zone until the cause of the injury or symptoms are determined.

**2. Personal Injury in the Support Zone:**

Upon notification of an injury in the Support Zone, the Project Team Leader and Site Safety Officer will assess the nature of the injury. If the cause of the injury or loss of the injured person does not affect the performance of remaining personnel, operations may continue. If the injury increases the risk to others, the designated emergency signal horn shall be sounded and all site personnel shall move to the Reduction Zone for further instructions.

In any case, the appropriate first aid will be initiated and necessary follow-up as stated above.

**3. Fire / Explosion:**

Upon notification of a fire or explosion on site, the designated emergency signal horn shall be sounded and all site personnel assembled at the Reduction Zone. The fire department shall be alerted and all personnel moved to a safe distance from the involved area. *Fire extinguishers shall be used with discretion to minimize the risk of fire and explosion that would result in injuries.*

**4. Personal Protective Equipment Failure:**

If any worker experiences a failure or alteration of protective equipment that affects the protection factor. The affected person and his/her buddy shall immediately leave the Exclusion Zone. Reentry shall not be permitted until the equipment has been repaired or replaced.

**5. Other Equipment Failure:**

If any other equipment fails to operate properly, the Project Team Leader and Safety Officer shall be notified and then determine the effect of this failure on continuing operations on site. If the failure affects the safety of personnel or prevents completion of the Work Plan tasks, all personnel shall leave the Exclusion Zone until the situation is evaluated and appropriate actions taken.



1. *The hazards have been reassessed.*
2. *The conditions resulting in the emergency have been corrected.*
3. *The Safety Plan has been reviewed, and personnel have been briefed on any changes in the Safety Plan.*

This plan has been reviewed and has the full approval of the following Management.

NAME: \_\_\_\_\_  
TITLE: \_\_\_\_\_  
DATE: \_\_\_\_\_

[illegible]



Appendix D

OSE Plugging Forms from Enviro Drill





# PLUGGING RECORD



**NOTE:** A Well Plugging Plan of Operations shall be approved by the State Engineer prior to plugging - 19.27.4 NMAC

## I. GENERAL / WELL OWNERSHIP:

State Engineer Well Number: MW-J3

Well owner: ENMRD-OIL CONSERVATION DIVISION C/O SOUDER MILLER Phone No.: 505-325-7535

Mailing address: 401 WEST BROADWAY

City: FARMINGTON State: NM Zip code: 87401

## II. WELL PLUGGING INFORMATION:/

- 1) Name of well drilling company that plugged well: ENVIRO-DRILL, INC.
- 2) New Mexico Well Driller License No.: WD 1186 Expiration Date: 03/31/16
- 3) Well plugging activities were supervised by the following well driller(s)/rig supervisor(s): RODNEY HAMMER
- 4) Date well plugging began: 02-24-14 Date well plugging concluded: 02/25/14
- 5) GPS Well Location: Latitude: 36 deg, 43 min, 41.24 sec  
Longitude: -108 deg, 19 min, 45.24 sec, NAD83
- 6) Depth of well confirmed at initiation of plugging as: 18 ft below ground level (bgl),  
by the following manner: \_\_\_\_\_
- 7) Static water level measured at initiation of plugging: 6 ft bgl
- 8) Date well plugging plan of operations was approved by the State Engineer: 02/26/14
- 9) Were all plugging activities consistent with an approved plugging plan? YES If not, please describe differences  
between the approved plugging plan and the well as it was plugged (attach additional pages as needed):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



- 10) Log of Plugging Activities - Label vertical scale with depths, and indicate separate plugging intervals with horizontal lines as necessary to illustrate material or methodology changes. Attach additional pages if necessary.

For each interval plugged, describe within the following columns:

Depth (ft bgl)	Plugging Material Used (include any additives used)	Volume of Material Placed (gallons)	Theoretical Volume of Borehole/ Casing (gallons)	Placement Method (tremie pipe, other)	Comments ("casing perforated first", "open annular space also plugged", etc.)
	PORTLAND TYPE I/II MIXED W/WATER	4.5 GALLONS	2.67	TREMIE FROM BOTTOM TO TOP	

MULTIPLY	BY	AND OBTAIN
cubic feet x	7.4805	= gallons
cubic yards x	201.97	= gallons

**III. SIGNATURE:**

I, Rodney Hammer, say that I am familiar with the rules of the Office of the State Engineer pertaining to the plugging of wells and that each and all of the statements in this Plugging Record and attachments are true to the best of my knowledge and belief.

Rodney Hammer

Signature of Well Driller

4-8-14

Date





# PLUGGING RECORD



**NOTE:** A Well Plugging Plan of Operations shall be approved by the State Engineer prior to plugging - 19.27.4 NMAC

## I. GENERAL / WELL OWNERSHIP:

State Engineer Well Number: MW-J4  
Well owner: ENMRD-OIL CONSERVATION DIVISION C/O SOUDER MILLER Phone No.: 505-325-7535  
Mailing address: 401 WEST BROADWAY  
City: FARMINGTON State: NM Zip code: 87401

## II. WELL PLUGGING INFORMATION:/

- 1) Name of well drilling company that plugged well: ENVIRO-DRILL, INC.
- 2) New Mexico Well Driller License No.: WD 1186 Expiration Date: 03/31/16
- 3) Well plugging activities were supervised by the following well driller(s)/rig supervisor(s): RODNEY HAMMER
- 4) Date well plugging began: 02-24-14 Date well plugging concluded: 02/25/14
- 5) GPS Well Location: Latitude: 36 deg, 43 min, 41.22 sec  
Longitude: -108 deg, 19 min, 44.04 sec, NAD83
- 6) Depth of well confirmed at initiation of plugging as: 18.5 ft below ground level (bgl),  
by the following manner: \_\_\_\_\_
- 7) Static water level measured at initiation of plugging: 5.8 ft bgl
- 8) Date well plugging plan of operations was approved by the State Engineer: 02/26/14
- 9) Were all plugging activities consistent with an approved plugging plan? YES If not, please describe differences  
between the approved plugging plan and the well as it was plugged (attach additional pages as needed):  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



- For each interval plugged, describe within the following columns:**

MULTIPLY		BY	AND OBTAIN	
cubic feet	x	7.4805	=	gallons
cubic yards	x	201.97	=	gallons

**III. SIGNATURE:**  
I, Rodney Hammer, say that I am familiar with the rules of the Office of the State Engineer pertaining to the plugging of wells and that each and all of the statements in this Plugging Record and attachments are true to the best of my knowledge and belief.

Signature of Well Driller

Date \_\_\_\_\_







- For each interval plugged, describe within the following columns:**

MULTIPLY		BY	AND OBTAIN
cubic feet	x	7.4805	= gallons
cubic yards	x	201.97	= gallons

I, Rodney Hammer, say that I am familiar with the rules of the Office of the State Engineer pertaining to the plugging of wells and that each and all of the statements in this Plugging Record and attachments are true to the best of my knowledge and belief.

Signature of Well Driller

Date \_\_\_\_\_



## Appendix E – Field Notes



Field Notes

Monitoring Well Plugging

Gloria Chavez Property

March 31, 2014

SMA on site at 11:45 AM, Denny Foust and Alicia Patterson, waited on EnviroDrill until 12:20 PM.

Shortly after Enviro-Drill arrived, NMOCD personnel Brandon Powell and Korey Smith arrived on site.

SMA held a short tailgate safety meeting.

Enviro-Drill rigged up and proceeded with plugging Monitoring wells J3-J-5 from 12:30 PM through 1340 PM.

Enviro-Drill filled the wellbore with cement grout to three feet below ground level, cut-off 2" PVC three feet below surface, pulled the manways and removed concrete supporting the manways , then placed one foot or 1.5 gallons of concrete on top of the grout filled casing and backfilled with two feet of soil.

SMA hauled off the concrete and manways for disposal. SMA left the site at 14:30 PM