AP - 65

STAGE 1 & 2 REPORTS

DATE:
July 24, 2009

July 24, 2009

STAGE 1 FINAL INVESTIGATION REPORT AND REQUEST FOR TERMINATION

EME M-9 SWD FACILITY (AP-65)

T20S, R37E, SECTION 9, UNIT LETTER M
LEA COUNTY, NEW MEXICO

Prepared by:

TRIDENT ENVIRONMENTAL

P. O. Box 7624
Midland, Texas 79708

Prepared for:

RICE OPERATING COMPANY
ROC
SINCE 1955

122 West Taylor
Hobbs, New Mexico
88240

TRIDENT ENVIRONMENTAL

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RETURN RECIEPT NO. 7099 3400 0017 1737 1902

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July 24, 2009

Mr. Ed Hansen
New Mexico Energy, Minerals, & Natural Resources
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87504

RE: STAGE 1 FINAL INVESTIGATION REPORT AND REQUEST FOR TERMINATION
EME M-9 SWD FACILITY (AP-65)
T20S, R37E, SECTION 9, UNIT LETTER M
LEA COUNTY, NEW MEXICO

Mr. Hansen:

On behalf of Rice Operating Company (ROC), we would like to request termination of further corrective actions associated with the above-referenced site. The attached *Stage 1 Final Investigation Report and Request for Termination* includes the findings from recent investigation activities in accordance with the NMOCD-approved Stage 1 Abatement Plan. In addition, soil sampling results from past investigations are also reviewed and discussed. A request for termination is made based on the conclusions presented in Section 7.0 and summarized below.

- Review of previous investigations and the results of the Stage 1 investigation uphold our conclusion that operation of the M-9 SWD has not caused any significant degradation to the vadose zone. Chloride concentrations in the vadose zone of all borings, monitoring wells, and excavations averaged less than 250 ppm which is representative of background levels.
- The excavation, backfilling, and installation of a clay layer performed by ROC, as described in the EME M-9 SWD Facility Excavation Closure Report, has mitigated any potential threat of constituents of concern (BTEX, chlorides, or TDS) from the former redwood tank area into the vadose zone or groundwater.
- Groundwater quality conditions on site are at or near background levels.
- Six years of groundwater monitoring have supported the conclusions herein; therefore, further corrective action to the vadose zone or groundwater is not warranted.

ROC has effectively and sufficiently mitigated any threat to groundwater through their remedial actions. Based on the results of investigation and characterization activities and statements provided herein, there is no indication that ROC has contributed to the degradation of groundwater quality; therefore, ROC respectfully requests OCD approval for termination of further corrective actions related to this site. Upon NMOCD approval of site termination, ROC will plug the monitoring wells.

ROC is the service provider (agent) for the EME SWD System and has no ownership of any portion of pipeline, well, or facility. The EME SWD System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

Thank you for your consideration concerning this request. If you have any questions, please contact me at (432) 638-8740 or Hack Conder at (575) 393-9174.

Sincerely,

Gilbert J. Van Deventer, PG, REM

cc: Hack Conder (ROC)
Brad Jones (NMOCD Santa Fe)
Buddy Hill (NMOCD-District 1)

Gil Van Deventer

From: "Gil Van Deventer" <gilbertvandeventer@suddenlink.net>
To: "Hansen, Edward J., EMNRD" <edwardj.hansen@state.nm.us>
Cc: "Johnson, Larry, EMNRD" <larry.johnson@state.nm.us>; "Geoffrey Leking" <GeoffreyR.Leking@state.nm.us>; "Buddy Hill" <larry.hill@state.nm.us>; "Haskell Conder" <hconder@riceswd.com>; "Katie Jones" <kjones@riceswd.com>; "Jones, Brad A., EMNRD" <brad.a.jones@state.nm.us>
Sent: Friday, July 24, 2009 12:46 PM
Attach: EME M-9 SWD_Stage1_FIR_TermReq.pdf; EME M-9 SWD_Stage1_FIR_TermReq_xmit ltr.pdf
Subject: Stage 1 Final Investigation Report and Termination Request for the EME M-9 SWD Facility (AP-65)

Attention: Edward Hansen, New Mexico Oil Conservation Division - Environmental Bureau

Subject: Stage 1 Final Investigation Report and Request for Termination

Site Name: EME M-9 SWD Facility (AP-65)

Site Agent: RICE Operating Company

Site Location: T20S-R37E-Section 9, Unit Letter M, Lea County, New Mexico

Hello Edward:

Attached is the *Stage 1 Final Investigation Report and Request for Termination* for the EME M-9 SWD Facility (AP-65). One complete hard copy and one copy on compact disk will be sent to you via USPS Certified Mail (# 7099 3400 0017 1737 1902) today. Upon receipt from Trident, ROC will also deliver a copy to the NMOCD District 1 office in Hobbs.

We look forward to hearing from you or meet you for approval of this request. Please feel free to contact me at 432-638-8740, or Hack Conder at ROC (575-393-9174).

Thank you,

Gil

Gilbert J. Van Deventer, PG, REM
Trident Environmental
P. O. Box 7624, Midland TX 79708
Work/Mobile 432-638-8740
Fax: 413-403-9968
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1.0 EXECUTIVE SUMMARY

This Stage 1 Final Investigation Report and Request for Termination includes the findings from recent investigation activities in accordance with the NMOCD-approved Stage 1 Abatement Plan. In addition, soil sampling results from past investigations are also reviewed and discussed. A request for termination is made based on the conclusions presented in Section 7.0.

- Review of previous investigations and the results of the Stage 1 investigation uphold our conclusion that operation of the M-9 SWD has not caused any significant degradation to the vadose zone. Chloride concentrations in the vadose zone of all borings, monitoring wells, and excavations averaged less than 250 ppm which is representative of background levels.
- The excavation, backfilling, and installation of a clay layer performed by ROC, as described in the *EME M-9 SWD Facility Excavation Closure Report*, has mitigated any potential threat of constituents of concern (BTEX, chlorides, or TDS) from the former redwood tank area into the vadose zone or groundwater.
- Groundwater quality conditions on site are at or near background levels.
- Six years of groundwater monitoring have supported the conclusions herein; therefore, further corrective action to the vadose zone or groundwater is not warranted.

ROC has effectively and sufficiently mitigated any threat to groundwater through their remedial actions. Based on the results of investigation and characterization activities and statements provided herein, there is no indication that ROC has contributed to the degradation of groundwater quality; therefore, ROC respectfully requests OCD approval for termination of further corrective actions related to this site. Upon NMOCD approval of site termination, ROC will plug the monitoring wells.

2.0 CHRONOLOGY OF EVENTS

September 17, 2001	Subsurface soil investigation with a backhoe, field test for chloride and hydrocarbon levels. Sampling results indicated TPH and chloride impacts approaching the depth to groundwater at about 18 feet below ground surface (bgs).
April 2, 2002	A monitoring well (MW-1) was installed a few feet south of the former redwood tanks to further assess if groundwater was impacted with chlorides.
May 9, 2002	ROC submitted notification of groundwater impact to the NMOCD office in Santa Fe.
June 19, 2002	Excavation operations began with the removal of the redwood tanks in accordance with the *Redwood Tank Replacement/Closure Plan for EME SWD Site M-9* (July 26, 2001). Five junction boxes were also removed as they were within the area excavated at the facility. Excavation of approximately 8,000 cubic yards of TPH impacted soil was completed to a depth of 20 feet bgs and was remediated on site. Due to the horizontal extent of the excavation, monitoring well MW-1 was lost.
September 9, 2002	Lining and backfilling of excavation was completed.
October 10, 2002	A replacement monitoring well (MW-1A) was installed immediately adjacent to the southeast corner of the excavated area. Subsequent sampling of MW-1A confirmed chloride and TDS levels slightly above WQCC standards, however BTEX concentrations were well below the WQCC standards.
November 4, 2002	The *EME M-9* SWD *Facility Excavation Closure Report* was submitted to the NMOCD.
June 20, 2003	A work plan proposing a groundwater investigation was submitted by Trident Environmental.
June 27, 2003	The work plan was approved by the NMOCD.
August 20, 2003	Monitoring wells MW-2 and MW-3 were installed approximately 120 feet downgradient (southeast) and approximately 130 feet upgradient (northwest) of MW-1A, respectively.
February 17, 2004	Monitoring well MW-4 was installed approximately 150 feet southeast of MW-2 for further downgradient delineation.
March 23, 2005	The 2004 Annual Monitor Well Report for the M-9 SWD facility was submitted.
March 28, 2005	Trident Environmental submitted an Investigation and Characterization Plan (ICP) to address potential groundwater concerns.
May 5, 2005	Mr. Daniel Sanchez of the OCD requested that ROC submit an abatement plan to the OCD pursuant to Rule 19.
January 3, 2006	A Stage 1 Abatement Plan was prepared by R. T. Hicks Consultants Ltd. and submitted to the NMOCD.
January 3, 2006	The 2005 Annual Groundwater Monitoring Report for the M-9 SWD facility was included as part of the Stage 1 Abatement Plan.

March 30, 2006	NMOCD gave verbal approval of the Stage 1 Abatement Plan Proposal and subsequently assigned it case number AP-65.
April 12, 2006	Monitoring well MW-5 was installed approximately 200 feet east of the abandoned water well.
February 6, 2007	The 2006 Annual Groundwater Monitoring Report for the M-9 SWD facility was prepared by Trident Environmental and submitted to the NMOCD.
December 17, 2007	Monitoring well MW-6 was installed approximately 100 feet northwest of monitoring well MW-3 to further assess upgradient conditions.
March 20, 2008	The 2007 Annual Groundwater Monitoring Report for the M-9 SWD facility was prepared by Trident Environmental and submitted to the NMOCD.
February 18, 2009	The 2008 Annual Groundwater Monitoring Report for the M-9 SWD facility was prepared by Trident Environmental and submitted to the NMOCD.
February 20, 2009	A request for the suspension of BTEX sampling at monitoring wells MW-5 and MW-6 was submitted to NMOCD by Trident Environmental

3.0 BACKGROUND

3.1 Site Location and Land Use

The M-9 SWD facility is located in Township 20 South, Range 37 East, Section 9, unit letter M approximately 3 miles south of Monument, NM as shown on the topographic map (Figure 1) and aerial photographic map (Figure 2). Land in the site area is primarily utilized for crude oil production and cattle grazing. The M-9 SWD facility collects produced water gathered by the EME SWD System for disposal into the M-9 SWD well. ROC is the service provider (agent) for the EME SWD System and has no ownership of any portion of the pipeline, well, or facility. The System is owned by a consortium of oil producers, System Parties, who provide all operating capital on a percentage ownership/usage basis.

The M-9 SWD facility is located on Fee land owned by S-W Cattle Company. The 2 acre site lease agreement has been in effect since 1989 and will continue until 2009 when a new lease agreement will be due. The S-W Cattle Company also has a grazing allotment (GR-1135) on state-owned land in section 16 that adjoins the south boundary of the site.

A high concentration of oil & gas wells (active and plugged) and associated structures (tank batteries, pits, pipelines, etc.) are located in all adjoining areas of the M-9 SWD facility as shown in Figure 2 below.

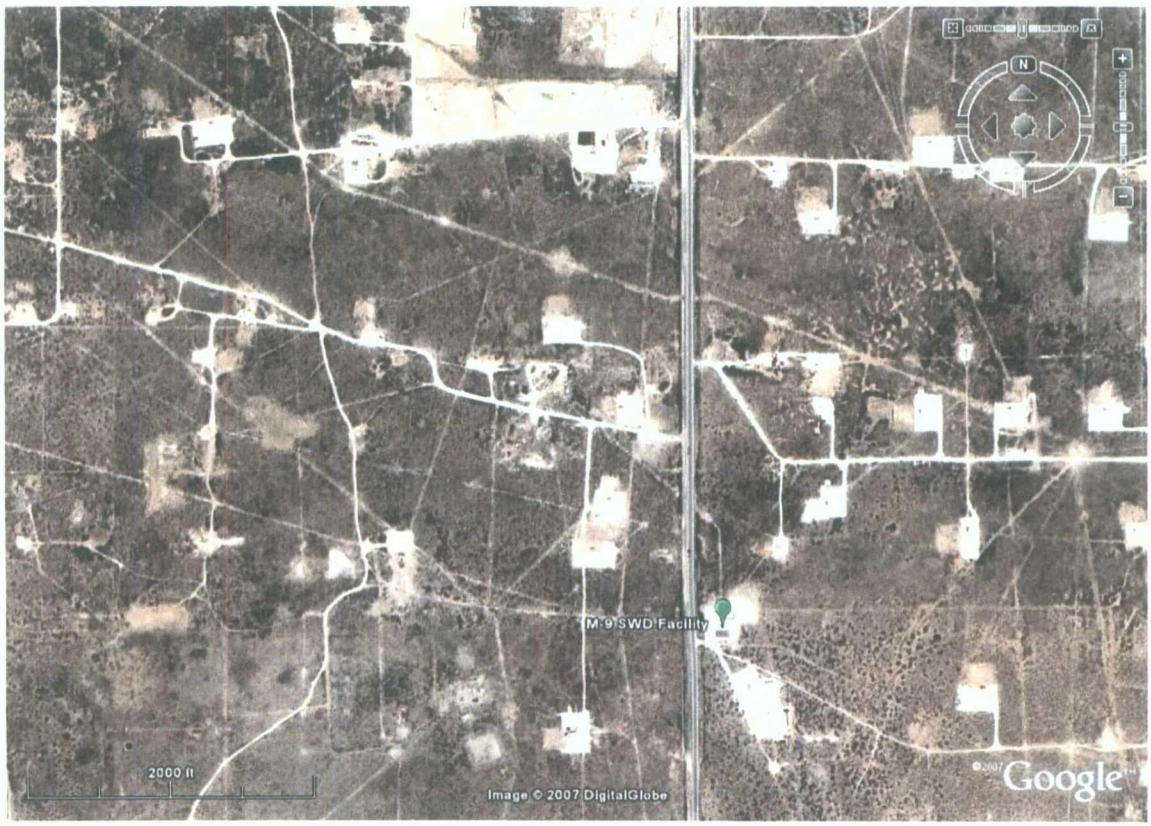
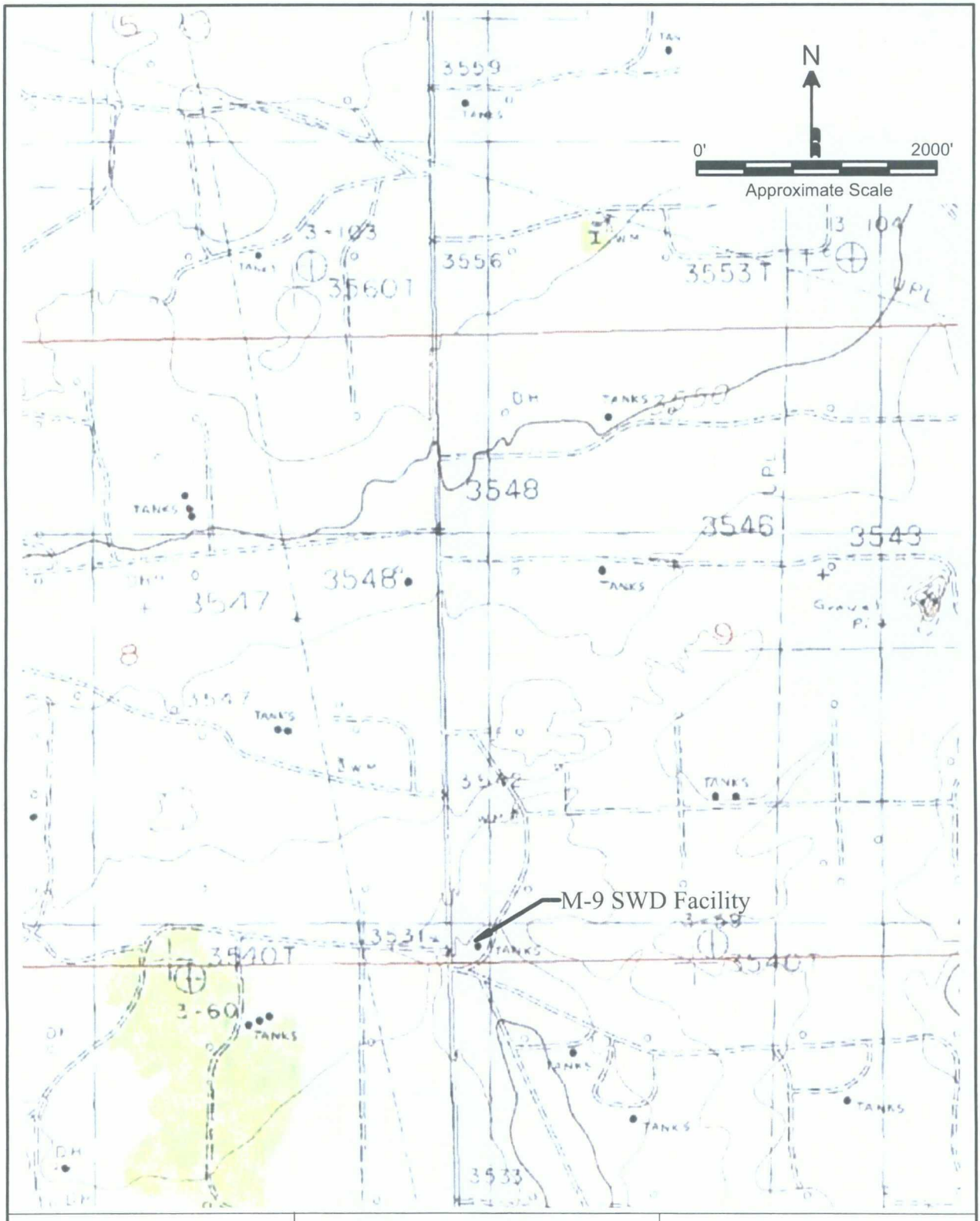


Figure 2: Aerial Photograph (April 2004)



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EME M-9 SWD FACILITY

T20S-R37E-Section 9 - Unit M

RICE *Operating Company*

FIGURE 1

TOPOGRAPHIC MAP

3.2 Summary of Previous Work and Investigations

Initial soil sampling activities for delineation of the M-9 SWD facility began on September 17, 2001, prior to the removal of the redwood tanks. Sampling results indicated TPH and chloride impacts approaching the depth to groundwater at about 18 feet below ground surface (bgs). A monitoring well (MW-1) was installed on April 2, 2002. The subsurface soils primarily consist of caliche with varying amounts of very fine to fine-grained sand and some clayey silty fine sand.

On June 19, 2002 excavation operations began with the removal of the redwood tanks in accordance with the *Redwood Tank Replacement/Closure Plan for EME SWD Site M-9* (July 26, 2001). Excavation of approximately 8,000 cubic yards of TPH impacted soil was completed to a depth of 20 feet bgs and was remediated on site. Due to the horizontal extent of the excavation, monitoring well MW-1 had to be removed. Clean backfill was placed in the deep excavation from 20 feet to 16 feet bgs. A 12-inch compacted clay layer was then installed prior to backfilling with the remediated soil in 3-foot lifts. Backfilling was completed on September 9, 2002. Three new fiberglass tanks were installed along the south end of the fenced facility. The *EME M-9 SWD Facility Excavation Closure Report* detailing all of the above-referenced work was submitted to the NMOCD on November 4, 2002.

On October 10, 2002, a replacement monitoring well (MW-1A) was installed immediately adjacent to the southeast corner of the excavated area. Subsequent sampling of MW-1A confirmed that groundwater was impacted with chloride and TDS levels slightly above WQCC standards; however, BTEX concentrations were well below the WQCC standards.

A work plan proposing a groundwater investigation was submitted by Trident Environmental on June 20, 2003 and was approved by the NMOCD on June 27, 2003. In accordance with the work plan, monitoring wells MW-2 and MW-3 were installed approximately 120 feet downgradient (southeast) and approximately 130 feet upgradient (northwest) of MW-1A, respectively, on August 20, 2003. On February 17, 2004, monitoring well MW-4 was installed approximately 150 feet southeast of MW-2 for further downgradient delineation. In accordance with the Stage 1 Abatement Plan, monitoring well MW-5 was installed approximately 200 feet east of the abandoned water well in April 2006. In December 2007, monitoring well MW-6 was installed approximately 100 feet northwest of monitoring well MW-3 to further assess upgradient conditions. Quarterly monitoring of the groundwater has been conducted since the installation of all monitoring wells.

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 Regional and Local Geology

The site is underlain by Quaternary colluvium deposits composed of sand, silt, and gravel deposited by slopewash, and talus which were re-deposited from the underlying Ogallala Formation. These deposits are often calichified (indurated with cemented calcium carbonate) with caliche layers from 1 to 20 feet thick. The thickness of the colluvium deposits and Ogallala Formation at the M-9 SWD Facility is estimated at 40 feet; however, it varies locally as a result of significant paleo-topography at the top of the underlying Triassic Dockum Group. Since Cretaceous Age rocks in the region have been removed by pre-Tertiary erosion, the colluvial deposits and Ogallala Formation rest unconformably on the Triassic Dockum Group. The uppermost unit of the Dockum Group is the Chinle Formation, which primarily consists of micaceous red clay and shale but also contains thin interbeds of fine-grained sandstone and siltstone. The red clays and shale of the Chinle Formation act as an aquitard beneath the water bearing colluvial deposits and therefore limit the amount of recharge to the underlying Dockum Group.

Based on the descriptions provided in lithologic logs the subsurface soils are composed of caliche with varying amounts of very fine to fine-grained sand in matrix (0-12 ft) and clayey silty very fine-grained sand with varying amounts of soft caliche in matrix (12-30 ft). More detailed descriptions of the subsurface lithology are provided on the lithologic logs in Appendix A.

4.2 Regional and Local Hydrogeology

Potable groundwater used in southern Lea County is derived primarily from the Ogallala Formation and the Quaternary alluvium. Water from the Ogallala and alluvium aquifers in southern Lea County is used for irrigation, stock, domestic, industrial, and public supply purposes. Recent data from the five monitoring wells at the M-9 SWD facility shows that the water table slopes towards the southeast at a magnitude of approximately 0.003 ft/ft which is consistent with that of several other groundwater monitoring sites in the Monument area and the regional gradient as cited in published reports (Nicholsen and Clebsch, 1961). The most recent groundwater gradient at the M-9 SWD facility is shown in Figure 5. Depth to groundwater beneath the site area is approximately 17 feet bgs.

Water well records from the Office of the State Engineer (NMOSE) and the United States Geological Survey (USGS) websites were reviewed to determine if there are any active water supply wells in use for domestic, irrigation, livestock, municipal, or industrial purposes in the M-9 SWD area. Based on this review and several field reconnaissance efforts, there currently are no known potential water supply receptors within 1,000 feet of the M-9 SWD facility. Additional documentation of this review is provided in Appendix B.

There are no surface water bodies located within a mile of the site.

5.0 VADOSE ZONE CHARACTERISTICS

Results of previous soil and groundwater investigations were thoroughly described in the *EME M-9 SWD Facility Excavation Closure Report* and the *Stage 1 Abatement Plan*. Results of these previously reported soil sampling activities are summarized in Table 1 and depicted in Figures 3, 4, and 5.

Table 1

Summary of Soil Sampling Results

Soil Borings

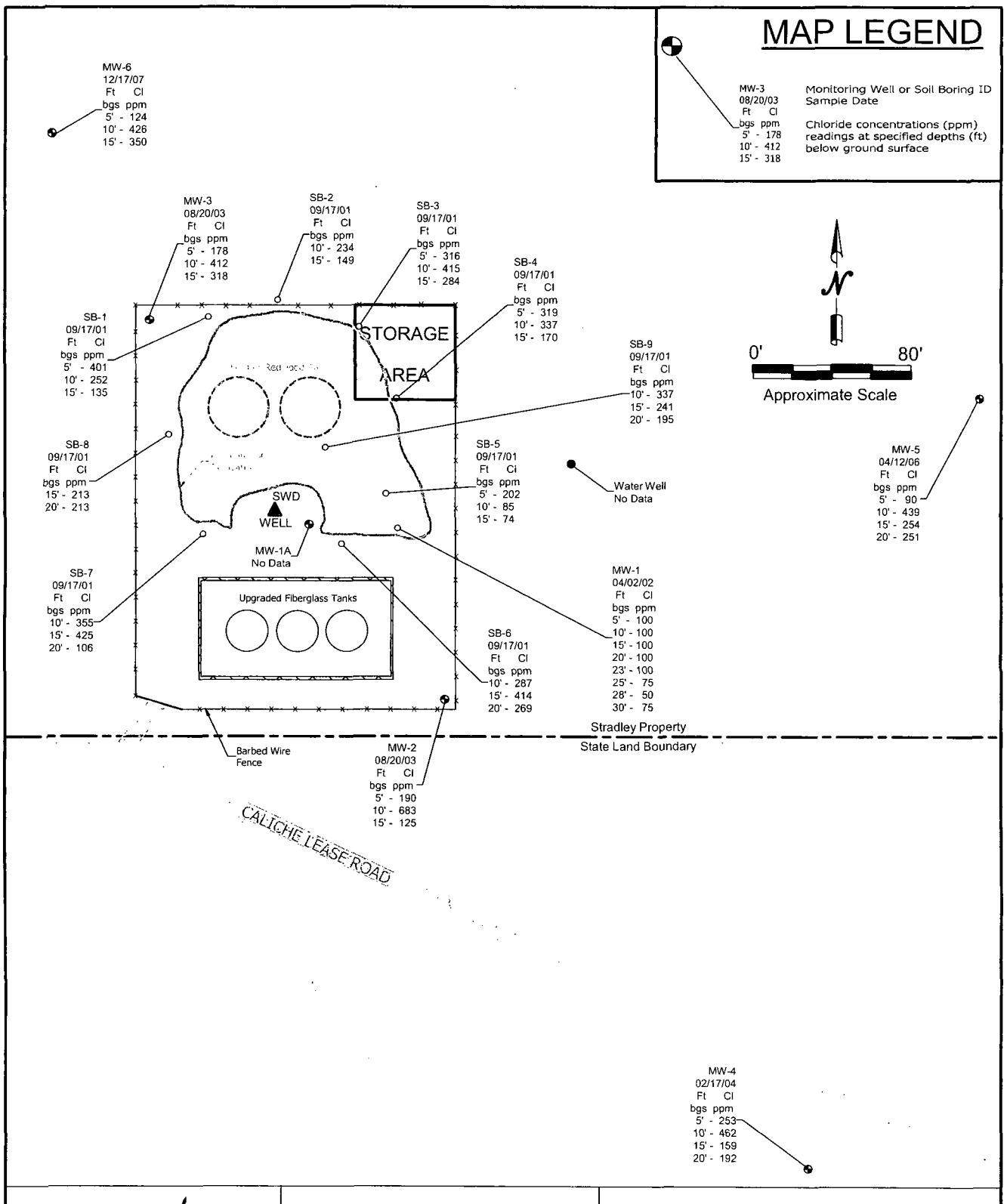
Sample ID	Sample Date	Depth (Ft bgs)	Chloride (ppm)
SB-1	9/17/01	5	401
		10	252
		15	135
SB-2	9/17/01	10	234
		15	149
SB-3	9/17/01	5	316
		10	415
		15	284
SB-4	9/17/01	5	319
		10	337
		15	170
SB-5	9/17/01	5	202
		10	85
		15	74
		30	542
SB-6	9/17/01	10	287
		15	414
		20	269
		25	542
SB-7	9/17/01	15	425
		20	106
SB-8	9/17/01	15	213
		20	213
SB-9	9/17/01	10	337
		15	241
		20	195

Monitoring Wells

Monitoring Well	Sample Date	Depth (Ft bgs)	Chloride (ppm)
MW-1	4/2/02	5	100
		10	100
		15	100
		20	100
		23	100
		25	75
		28	50
		30	75
MW-2	8/20/03	5	190
		10	683
		15	125
MW-3	8/20/03	5	178
		10	412
		15	318
MW-4	2/17/04	5	253
		10	462
		15	159
		20	192
MW-5	4/12/06	5	90
		10	439
		15	254
		20	251
MW-6	12/17/07	5	124
		10	426
		15	350

Soil borings SB-1 through SB-9 were sampled outside the perimeter of the excavated area as shown in Figure 3.
Monitoring wells MW-1 through MW-6 were installed as shown in Figure 5.
Chloride values listed above performed using field-adapted Method 9253

Based on the extensive soil sampling performed to date there is no evidence that the M-9 SWD facility contributed to the chloride and TDS levels in groundwater. Chloride concentrations in the vadose zone of all borings, monitoring wells, and excavations averaged less than 250 ppm which is representative of background levels. Furthermore, the excavation, backfilling, and installation of a clay layer performed by ROC, as described in the *EME M-9 SWD Facility Excavation Closure Report*, has mitigated any potential threat of constituents of concern (BTEX, chlorides, or TDS) from the former redwood tank area; therefore, further characterization of the vadose zone has not been necessary.



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EME M-9 SWD SITE

T20S-R37E-Section 9 - Unit M

RICE *Operating Company*

FIGURE 3

FIELD CHLORIDE TESTING RESULTS

SAMPLE LEGEND

Test Point	Cl	TPH
#1 Wall Composite	245	<10
#2 Bottom Composite	95	<10
#3 Injection Well Wall	425	362

Lab results listed in milligrams per kilogram (mg/kg)

Clay Density Test

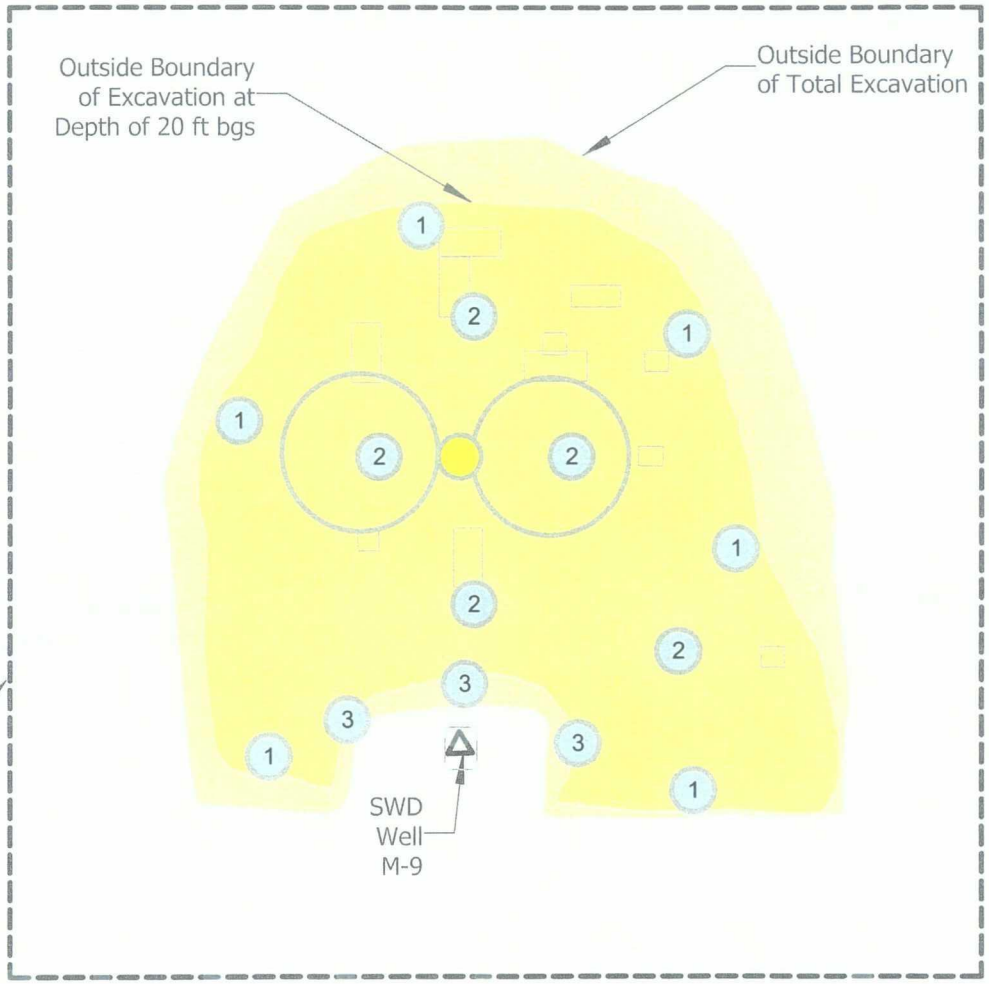
Composite Test Points

This diagram reproduced from Exhibit 6 in Excavation Closure Report (November 4, 2002).

N

0' Feet 30'

Approximate Scale



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EME M-9 SWD FACILITY

T20S-R37E-Section 9 - Unit M

RICE Operating Company

FIGURE 4

EXCAVATION CLOSURE SAMPLE RESULTS

August 30, 2002

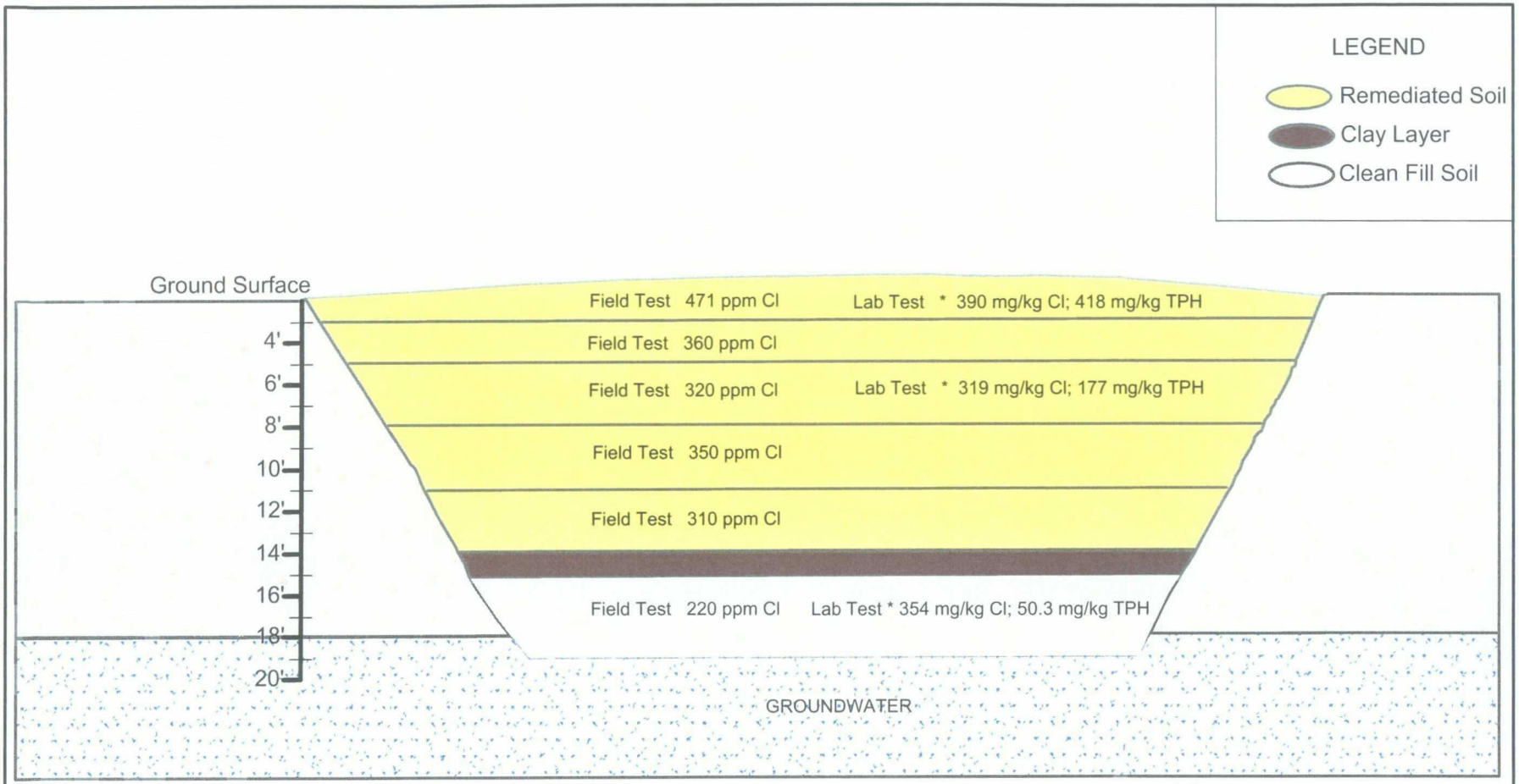

Diagram above reproduced from Exhibit 7 in Excavation Closure Report (November 4, 2002).

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EME M-9 SWD FACILITY

T20S-R37E-Section 9 - Unit M

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FIGURE 5

BACKFILL AND CLAY LAYER DIAGRAM

September 12, 2002

6.0 GROUNDWATER QUALITY

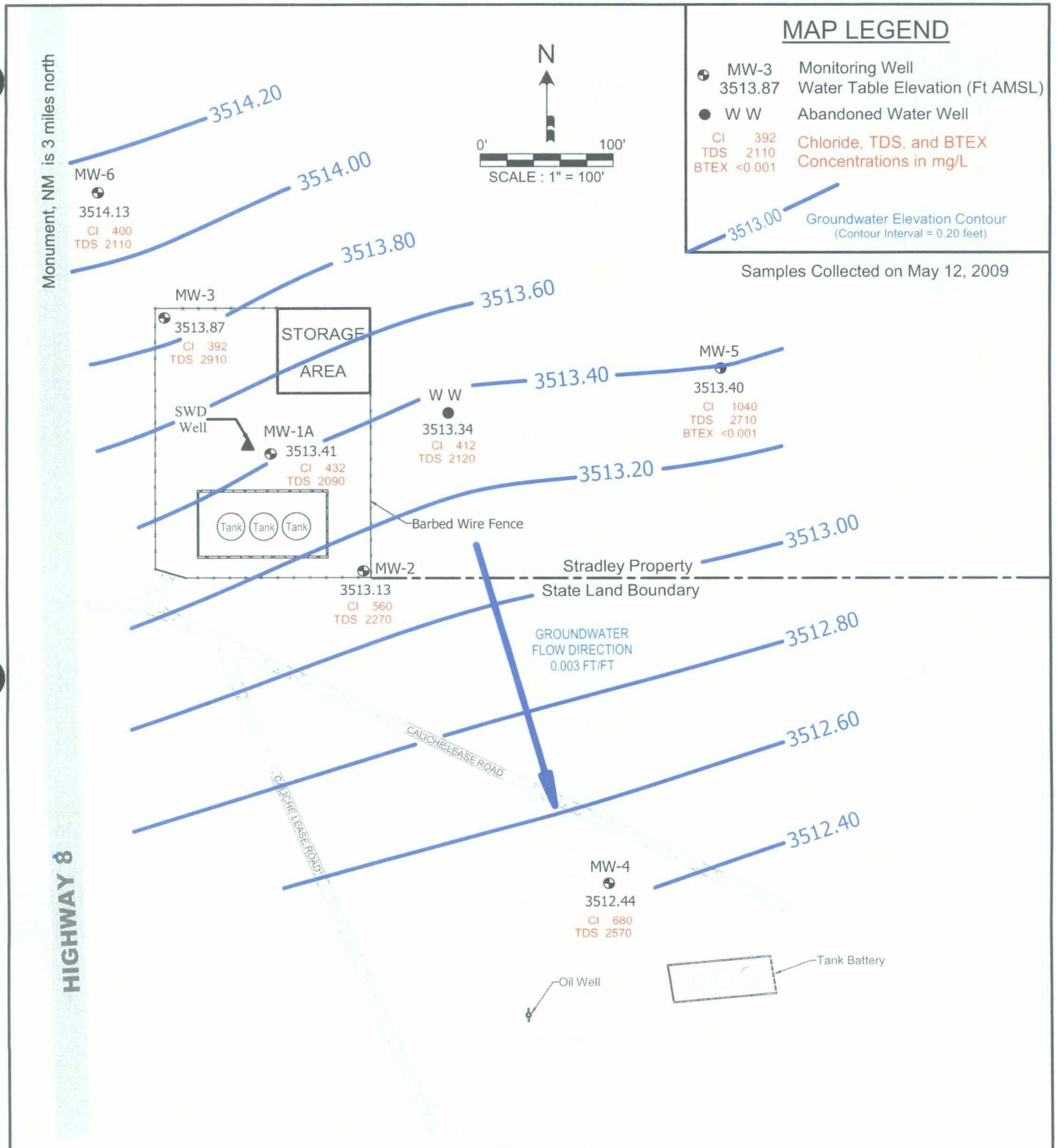
Monitoring wells MW-1, MW-2, MW-3, and MW-4 and water well WW-1 have been sampled on a quarterly basis for major ions, TDS, and BTEX. On April 12, 2006, an additional monitoring well (MW-5) was installed off site approximately 200 feet east of the abandoned water well to determine background concentrations of chlorides and TDS. On December 17, 2007, monitoring well MW-6 was installed approximately 100 feet northwest of MW-3 to further assess upgradient conditions. Copies of the lithologic logs and well completion diagrams for all monitoring wells are included in Appendix A. A summary of historical analytical results and groundwater elevations for all wells is listed in Table 2 on the following pages. Analytical results for the most recent sampling event conducted on November 8, 2008 are also shown on Figure 6. A copy of the laboratory analytical report and chain of custody form for the most recent groundwater sampling event is included in Appendix C.

6.1 Hydrocarbons in Groundwater

On May 19, 2006, the NMOCD approved the suspension of analysis for BTEX concentrations in monitoring wells MW-1, MW-2, MW-3, and MW-4, as each component of BTEX has been below the WQCC standards since August 22, 2003 for all monitoring wells.

6.2 Other Constituents of Concern

Chloride and TDS concentrations in monitoring wells MW-1A, MW-2, and MW-3 have remained relatively consistent over the past several years. Monitoring wells MW-3 and MW-6 are located upgradient of the former redwood tanks and are considered representative of the background conditions for the site, with average chlorides and TDS concentrations of 363 mg/L and 1,780 mg/L. The abandoned water well and recently installed monitoring well MW-5 indicate levels above background conditions which suggests that there is an offsite source of the elevated chlorides and TDS encroaching the site from the north. Chloride concentrations in the vadose zone of all borings, monitoring wells, and excavations averaged less than 250 ppm. Remediation activities performed by ROC during the facility upgrade in 2002 exclude the redwood tank area as a contributing source of chlorides and TDS observed in the abandoned water well or onsite monitoring wells.



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EME M-9 SWD SITE

T20S-R37E-Section 9 - Unit M

RICE Operating Company

FIGURE 6
GROUNDWATER GRADIENT AND CHLORIDE, TDS, & BTEX CONCENTRATION MAP

Table 2
Summary of Groundwater Monitoring Results

Monitoring Well	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
MW-1A	10/28/02	19.10	3510.69	**372**	**1470**	< 0.001	< 0.001	< 0.001	< 0.001
	02/28/03	18.48	3511.31	**372**	**1500**	0.002	0.002	0.002	0.003
	05/16/03	19.00	3510.79	**390**	**1470**	0.001	< 0.001	< 0.001	0.001
	08/22/03	19.38	3510.41	**372**	**1470**	0.002	< 0.001	< 0.001	< 0.001
	10/30/03	19.57	3510.22	**346**	**1530**	< 0.001	< 0.001	< 0.001	< 0.001
	02/20/04	19.41	3510.38	**337**	**1390**	0.001	< 0.001	< 0.001	< 0.001
	05/05/04	17.76	3512.03	**337**	**1400**	0.001	< 0.001	< 0.001	< 0.001
	08/11/04	18.27	3511.52	**390**	**1690**	0.003	< 0.001	< 0.001	< 0.001
	11/10/04	17.23	3512.56	**390**	**1740**	0.003	< 0.001	< 0.001	< 0.001
	02/08/05	15.90	3513.89	**304**	**1500**	0.003	< 0.001	< 0.001	0.001
	05/02/05	20.03	3509.76	**329**	**1450**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/05	16.61	3513.18	**286**	**1480**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/05	16.28	3513.51	**602**	**1340**	< 0.001	< 0.001	< 0.001	< 0.001
	02/14/06	16.09	3513.70	**277**	**1210**	0.002	0.002	0.003	0.006
	05/15/06	16.23	3513.56	**344**	**1470**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	16.69	3513.10	**355**	**1590**	---	---	---	---
	11/29/06	16.32	3513.47	**351**	**1510**	---	---	---	---
	03/05/07	16.24	3513.55	**328**	**1550**	---	---	---	---
	06/01/07	15.75	3514.04	**401**	**1590**	---	---	---	---
	08/09/07	16.63	3513.16	**410**	**1700**	---	---	---	---
	10/22/07	16.22	3513.57	**336**	**1814**	---	---	---	---
	02/29/08	16.12	3513.67	**408**	**1720**	---	---	---	---
	05/08/08	16.00	3513.79	**284**	**1500**	---	---	---	---
	08/05/08	16.83	3512.96	**440**	**1760**	---	---	---	---
	11/05/08	16.38	3513.41	**300**	**1620**	---	---	---	---
	02/10/09	16.42	3513.37	**400**	**1720**	---	---	---	---
	05/12/09	16.38	3513.41	**432**	**2090**	---	---	---	---
MW-2	08/22/03	21.45	3510.07	**603**	**2060**	< 0.001	< 0.001	< 0.001	< 0.001
	10/30/03	21.61	3509.91	**709**	**2300**	< 0.001	< 0.001	< 0.001	< 0.001
	02/20/04	21.44	3510.08	**478**	**1800**	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/04	19.67	3511.85	**328**	**1460**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/04	20.26	3511.26	**461**	**1770**	< 0.001	< 0.001	< 0.001	< 0.001
	11/10/04	19.13	3512.39	**346**	**1610**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/05	17.80	3513.72	**311**	**1390**	< 0.001	< 0.001	< 0.001	< 0.001
	05/02/05	21.94	3509.58	**295**	**1390**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/05	18.62	3512.90	**476**	**1840**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/05	18.24	3513.28	**440**	**1630**	< 0.001	< 0.001	< 0.001	< 0.001
	02/14/06	18.14	3513.38	**396**	**1490**	< 0.001	< 0.001	< 0.001	< 0.001
	05/15/06	18.23	3513.29	**471**	**1740**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	18.72	3512.80	**386**	**1790**	---	---	---	---
	11/29/06	18.33	3513.19	**432**	**1830**	---	---	---	---
	03/05/07	18.25	3513.27	**427**	**1810**	---	---	---	---
	06/01/07	17.75	3513.77	**498**	**1890**	---	---	---	---
	08/09/07	18.67	3512.85	**470**	**2050**	---	---	---	---
	10/22/07	18.25	3513.27	**500**	**2045**	---	---	---	---
	02/29/08	18.15	3513.37	**470**	**1980**	---	---	---	---
	05/08/08	17.99	3513.53	**390**	**2020**	---	---	---	---
	08/05/08	19.03	3512.49	**510**	**2070**	---	---	---	---
	11/05/08	18.58	3512.94	**352**	**2030**	---	---	---	---
	02/10/09	18.47	3513.05	**510**	**2160**	---	---	---	---
	05/12/09	18.39	3513.13	**560**	**2270**	---	---	---	---

Table 2
Summary of Groundwater Monitoring Results

Monitoring Well	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
MW-3	08/22/03	21.68	3510.76	**319**	**1590**	< 0.001	< 0.001	< 0.001	< 0.001
	10/30/03	21.86	3510.58	**328**	**1740**	< 0.001	< 0.001	< 0.001	< 0.001
	02/20/04	21.70	3510.74	**337**	**1550**	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/04	20.10	3512.34	**328**	**1530**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/04	20.62	3511.82	**337**	**1560**	< 0.001	< 0.001	< 0.001	< 0.001
	11/10/04	19.61	3512.83	**337**	**1600**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/05	18.26	3514.18	**312**	**1450**	< 0.001	< 0.001	< 0.001	< 0.001
	05/02/05	22.38	3510.06	**329**	**1510**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/05	18.95	3513.49	**300**	**1480**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/05	18.43	3514.01	**272**	**1510**	< 0.001	< 0.001	< 0.001	< 0.001
	02/14/06	18.38	3514.06	**349**	**1440**	< 0.001	< 0.001	< 0.001	< 0.001
	05/15/06	18.50	3513.94	**388**	**1710**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	19.04	3513.40	**407**	**1760**	---	---	---	---
	11/29/06	18.61	3513.83	**387**	**1790**	---	---	---	---
	03/05/07	18.49	3513.95	**371**	**1860**	---	---	---	---
	06/01/07	18.05	3514.39	**413**	**2000**	---	---	---	---
	08/09/07	18.93	3513.51	**398**	**1940**	---	---	---	---
	10/22/07	18.50	3513.94	**400**	**2150**	---	---	---	---
	02/29/08	18.35	3514.09	**376**	**2040**	---	---	---	---
	05/08/08	18.17	3514.27	**376**	**2070**	---	---	---	---
	08/05/08	19.18	3513.26	**370**	**1990**	---	---	---	---
	11/05/08	18.75	3513.69	**328**	**1780**	---	---	---	---
	02/10/09	18.63	3513.81	**350**	**1950**	---	---	---	---
	05/12/09	18.57	3513.87	**392**	**2110**	---	---	---	---
MW-4	02/20/04	22.61	3509.47	**585**	**1820**	< 0.001	< 0.001	< 0.001	< 0.001
	05/05/04	20.77	3511.31	**549**	**1760**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/04	21.28	3510.80	**567**	**1770**	< 0.001	< 0.001	< 0.001	< 0.001
	11/10/04	20.21	3511.87	**514**	**1790**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/05	18.90	3513.18	**520**	**1670**	< 0.001	< 0.001	< 0.001	< 0.001
	05/02/05	22.99	3509.09	**591**	**1790**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/05	19.75	3512.33	**571**	**1830**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/05	19.40	3512.68	**378**	**1850**	< 0.001	< 0.001	< 0.001	< 0.001
	02/14/06	19.33	3512.75	**729**	**2010**	< 0.001	< 0.001	< 0.001	< 0.001
	05/15/06	19.40	3512.68	**837**	**2400**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	19.87	3512.21	**793**	**2450**	---	---	---	---
	11/29/06	19.53	3512.55	**838**	**2360**	---	---	---	---
	03/05/07	19.49	3512.59	**827**	**2610**	---	---	---	---
	06/01/07	18.97	3513.11	**911**	**2840**	---	---	---	---
	08/09/07	19.87	3512.21	**863**	**2880**	---	---	---	---
	10/22/07	19.49	3512.59	**840**	**3069**	---	---	---	---
	02/29/08	19.45	3512.63	**820**	**3070**	---	---	---	---
	05/08/08	19.30	3512.78	**800**	**3070**	---	---	---	---
	08/05/08	20.29	3511.79	**780**	**2810**	---	---	---	---
	11/05/08	19.83	3512.25	**740**	**2860**	---	---	---	---
	02/10/09	19.71	3512.37	**740**	**2700**	---	---	---	---
	05/12/09	19.64	3512.44	**680**	**2570**	---	---	---	---

Table 2
Summary of Groundwater Monitoring Results

Monitoring Well	Sample Date	Depth to Groundwater (feet BTOC)	Groundwater Elevation (feet AMSL)	Chloride (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylene (mg/L)
MW-5	05/15/06	21.10	3513.55	**1230**	**2760**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	21.64	3513.01	**1060**	**2470**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/06	21.22	3513.43	**1040**	**2300**	< 0.001	< 0.001	< 0.001	< 0.001
	03/05/07	21.12	3513.53	**1070**	**2140**	< 0.001	< 0.001	< 0.001	< 0.001
	06/01/07	20.65	3514.00	**1140**	**2520**	< 0.001	< 0.001	< 0.001	< 0.001
	08/09/07	21.63	3513.02	**1130**	**2390**	< 0.001	< 0.001	< 0.001	< 0.001
	10/22/07	21.17	3513.48	**1150**	**2809**	< 0.001	< 0.001	< 0.001	< 0.001
	02/29/08	21.00	3513.65	**1200**	**2920**	< 0.001	< 0.001	< 0.001	< 0.003
	05/08/08	20.82	3513.83	**1240**	**3160**	< 0.002	< 0.002	< 0.002	< 0.006
	08/05/08	21.93	3512.72	**1280**	**2740**	< 0.001	< 0.001	< 0.001	< 0.003
	11/05/08	21.45	3513.20	**1160**	**2710**	< 0.001	< 0.001	< 0.001	< 0.003
	02/10/09	21.30	3513.35	**1100**	**2680**	< 0.001	< 0.001	< 0.001	< 0.003
	05/12/09	21.25	3513.40	**1040**	**2710**	< 0.001	< 0.001	< 0.001	< 0.003
MW-6	02/29/08	18.61	3514.36	**410**	**2110**	< 0.001	< 0.001	< 0.001	< 0.003
	05/08/08	18.49	3514.48	**420**	**2180**	< 0.002	< 0.002	< 0.002	< 0.006
	08/05/08	19.48	3513.49	**380**	**1930**	< 0.001	< 0.001	< 0.001	< 0.003
	11/05/08	19.04	3513.93	**368**	**2130**	< 0.001	< 0.001	< 0.001	< 0.003
	02/10/09	18.88	3514.09	**390**	**2060**	< 0.001	< 0.001	< 0.001	< 0.003
	05/12/09	18.84	3514.13	**400**	**2110**	< 0.001	< 0.001	< 0.001	< 0.003
WW	08/22/03	21.09	3509.37	---	---	---	---	---	---
	10/30/03	20.25	3510.21	**284**	**1150**	< 0.001	< 0.001	< 0.001	0.002
	02/20/04	20.07	3510.39	**292**	**1100**	< 0.001	< 0.001	< 0.001	0.002
	05/14/04	18.29	3512.17	**266**	**1040**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/04	18.92	3511.54	**266**	**1810**	< 0.001	< 0.001	< 0.001	< 0.001
	11/10/04	17.82	3512.64	**284**	**959**	< 0.001	< 0.001	< 0.001	< 0.001
	02/08/05	16.41	3514.05	**395**	**1180**	< 0.001	< 0.001	< 0.001	< 0.001
	05/02/05	20.54	3509.92	**866**	**2470**	< 0.001	< 0.001	< 0.001	< 0.001
	08/11/05	18.11	3513.12	**751**	**2900**	< 0.001	< 0.001	< 0.001	< 0.001
	11/29/05	17.60	3513.63	**775**	**2490**	< 0.001	< 0.001	< 0.001	< 0.001
	02/14/06	17.55	3513.68	**594**	**2270**	< 0.001	< 0.001	< 0.001	< 0.001
	05/15/06	17.58	3513.65	**651**	**2320**	< 0.001	< 0.001	< 0.001	< 0.001
	08/30/06	18.10	3513.13	**605**	**2310**	---	---	---	---
	11/29/06	17.74	3513.49	**853**	**2850**	---	---	---	---
	03/05/07	17.63	3513.60	**692**	**2220**	---	---	---	---
	06/01/07	17.16	3514.07	**568**	**2120**	---	---	---	---
	08/09/07	18.09	3513.14	**591**	**1960**	---	---	---	---
	10/22/07	17.62	3513.61	**556**	**1988**	---	---	---	---
	02/29/08	17.51	3513.72	**500**	**2140**	---	---	---	---
	05/08/08	17.36	3513.87	**396**	**2120**	---	---	---	---
	08/05/08	18.42	3512.81	**510**	**1470**	---	---	---	---
	11/05/08	17.93	3513.30	**316**	**1680**	---	---	---	---
	02/11/09	17.93	3513.30	**430**	**1530**	---	---	---	---
	05/12/09	17.89	3513.34	**412**	**2120**	---	---	---	---
			WQCC Standards	250	1000	0.01	0.75	0.75	0.62

Total Dissolved Soilds (TDS), chloride, and BTEX concentrations listed in milligrams per liter (mg/L)

BTEX analyses for monitoring wells MW-1A, MW-2, MW-3, and MW-4, and water well WW were suspended since approved by NMOCD on May 19, 200

Values in boldface type indicate concentrations exceed New Mexico Water Quality Commission (WQCC) standards.

AMSL - Above Mean Sea Level; BTOC - Below Top of Casing

Groundwater flow direction is to the southeast with a gradient of approx. 0.002 ft/ft.

Elevations and state plane coordinates surveyed by Basin Surveys, Hobbs, NM.

7.0 CONCLUSIONS

7.1 Corrective Action to the Vadose Zone

Review of previous investigations and the results of the Stage 1 investigation uphold our conclusion that operation of the M-9 SWD has not caused any significant degradation to the vadose zone. Chloride concentrations in the vadose zone of all borings, monitoring wells, and excavations averaged less than 250 ppm which is representative of background levels. The former redwood tanks and junction boxes were physically removed thus eliminating any future threat of a release from these sources. The excavation, backfilling, and installation of a clay layer performed by ROC, as described in the *EME M-9 SWD Facility Excavation Closure Report*, has mitigated any potential threat of constituents of concern (BTEX, chlorides, or TDS) from the former redwood tank area; therefore, further characterization of the vadose zone is not necessary.

7.2 Corrective Action to the Groundwater

Chloride and TDS concentrations at the onsite monitoring wells (MW-1A, MW-2, and MW-3) are slightly above WQCC standards; however, they are consistent with background concentrations. Therefore, further corrective action to the on site groundwater is not necessary.

The offsite source of groundwater impact east and southeast of the M-9 SWD facility as evidenced from offsite monitoring wells MW-4, MW-5, and the abandoned water well (WW-1) is unknown because of the numerous potential facilities, past and present, located north, northwest, south, and southeast of the M-9 SWD facility.

7.3 Request for Termination

ROC has effectively and sufficiently mitigated any threat to groundwater through their remedial actions. Based on the results of investigation and characterization activities and statements provided herein, there is no indication that ROC has contributed to the degradation of groundwater quality; therefore, ROC respectfully requests OCD approval for termination of further corrective actions related to this site. Upon NMOCD approval of site termination, ROC will plug the monitoring wells.

APPENDIX A

LITHOLOGIC LOGS

AND

MONITORING WELL CONSTRUCTION DIAGRAMS

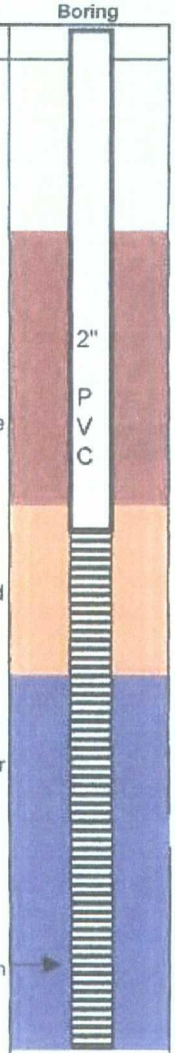
MW-1

DRILLING LOG	Site Name/Location				
RICE *Operating Company*	**M-9 SWD Facility**	Well No.: MW1	Date Dated: 4/2/02	Driller: Eades	Logged by: F. Root
122 West Taylor	**9-T20S-R37E**	Well Depth: 35'	Boring Depth: 35'	Well Material: PVC	Construction:
Hobbs, New Mexico 88240	**EME**	Casing Length: 20'	Boring Diameter: 4.75"	Casing Size: 2"	Sand and bentonite above screen.
Phone: (505) 393-9174	**SWD System**	Screen Length: 15'	Drilling Method: Air Rotary	Slot Size: N/A	
Fax: (505) 397-1471	**Lea County, NM**				

DEPTH	SUBSURFACE LITHOLOGY	SAMPLE TYPE	TEST (ppm) Cl	REMARKS TPH (EPA 418.1) ppm	MW Boring
0	Ground surface				
1	Topsoil				
2					
3	Sand & sandy clay				
4					
5		Grab	100	13	
6				cuttings	
7					
8					
9					
10		Grab	100	10	2" PVC
11					
12					
13					
14					
15		Grab	100	14	
16				bentonite	
17					
18	Sand				
19					
20	Sand & sandy brown clay	Grab	100	17	
21					
22					
23		Grab	100	13	
24				water	
25		Grab	75	14	
26					
27					
28		Grab	50	20	
29					
30		Grab	75	16	
31				screen	
32					
33					
34					
35					

DRILLING LOG	Site Name/Location	BORING/WELL INFORMATION			Logged by: A. Eades
RICE *Operarting Company*	**M-9 SWD Facility**	Well No.: MW - 1A	Date Drilled: 10-10-02	Driller: Eades	Completion:
122 West Taylor	**9-T20S-R37E**	Well Depth: 29'	Boring Depth: 29'	Well Material: PVC	Sand and
Hobbs, New Mexico 88240	**EME SWD System**	Casing Length: 29"	Boring Diameter: 4.5"	Casing Size: 2"	bentonite above
(505) 393-9174	**Lea County, NM**	Screen Length: 15'	Drilling Method: Air Rotary	Slot Size: N/A	screen.

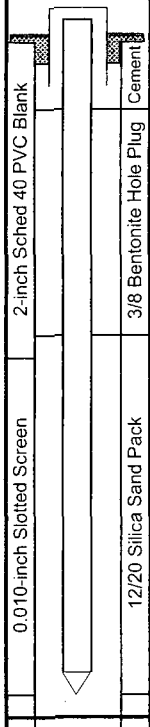
DEPTH	SUBSURFACE LITHOLOGY	SAMPLE TYPE	Test Results (ppm) Cl⁻	TPH	REMARKS	Boring
0	Ground surface		Titrate	EPA 418.1		
1	Topsoil					
2						
3					grout	
4						
5						
6						
7						
8						
9						
10						
11					bentonite	
12	Caliche					
13						
14						
15						
16					sand	
17						
18						
19						
20						
21					water	
22						
23						
24						
25						
26						
27					screen	
28						
29	Sand					



LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL
PO BOX 7624
MIDLAND, TEXAS 79708

MONITOR WELL NO.:	MW-2	TOTAL DEPTH:	29 Feet
SITE ID:	EME M-9	CLIENT:	Rice Operating Company
SURFACE ELEVATION:	3528.9	COUNTY:	Lea
CONTRACTOR:	Eades Drilling & Pump Service	STATE:	New Mexico
DRILLING METHOD:	Air Rotary	LOCATION:	T20S-R37E-Sec 9-Unit M
START DATE:	08/20/03	FIELD REP.:	G. Van Deventer
COMPLETION DATE:	08/20/03	FILE NAME:	Projects/Rice/MW_Diagram.xls
COMMENTS:	Located inside southeast corner of fence.		



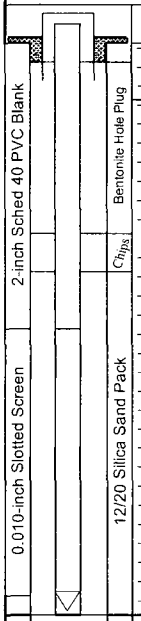
Depth	Time	Type	Chloride (ppm)	LITH.	USCS	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING
	1022	Surface			CAL	Unconsolidated caliche gravel cover.
5	1024	Cuttings	190 (field)			Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains.
10	1030	Split Spoon	683 (field) 532 (lab)			As above (Split Spoon sample taken from 9' - 11')
15	1044	Split Spoon	125 (field) 70.9 (lab)		CAL/ SM	As above (Split Spoon sample taken from 13' - 15')
						Groundwater encountered at 18 ft below ground surface.
20	1055	Cuttings				Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains.
25	1058	Cuttings				Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains, moderately moist.
30	1100	Cuttings				Lithology as above. Bottom of boring at 30 ft below ground surface.

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL
PO BOX 7624
MIDLAND, TEXAS 79708

MONITOR WELL NO.: MW-3
SITE ID: EME M-9
SURFACE ELEVATION: 3529.9
CONTRACTOR: Eades Drilling & Pump Service
DRILLING METHOD: Air Rotary
START DATE: 08/20/03
COMPLETION DATE: 08/20/03
COMMENTS: Located inside northwest corner of fence.

TOTAL DEPTH: 30 Feet
CLIENT: Rice Operating Company
COUNTY: Lea
STATE: New Mexico
LOCATION: T20S-R37E-Sec 9-Unit M
FIELD REP.: G. Van Deventer
FILE NAME: Projects/Rice/MW_Diagram.xls



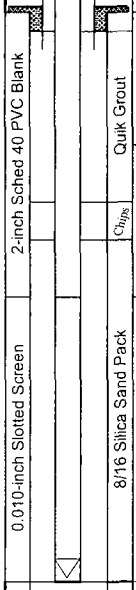
LITH.	USCS	Sample Depth	Sample Time	Sample Type	Chloride (ppm)	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING FEATURES
	CAL		0828	Surface		Unconsolidated caliche gravel cover.
	CAL/ SM	5	0830	Cuttings	178 (field)	Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains.
		10	0845	Split Spoon	412 (field)	As above (Split Spoon sample taken from 10' - 12') Silty fine sand stringer at 11', mod sorted, slightly moist.
		15	0900	Split Spoon	318 (field)	(Split Spoon sample taken from 13' - 15') Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains. Groundwater encountered at 18 ft below ground surface.
		20	0910	Cuttings		Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains, slightly moist.
		25	0912	Cuttings		Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is pale yellowish brown (10 YR 6/2), moderately well sorted, subangular grains, moderately moist.
		30	0915	Cuttings		As above
						Bottom of boring at 30 ft below ground surface.

LITHOLOGIC LOG (MONITORING WELL)

TRIDENT ENVIRONMENTAL
PO BOX 7624
MIDLAND, TEXAS 79708

MONITOR WELL NO.: MW-4
SITE ID: EME M-9
SURFACE ELEVATION: 3529.2
CONTRACTOR: Atkins Engineering Associates Inc.
DRILLING METHOD: Hollow Stem Auger
START DATE: 02/17/04
COMPLETION DATE: 02/17/04
COMMENTS: Located approximately 30 feet southeast of MW-2.

TOTAL DEPTH: 30 Feet
CLIENT: Rice Operating Company
COUNTY: Lea
STATE: New Mexico
LOCATION: T20S-R37E-Sec 16-Unit D
FIELD REP.: G. Van Deventer
FILE NAME: Projects/Rice/MW_Diagram.xls

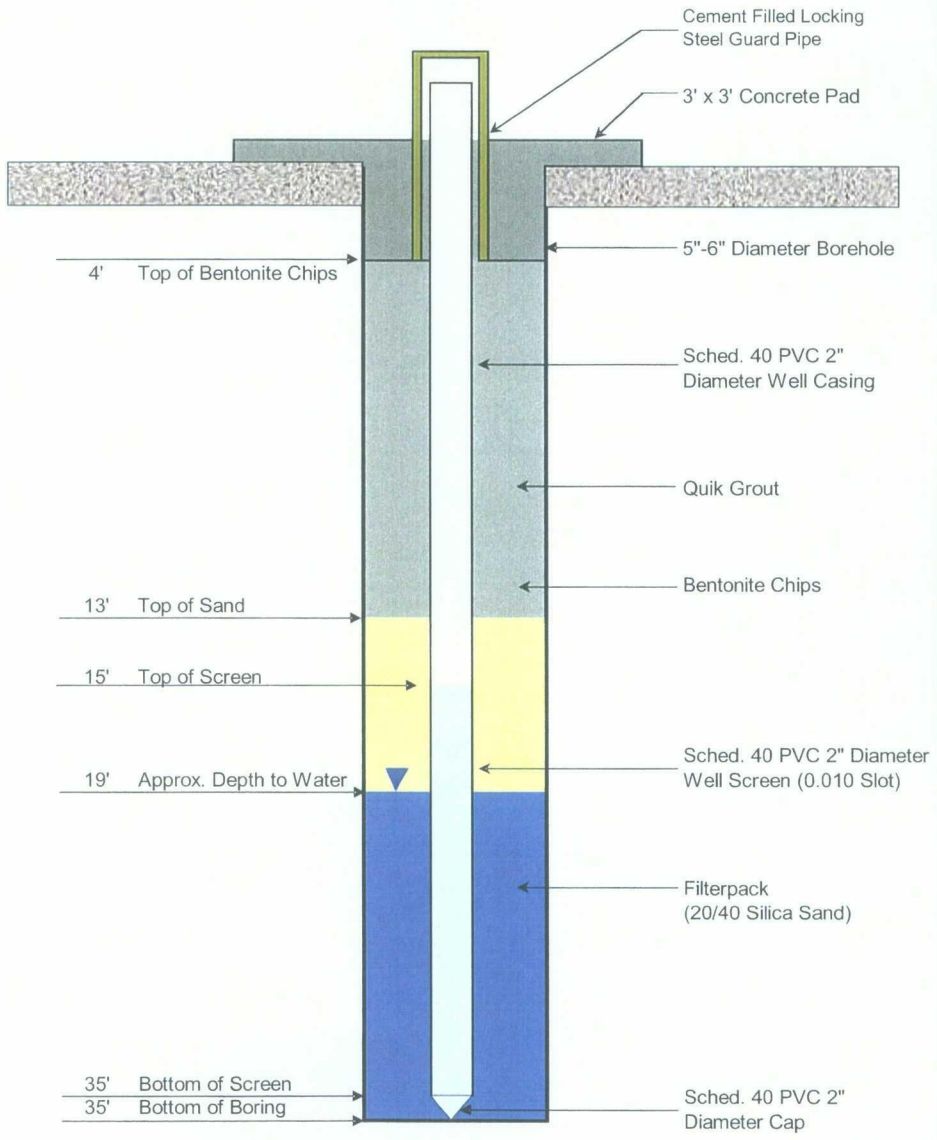


LITH.	USCS	Sample Depth	Sample Time	Sample Type	Chloride (ppm)	LITHOLOGIC DESCRIPTION: LITHOLOGY, COLOR, GRAIN SIZE, SORTING, ROUNDING, CONSOLIDATION, DISTINGUISHING FEATURES
			0855			
	CAL/ SM	5	0900	Split Spoon (4-6)	253 (field)	Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is grayish orange pink (5 YR 7/2), moderately well sorted, subangular
	CAL/ SM	10	0907	Split Spoon (9-11)	462 (field)	Caliche with varying amounts of very fine to fine-grained sand in matrix. Caliche is moderately hard and is very pale orange (10 YR 8/2). Sand is grayish orange pink (5 YR 7/2), moderately well sorted, subangular Clayey silty very fine-grained sand with varying amounts of soft caliche in matrix. Sand is light brown (5 YR 5/6), moderately well sorted, subangular grains.
		15	0915	Split Spoon (14-16)	159 (field)	Caliche is moderately hard and is very pale orange (10 YR 8/2). Fine-grained sand with varying amounts of soft caliche in matrix. Sand is grayish orange (10 YR 7/4), moderately well sorted, subangular grains. Caliche is moderately hard and is very pale orange (10 YR 8/2).
	CAL/ SM	20	0924	Split Spoon (19-21)	192 (field)	As above
		25	0912	Cuttings		As above
		30	0915	Cuttings		As above
						Bottom of boring at 30 ft below ground surface.

Geologist:	Gil Van Deventer	**RICE** *Operating Company*	Borehole ID:
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air Rotary	Project Name:	
Start Date:	04/12/06	EME M-9 SWD Site	MW-5
End Date:	04/12/06	Location:	
Notes: Monitoring well is located approximately 200 ft downgradient (east) of water well.		EME SWD System	
		unit 'M', Sec. 9, T20S, R37E	
		Lea County, NM	

Depth (feet)	Sample Interval	Time	Type	Chloride (ppm)	OVM (ppm)	Color	USCS Symbol	Description: Color, Grain size, Sorting, rounding, Consolidation, Distinguishing Features
0								
1							SW	Light brown (5 YR 6/4) sandy loam, dune sand, fine-grained, subrounded grains, unconsolidated, dry
2								
3	3 - 5	0837	Split Spoon	90	0			Very pale orange (10 YR 8/2) fine-grained sand, subrounded grains, unconsolidated, dry.
4								
5							CAL/SM	
6								
7								
8	8 - 10	0839	Split Spoon	439	0			Very pale orange (10 YR 8/2) caliche (soft) with grayish-orange (10 YR 7/4) fine-grained sand, subrounded grains, unconsolidated, dry.
9								
10								
11								
12								
13	13 - 15	0842	Split Spoon	254	0			Very pale orange (10 YR 8/2) caliche (soft) with grayish-orange (10 YR 7/4) fine-grained sand, subrounded grains, unconsolidated, dry.
14								
15								
16								
17								
18	18 - 20	0845	Split Spoon	251	0	▼		Light brown (5 YR 5/6) fine-grained sand, subrounded grains, unconsolidated, becoming moist at 19 ft Groundwater encountered at approximately 19 ft bgs.
19								
20								
21								
22								
23								
24								
25	25	0845	Cuttings					Very pale orange (10 YR 8/2) fine-grained sand, subrounded grains, unconsolidated, wet.
26								
27								
28								
29							SW	
30	25	0845	Cuttings					Light brown (5 YR 6/4) fine-grained sand, subrounded grains, unconsolidated, wet.
31								
32								
33								
34								
35	35	0845	Cuttings					Light brown (5 YR 5/6) fine-grained sand, subrounded grains, unconsolidated, wet (kept drilling to find redbed surface).
36								
37								
38								
39								
40	40	0845	Cuttings					Moderate yellowish brown (10YR 5/4) gravelly fine-grained sand, subrounded grains, unconsolidated, wet (kept drilling to find redbed surface).
41								
42							SP	
43								
44								
45	45	0845	Cuttings				CL	Moderate reddish brown (10R 4/6) fine sandy clay

MONITORING WELL CONSTRUCTION DIAGRAM
(Not to Scale)



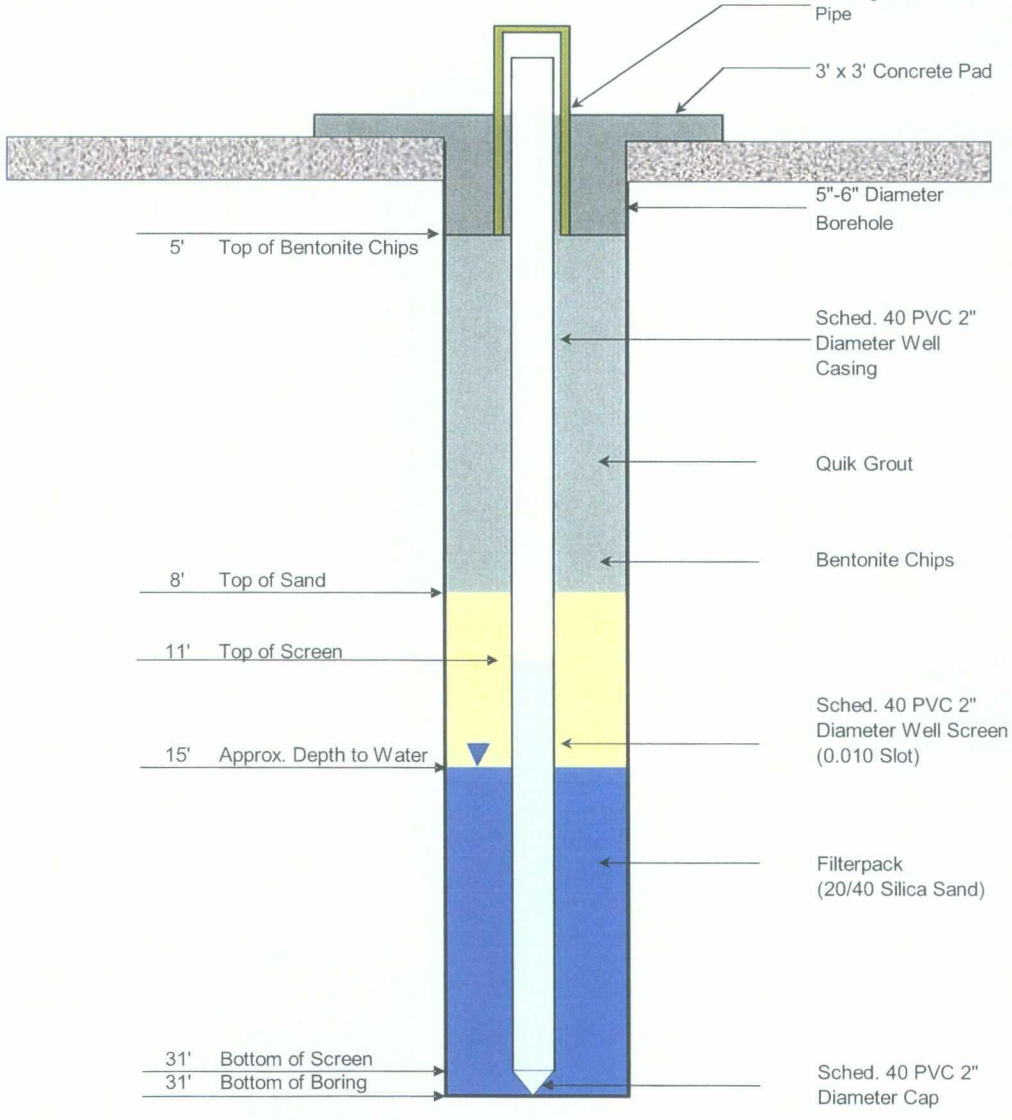
Client:	Rice Operating Company
Site Name:	EME M-9 SWD Site
Completion Date:	April 12, 2006
On Site Geologist:	Gil Van Deventer

MW-5
Monitoring Well
Construction Diagram

Geologist:	Gil Van Deventer	**RICE** *Operating Company*	Borehole ID:
Driller:	Harrison & Cooper, Inc.		
Drilling Method:	Air Rotary	Project Name:	
Start Date:	12/17/07	EME M-9 SWD Site	
End Date:	12/17/07	Location:	MW-6
Notes: Monitoring well is located approximately 75 ft upgradient (northwest) of MW-3.		EME SWD System	
		unit 'M', Sec. 9, T20S, R37E	
		Lea County, NM	

Depth (feet)	Sample Interval	Sample Time	Sample Type	Chloride (ppm)	Color	USCS Symbol	Description: Color, Grain size, Sorting, rounding, Consolidation, Distinguishing Features
0							
1							
2						SW	Fine-grained sand, very pale orange (10YR 8/2) and grayish-orange (10YR 7/4), subrounded, moderately well sorted, unconsolidated, dry. Rounded, frosted, quartz grains typical of aeolian deposional environment.
3							
4	3 - 5	1349	Split Spoon	124			Fine-grained sand, very pale orange (10YR 8/2) and grayish-orange (10YR 7/4), subrounded, moderately well sorted, unconsolidated, dry. Rounded, frosted, quartz grains typical of aeolian deposional environment.
5							
6							
7							
8						SW/CAL	
9	8 - 10	1351	Split Spoon	426			Fine-grained sand, grayish-orange (10YR 7/4), with some calcium carbonate in matrix, Sand grains are subrounded, moderately well sorted, unconsolidated, dry. Large proportion of rounded, frosted quartz grains typical of aeolian deposional environment.
10							
11							
12							
13							
14	13 - 15	1353	Split Spoon	350	▼		Fine-grained sand, grayish-orange (10YR 7/4), with thin white seams of crystallized calcium carbonate. Sand grains are subrounded, moderately well sorted, unconsolidated, moist. Groundwater encountered at 15 feet bgs.
15							
16							
17							
18							
19							
20	20	1355	Cuttings			SM / SW / CAL	Fine-grained sand, grayish-orange (10YR 7/4) and pale yellowish brown (10YR6/2), with slight amount of calcium carbonate in matrix, Sand grains are subrounded, moderately well sorted, unconsolidated, moist/wet.
21							
22							
23							
24							
25	25	1357	Cuttings				Fine-grained sand, grayish-orange (10YR 7/4) and pale yellowish brown (10YR6/2), with slight amount of calcium carbonate in matrix, Sand grains are subrounded, moderately well sorted, unconsolidated, wet.
26							
27							
28							
29						SW/CAL	
30	30	1400	Cuttings				Fine-grained sand, pale yellowish brown (10YR6/2), subrounded, moderately well sorted, unconsolidated, wet.
31							Bottom of boring at 31 feet below ground surface.
32							
33							
34							
35							
36							
37							
38							
39							
40							
41							
42							
43							
44							
45							

MONITORING WELL CONSTRUCTION DIAGRAM (Not to Scale)



TRIDENT ENVIRONMENTAL

Client:	**RICE** *Operating Company*
Site Name:	EME M-9 SWD Facility
Completion Date:	December 19, 2007
On Site Geologist:	Gil Van Deventer

MW-6
Monitoring Well
Construction Diagram

APPENDIX B

WATER WELL INVENTORY

Summary of Water Well Data

Well ID (File #.)	Well Type (Status)	Permit Holder	T20S-R37E		Distance from M-9 SWD Site
			Sec	UL	
L-10356	Livestock (Active)	S-W Cattle Co.	9	L	1,900 ft North
L-07619	Windmill (Abandoned)	Jim Cooper	8	I	1,500 ft NNW
L-09590	Domestic (None found)	Jim Cooper	8	I	1,510 ft WNW
L-10150	Livestock (Abandoned)	S-W Cattle Co.	9	M	100 ft East

New Mexico Office of the State Engineer
Transaction Summary

Back

72121 All Applications Under Statute 72-12-1

Trn_nbr: 122066 **Trn_desc:** CONVERSION L 10356 **File Date:** 10/28/1993

Primary status: PMT Permit
Secondary status: APR Approved
Person assigned: null
Applicant: S-W CATTLE CO

Events

Date	Type	Description	Comment	Processed By
10/28/1993	CNV	Converted from Main Frame		******

DB_File_Nbr	Acres	Diversion	Consumptive	Purpose of Use
L 10356	0	0	0	STK 72-12-1 LIVESTOCK WATERING

New Mexico Office of the State Engineer
Point of Diversion Summary

Back

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are biggest to smallest)

POD Number	Tws	Rng	Sec	q	q	q	Zone	X	Y
L 10356	20S	37E	09	3	1	1			

Driller Licence:
Driller Name: Source:
Drill Start Date: Drill Finish Date:
Log File Date: PCW Received Date:
Pump Type: Pipe Discharge Size:
Casing Size: Estimated Yield:
Depth Well: Depth Water:

New Mexico Office of the State Engineer
Water Right Summary

Back

DB File Nbr: L 07619
Primary Purpose: IRR IRRIGATION
Primary Status: LIC Licensed
Total Acres: 5.19
Total Diversion: 15.57
Owner: JIM COOPER

Documents on File

Doc	File/Act	Status 1 2 3	Trans_Desc	From/To	Acres	Diversion	Consumptive
LIC	08/05/1985	LIC PRC ABS	L 07619	T	5.19	15.57	

Point of Diversion (qtr are 1=NW 2=NE 3=SW 4=SE) (qtr are biggest to smallest) X Y are in Feet UTM are in Meters)

POD Number	Source	Tws	Rng	Sec	q	q	q	Zone	X	Y	UTM_Zone	Easting	Northing
L 07619	Shallow	20S	37E	08	4	2	2				13	662734	3606797
L 07619 S	Shallow	20S	37E	08	4	1	1				13	662132	3606792

Priority	Status	Acres	Diversion	POD Number	Source
10/08/1976	LIC	5.19	15.57	L 07619	Shallow
				L 07619 S	Shallow

Place of Use (quarters are 1=NW 2=NE 3=SW 4=SE) (quarters are biggest to smallest

Tws	Rng	Sec	q	q	q	q	Acres	Diversion	Consumptive	Use	Priority	Status	Other Location Description
20S	37E	08	4	2	2		0.01	0.03		IRR	10/08/1976	LIC	
20S	37E	08	4	2	3		1.16	3.48		IRR	10/08/1976	LIC	
20S	37E	08	4	2	4		4.02	12.06		IRR	10/08/1976	LIC	

New Mexico Office of the State Engineer
Point of Diversion Summary

Back

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are biggest to smallest)

POD Number	Tws	Rng	Sec	q	q	q	Zone	X	Y
L 07619 S	20S	37E	08	4	1	1			

Driller Licence:
Driller Name:
Drill Start Date:
Log File Date:
Pump Type:
Casing Size:
Depth Well:
Source: Shallow
Drill Finish Date:
PCW Received Date:
Pipe Discharge Size:
Estimated Yield:
Depth Water:

Meter Number: 8658
Meter Serial Number: 218633
Number of Dials: 6
Unit of Messure: BARRL
Meter Make: HALLIBURTON
Meter Multiplier: 1
Meter Type: Diversion
Usage Multiplier:
Return Flow Percent:

Meter Readings (in Acre-Feet)

Read Date	Year	Mtr_Reading	Flag	Rdr	Comment	Mtr_Amount	YTD_Amount
01/01/2005	2005	160418	A	jw		0	
04/04/2005	2005	166301	A	jw		0.758	
10/04/2005	2005	202752	A	jw		4.698	
01/01/2006	2005	368480	A	RPT		21.361	26.817
04/01/2006	2006	379711	A	RPT		1.448	
07/01/2006	2006	389711.522	A	RPT	new meter readi	1.289	2.737

New Mexico Office of the State Engineer
Water Right Summary

Back

DB File Nbr: L 09590
Primary Purpose: DOM 72-12-1 DOMESTIC ONE HOUSEHOLD
Primary Status: PMT Permit
Total Acres: 0
Total Diversion: 3
Owner: JIMMY COOPER

Documents on File

Doc	File/Act	Status 1 2 3	Trans_Desc	From/To	Acres	Diversion	Consumptive
72121	11/26/1984	PMT APR CNV	CONVERSION	L 095 T	0	3	

(qtr are 1=NW 2=NE 3=SW 4=SE)

Point of Diversion (qtr are biggest to smallest) **X Y are in Feet** **UTM are in Meters)**

POD Number	Source	Tws	Rng	Sec	q q q	Zone	X	Y	UTM_Zone	Easting	Northing
L 09590	Shallow	20S	37E	08	4				13	662440	3606491

New Mexico Office of the State Engineer
Point of Diversion Summary

Back

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are biggest to smallest)

POD Number	Tws	Rng	Sec	q q q	Zone	X	Y
L 09590	20S	37E	08	4			

Driller Licence: 208 VAN NOY, W.L.
Driller Name:
Drill Start Date: 11/30/1984
Log File Date: 12/12/1984
Pump Type:
Casing Size:
Depth Well: 70

Source: Shallow
Drill Finish Date: 12/03/1984
PCW Received Date:
Pipe Discharge Size:
Estimated Yield:
Depth Water: 35

New Mexico Office of the State Engineer
Transaction Summary

Back

72121 All Applications Under Statute 72-12-1

Trn_nbr: 121871 **Trn_desc:**CONVERSION L 10150 **File Date:**11/02/1990

Primary status: EXP Expired Permit
Secondary status: EXP Expired
Person assigned: null
Applicant: S&U CATTLE CO.

Events

Date	Type	Description	Comment	Processed By
11/02/1990	CNV	Converted from Main Frame		******

DB_File_Nbr	Acres	Diversion	Consumptive	Purpose of Use
L 10150	0	0	0	STK 72-12-1 LIVESTOCK WATERING

New Mexico Office of the State Engineer
Point of Diversion Summary

Back

(quarters are 1=NW 2=NE 3=SW 4=SE)
(quarters are biggest to smallest)

POD Number	Tws	Rng	Sec	q	q	q	Zone	X	Y
L 10150	20S	37E	09	4	1				

Driller Licence: 982 EADES, GENE
Driller Name:
Drill Start Date: 11/19/1990
Log File Date: 06/20/1991
Pump Type:
Casing Size:
Depth Well: 30

Source: Shallow
Drill Finish Date: 11/19/1990
PCW Received Date:
Pipe Discharge Size:
Estimated Yield:
Depth Water:

APPENDIX C

LABORATORY ANALYTICAL REPORTS

AND

CHAIN OF CUSTODY DOCUMENTATION

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 WEST TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 05/13/09
Reporting Date: 05/15/09
Project Number: NOT GIVEN
Project Name: EME M-9 SWD
Project Location: T20S R37E SEC9 M ~ LEA CO., NM

Sampling Date: 05/12/09
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: TR

LAB NO.	SAMPLE ID	Cl^- (mg/L)	SO_4 (mg/L)	TDS (mg/L)
Analysis Date:		05/14/09	05/15/09	05/14/09
H17418-1	MONITOR WELL #1A	432	737	2,090
H17418-2	MONITOR WELL #2	560	702	2,270
H17418-3	MONITOR WELL #3	392	767	2,110
H17418-4	MONITOR WELL #4	680	765	2,570
H17418-5	MONITOR WELL #5	1,040	264	2,710
H17418-6	MONITOR WELL #6	400	754	2,110
H17418-7	WATER WELL	412	NA	2,120
Quality Control		500	41.6	NR
True Value QC		500	40.0	NR
% Recovery		100	104	NR
Relative Percent Difference		<0.1	2.4	0.4
METHOD: Standard Methods, EPA		4500-Cl⁻B	375.4	160.1

NA - Not Analyzed

Chemist

05/18/09
Date

H17418 RICE

CARDINAL LABORATORIES

PHONE (575) 393-2326 • 101 E. MARLAND • HOBBS, NM 88240

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: HACK CONDER
122 W. TAYLOR
HOBBS, NM 88240
FAX TO: (575) 397-1471

Receiving Date: 05/13/09
Reporting Date: 05/20/09
Project Number: NOT GIVEN
Project Name: EME M-9 SWD
Project Location: T20S-R37E-SEC9 M~ LEA CO., NM

Sampling Date: 05/12/09
Sample Type: WATER
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: ZL

LAB NUMBE	SAMPLE ID	BENZENE (mg/L)	TOLUENE (mg/L)	ETHYL BENZENE (mg/L)	TOTAL XYLENES (mg/L)
ANALYSIS DATE		05/19/09	05/19/09	05/19/09	05/19/09
H17418-5	MONITOR WELL #5	<0.001	<0.001	<0.001	<0.003
H17418-6	MONITOR WELL #6	<0.001	<0.001	<0.001	<0.003
Quality Control		0.057	0.054	0.047	0.138
True Value QC		0.050	0.050	0.050	0.150
% Recovery		114	108	94.0	92.0
Relative Percent Difference		18.2	17.0	13.6	13.0

METHOD: EPA SW-846 8021 B

TEXAS NELAP ACCREDITATION T104704398-08-TX FOR BENZENE, TOLUENE, ETHYL BENZENE, AND TOTAL XYLENES.

Chemist

05/20/09
Date

H17418 WBRICE

101 East Marland - Hobbs, New Mexico 88240
Tel (575) 393-2326
Fax (575) 393-2476

Cardinal Laboratories, Inc.

CHAIN-OF-CUSTODY AND ANALYSIS REQUEST

LAB Order ID # _____

Company Name: RICE Operating Company	BILL TO Company: RICE Operating Company — PO#
Project Manager: Hack Conder	Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240
Address: (Street, City, Zip) 122 W Taylor Street ~ Hobbs, New Mexico 88240	Phone#: (575) 393-9174 — Fax#: (575)397-1471
Phone #: (575) 393-9174	Fax #: (575) 397-1471
Project #: — Project Name: EME M-9 SWD	
Project Location: T20S-R37E-Sec9 M ~ Lea County - New Mexico	Sampler Signature: Rozanne Johnson (575)631-9310 rozanne@valornet.com

LAB # (LAB USE ONLY)	FIELD CODE	(G)rab or (C)omp	# CONTAINERS	MATRIX: WATER	SOIL	AIR	SLUDGE	PRESERVATIVE METHOD: HCL (2 40ml VOA)	HNO_3	$NaHSO_4$	H_2SO_4	ICE (1-1Liter HDPE)	NONE	SAMPLING: DATE (2009)	TIME
H17418-1	Monitor Well #1A	G	1	X								1		5-12	14:05
-2	Monitor Well #2	G	1	X								1		5-12	13:20
-3	Monitor Well #3	G	1	X								1		5-12	12:40
-4	Monitor Well #4	G	1	X								1		5-12	10:15
-5	Monitor Well #5	G	3	X				2				1		5-12	11:05
-6	Monitor Well #6	G	3	X				2				1		5-12	11:50
-7	Water Well	G	1	X								1		5-12	16:20

ANALYSIS REQUEST

(Circle or Specify Method No.)

MTBE 8021B/602	BTEX 8021B/602	TPH 418.1/TX1005 / TX1005 Extended (C35)	PAH 8270C	Total Metals Ag As Ba Cd Cr Pb Se Hg 6010B/200.7	TCLP Metals Ag As Ba Cd Cr Pb Se Hg	TCLP Volatiles	TCLP Semi Volatiles	TCLP Pesticides	RCI	GC/MS Vol. 8260B/624	GC/MS Semi. Vol. 8270C/625	PCB's 8082/608	Pesticides 8081A/608	BOD, TSS, pH	Moisture Content	Cations (Ca, Mg, Na, K)	Anions (Cl, SO4, CO3, HCO3)	Sulfates	Total Dissolved Solids	Chlorides	Turn Around Time ~ 24 Hours
																		X	X	X	
																		X	X	X	
																		X	X	X	
																		X	X	X	
	X																	X	X	X	
	X																	X	X	X	
																			X	X	

Relinquished by: Rozanne Johnson	Date: 5-13-2009	Time: 7:10	Received by: Kathy Watkins	Date: 5-13-2009	Time: 7:11
Relinquished by: Kathy Watkins	Date: 5/13/09	Time: 15:08	Received By: (Laboratory Staff) Misty LaBurt	Date: 5/13/09	Time: 3:10

Phone Results ☐ Yes ☐ No

Fax Results ☐ Yes ☐ No Additional Fax Number:

REMARKS:

hconder@riceswd.com
lweinheimer@riceswd.com
rozanne@valornet.com

Delivered By: (Circle One)
Sampler - UPS - Bus - Other:

Sample Condition: Cool: Yes ☐ No ☐ — Intact: Yes ☐ No ☐

CHECKED BY: (Initials) MCBB