AP - 43

ANNUAL MONITORING REPORT

YEAR(S):

2009

ARCADIS

Infrastructure, environment, buildings

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ARCADIS U.S., Inc.
1004 North Big Spring Street
Suite 300
Midland
Texas 79701
Tel 432 687 5400
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www.arcadis-us.com

Environmental

Sent Certified mail
Return Receipt No. 7002 2410 0001 5813 0219

Mr. Edward Hansen
New Mexico Energy, Minerals, & Natural Resources Dept.
Oil Conservation Division, Environmental Bureau
1220 S. St. Francis Drive
Santa Fe, New Mexico 87505

Subject: **2009 MONITOR WELL REPORT/SAMPLING SUMMARY AND EXCAVATION SUMMARY JCT. A-20, EME SWD SYSTEM UNIT 'A', SEC. 20, T20S, R37E NMOCD CASE # AP-43 (formerly 1R0427-89)**

Date:
April 12, 2010

Contact:
Sharon E. Hall

Phone:
432 687-5400

Email:
sharon.hall@arcadis-us.com

Our ref:
MT000857.0001

Mr. Hansen:

On behalf of Rice Operating Company (ROC), ARCADIS U.S., Inc. (ARCADIS) respectfully submits the 2009 Monitor Well Report and Excavation Summary for the EME Jct. A-20 site located in the Eunice Monument Eumont (EME) Salt Water Disposal (SWD) System.

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.

Background

One monitoring well was installed in 2002 during delineation as part of the Junction Box Upgrade Program.

Soon after the well was installed, phase-separated hydrocarbon (PSH) was found on the water. ROC has actively worked at recovering the PSH in the well by hand bailing or by using an absorbent sock. In September of 2004 ARC Environmental Service Technologies (ARC) assumed the maintenance and weekly replacement of the socks; PSH thickness and volume were measured weekly. Product thickness and recovery information is shown in the attached field measurement/observation log.

A Stage 1 Abatement Plan was submitted to NMOCD on June 23, 2005. NMOCD approved the Abatement Plan Proposal on February 21, 2006.

On February 28, 2006 monitor wells MW-2 and MW-3 were installed northwest and south of Jct. A-20 and soil and groundwater samples were collected. On May 31, 2006, monitor wells MW-4 and MW-5 were installed southeast and northwest of Jct. A-20 and soil and groundwater samples were collected. A Stage 1 Abatement Plan Report and Stage 2 Abatement Plan proposal was submitted to NMOCD on January 30, 2007. The report details the investigation and investigation results.

2009 Monitor Well Report/Sampling Summary

A Stage 2 Abatement Plan proposal was submitted on August 27, 2008 and approved on May 12, 2009. A four-inch diameter recovery well was drilled at the site on September 21, 2009. Groundwater removal from the recovery well will begin in the second quarter of 2010.

All monitor wells are sampled quarterly per NMOCD guidelines. The attached tables summarize the groundwater conditions at the site.

Excavation Summary

Per the approved Stage 2 Abatement Plan dated August 25, 2008 and subsequent addendums approved by NMOCD on May 12, 2009, soils with a chloride concentration in excess of 1,000 mg/kg and a TPH concentration in excess of 1,000 mg/kg were excavated and evaluated for remediation or disposal. Hydrocarbon (diesel range organics) impacted soils in the base of the excavation were treated by leaving the excavation open to allow aeration. Excavated soils were blended with clean soils and returned to the excavation. Laboratory results of a soil sample collected the blended backfill is attached.

The excavated portion of the site was backfilled to a depth of eight feet below ground surface and covered with one foot of clay compacted to 91.1% standard proctor density. The clay was covered with soil to a depth of 18 inches below ground surface. The soil was compacted to 83.2% proctor density. Soil and clay density and hydraulic conductivity of the compacted clay test results are attached. The compacted soil was covered with a blended mixture of sand, hay, peat moss and organic compost. The backfilled area was seeded with native vegetation and the seed tilled into the soil. In order to hold the seed in place silk netting was erected around the perimeter of the seeded area and Excelsior Green cover was placed over the seeded soil. Photographs of excavation and site restoration activities are attached.

Thank you for your consideration concerning this annual summary of groundwater monitoring information and excavation summary. If you have any questions, do not hesitate to contact Hack Conder or me.

Sincerely,

ARCADIS U.S., Inc.

Sharon E. Hall

Sharon E. Hall
Associate Vice President

Copies:
Hack Conder- ROC

Attachments:
MW Summary Tables
Monitor Well Location Figure
Excavation and Site Restoration Photographs
Soil Density Test Results
Clay Density Test Results
Hydraulic Conductivity Test Results

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
1	24.70	38.40	2.2	6.7	3/5/2002	2279	5044	<0.002	0.003	0.006	0.014	1087
1	25.62	38.22	2	6	5/13/2002	2100	4840	XXX	XXX	XXX	XXX	793
1	26.00	38.25	1.96	6	8/22/2002	2130	4890	XXX	XXX	XXX	XXX	822
1	24.97	38.25	2.125	6.5	11/12/2002	2130	5070	XXX	XXX	XXX	XXX	780
1	26.20	38.00	0.28	0.8	3/14/2003	1120	5020	XXX	XXX	XXX	XXX	673
1	23.20	26.00	0.448	1.3	6/5/2003	2130	4500	XXX	XXX	XXX	XXX	875
1	23.42	26.00	0.4	1.2	9/3/2003	2130	5240	XXX	XXX	XXX	XXX	679
1	23.20	26.00	0.448	1.3	12/10/2003	2390	4870	XXX	XXX	XXX	XXX	731
1	25.64	26.50	0.86	2.5	2/26/2004	2300	4900	XXX	XXX	XXX	XXX	588
1	23.02	26.00	0.448	1.3	5/27/2004	1910	4480	XXX	XXX	XXX	XXX	588
1	XXX	XXX	XXX	XXX	9/16/2004	2360	5340	XXX	XXX	XXX	XXX	273
1	24.53	38.36	2.21	6.6	11/24/2004	1930	5110	XXX	XXX	XXX	XXX	422
1	22.39	XXX	XXX	XXX	3/22/2005	2330	4290	XXX	XXX	XXX	XXX	125
1	23.40	32.00	XXX	4.32	6/28/2005	2430	5060	XXX	XXX	XXX	XXX	481
1	23.45	32.00	XXX	4.18	9/6/2005	2460	5100	XXX	XXX	XXX	XXX	486
1	23.43	38.36	2.4	8	11/2/2005	2330	5310	0.00643	0.0125	0.0635	0.1558	484
1	23.22	38.36	2.4	8	2/1/2006	2750	5100	0.0139	0.0435	0.145	0.3009	434
1	23.20	38.36	2.4	8	4/26/2006	2700	5430	j[0.00433]	0.00849	0.0694	0.1248	482
1	23.84	38.36	2.3	8	7/24/2006	2180	4010	0.0341	<0.0200	0.0823	0.0866	96.8
1	23.60	38.36	2.4	8	10/17/2006	1830	4050	0.0409	0.0187	0.124	0.1489	44.7
1	23.82	38.26	2.3	8	1/30/2007	2960	4870	<0.001	<0.001	<0.001	<0.001	504
1	23.67	38.26	2.3	8	4/12/2007	2870	6360	0.0288	0.0472	0.177	0.194	493
1	24.06	38.26	2.3	8	7/16/2007	2090	4220	<0.001	<0.001	<0.001	<0.002	70.4
1	24.48	38.26	2.2	8	9/4/2007	1999	4612	<0.002	0.031	0.24	0.246	115
1	24.14	38.26	2.3	8	10/11/2007	2100	4416	0.068	0.012	0.17	0.138	111
1	24.00	38.26	2.3	8	1/16/2008	2320	5501	0.028	<0.02	0.139	0.132	305
1	23.88	38.26	2.3	8	4/11/2008	2440	5560	0.027	0.006	0.102	0.068	457
1	24.41	38.26	2.2	8	7/22/2008	3200	6560	<0.002	<0.002	<0.002	<0.006	670
1	24.22	38.26	2.2	8	10/17/2008	3100	6990	0.001	<0.001	0.002	<0.003	744
1	23.90	38.28	2.3	8	2/4/2009	6570	3200	0.003	<0.001	0.003	<0.003	691
1	23.83	38.28	2.3	8	5/8/2009	2400	5120	0.03	0.004	0.05	0.024	201
1	24.76	38.28	2.2	8	8/28/2009	3300	6910	<0.001	<0.001	<0.001	<0.003	631
1	24.77	38.28	2.2	8	10/30/2009	3150	7540	0.056	0.073	0.32	1.69	610

mg/L=milligrams per liter
XXX- not analayzed

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
2	23.84	32	1.3	4	3/8/2006	2030	4610	<0.001	<0.001	<0.001	<0.001	491
2	23.72	32	1.3	15	4/26/2006	1970	4800	<0.001	<0.001	<0.001	<0.001	479
2	24.45	32	1.2	10	7/24/2006	2270	4825	<0.001	<0.001	<0.001	<0.001	648
2	24.08	32	1.3	8	10/17/2006	2040	4590	<0.001	<0.001	<0.001	<0.001	679
2	23.85	31.72	1.3	6	1/30/2007	2260	4460	<0.001	<0.001	<0.001	<0.001	745
2	23.71	31.72	1.3	6	4/12/2007	2320	5040	<0.001	<0.001	<0.001	<0.001	694
2	24.03	31.72	1.2	6	7/16/2007	2230	4870	<0.001	<0.001	<0.001	<0.002	740
2	24.46	31.72	1.2	5	9/4/2007	2339	5664	<0.002	<0.002	<0.002	<0.006	842
2	24.11	31.72	1.2	5	10/11/2007	2260	5500	<0.001	<0.001	<0.001	<0.003	790
2	23.96	31.71	1.2	5	1/16/2008	2260	5718	<0.001	<0.001	<0.001	<0.003	896
2	23.87	31.71	1.3	5	4/11/2008	2400	5780	<0.001	<0.001	<0.001	<0.003	1200
2	24.67	31.71	1.1	5	7/23/2008	2500	5520	<0.002	<0.002	<0.002	<0.006	749
2	24.39	31.71	1.2	5	10/17/2008	2460	5740	<0.001	<0.001	<0.001	<0.003	819
2	24.12	33.45	1.5	5	2/4/2009	2580	5600	<0.001	<0.001	<0.001	<0.003	691
2	24.04	33.45	1.5	5	5/8/2009	2600	5660	<0.001	<0.001	<0.001	<0.003	741
2	24.87	33.45	1.4	5	8/28/2009	2420	5360	<0.001	<0.001	<0.001	<0.003	659
2	24.92	33.45	1.4	5	10/30/2009	2550	5940	<0.001	<0.001	<0.001	<0.003	618

mg/L=milligrams per liter

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
3	23.90	32.70	1.4	5	3/8/2006	2200	4860	<0.001	<0.001	<0.001	<0.001	486
3	23.93	32.70	1.4	15	4/29/2006	2340	5320	<0.001	<0.001	<0.001	<0.001	452
3	24.61	32.70	1.3	10	7/24/2006	2890	4650	<0.001	<0.001	<0.001	<0.001	566
3	24.23	32.70	1.4	8	10/17/2006	2310	4900	<0.001	<0.001	<0.001	<0.001	563
3	24.02	32.75	1.4	6	1/30/2007	2460	4490	<0.001	<0.001	<0.001	<0.001	589
3	23.87	32.75	1.4	6	4/12/2007	2670	5530	<0.001	0.00109	0.000397	0.00104	516
3	24.27	32.75	1.4	6	7/16/2007	2530	5960	<0.001	<0.001	<0.001	<0.002	541
3	24.70	32.75	1.3	5	9/4/2007	2619	6212	<0.002	<0.002	<0.002	<0.006	679
3	24.30	32.75	1.4	5	10/11/2007	2500	5417	<0.001	<0.001	<0.001	<0.003	548
3	24.14	32.82	1.4	5	1/16/2008	2700	5993	<0.001	<0.001	<0.001	0.003	628
3	24.05	32.82	1.4	5	4/11/2008	2800	6010	<0.001	<0.001	<0.001	<0.003	788
3	24.81	32.82	1.3	5	7/23/2008	3000	6080	<0.002	<0.002	<0.002	<0.006	692
3	24.63	32.82	1.3	5	10/17/2008	2850	6590	<0.001	<0.001	<0.001	<0.003	662
3	24.32	33.28	1.4	5	2/4/2009	2900	6460	<0.001	<0.001	<0.001	<0.003	635
3	24.24	33.28	1.4	5	5/8/2009	2900	6160	<0.001	<0.001	<0.001	<0.003	624
3	25.13	33.28	1.3	5	8/28/2009	2800	5840	<0.001	<0.001	<0.001	<0.003	557
3	25.14	33.28	1.3	5	10/30/2009	2950	6850	<0.001	<0.001	<0.001	<0.003	679

mg/L=milligrams per liter

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
4	21.87	31.80	1.6	10	6/13/2006	3840	6790	<0.001	<0.001	<0.001	<0.001	1060
4	21.97	31.80	1.6	10	7/24/2006	3520	6135	<0.001	<0.001	<0.001	<0.001	806
4	21.59	31.50	1.6	8	10/17/2006	3020	6560	j[0.000732]	<0.001	<0.001	<0.001	791
4	21.37	32.05	1.7	8	1/30/2007	3330	6260	<0.001	<0.001	<0.001	<0.001	1170
4	21.20	32.05	1.7	8	4/12/2007	3140	7170	<0.001	<0.001	<0.001	<0.001	1090
4	21.65	32.05	1.7	8	7/16/2007	3170	XXX	<0.001	<0.001	<0.001	<0.002	751
4	22.11	32.05	1.6	6	9/4/2007	3179	7270	<0.002	<0.002	<0.002	<0.006	831
4	24.30	32.75	1.4	5	10/11/2007	3000	6587	0.002	<0.001	<0.001	<0.003	670
4	21.49	32.03	1.7	6	1/16/2008	3250	7386	<0.001	<0.001	<0.001	<0.003	818
4	21.42	32.03	1.7	6	4/11/2008	3350	7450	<0.001	<0.001	<0.001	<0.003	1400
4	22.24	32.03	1.6	6	7/23/2008	3400	7000	<0.002	<0.002	<0.002	<0.006	818
4	22.00	32.03	1.6	6	10/17/2008	3250	7510	<0.001	<0.001	<0.001	<0.003	771
4	21.68	32.20	1.7	6	2/4/2009	3300	7450	<0.001	<0.001	<0.001	<0.003	756
4	21.63	32.20	1.7	6	5/8/2009	3350	6900	<0.001	<0.001	<0.001	<0.003	759
4	22.54	32.20	1.5	6	8/28/2009	3400	7060	<0.001	<0.001	<0.001	<0.003	637
4	22.53	32.20	1.5	6	10/30/2009	3350	7750	<0.001	<0.001	<0.001	<0.003	605

mg/L=milligrams per liter
XXX- not analayzed

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
5	25.02	32.20	1.10	10	6/13/2006	2450	4960	<0.001	<0.001	<0.001	<0.001	519
5	25.26	32.20	1.10	10	7/24/2006	2300	4235	<0.001	<0.001	<0.0001	<0.001	574
5	24.92	32.20	1.20	8	10/17/2006	2100	4550	<0.001	<0.001	<0.001	<0.001	573
5	24.68	31.98	1.20	6	1/30/2007	2420	4390	<0.001	<0.001	<0.001	<0.001	588
5	24.55	31.98	1.20	6	4/12/2007	2290	4640	<0.001	<0.001	<0.001	<0.001	505
5	24.78	31.98	1.20	6	7/16/2007	2190	4800	<0.001	<0.001	<0.001	<0.002	527
5	25.18	31.98	1.10	5	9/4/2007	2299	5236	<0.002	<0.002	<0.002	<0.006	623
5	24.90	31.98	1.10	5	10/11/2007	2220	5082	<0.001	<0.001	<0.001	<0.003	428
5	24.71	31.88	1.10	5	1/16/2008	2280	5457	<0.001	<0.001	<0.001	<0.003	548
5	24.66	31.88	1.20	5	4/11/2008	2200	5230	<0.001	<0.001	<0.001	<0.003	761
5	25.27	31.88	1.10	5	7/23/2008	2500	5510	<0.002	<0.002	<0.002	<0.006	587
5	25.19	31.88	1.10	5	10/17/2008	2650	5750	<0.001	<0.001	<0.001	<0.003	669
5	24.88	31.90	1.10	5	2/4/2009	2560	5590	<0.001	<0.001	<0.001	<0.003	577
5	24.80	31.90	1.10	5	5/8/2009	2500	5580	<0.001	<0.001	<0.001	<0.003	609
5	25.53	31.90	1.00	5	8/28/2009	2520	5640	<0.001	<0.001	<0.001	<0.003	527
5	25.64	31.90	1.00	5	10/30/2009	2350	5490	<0.001	<0.001	<0.001	<0.003	551

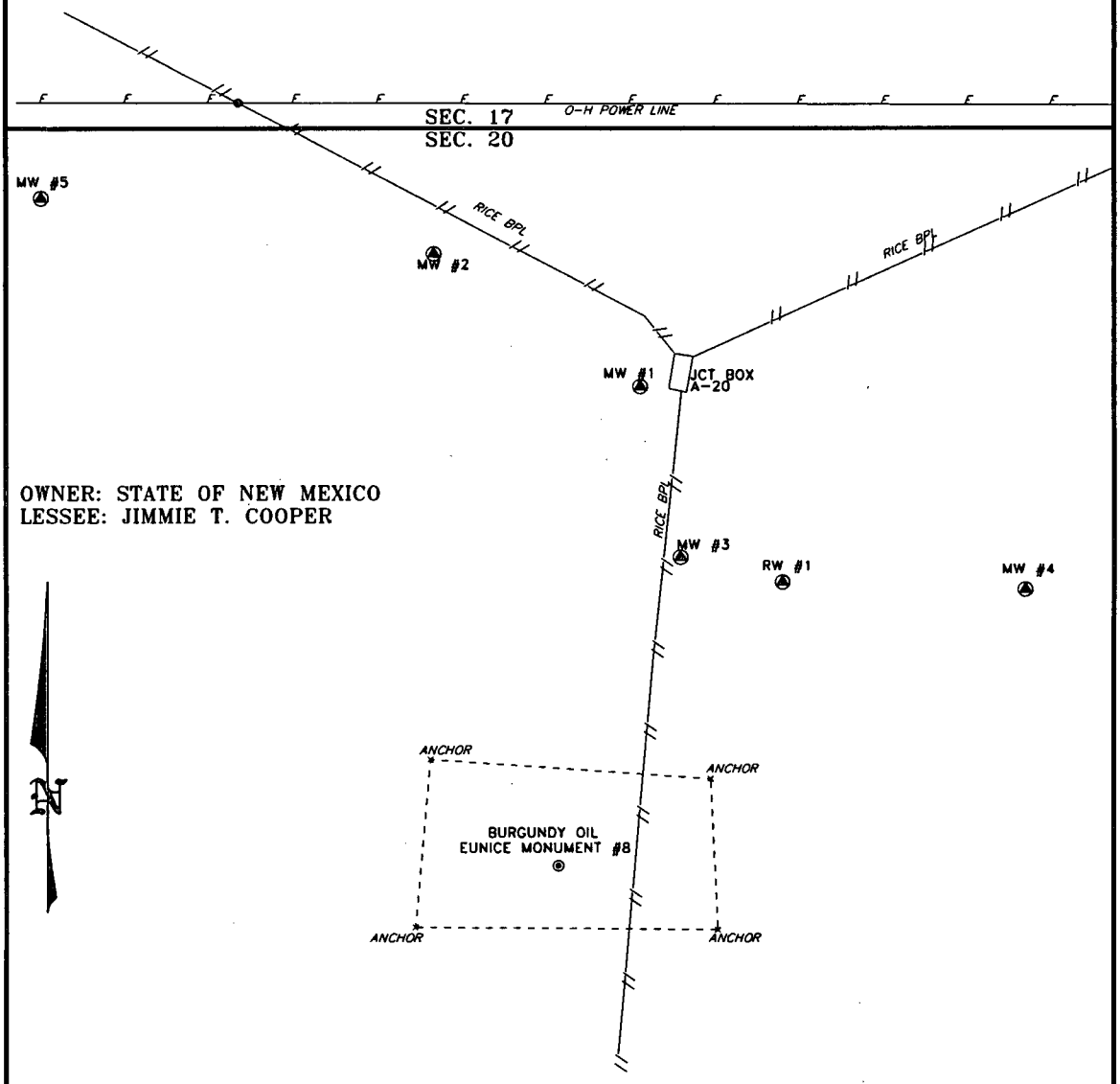
mg/L=milligrams per liter

ROC EME Jct. A-20

MW	Depth to Water (feet)	Total Depth (feet)	Well Volume (gallons)	Volume Purged (gallons)	Sample Date	Cl (mg/L)	TDS (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethyl Benzene (mg/L)	Total Xylenes (mg/L)	Sulfate (mg/L)
RW-1	24.49	66.38	27.2	90	10/30/2009	3450	8160	<0.001	<0.001	<0.001	<0.003	610

mg/L=milligrams per liter

SECTION 20, TOWNSHIP 20 SOUTH, RANGE 37 EAST, N.M.P.M.,
LEA COUNTY, **NEW MEXICO.**



OWNER: STATE OF NEW MEXICO
LESSEE: JIMMIE T. COOPER

NEW MEXICO STATE PLANE COORDINATES (NAD 83)

WELL#	NORTHING	EASTING	LATITUDE	LONGITUDE	ELEV(GRND)	ELEV(PVC)	ELEV(CONC)
MW #1	571138.655	870172.201	N32°33'56.1"	W103°15'57.4"	3521.12'	3524.40'	
MW #2	571195.295	870083.029	N32°33'56.6"	W103°15'58.5"	3521.91'	3524.75'	
MW #3	571065.335	870190.079	N32°33'55.3"	W103°15'57.2"	3521.80'	3524.67'	
MW #4	571053.771	870335.855	N32°33'55.3"	W103°15'55.6"	3519.09'	3521.92'	
MW #5	571223.099	869914.641	N32°33'57.0"	W103°16'00.5"	3522.62'	3525.66'	
RW #1	571056.958	870231.835	N32°33'55.0"	W103°15'57.3"	3522.80'	3525.37'	3523.09'

I HEREBY CERTIFY THAT THIS PLAT WAS PREPARED FROM FIELD NOTES OF ACTUAL SURVEY AND MEETS OR EXCEEDS ALL REQUIREMENTS FOR LAND SURVEYS AS SPECIFIED BY THIS STATE.

GARY L. JONES, N.M. P.S. No. 7977
TEXAS P.S. No. 5074

60 0 60 120 FEET

RICE OPERATING COMPANY

REF: A-20 JCT BOX MONITOR WELLS

MONITOR WELLS LOCATED IN
SECTION 20, TOWNSHIP 20 SOUTH, RANGE 37 EAST,
N.M.P.M., LEA COUNTY, NEW MEXICO.

BASIN SURVEYS P.O. BOX 1786 - HOBBS, NEW MEXICO

W.O. Number: 21868	Drawn By: K. GOAD		
Date: 10-28-2009	Disk: KJG - 21868MW.DWG	Survey Date: VARIES	Sheet 1 of 1 Sheets

Beginning excavation 7-14-2009

Continuing excavation 7-16-2009

Completed excavation 7-37-2009

Pettigrew on site to test clay layer 8-5-2009

Tilling the seed into the soil 9-8-2009

Completed site restoration with silt netting and Excelsior Green to hold seed in place 9-8-2009

LABORATORY TEST REPORT

PETTIGREW & ASSOCIATES, P.A.

1110 N. GRIMES
HOBBS, NM 88240
(575) 393-9827

AASHTO R18

DEBRA P. HICKS, P.E./L.S.I.
WILLIAM M. HICKS. III, P.E./P.S.

To: Rice Operating Company
122 W. Taylor
Hobbs, NM 88240

Material: Light Brown Silty Sand w/Rock

Test Method: ASTM: D 2922

Project: A-20 Site
Project No. 2009.1202

Date of Test: August 18, 2009

Depth: See Below

Depth of Probe: 6"

Test No.	Location	Dry Density % Max	% Moisture	Depth
SG 1	Pad - 10' N. & 30' W. of SE Corner	83.2	8.8	FSG

RECEIVED
OCT 05 2009
RICE OPERATING
HOBBS, NM

Control Density: 113.7
ASTM: D 698

Optimum Moisture: 13.6%

Required Compaction: 75%

Densometer ID: 5357

Lab No.: 09 5021

PETTIGREW & ASSOCIATES

Copies To: Rice Operating

BY: Erica M Hart

BY: _____ **P.E.**

LABORATORY TEST REPORT

PETTIGREW & ASSOCIATES, P.A.

1110 N. GRIMES
HOBBS, NM 88240
(575) 393-9827

AASHTO R18

DEBRA P. HICKS, P.E./L.S.I.
WILLIAM M. HICKS. III, P.E./P.S.

To: Rice Operating Company
Attn: Bruce
122 W. Taylor
Hobbs, NM 88240

Material: Cooper Red Clay

Test Method: ASTM: D 2922

Project: EME A-20
Project No. 2009.1187

Date of Test: August 5, 2009

Depth: See Below

Depth of Probe: 6"

Test No.	Location	Dry Density % Max	% Moisture	Depth
SG 1	EME A-20 Clean Up - 10' N. & 25' E. of SW Corner	91.1	15.0	6' Below FG

Control Density: 100.4
ASTM: D 698

Optimum Moisture: 21.6%

Required Compaction: 90%

Densometer ID: 5572

Lab No.: 09 4667-4668

PETTIGREW & ASSOCIATES

Copies To: Rice Operating

BY: Jessica M Hart

BY: _____ **P.E.**

ETTL Engineers & Consultants Inc.

GEOTECHNICAL * MATERIALS * ENVIRONMENTAL * DRILLING * LANDFILLS

HYDRAULIC CONDUCTIVITY DETERMINATION
FLEXIBLE WALL PERMEAMETER - CONSTANT VOLUME
(Mercury Permometer Test)

Project : Pettigrew & Associates, P.A., Hobbs, NM - Project #2010.1026 Report No: 1-1201-000002
Date: 2/6/2010 Panel Number : P 2 ; ASTM D 6084
Project No. : C 4535-101 Permometer Data

Boring No.:		ap =	0.031416	cm2	Set Mercury to Bleed Pin at	Equilibrium	1.6	cm3
Sample:	9539	aa =	0.767120	cm2		Pipet Rp	6.7	cm3
Depth (ft):		M1 =	0.030180	C = 0.000431428		Annulus Ra	1.5	cm3
Other Location:	Cooper Pit Monument	M2 =	1.040953	T = 0.203778436				

Material Description : Red Clay (Your Sample No 10 1500-1502) Compacted D 698 at 95% of your M/D curve (wet side)

SAMPLE DATA

					Before Test		After Test	
Wet Wt. sample + ring or tare :			532.08	g	Tare No.:	T 4	Tare No.:	T 2
Tare or ring Wt. :			0.0	g	Wet Wt.+tare:	694.63	Wet Wt.+tare:	794.06
Wet Wt: of Sample :			532.08	g	Dry Wt.+tare:	613.98	Dry Wt.+tare:	673.81
Diameter :	2.78	in	7.05	cm2	Tare Wt:	219.48	Tare Wt:	216.84
Length :	2.77	in	7.03	cm	Dry Wt.:	394.5	Dry Wt.:	457.17
Area:	6.05	in^2	39.02	cm2	Water Wt.:	80.66	Water Wt.:	120.25
Volume :	16.73	in^3	274.24	cm3	% moist.:	20.4	% moist.:	26.3
Unit Wt.(wet):	121.07	pcf	1.94	g/cm^3				
Unit Wt.(dry):	100.62	pcf	1.61	g/cm^3				

Specific Gravity: 2.80 Max Dry Density(pcf) = 100.6628 OMC = 20.4436995
% of max = 100.0 +/- OMC = 0.00
Calculated % saturation: 99.66 Void ratio (e) = 0.74 Porosity (n)= 0.42

TEST READINGS

Z1(Mercury Height Difference @ t1): 5.1 cm Hydraulic Gradient = 9.16

Date	elapsed t (seconds)	Z (pipet @ t)	ΔZπ (cm)	temp (deg C)	α (temp corr)	k (cm/sec)	k (ft./day)	Reset = *
2/5/2010	1140	5.65	1.0072906	25	0.889	7.73E-08	2.19E-04	
2/5/2010	1320	5.5	1.1572906	25	0.889	7.82E-08	2.22E-04	
2/6/2010	1500	5.4	1.2572906	25	0.889	7.57E-08	2.16E-04	
2/5/2010	1680	5.3	1.3572906	25	0.889	7.39E-08	2.10E-04	

SUMMARY

ka = 7.63E-08 cm/sec Acceptance criteria = 25 %

ki		Vm		
k1 =	7.73E-08 cm/sec	1.4	%	Vm = $\frac{\lvert ka-ki \rvert}{ka} \times 100$
k2 =	7.82E-08 cm/sec	2.5	%	
k3 =	7.57E-08 cm/sec	0.8	%	
k4 =	7.39E-08 cm/sec	3.1	%	

Hydraulic conductivity	k =	7.63E-08	cm/sec	2.16E-04	ft/day
Void Ratio	e =	0.74			
Porosity	n =	0.42			
Bulk Density	γ =	1.94	g/cm3	121.1	pcf
Water Content	W =	0.33	cm3/cm3	(at 20 deg C)	
Intrinsic Permeability	kint =	7.82E-13	cm2	(at 20 deg C)	

Liquid Limit	LL	
Plastic Limit	PL	
Plasticity Index	PI	
- 200 Sieve		%
+ No 40 Sieve		%
+ No 4 Sieve		%

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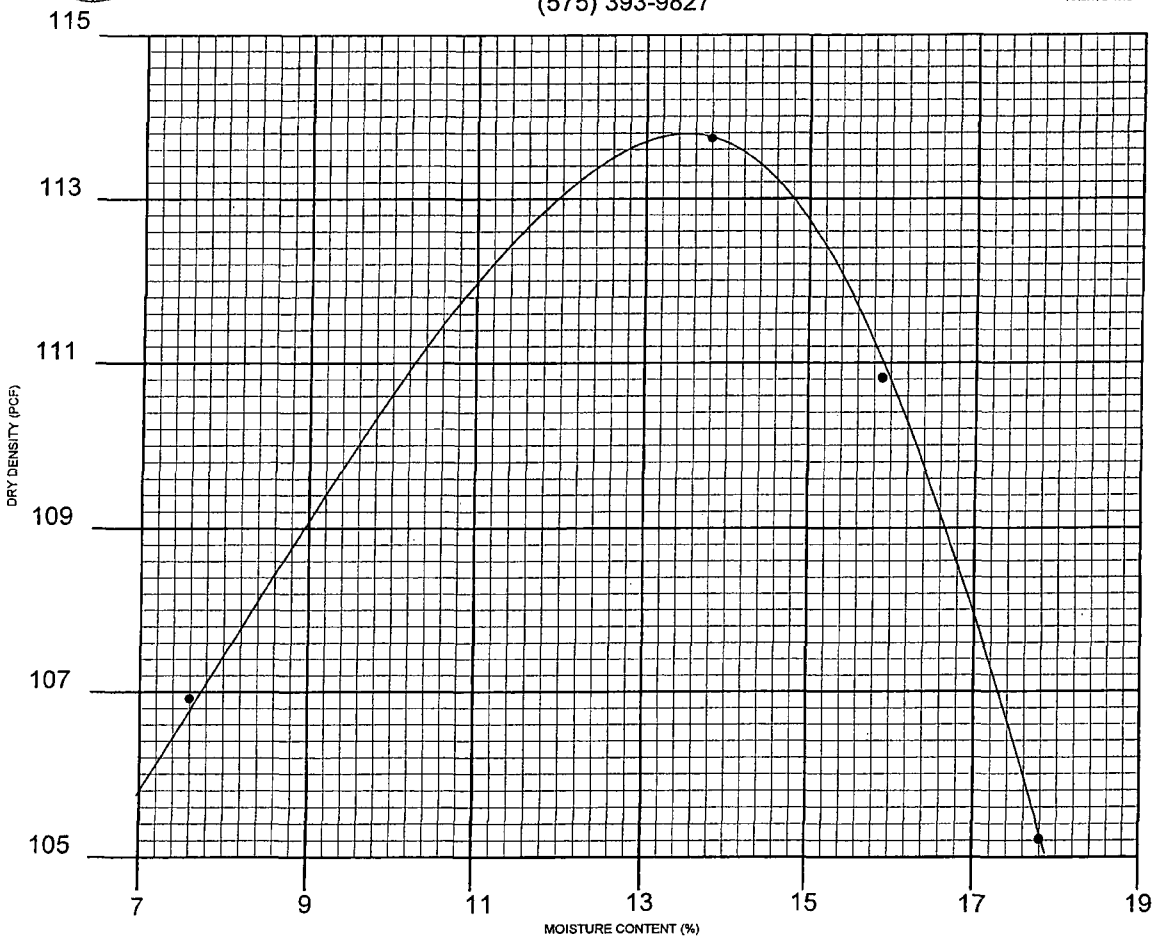

CLIENT: Rice Operating PROJECT: A-20 Site Project No. 2009.1202

SAMPLE LOCATION: Stockpile On-Stie

SOIL DESCRIPTION: Light Brown Silty Sand w/Rock

SOIL CLASSIFICATION: _____ TEST METHOD: ASTM: D 698

ATTERBERG: LL ____ PI ____ Sampled & Delivered 8/18/09

DATE: 8/19/09 LAB NO. 09 5018-5020

DRY WEIGHT LB/CU. FT. 113.7 MOISTURE CONTENT % 13.6

SIEVE ANALYSIS - % PASSING										

PETTIGREW & ASSOCIATES

BY: Erica M Hart

COPIES: Rice Operating

BY: _____ P.E.

CARDINAL LABORATORIES

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

ANALYTICAL RESULTS FOR
RICE OPERATING COMPANY
ATTN: DARNELL MITCHELL
122 W. TAYLOR
HOBBS, NM 88240

Receiving Date: 08/10/09
Reporting Date: 08/11/09
Project Number: NOT GIVEN
Project Name: 8 PT. BLENDED BACKFILL
Project Location: EME JCT A-20

Sampling Date: 08/10/09
Sample Type: SOIL
Sample Condition: COOL & INTACT
Sample Received By: ML
Analyzed By: AB/HM

LAB NUMBER	SAMPLE ID	GRO (C_6-C_{10}) (mg/kg)	DRO (>C_{10}-C_{28}) (mg/kg)	Cl* (mg/kg)
ANALYSIS DATE		08/11/09	08/11/09	08/11/09
H17961-1	8 PT. BLENDED BACKFILL	<10.0	209	176
Quality Control		502	606	490
True Value QC		500	500	500
% Recovery		100	121	98.0
Relative Percent Difference		1.1	0.5	2.0

METHODS: TPH GRO & DRO: EPA SW-846 8015 M; Cl⁻: Std. Methods 4500-Cl⁻B
*Analysis performed on a 1:4 w:v aqueous extract. Reported on wet weight.

Chemist

08/12/09
Date

H17961 TCL RICE

CARDINAL LABORATORIES

101 East Marland, Hobbs, NM 88240
(575) 393-2326 Fax (575) 393-2476

Company Name: Rice Operating
Project Manager: Darnell Mitchell
Address: 122 W. Taylor
City: Hobbs State: N.M Zip: 88240
Phone #: 393-9174 Fax #: 575-397-1471
Project #: Project Owner:
Project Name: 8 PT. Blended Backfill
Project Location: EME Jct A-20
Sampler Name: Darnell Mitchell

BILL TO
P.O. #:
Company: SAME
Attn:
Address:
City:
State: Zip:
Phone #:
Fax #:

ANALYSIS REQUEST

Lab I.D.	Sample I.D.	(G)RAB OR (C)OMP	# CONTAINERS	MATRIX: GROUNDWATER	WASTEWATER	SOIL	OIL	SLUDGE	OTHER	PRESERV: ACID/BASE	ICE / COOL	OTHER	SAMPLING: DATE	TIME	TPH	CL
H17966-1	8 PT. Blended Backfill	C	1			✓					✓		8-10-09	12:50pm	✓	✓

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Terms and Conditions: Interest will be charged on all accounts more than 30 days past due at the rate of 24% per annum from the original date of invoice, and all costs of collections, including attorney's fees.

Sampler Relinquished: Darnell Mitchell Date: 8-10-09 Time: 4:20 Received By: Misty LeBert

Relinquished By: Date: Time: Received By:

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

Temp.

Sample Condition: Cool ✓ Yes ☑ No | Intact ☑ Yes ☐ No

CHECKED BY: (Initials) MCB

Phone Result: ☐ Yes ☐ No Add'l Phone #:
Fax Result: ☐ Yes ☐ No Add'l Fax #:
REMARKS:
Results Hack corners Rice SWD .com

† Cardinal cannot accept verbal changes. Please fax written changes to 575-393-2476.