AP - 001

STAGE 1 & 2 REPORTS

DATE:

MARCH 1991

REXENE CORPORATION
DALLAS, TEXAS

PHASE I SITE INVESTIGATION
FIELD INVESTIGATION REPORT FOR
OLD BRICKLAND REFINERY SITE
SUNLAND PARK, NEW MEXICO

PART III

PROJECT #604-9
MARCH 1991

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TABLE OF CONTENTS

		Page
I.	OVERVIEW	1
II.	EID REQUESTS OF OCTOBER 24, 1990	2
	Area A & B Semi-VOC Data	2
	Depth of Soil Sample Collected in MW-12	2
	Arsenic Soil Data Gap	2
	Outfall Metals Data and Site Background Levels	5
	Definition of the Term "Significant"	5
	Field Measured Groundwater Parameters	7
	Identification of K048-K052 RCRA Wastes	7
	Missing Well Identification	7
	Site Maps	11

APPENDIX A - REVISED BACKGROUND SOIL METAL LEVELS AT OLD BRICKLAND REFINERY SITE

APPENDIX B - IDENTIFICATION OF RCRA-LISTED WASTES FROM PETROLEUM REFINING

LIST OF TABLES

TABLE 1 - SUPPLEMENTAL SOIL ARSENIC SAMPLING RESULTS
TABLE 2 - METALS DATA SUMMARY FROM CULVERT SOIL SAMPLES
TABLE 3 - FIELD PARAMETERS AT THE OLD BRICKLAND REFINERY SITE OBSERVED 4/90 AND 7/90
TABLE 4 - FOUR MILE RADIUS WELL INFORMATION

APPENDIX B TABLES

TABLE 1 - COMPARISON CHART FOR WASTE CONCENTRATION (K048)
TABLE 2 - COMPARISON CHART FOR WASTE CONCENTRATION (K049)
TABLE 3 - COMPARISON CHART FOR WASTE CONCENTRATION (K050)
TABLE 4 - COMPARISON CHART FOR WASTE CONCENTRATION (K051)
TABLE 5 - COMPARISON CHART FOR WASTE CONCENTRATION (K052)

LIST OF DRAWINGS

III-1 - DISTRIBUTION OF VOLATILE COMPOUNDS IN GROUNDWATER, JULY 1990
III-2 - DISTRIBUTION OF SEMI-VOLATILE COMPOUNDS IN GROUNDWATER, JULY 1990
III-3 - DISTRIBUTION OF COPPER IN SOILS SAMPLES
III-4 DISTRIBUTION OF LEAD IN SOILS SAMPLES
III-5 MAGNETOMETER CONTOURED DATA

I. OVERVIEW

Eder Associates Consulting Engineers, P.C. (EA) was retained by Simpson Thacher & Bartlett, counsel to Rexene Corporation (Rexene) to investigate the Brickland Refinery Site in Sunland Park, New Mexico. The investigation was performed in accordance with a January 1990 work plan approved by the New Mexico Environmental Improvement Division (EID), Santa Fe. The investigation report has been submitted in the following parts: Part I - field investigation, local geology and hydrogeology, and site history (August 1990); Part II - analytical data summary (October 1990); and Part IIA containing laboratory data sheets (February 1991); and Part III which follows. Part III presents information EID requested during its meeting with Rexene representatives on October 24, 1990 and information provided to EID during that meeting.

II. EID REQUESTS OF OCTOBER 24, 1990

Area A & B Semi-VOC Data

EID requested information on the availability of semi-VOC data collected from Areas A & B during the two phases of field work. No semi-VOC samples were analyzed by International Technologies Analytical Services (ITAS) Austin Texas lab because the work plan called for the use of oil and grease as a surrogate analytical parameter to select the highest 20 percent of oil and grease samples for semi-VOC analysis. The samples from Areas A & B were sent to the lab along with samples from areas with higher oil and grease levels such that, in comparison, Area A & B samples results were much lower than the results for the other areas and were not run for semi-VOC. This does not represent a major data gap because the site-wide data show excellent correlation between oil and grease and semi-VOC content and no atypical semi-VOCs were detected. Nevertheless, samples may be collected from Areas A & B for semi-VOC analysis during future site investigation, if necessary to satisfy EID concerns.

Depth of Soil Sample Collected in MW-12

EID requested the depth the soil sample from monitoring well number 12 was collected. The soil sample was collected from 0-2' below grade and analyzed for metals, utilized to develop background levels. This information was obtained from field notes and sample chain of custody forms.

Arsenic Soil Data Gap

EA pointed out to EID that arsenic soil data presented in the Part II report had a gap, explaining that arsenic analysis for

certain composite soil samples had QA/QC problems which required their being re-run. The results of those composite samples were not available in time to analyze unique arsenic samples for the Part II report. The report was therefore issued with only partial unique arsenic results so that the report could be submitted to EID in a timely manner.

The unique samples were selected and run for arsenic in mid December 1990, but the time to produce QA/QC deliverables further delayed the preparation of this report. Prior to ordering the analysis, EA informed EID that the analysis would be performed past the sample holding time of six months for this analytical method. EID and EA agreed that this would not have a significant effect on the results and that EID would accept the data.

The arsenic results, shown in Table 1 range from 4.0-99.0 mg/kg. This magnitude compares closely with the arsenic soil levels reported in Part II which were between non-detected and 169 mg/kg. The ranges of arsenic in the composite and unique samples are sufficiently similar that these same general ranges should apply uniformly over the site.

The El Paso Health Department (EPHD) studied atmospheric deposition of arsenic as a result of ASARCO stack emissions. Data from the above study are presented in Appendix A of the Part II report and soil concentrations attributable to ASARCO in the Brickland vicinity ranged from 20-40 mg/kg. While the EPHD arsenic study did not focus on the Brickland site, the ASARCO emissions are the most probable source of the arsenic. A more recent (1989) arsenic study by the Texas Air Control Board (TACB) found arsenic concentrations of 11 to 250 mg/kg in soil samples taken between 0.6 and 1.5 miles of ASARCO and the Brickland site is approximately 1 mile from ASARCO. Neither the EPHD nor the TACB studies have resulted in any soil remediation for arsenic and no further

OLD BRICKLAND REFINERY
SUNLAND PARK, NEW MEXICO

TABLE 1

SUPPLEMENTAL SOIL ARSENIC SAMPLING RESULTS (mg/kg)

Location	Result	Location	Result
E-TP-17	5.7*	E-TP-59	60*
E-TP-18	2.0*B	E-TP-60	99*S
E-TP-19	3.8*	E-TP-61	46*S
E-TP-20	4.0*	E-TP-62	82*S
E-TP-21	1.9*BW	B-TP-83	57*
E-TP-22	38*S	B-TP-84	14*U
E-TP-23	8.3*	B-TP-85	9.5*
E-TP-24	16*	B-TP-86	8.3*

Notes:

* - Digestion Duplicate % RPD is > 20%
B - Result is between CRDL and IDC
W - Analytical spike is > 115% recovery but not MSA required
S - Correlation coefficient > 0.995 . . . Quantitated by MSA
U - Result non-detected . . . < IDL

information was available on any proposed future studies or remediation.

Outfall Metals Data and Site Background Levels

EID questioned why certain culvert sample analytical results were not reported in the Part II report. The report did not include a separate discussion of the culvert samples however they were included as part of the analysis of background metals presented in Appendix A of the Part II report. Data for culvert numbers 1 and 2 were omitted from the report due to an oversight. Table 2 summarizes all culvert metals data.

Further QA/QC review, after the Part II report had been submitted, indicated that metal results from culvert samples were reported by the lab on a wet weight basis rather than on a dry weight basis, so metal results for each culvert sample had to be adjusted upwards after the percent moisture for each was calculated. The metal levels for culvert samples reported in the memorandum analyzing background metal levels at the site (Part II, Appendix A) were also reported on a wet weight basis. A revised version of that table corrected to show the dry weight is Appendix A to this report, and should also be substituted for the background table in Appendix A of the Part II report.

Definition of the Term "Significant"

EID questioned EA's use of the term "significant" in the Part II report while discussing soil and groundwater data obtained during the Phase I study. The term simply conveyed EA's judgment of concentration levels based on qualitative site-wide comparisons. The term was not intended to reflect EA's judgment about how levels at this site compare with those at other sites, nor does it relate

OLD BRICKLAND REFINERY
SUNLAND PARK, NEW MEXICO

TABLE 2

METALS DATA SUMMARY FROM CULVERT SOIL SAMPLES

SAMPLE ID	CUL-1-1	CUL-1-2	CUL-2-1	CUL-3-1	CUL-3-2	CUL-4-1
Arsenic	ND	ND	ND	ND	ND	ND
Selenium	ND	ND	ND	ND	ND	ND
Mercury	ND	0.27	ND	ND	ND	0.05
Silver	ND	1.0	ND	ND	ND	1.2
Beryllium	1.3	1.6	1.7	0.97	2.2	1.2
Cadmium	1.8	7.9	2.8	1.2	3.2	5.7
Chromium	12	39	15	10	16	31
Copper	17	240	23	8.3	18	120
Nickel	9.2	12	12	6.9	13	13
Lead	11	260	18	8.3	11	100
Antimony	ND	ND	ND	ND	ND	ND
Thallium	ND	ND	ND	ND	ND	ND
Zinc	38	190	49	29	48	160

Notes:
1) All data is presented on a dry weight basis
2) Units are mg/kg
3) ND - Not Detected

to statistical comparison testing or any legal or regulatory definition.

Field Measured Groundwater Parameters

EID requested a summary of field-determined groundwater parameters such as: pH, conductance, temperature, TDS and sum of ions. These parameters have been summarized from field notes and are shown on Table 3. The TDS was estimated from a figure presented in Hem, 1989 p.67. The sum of ions was calculated from laboratory sampling results. At EID's request, this information was also supplied to EID on an expedited basis during the last week of October 1990.

Identification of K048-K052 RCRA Wastes

EID requested EA to evaluate whether RCRA wastes K048-K052 were generated or disposed of at the Old Brickland Refinery in an effort to identify areas where such wastes were processed/stored (if at all), and to prepare a written summary of its conclusions. That written summary is Appendix B.

Missing Well Identification

EID requested information on Well #29 as presented in the Part I report, shown on the Drawing III-1 and summarized in Table 2. The well located at the Sunland Park Airport inadvertently was not named in Table 2. Table 4 presents the physical parameters for this well.

OLD BRICKLAND REFINERY
SUNLAND PARK, NEW MEXICO

TABLE 3

FIELD PARAMETERS AT THE OLD BRICKLAND REFINERY SITE
OBSERVED 4/90 AND 7/90

Well No.	Date	pH[1]	Conductance[2]	Temp[3]	TDS[4]	Sum of Ions[5]
MW-1	4/12/90	7.97	1,070	17.1	631	760
MW-1	7/17/90	7.44	1,406		830	850
MW-2	4/90	6.56	18,600	18.6	10,974	2,359
MW-2	7/18/90	6.78	10,833		6,391	15,160
MW-3S	4/11/90	7.56	8,960	16.5	5,286	8,932
MW-3S	7/17/90	7.36	6,830		4,030	9,224
MW-3D	4/11/90	7.25	16,653	19.23	9,825	11,988
MW-3D	7/17/90	7.24	16,203		9,560	11,721
MW-4	4/12/90	6.85	12,990	19.73	7,664	9,849
MW-4	7/18/90	6.93	14,110		8,325	10,577
MW-5	4/90	6.63	14,430	21.2	8,514	10,028
MW-5	7/18/90	6.68	14,470		8,537	10,554
MW-6S	4/11/90	7.29	6,500	19.2	3,835	4,743
MW-6S	7/90	6.99	7,590		4,478	5,012
MW-6D	4/11/90	7.1	14,957	20.97	8,825	11,798
MW-6D	7/90	7.55	16,043		9,465	11,871
MW-7	4/11/90	7.01	8,467	21.1	4,996	7,384
MW-7	7/18/90	7.01	8,800		5,192	6,165
MW-8	4/11/90	7.07	6,950	20.75	4,101	5,812
MW-8	7/18/90	6.63	3,895		2,298	5,411
MW-9S	4/12/90	7.47	5,990	17.33	3,534	4,838
MW-9S	7/17/90	7.61	6,080		3,587	7,570
MW-9D	4/12/90	7.2	14,900	20.6	8,791	11,251

Table 3 continued . . .

Well No.	Date	pH[1]	Conductance[2]	Temp[3]	TDS[4]	Sum of Ions[5]
MW-9D	7/17/90	7.17	15,677		9,249	11,115
MW-10	4/12/90	7.02	5,257	20.1	3,102	3,138
MW-10 (6)	7/18/90					3,525
MW-11	4/12/90	7.02	5,110	19.55	3,015	2,973
MW-11	7/18/90	6.89	5,375		3,171	3,731
MW-12	4/11/90	6.94	19,333	20.8	11,406	16,449
MW-12	7/17/90	6.95	2,357		1,391	16,319
MW-13	4/12/90	6.5	21,400	19.4	12,626	17,100
MW-13	7/18/90	6.92	17,705		10,446	17,922

(1) Standard Units
(2) Micromhos per centimeter
(3) Degrees Celsius
(4) Milligrams per liter, rough estimate based on Hem, 1989 p.67
(5) Summation of major ions detected during sampling in mg/l
(6) Product in well, no reading

OLD BRICKLAND REFINERY
SUNLAND PARK, NEW MEXICO

TABLE 4

FOUR MILE RADIUS WELL INFORMATION

EA Well No.	New Mexico Well No.	Owner	Depth of Well	Geologic Unit	Altitude of Land Surface	Water Level		
						Depth Below Land Surface	Date Measured	Use of Water
29	29S.4E.7.123	Sunland Racetrack	60 feet	AVMB	3736 feet	4.84 feet	07-28-57	P

Site Maps

EID requested that additional information on areal distribution of selected contaminants be displayed on site maps. EA has prepared 4 new site maps which are attached.

Drawings III-1 and III-2 show the distribution of VOC and SVOC detected in groundwater in July of 1990. These two drawings were provided on an expedited basis to EID at the end of October 1990, at EID's request. Note: while these drawings are derived in part from all wells sampled, they are nevertheless based on limited groundwater data. The data were supplemented by visual observation, which is true of all the distribution maps, III-1 to III-4.

Drawing III-3 shows the areal distribution of copper data from unique soil samples. Note: The soils distribution maps (III-3 and III-4) may provide guidance in identifying "hot spots" but are not appropriate for other uses such as calculating volumes of metals contaminated soils, because soils are nonhomogeneous in nature.

Drawing III-4 shows the distribution of lead in unique soil samples collected and analyzed at the site.

Drawing III-5 shows contoured magnetometer data for areas C,D,E and F. This drawing was also provided to EID at the meeting of October 24, 1990.

APPENDIX A

REVISED - BACKGROUND SOIL METAL LEVELS AT OLD BRICKLAND REFINERY SITE

OLD BRICKLAND REFINERY

SUNLAND PARK, NEW MEXICO

BACKGROUND SOIL METAL LEVELS

SAMPLING LOCATION

UNITS (MG/KG)

Parameter	Western US(1) USGS Range	Surface Range Soil (2)	CUL-4-1	CUL-3-1	CUL-3-2	MW-12	B-TP 83,84,85,86	A-TP 87,88,89,90	Site Background Range
Arsenic	<0.1-97	20-40	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4-40
Selenium	--	--	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Mercury	<0.01-4.6	--	0.05	<0.02	<0.02	0.11	0.07	<0.0002	<0.02-0.11
Silver	--	--	1.2	<0.25	<0.25	<0.25	1.4	1.0	<0.25-1.4
Beryllium	<1-13	--	1.2	0.97	2.2	2.2	2.4	2.0	0.9-2.4
Cadmium	--	10-20	5.7	1.2	3.2	5.5	2.3	3.2	1.2-20
Chromium	3-2,000	--	31	10	16	11	8.0	10	10-31
Copper	2-300	--	120	8.3	18	140	3.2	67	8.3-140
Nickel	<5-700	--	13	6.9	13	8.0	6.3	9.8	6.3-13
Lead	<10-700	200-400	100	8.3	11	270	79	51	83-400
Antimony	<1-2.6	--	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1	<1.1
Thallium	2.4-31	--	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65	<0.65
Zinc	<20-1,500	200-400	160	29	48	180	86	61	29-400

Notes:

(1) Shaklette, H.T. Et.Al, Element Composition of Surfacial material in the Conterminous United States, USGS Professional Paper 574-D, 1971.

(2) Landrigan, P.J. et. al., Epidemic Lead Absorption Near An Ore Smelter: Role of Particulate Lead, A report prepared by the El Paso Health Department, 1974, showed concentrations of metals in the area of the site.

-- No value reported

APPENDIX B

IDENTIFICATION OF RCRA-LISTED WASTES FOR PETROLEUM REFINING

IDENTIFICATION OF RCRA-LISTED WASTES FROM PETROLEUM REFINING

The New Mexico Environmental Improvement Division (EID) asked that an analysis be made of the possible occurrence of RCRA-listed petroleum refinery wastes K048-K052 on the Brickland site as a follow-up to Parts I and II of the Phase I Site Investigation Report by Eder Associates (EA). This analysis would be based on the data collected during the field investigation, laboratory analyses of soil from the site, and literature sources including a USEPA document (BDAT Document for Petroleum Treatability Group, K048 through K052, Volume 3). This analysis would further rely on a comparison of the site-specific data with those in the literature to see whether contaminants found in the soils were similar in composition to those reported in the literature for one or more of the listed wastes.

Both the EID and EA recognized that this analysis has significant limitations. The RCRA listing of K048 through K052 wastes relates to present-day processes in the petroleum industry whereas the Brickland refinery operated between the 1930s and late 1950s before being dismantled in the early 1960s. Furthermore, the refinery process diagrams did not indicate the ultimate disposal of refinery wastes and the former refinery personnel who were interviewed were only partially familiar with waste disposal activities at the refinery. Finally, the listed wastes K048 through K052 are not unique in chemical composition and cannot be differentiated from similar substances which are not listed wastes, on the basis of any chemical analysis.

Descriptions of each of the K048 through K052 wastes as they are given in the USEPA BDAT Document (August 1988) are given below along with comments by EA on the comparison of the listed-waste chemical characteristics with the Brickland laboratory data.

OLD BRICKLAND REFINERY

SUNLAND PARK, NEW MEXICO

TABLE 1

COMPARISON CHART FOR WASTE CONCENTRATION (K048)

UNITS (MG/KG)

Analytical Parameters	K048 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Volatile Organics									
Benzene	<1.0-16	ND	NS	14.7	0.9JB-17.9	1.4-36.8	1.6-498.6	0.034-54.0	ND
Carbon Disulfide	NA	ND	NS	ND	ND	ND	ND	ND	ND
Dichlorodiflouromethane	<14.0-310	ND	NS	ND	ND	ND	ND	ND	ND
Ethyl Benzene	<1.0-120	ND	NS	75.5	1.3-44.6	4.1-45.8	2.5-159.9	0.063-79.0	1.2
Toluene	<1.0-150	ND	NS	ND	ND	0.1-13.4	0.3-174.9	0.032-16.0	ND
Xylene (Total)	<4.1-170	0.5	NS	125.8	3.0-25.0	1.7-196	1.8-944	0.094-120	7.7
Semi-Volatile Organics									
Anthracene	NA	NS	NS	6.1	0.15-2.0	1.0-5.0	0.8-9.9	0.2-19.0	0.05-0.67
Acenaphthene	NA	NS	NS	0.034J-3.2	0.05	1.0	0.5-4.8	0.3-1.7	ND
Benzo(a)anthracene	NA	NS	NS	4.4	0.4	1.0-3.0	0.5	0.4-1.9	0.08-0.7
Benzo(a)pyrene	0.004-<40	NS	NS	1.6	0.6	1.0-2.0	ND	1.2	0.09-0.9
Benzo(g,h,i)perulene	NA	NS	NS	ND	0.1	1.0	ND	0.5	0.5
o-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS
p-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS

Analytical Parameters	K048 (1)(2) -	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Bis(2-ethylhexyl)phthalate	<20.0-59	NS	NS	0.062JB-0.13JB	ND	ND-0.21JB	0.09JB	0.23JB-0.32	0.73
Chrysene	<0.66-59	NS	NS	5.5	0.4	1.0-4.0	0.5	0.4-1.9	0.2-1.0
2,4-Dimethylphenol	NA	NS	NS	ND	ND	ND-2.6	ND	ND	ND
Di-n-butyl phthalte	<40.0-190	NS	NS	0.11JB-0.26JB	ND-7.0J	ND-0.16JB	0.092JB	0.21-0.22JB	ND
Flouranthene	NA	NS	NS	2.5	0.1	2.0	ND	0.3-0.7	0.07-1.22
Fluorene	<0.66-58	NS	NS	0.087J-6.7	0.15-2.2	0.2-5.0	0.12-8.0	0.6J-9.0	ND
Naphthalene	<40-350	NS	NS	0.087J-2.9	1.27-33.0	2.0-46.0	1.1-53.9	1.0-27.9	ND
Phenanthrene	<40-190	NS	NS	0.081J-19.8	0.15-2.0	3.0-27.0	0.14-22.0	1.17J-19.0	0.05-0.67
Phenol	3.0-210	NS	NS	ND	ND	ND	ND	ND-1.5J	ND
Pyrene	31-93	NS	NS	18.8	0.2-0.9	2.0-18.0	0.5-6.4	0.43J-11.0	0.11-0.3
Metals									
Antimony	4.4-7	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.05-10.5	19.8*NS	5.98*NS	5.0B*N+-129	4.4-169	5.4B*N-33.8*NS	35.3	29.9*NS	ND-40
Barium	43.0-59	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	0.0012-0.84	2.0-2.1	2.4-3.0	0.58-0.76	0.7-1.8	0.05-1.7	1.5-6.0	3.0-4.1	0.97-2.2
Cadmium	<0.25-0.7	2.9	4.7*N	0.2B-19.0	0.2U*N-44.4*N	0.2U	0.85-25.4	0.3B*N-36.7	1.2-7.9
Chromium (total)	0.04-3,435	13.5	860	7.5	5.2	5.2-75	4.7-47.2	7.0-97.0	10-39
Chromium (Hexavalent)	NA	---	NS	NS	NS	NS	NS	NS	NS
Copper	0.05-56	5.9N-169N	35.5*N-1,370*N	4.8-280	1.28*N-951*N	9.6B*N-300	6.5-34,000	7.1N-20,100*N	8.3-240
Lead	0.05-1,250	15.4-284	60N-2,830N	5.0-683	5.9-1500N	29.5*-139,000	8.2-377,000	14.5N-34,900N	11.0-260
Mercury	<0.05-0.89	0.06UN	0.41N	0.06UN	0.09N	<0.02-0.76N	0.03-10.0	0.03-0.15	0.05-0.27

Analytical Parameters	K048 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Nickel	0.025-16	10.2	5.4	10.2	5.4	17.3-22.0	7.0-42.9	7.7-41.2	6.9-13.0
Selenium	0.1-11	---	ND	ND	ND	ND	ND	ND	ND
Silver	0.0013-6	0.6U	1.4-177	2.9	0.56U-27.8	4.2	0.45-8.1	2.5	1.0-1.2
Vanadium	0.05-460	---	NS	NS	NS	NS	NS	NS	NS
Zinc	10-1825	101	30.9N-251N	17.1-367	11.1N-887N	48.4-69.8	23.0-2,370	33.7-985	29.0-190

Notes:

U - Undetected at <IDL
B - Undetected,<CRDL but >IDL
N - Matrix spike out of acceptable range
S - Performed by MSA
\+ - MSA correlation coefficient <.995
* - Digested duplicate out of 20% RPD
J - Estimated concentration
BDL - Below detection limit (EPA Notation)
NA - Data Not Available
NS - Area Not Sampled for this Analyte
ND - Analyte Not Detected
(1) - Waste codes and data are based on EPA document "Best Demonstrated Available Technology (BDAT) Background Document for K048, K049, K050, K051, K052", August 1988 - May 1990
(2) - Range of concentrations in untreated waste
(3) - Beryllium results have been summarized from composite sample results because they were not analyzed for unique metals.

K049 ("Slop Oil Emulsion Solids")

This listed waste is described by the USEPA as follows:

"Process wastewater from refining operations is in many cases treated in an oil/water/solids separator where the waste separates by gravity into a multiphase mixture. The skimmings from the primary separator generally consist of a three-phase mixture of water, oil, and an emulsified (inseparable) layer. These skimmings are collected in a "slop oil system" where the three phases are separated. The emulsified layer is the listed waste K049."

Site plans and former refinery employees indicated that slop oil accumulated in pits at the southern end of the Brickland refinery in what has been designated "Area G" for purposes of the Phase I investigation. Former employees indicated that slop oil reprocessing took place at Brickland, however, there is no information as to whether an emulsified layer was separated before reprocessing or whether a waste consisting of these emulsified skimmings was generated at the refinery. If such a waste was generated, there is no information on how it was handled, stored or disposed of. No antimony and only one phenol "hit" (phenol estimated at 1.5J (mg/kg) in 1 of 46 samples) was detected in soil sampling, phenol and antimony are typical of K049 waste.

A comparison of chemical data for listed waste K049 and the chemical constituents found in each of the refinery areas investigated by EA is given in Table 2.

OLD BRICKLAND REFINERY

SUNLAND PARK, NEW MEXICO

TABLE 2

COMPARISON CHART FOR WASTE CONCENTRATION (K049)

UNITS (MG/KG)

Analytical Parameters	K049 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Volatile Organics									
Benzene	BDL-1,600	ND	NS	14.7	0.9JB-17.9	1.4-36.8	1.6-498.6	0.034-54.0	ND
Carbon Disulfide	BDL-0.96	ND	NS	ND	ND	ND	ND	ND	ND
Dichlorodiflouromethane	NA	ND	NS	ND	ND	ND	ND	ND	ND
Ethyl Benzene	120-160	ND	NS	75.5	1.3-44.6	4.1-45.8	2.5-159.9	0.063-79.0	1.2
Toluene	28.9-18,000	ND	NS	ND	ND	0.1-13.4	0.3-174.9	0.032-16.0	ND
Xylene (Total)	55.2-1,600	0.5	NS	125.8	3.0-25.0	1.7-196	1.8-944	0.094-120	7.7
Semi-Volatile Organics									
Anthracene	BDL-<190	NS	NS	6.1	0.15-2.0	1.0-5.0	0.8-9.9	0.2-19.0	0.05-0.67
Acenaphthene	NA	NS	NS	0.034J-3.2	0.05	1.0	0.5-4.8	0.3-1.7	ND
Benzo(a)anthracene	NA	NS	NS	4.4	0.4	1.0-3.0	0.5	0.4-1.9	0.08-0.7
Benzo(a)pyrene	0.002-<190	NS	NS	1.6	0.6	1.0-2.0	ND	1.2	0.09-0.9
Benzo(g,h,i)perulene	NA	NS	NS	ND	0.1	1.0	ND	0.5	0.5
o-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS

Analytical Parameters	K049 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
p-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-ethylhexyl)phthalate	BDL-<190	NS	NS	0.062JB-0.13JB	ND	ND-0.21JB	0.09JB	0.23JB-0.32	0.73
Chrysene	BDL-<190	NS	NS	5.5	0.4	1.0-4.0	0.5	0.4-1.9	0.2-1.0
2,4-Dimethylphenol	BDL-3.3	NS	NS	ND	ND	ND-2.6	ND	ND	ND
Di-n-butyl phthalte	<5.4-<190	NS	NS	0.11JB-0.26JB	ND-7.0J	ND-0.16JB	0.092JB	0.21-0.22JB	ND
Flouranthene	NA	NS	NS	2.5	0.1	2.0	ND	0.3-0.7	0.07-1.22
Fluorene	NA	NS	NS	0.087J-6.7	0.15-2.2	0.2-5.0	0.12-8.0	0.6J-9.0	ND
Naphthalene	15.8-680	NS	NS	0.087J-2.9	1.27-33.0	2.0-46.0	1.1-53.9	1.0-27.9	ND
Phenanthrene	BDL-390	NS	NS	0.081J-19.8	0.15-2.0	3.0-27.0	0.14-22.0	1.17J-19.0	0.05-0.67
Phenol	BDL-<190	NS	NS	ND	ND	ND	ND	ND-1.5J	ND
Pyrene	4.5-<190	NS	NS	18.8	0.2-0.9	2.0-18.0	0.5-6.4	0.43J-11.0	0.11-0.3
Metals									
Antimony	BDL-19	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	<2.2-30	19.8*NS	5.98*NS	5.0B*N+-129	4.4-169	5.4B*N-33.8*NS	35.3	29.9*NS	ND-40
Barium	28-370	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium	BDL-0.35	2.0-2.1	2.4-3.0	0.58-0.76	0.7-1.8	0.05-1.7	1.5-6.0	3.0-4.1	0.97-2.2
Cadmium	0.19-28.8	2.9	4.7*N	0.2B-19.0	0.2U*N-44.4*N	0.2U	0.85-25.4	0.3B*N-36.7	1.2-7.9
Chromium (total)	28.9-1,400	13.5	860	7.5	5.2	5.2-75	4.7-47.2	7.0-97.0	10-39
Chromium (Hexavalent)(3)	0.02-<1.9	---	NS	NS	NS	NS	NS	NS	NS
Copper	48-79.8	5.9N-169N	35.5*N-1,370*N	4.8-280	1.28*N-951*N	9.6B*N-300	6.5-34,000	7.1N-20,100*N	8.3-240

Analytical Parameters	K049 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Lead	21.95-3,900	15.4-284	60N-2,830N	5.0-683	5.9-1500N	29.5*-139,000	8.2-377,000	14.5N-34,900N	11.0-260
Mercury	BDL-32	0.06UN	0.41N	0.06UN	0.09N	<0.02-0.76N	0.03-10.0	0.03-0.15	0.05-0.27
Nickel	9.2-86	10.2	5.4	10.2	5.4	17.3-22.0	7.0-42.9	7.7-41.2	6.9-13.0
Selenium	BDL-5.0	---	ND	ND	ND	ND	ND	ND	ND
Silver	<0.38-0.4	0.6U	1.4-177	2.9	0.56U-27.8	4.2	0.45-8.1	2.5	1.0-1.2
Vanadium	2.5-60	---	NS	NS	NS	NS	NS	NS	NS
Zinc	72.8-250	101	30.9N-251N	17.1-367	11.1N-887N	48.4-69.8	23.0-2,370	33.7-985	29.0-190

Notes:

U - Undetected at <IDL
B - Undetected,<CRDL but >IDL
N - Matrix spike out of acceptable range
S - Performed by MSA
\+ - MSA correlation coefficient <.995
* - Digested duplicate out of 20% RPD
J - Estimated concentration
BDL - Below detection limit (EPA Notation)
NA - Data Not Available
NS - Area Not Sampled for this Analyte
ND - Analyte Not Detected
(1) - Waste codes and data are based on EPA document "Best Demonstrated Available Technology (BDAT) Background Document for K048, K049, K050, K051, K052", August 1988 - May 1990
(2) - Range of concentrations in untreated waste
(3) - Beryllium results have been summarized from composite sample results because they were not analyzed for unique metals.

K050 "Heat Exchanger Bundle Cleaning Sludge"

This listed waste is described by the USEPA as follows:

"Heat exchanges are utilized throughout petroleum refining processes. Bundles (groupings of tubes) from these heat exchanges are periodically cleaned to remove deposits of scale and sludge. Depending upon the characteristics of the deposits, the outsides of the tube bundles may be washed, brushed, or sandblasted, while the tube insides can be wiped, brushed, or rodded out. The solids or sludge resulting from this cleaning operation forms the listed waste K050."

Heat exchanger bundles were present at the Brickland refinery and were cleaned according to former employees. The field investigation encountered a black powdery deposit in a small section approximately 150 square feet of Area F, where refinery equipment was located. However, K050 waste is listed because of chromium content, whereas chromium levels in soil samples from Area F are relatively low. A comparison of chemical data for listed waste K050 and the chemical constituents found in each of the refinery areas investigated by EA is given in Table 3. No antimony, one phenol "hit" (phenol estimated at 1.5J (mg/kg) in 1 of 46 samples) and only low levels of total chromium were detected on site, K050 waste has phenols and antimony present and chromium (total) up to 1,600 mg/kg.

While a waste similar to K050 was generated and disposed of on-site, the field data only reveal small quantities of such material, all of which is in Area F. The chemical analyses of material in Area F and the other site areas do not show chromium concentrations which would be expected in K050 waste.

OLD BRICKLAND REFINERY
SUNLAND PARK, NEW MEXICO

TABLE 3

COMPARISON CHART FOR WASTE CONCENTRATION (K050)
UNITS (MG/KG)

Analytical Parameters	K050 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Volatile Organics									
Benzene	NA	ND	NS	14.7	0.9JB-17.9	1.4-36.8	1.6-498.6	0.034-54.0	ND
Carbon Disulfide	NA	ND	NS	ND	ND	ND	ND	ND	ND
Dichlorodiflouromethane	NA	ND	NS	ND	ND	ND	ND	ND	ND
Ethyl Benzene	NA	ND	NS	75.5	1.3-44.6	4.1-45.8	2.5-159.9	0.063-79.0	1.2
Toluene	NA	ND	NS	ND	ND	0.1-13.4	0.3-174.9	0.032-16.0	ND
Xylene (Total)	NA	0.5	NS	125.8	3.0-25.0	1.7-196	1.8-944	0.094-120	7.7
Semi-Volatile Organics									
Anthracene	NA	NS	NS	6.1	0.15-2.0	1.0-5.0	0.8-9.9	0.2-19.0	0.05-0.67
Acenaphthene	NA	NS	NS	0.034J-3.2	0.05	1.0	0.5-4.8	0.3-1.7	ND
Benzo(a)anthracene	NA	NS	NS	4.4	0.4	1.0-3.0	0.5	0.4-1.9	0.08-0.7
Benzo(a)pyrene	0.7-3.6	NS	NS	1.6	0.6	1.0-2.0	ND	1.2	0.09-0.9
Benzo(g,h,i)perulene	NA	NS	NS	ND	0.1	1.0	ND	0.5	0.5
o-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS

Analytical Parameters	K050 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
p-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-ethylhexyl)phthalate	NA	NS	NS	0.062JB-0.13JB	ND	ND-0.21JB	0.09JB	0.23JB-0.32	0.73
Chrysene	NA	NS	NS	5.5	0.4	1.0-4.0	0.5	0.4-1.9	0.2-1.0
2,4-Dimethylphenol	NA	NS	NS	ND	ND	ND-2.6	ND	ND	ND
Di-n-butyl phthalte	NA	NS	NS	0.11JB-0.26JB	ND-7.0J	ND-0.16JB	0.092JB	0.21-0.22JB	ND
Flouranthene	NA	NS	NS	2.5	0.1	2.0	ND	0.3-0.7	0.07-1.22
Fluorene	NA	NS	NS	0.087J-6.7	0.15-2.2	0.2-5.0	0.12-8.0	0.6J-9.0	ND
Naphthalene	NA	NS	NS	0.087J-2.9	1.27-33.0	2.0-46.0	1.1-53.9	1.0-27.9	ND
Phenanthrene	NA	NS	NS	0.081J-19.8	0.15-2.0	3.0-27.0	0.14-22.0	1.17J-19.0	0.05-0.67
Phenol	8-18.5	NS	NS	ND	ND	ND	ND	ND-1.5J	ND
Pyrene	NA	NS	NS	18.8	0.2-0.9	2.0-18.0	0.5-6.4	0.43J-11.0	0.11-0.3
Metals									
Antimony	NA	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	10.2-11	19.8*NS	5.98*NS	5.0B*N+-129	4.4-169	5.4B*N-33.8*NS	35.3	29.9*NS	ND-40
Barium	NA	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium(3)	0.05-0.34	2.0-2.1	2.4-3.0	0.58-0.76	0.7-1.8	0.05-1.7	1.5-6.0	3.0-4.1	0.97-2.2
Cadmium	1.0-1.5	2.9	4.7*N	0.2B-19.0	0.2U*N-44.4*N	0.2U	0.85-25.4	0.3B*N-36.7	1.2-7.9
Chromium (total)	11-1,600	13.5	860	7.5	5.2	5.2-75	4.7-47.2	7.0-97.0	10-39
Chromium (Hexavalent)	0.01-<1.0	---	NS	NS	NS	NS	NS	NS	NS
Copper	67-75	5.9N-169N	35.5*N-1,370*N	4.8-280	1.28*N-951*N	9.6B*N-300	6.5-34,000	7.1N-20,100*N	8.3-240
Lead	0.5-1,100	15.4-284	60N-2,830N	5.0-683	5.9-1500N	29.5*-139,000	8.2-377,000	14.5N-34,900N	11.0-260

	K050 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Mercury	0.14-3.6	0.06UN	0.41N	0.06UN	0.09N	<0.02-0.76N	0.03-10.0	0.03-0.15	0.05-0.27
Nickel	61-170	10.2	5.4	10.2	5.4	17.3-22.0	7.0-42.9	7.7-41.2	6.9-13.0
Selenium	2.4-52	---	ND	ND	ND	ND	ND	ND	ND
Silver	0.0007-0.01	0.6U	1.4-177	2.9	0.56U-27.8	4.2	0.45-8.1	2.5	1.0-1.2
Vanadium	0.7-50	---	NS	NS	NS	NS	NS	NS	NS
Zinc	91-297	101	30.9N-251N	17.1-367	11.1N-887N	48.4-69.8	23.0-2,370	33.7-985	29.0-190

Notes:

U - Undetected at <IDL
B - Undetected,<CRDL but >IDL
N - Matrix spike out of acceptable range
S - Performed by MSA
\+ - MSA correlation coefficient <.995
* - Digested duplicate out of 20% RPD
J - Estimated concentration
BDL - Below detection limit (EPA Notation)
NA - Data Not Available
NS - Area Not Sampled for this Analyte
ND - Analyte Not Detected
(1) - Waste codes and data are based on EPA document "Best Demonstrated Available Technology (BDAT) Background Document for K048, K049, K050, K051, K052", August 1988 - May 1990
(2) - Range of concentrations in untreated waste
(3) - Beryllium results have been summarized from composite sample results because they were not analyzed for unique metals.

K051 ("API Separator Sludge")

This listed waste is described by the USEPA as follows:

"API separators are used in petroleum refining operations to remove floating oil and suspended solids from the wastewater. In an API separator, oily wastewater enters one end of a rectangular channel, flows through the length of the channel, and discharges at the other end. A sufficient residence time is provided to allow oil droplets to float and coalesce at the surface of the wastewater. An oil skimmer is provided near the end of the separator to collect floating oil. Solids that have settled out of the water are scraped along the channel bottom to a sludge collecting hopper. The API separator sludge is the listed waste K051."

There has been no indication from any source, that an API separator was used at the refinery. The API separator design is for a concrete structure, usually belowgrade with baffles to facilitate solids settlement and no such structure was shown on site blueprints nor was there any physical evidence of such a structure uncovered during the site investigation. Because concrete foundations of tanks, building, etc. were easily seen after many years of the refinery demolition, it would be reasonable to expect that there would be evidence of an API separator if one ever existed at Brickland. It is therefore highly unlikely that API separator sludge was generated at the site or disposed of there.

A comparison of chemical data for listed waste K051 and the chemical constituents found in each of the refinery areas investigated by EA is found in Table 4. No antimony, one phenol "hit" (phenol estimated at 1.5J (mg/kg) in 1 of 46 samples) and

OLD BRICKLAND REFINERY

SUNLAND PARK, NEW MEXICO

TABLE 4

COMPARISON CHART FOR WASTE CONCENTRATION (K051)

UNITS (MG/KG)

Analytical Parameters	K051 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Volatile Organics									
Benzene	74	ND	NS	14.7	0.9JB-17.9	1.4-36.8	1.6-498.6	0.034-54.0	ND
Carbon Disulfide	NA	ND	NS	ND	ND	ND	ND	ND	ND
Dichlorodiflouromethane	NA	ND	NS	ND	ND	ND	ND	ND	ND
Ethyl Benzene	46-120	ND	NS	75.5	1.3-44.6	4.1-45.8	2.5-159.9	0.063-79.0	1.2
Toluene	33-450	ND	NS	ND	ND	0.1-13.4	0.3-174.9	0.032-16.0	ND
Xylene (Total)	71-720	0.5	NS	125.8	3.0-25.0	1.7-196	1.8-944	0.094-120	7.7
Semi-Volatile Organics									
Anthracene	13-33	NS	NS	6.1	0.15-2.0	1.0-5.0	0.8-9.9	0.2-19.0	0.05-0.67
Acenaphthene	<10-33	NS	NS	0.034J-3.2	0.05	1.0	0.5-4.8	0.3-1.7	ND
Benzo(a)anthracene	<10-29	NS	NS	4.4	0.4	1.0-3.0	0.5	0.4-1.9	0.08-0.7
Benzo(a)pyrene	0.002-<10	NS	NS	1.6	0.6	1.0-2.0	ND	1.2	0.09-0.9
Benzo(g,h,i)perulene	NA	NS	NS	ND	0.1	1.0	ND	0.5	0.5
o-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS

Analytical Parameters	K051 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
p-Cresol	NA	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-ethylhexyl)phthalate	<10-30	NS	NS	0.062JB-0.13JB	ND	ND-0.21JB	0.09JB	0.23JB-0.32	0.73
Chrysene	14-51	NS	NS	5.5	0.4	1.0-4.0	0.5	0.4-1.9	0.2-1.0
2,4-Dimethylphenol	NA	NS	NS	ND	ND	ND-2.6	ND	ND	ND
Di-n-butyl phthalte	<10-230	NS	NS	0.11JB-0.26JB	ND-7.0J	ND-0.16JB	0.092JB	0.21-0.22JB	ND
Flouranthene	NA	NS	NS	2.5	0.1	2.0	ND	0.3-0.7	0.07-1.22
Fluorene	11-37	NS	NS	0.087J-6.7	0.15-2.2	0.2-5.0	0.12-8.0	0.6J-9.0	ND
Naphthalene	97-200	NS	NS	0.087J-2.9	1.27-33.0	2.0-46.0	1.1-53.9	1.0-27.9	ND
Phenanthrene	70-120	NS	NS	0.081J-19.8	0.15-2.0	3.0-27.0	0.14-22.0	1.17J-19.0	0.05-0.67
Phenol	<2-156.7	NS	NS	ND	ND	ND	ND	ND-1.5J	ND
Pyrene	24-74	NS	NS	18.8	0.2-0.9	2.0-18.0	0.5-6.4	0.43J-11.0	0.11-0.3
Metals									
Antimony	9-18	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	0.1-32	19.8*NS	5.98*NS	5.0B*N+-129	4.4-169	5.4B*N-33.8*NS	35.3	29.9*NS	ND-40
Barium	68-412	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium(3)	0.0012-0.24	2.0-2.1	2.4-3.0	0.58-0.76	0.7-1.8	0.05-1.7	1.5-6.0	3.0-4.1	0.97-2.2
Cadmium	0.024-3.0	2.9	4.7*N	0.2B-19.0	0.2U*N-44.4*N	0.2U	0.85-25.4	0.3B*N-36.7	1.2-7.9
Chromium (total)	0.1-6,790	13.5	860	7.5	5.2	5.2-75	4.7-47.2	7.0-97.0	10-39
Chromium (Hexavalent)	0.01-22	---	NS	NS	NS	NS	NS	NS	NS
Copper	2.5-550	5.9N-169N	35.5*N-1,370*N	4.8-280	1.28*N-951*N	9.6B*N-300	6.5-34,000	7.1N-20,100*N	8.3-240
Lead	0.25-2,480	15.4-284	60N-2,830N	5.0-683	5.9-1500N	29.5*-139,000	8.2-377,000	14.5N-34,900N	11.0-260

Analytical Parameters	K051 (1)(2) -	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Mercury	0.04-6.2	0.06UN	0.41N	0.06UN	0.09N	<0.02-0.76N	0.03-10.0	0.03-0.15	0.05-0.27
Nickel	0.25-150.4	10.2	5.4	10.2	5.4	17.3-22.0	7.0-42.9	7.7-41.2	6.9-13.0
Selenium	0.005-12	---	ND	ND	ND	ND	ND	ND	ND
Silver	0.05-3	0.6U	1.4-177	2.9	0.56U-27.8	4.2	0.45-8.1	2.5	1.0-1.2
Vanadium	1.0-350	---	NS	NS	NS	NS	NS	NS	NS
Zinc	25-6,596	101	30.9N-251N	17.1-367	11.1N-887N	48.4-69.8	23.0-2,370	33.7-985	29.0-190

Notes:

U - Undetected at <IDL
B - Undetected,<CRDL but >IDL
N - Matrix spike out of acceptable range
S - Performed by MSA
+ - MSA correlation coefficient <.995
* - Digested duplicate out of 20% RPD
J - Estimated concentration
BDL - Below detection limit (EPA Notation)
NA - Data Not Available
NS - Area Not Sampled for this Analyte
ND - Analyte Not Detected
(1) - Waste codes and data are based on EPA document "Best Demonstrated Available Technology (BDAT) Background Document for K048, K049, K050, K051, K052", August 1988 - May 1990
(2) - Range of concentrations in untreated waste
(3) - Beryllium results have been summarized from composite sample results because they were not analyzed for unique metals.

only low levels of total chromium were detected on site, while K051 waste has phenols, and antimony present and chromium (total) up to 6,790 mg/kg.

K052 ("Leaded Tank Bottoms")

This listed waste is described by the USEPA as follows:

"Leaded petroleum products are stored in tanks after being separated in distillation columns. As cooling occurs, water separates from the hydrocarbon phase and is drained into the refinery wastewater system. Solids form as corrosion products in the storage tank. These solids are periodically removed during tank cleaning, generating the listed waste K052."

Leaded gasoline was produced at the Brickland refinery and tetraethyl lead was supplied for blending by the refinery. Reportedly, tank bottoms were sometimes placed at the southern end of the site in slop oil pits; residuals in the pits were periodically cleaned out and hauled off-site by truck for disposal. It is unclear, however, whether leaded tank bottoms were ever placed in these pits or disposed of elsewhere on site. It appears unlikely because former refinery personnel emphasized the care which was accorded to tetraethyl lead-containing materials.

A comparison of chemical data for listed waste K052 and the chemical constituents found in each of the refinery areas investigated by EA is given in Table 5. The elevated lead concentrations in soils from Areas E, F and G are higher than those reported in the literature for K052 waste. It is likely that spills of leaded gasoline are the source of some of these concentrations, especially since some of the highest lead concentrations are associated with product loading facilities. No antimony and only one phenol "hit" (phenol estimated at 1.5J (mg/kg) in 1 of 46 samples) was detected in soil sampling, phenol and antimony are typical of K052 waste.

OLD BRICKLAND REFINERY

SUNLAND PARK, NEW MEXICO

TABLE 5

COMPARISON CHART FOR WASTE CONCENTRATION (K052)

UNITS (MG/KG)

Analytical Parameters	K052 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Volatile Organics									
Benzene	650	ND	NS	14.7	0.9JB-17.9	1.4-36.8	1.6-498.6	0.034-54.0	ND
Carbon Disulfide	NA	ND	NS	ND	ND	ND	ND	ND	ND
Dichlorodiflouromethane	NA	ND	NS	ND	ND	ND	ND	ND	ND
Ethyl Benzene	2,300	ND	NS	75.5	1.3-44.6	4.1-45.8	2.5-159.9	0.063-79.0	1.2
Toluene	6,400	ND	NS	ND	ND	0.1-13.4	0.3-174.9	0.032-16.0	ND
Xylene (Total)	3,500	0.5	NS	125.8	3.0-25.0	1.7-196	1.8-944	0.094-120	7.7
Semi-Volatile Organics									
Anthracene	NA	NS	NS	6.1	0.15-2.0	1.0-5.0	0.8-9.9	0.2-19.0	0.05-0.67
Acenaphthene	NA	NS	NS	0.034J-3.2	0.05	1.0	0.5-4.8	0.3-1.7	ND
Benzo(a)anthracene	NA	NS	NS	4.4	0.4	1.0-3.0	0.5	0.4-1.9	0.08-0.7
Benzo(a)pyrene	0.02-<1.8	NS	NS	1.6	0.6	1.0-2.0	ND	1.2	0.09-0.9
Benzo(g,h,i)perulene	NA	NS	NS	ND	0.1	1.0	ND	0.5	0.5
o-Cresol	13	NS	NS	NS	NS	NS	NS	NS	NS

Analytical Parameters	K052 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
p-Cresol	13	NS	NS	NS	NS	NS	NS	NS	NS
Bis(2-ethylhexyl)phthalate	NA	NS	NS	0.062JB-0.13JB	ND	ND-0.21JB	0.09JB	0.23JB-0.32	0.73
Chrysene	NA	NS	NS	5.5	0.4	1.0-4.0	0.5	0.4-1.9	0.2-1.0
2,4-Dimethylphenol	4.2	NS	NS	ND	ND	ND-2.6	ND	ND	ND
Di-n-butyl phthalte	NA	NS	NS	0.11JB-0.26JB	ND-7.0J	ND-0.16JB	0.092JB	0.21-0.22JB	ND
Flouranthene	NA	NS	NS	2.5	0.1	2.0	ND	0.3-0.7	0.07-1.22
Fluorene	NA	NS	NS	0.087J-6.7	0.15-2.2	0.2-5.0	0.12-8.0	0.6J-9.0	ND
Naphthalene	13	NS	NS	0.087J-2.9	1.27-33.0	2.0-46.0	1.1-53.9	1.0-27.9	ND
Phenanthrene	1.4	NS	NS	0.081J-19.8	0.15-2.0	3.0-27.0	0.14-22.0	1.17J-19.0	0.05-0.67
Phenol	<1.8-250	NS	NS	ND	ND	ND	ND	ND-1.5J	ND
Pyrene	NA	NS	NS	18.8	0.2-0.9	2.0-18.0	0.5-6.4	0.43J-11.0	0.11-0.3
Metals									
Antimony	111	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	63-525	19.8*NS	5.98*NS	5.0B*N+-129	4.4-169	5.4B*N-33.8*NS	35.3	29.9*NS	ND-40
Barium	8	NS	NS	NS	NS	NS	NS	NS	NS
Beryllium(3)	0.0025-<0.1	2.0-2.1	2.4-3.0	0.58-0.76	0.7-1.8	0.05-1.7	1.5-6.0	3.0-4.1	0.97-2.2
Cadmium	0.82-8.1	2.9	4.7*N	0.2B-19.0	0.2U*N-44.4*N	0.2U	0.85-25.4	0.3B*N-36.7	1.2-7.9
Chromium (total)	1.0-504	13.5	860	7.5	5.2	5.2-75	4.7-47.2	7.0-97.0	10-39
Chromium (Hexavalent)	NA	---	NS	NS	NS	NS	NS	NS	NS
Copper	110-172	5.9N-169N	35.5*N-1,370*N	4.8-280	1.28*N-951*N	9.6B*N-300	6.5-34,000	7.1N-20,100*N	8.3-240
Lead	11-5,800	15.4-284	60N-2,830N	5.0-683	5.9-1500N	29.5*-139,000	8.2-377,000	14.5N-34,900N	11.0-260

Analytical Parameters	K052 (1)(2)	Old Brickland Refinery Site Area "A"	Old Brickland Refinery Site Area "B"	Old Brickland Refinery Site Area "C"	Old Brickland Refinery Site Area "D"	Old Brickland Refinery Site Area "E"	Old Brickland Refinery Site Area "F"	Old Brickland Refinery Site Area "G"	Old Brickland Refinery Site "off-site" Area
Mercury	0.19-2.4	0.06UN	0.41N	0.06UN	0.09N	<0.02-0.76N	0.03-10.0	0.03-0.15	0.05-0.27
Nickel	97.2-392	10.2	5.4	10.2	5.4	17.3-22.0	7.0-42.9	7.7-41.2	6.9-13.0
Selenium	3.1-<100	---	ND	ND	ND	ND	ND	ND	ND
Silver	0.05-<6.0	0.6U	1.4-177	2.9	0.56U-27.8	4.2	0.45-8.1	2.5	1.0-1.2
Vanadium	1.0-9.8	---	NS	NS	NS	NS	NS	NS	NS
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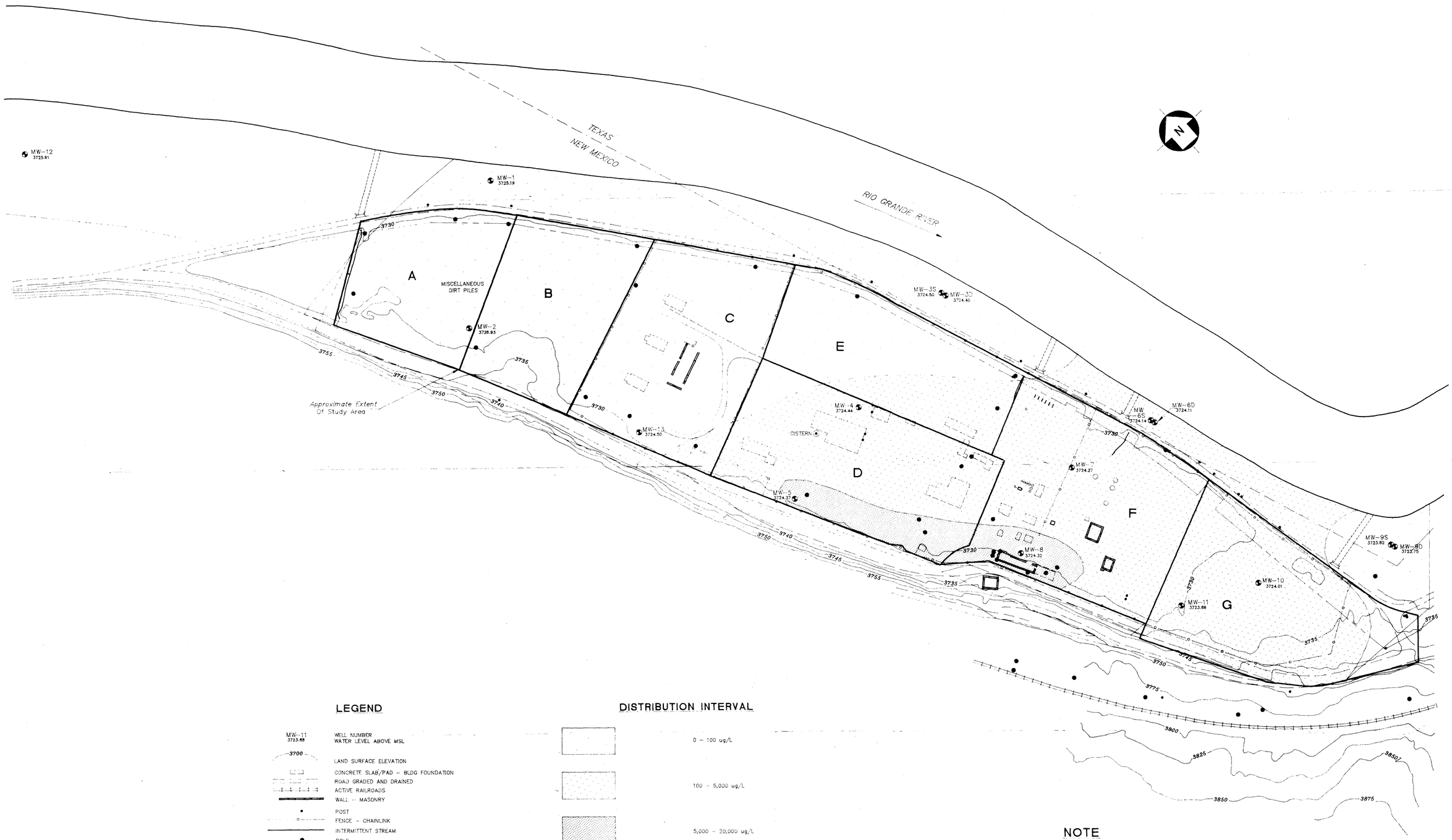
(1) - Waste codes and data are based on EPA document "Best Demonstrated Available Technology (BDAT) Background Document for K048, K049, K050, K051, K052", August 1988 - May 1990
(2) - Range of concentrations in untreated waste
(3) - Beryllium results have been summarized from composite sample results because they were not analyzed for unique metals.



LEGEND

MW-11 3723.88	WELL NUMBER WATER LEVEL ABOVE MSL
3700	LAND SURFACE ELEVATION
	CONCRETE SLAB/PAD - BLDG FOUNDATION
	ROAD GRADED AND DRAINED
	ACTIVE RAILROADS
	WALL - MASONRY
	POST
	FENCE - CHAINLINK
	INTERMITTENT STREAM
	POLE
	MONITORING WELL
	TEST PIT
	TEST BORING
	HAND AUGER BORING
x	SURFACE SAMPLING LOCATIONS
	CISTERN SAMPLING LOCATION
	RIVER SAMPLING LOCATION
	STORM WATER OUTFALL WITH A DITCH

DISTRIBUTION INTERVAL

	0 - 100 ug/L
	100 - 5,000 ug/L
	5,000 - 20,000 ug/L

100 0 100 200

SCALE 1" = 100'
CONTOUR INTERVAL : 5'

NOTE

VOC's Results Are The Sum Of Total BTEX And Total Non-Target Compounds.

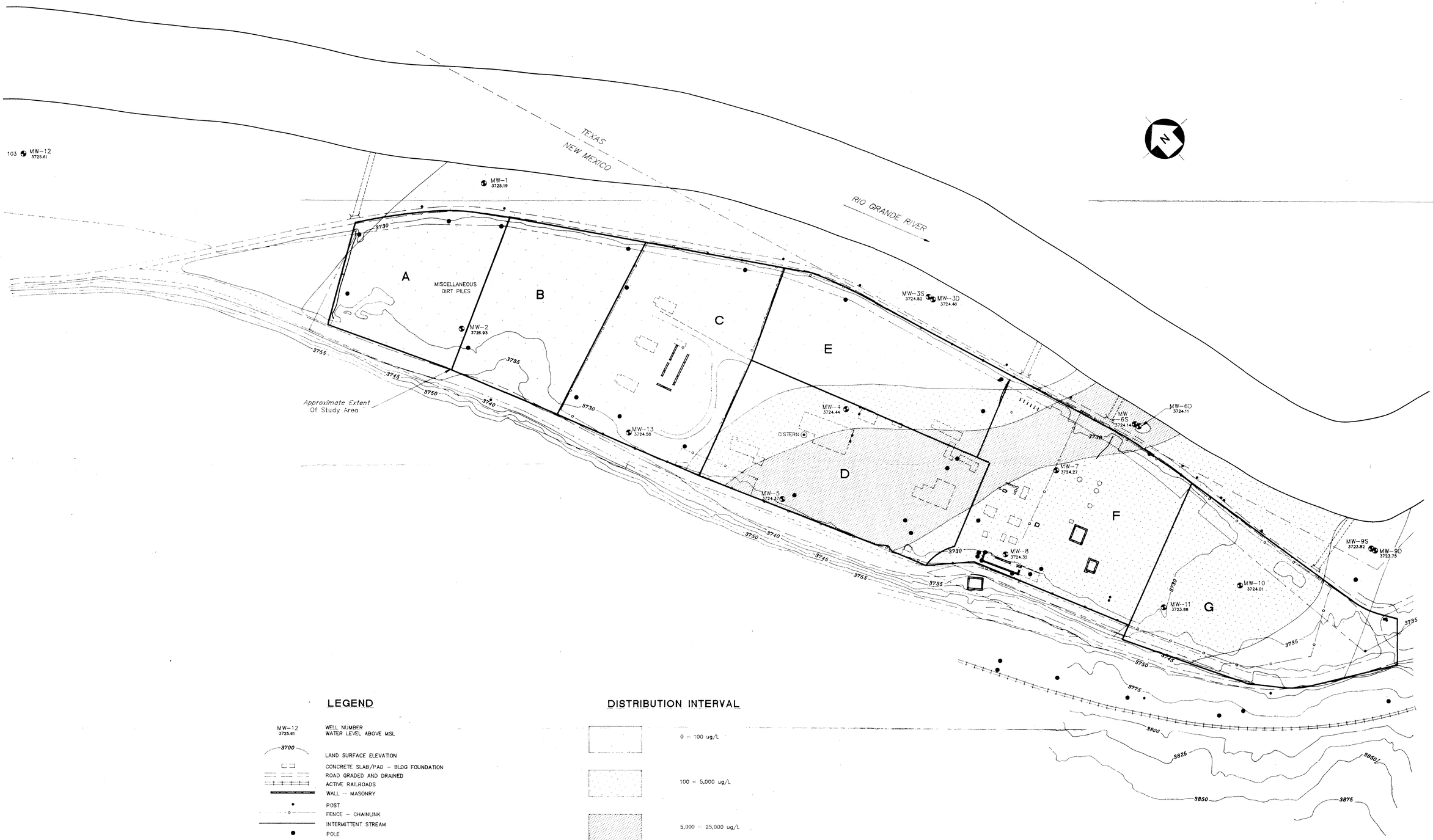
eder associates, consulting engineers p. c.
85 FOREST AVENUE LOCUST VALLEY, N.Y. 11560
8000 EXCELSIOR DRIVE MADISON, WI. 53717
315 W.HURON STREET ANN ARBOUR, MI. 48104

DATE: NOVEMBER, 1990 | DRAWN BY: JIK
DWG: 604-9Y | APPROVED BY: MJM

TITLE - DISTRIBUTION OF VOLATILE COMPOUNDS IN GROUNDWATER, JULY, 1990

PROJECT - OLD BRICKLAND REFINERY SITE SUNLAND PARK, NEW MEXICO

III-1



LEGEND

MW-12 3725.61	WELL NUMBER WATER LEVEL ABOVE MSL
3700	LAND SURFACE ELEVATION
	CONCRETE SLAB/PAD – BLDG FOUNDATION
	ROAD GRADED AND DRAINED
	ACTIVE RAILROADS
	WALL -- MASONRY
	POST
	FENCE – CHAINLINK
	INTERMITTENT STREAM
	POLE
	MONITORING WELL
	TEST PIT
	TEST BORING
	HAND AUGER BORING
	SURFACE SAMPLING LOCATIONS
	CISTERN SAMPLING LOCATION
	RIVER SAMPLING LOCATION
	STORM WATER OUTFALL WITH A DITCH

DISTRIBUTION INTERVAL

	0 – 100 ug/L
	100 – 5,000 ug/L
	5,000 – 25,000 ug/L

100 0 100 200

SCALE 1" = 100'
CONTOUR INTERVAL : 5'

NOTE

SVOC Results Are The Sum Of Total Target And Total Non-Target Compounds, Shown On Tables.

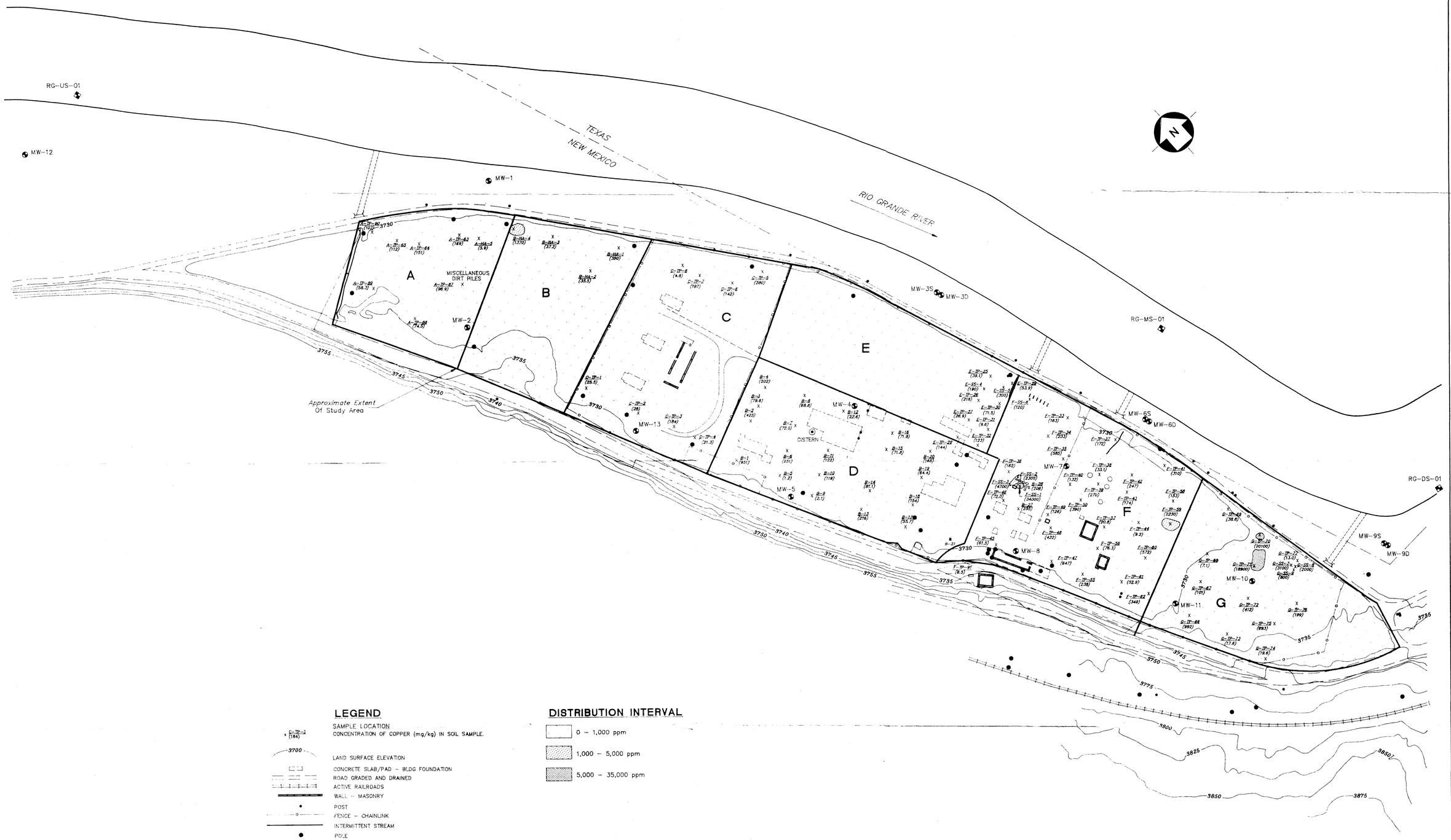
eder associates, consulting engineers p. c.
85 FOREST AVENUE LOCUST VALLEY, N.Y. 11560
8000 EXCELSIOR DRIVE MADISON, WI. 53717
315 W.HURON STREET ANN ARBOUR, MI. 48104

DATE NOVEMBER, 1990 | DRAWN BY JIK
DWG 604-9X | APPROVED BY MJM

TITLE –
DISTRIBUTION OF SEMI-VOLATILE COMPOUNDS IN GROUNDWATER, JULY, 1990

PROJECT –
OLD BRICKLAND REFINERY SITE
SUNLAND PARK, NEW MEXICO

III-2



LEGEND

SAMPLE LOCATION
CONCENTRATION OF COPPER (mg/kg) IN SOIL SAMPLE.

LAND SURFACE ELEVATION

CONCRETE SLAB/PAD – BLDG FOUNDATION
ROAD GRADED AND DRAINED
ACTIVE RAILROADS
WALL – MASONRY
POST
FENCE – CHAINLINK
INTERMITTENT STREAM
POLE
MONITORING WELL
STORM WATER OUTFALL WITH A DITCH

DISTRIBUTION INTERVAL

0 – 1,000 ppm
1,000 – 5,000 ppm
5,000 – 35,000 ppm

100 0 100 200
SCALE 1"= 100'
CONTOUR INTERVAL : 5'

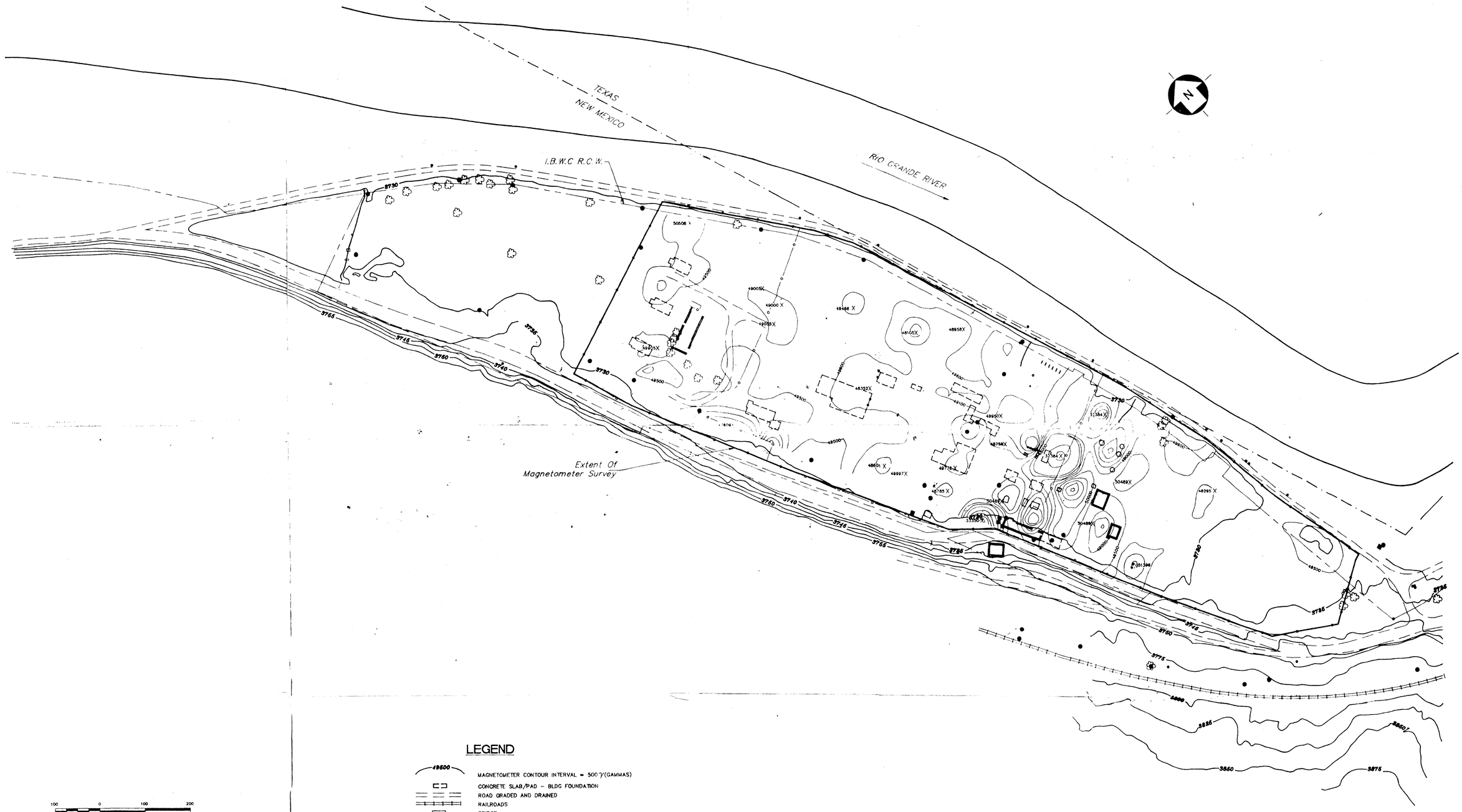
eder associates, consulting engineers p. c.
85 FOREST AVENUE LOCUST VALLEY, N.Y. 11560
5000 EXCELSIOR DRIVE MADISON, WI. 53717
315 WHURON STREET ANN ARBOUR, MI. 48104

DATE SEPTEMBER, 1990 | DRAWN BY JIK
DWG 604-92 | APPROVED BY MJM

TITLE – DISTRIBUTION OF COPPER IN SOIL SAMPLES

PROJECT – OLD BRICKLAND REFINERY SITE SUNLAND PARK, NEW MEXICO

M-3



LEGEND

- 49500 — MAGNETOMETER CONTOUR INTERVAL = 500 γ (GAMMAS)
- CONCRETE SLAB/PAD – BLDG FOUNDATION
- ROAD GRADED AND DRAINED
- RAILROADS
- BRIDGE
- WALL – MASONRY
- SIGN
- X — MAGNETOMETER SURVEY POINT
- POST
- FENCE – CHAINLINK
- INTERMITTENT STREAM
- POLE

100 0 100 200

SCALE 1" = 100'

CONTOUR INTERVAL = 1' / 5'

eder associates, consulting engineers p. c.
85 FOREST AVENUE LOCUST VALLEY, N.Y. 11560
8000 EXCELSIOR DRIVE MADISON, WI. 53717
315 WUHURON STREET ANN ARBOUR, MI. 48104

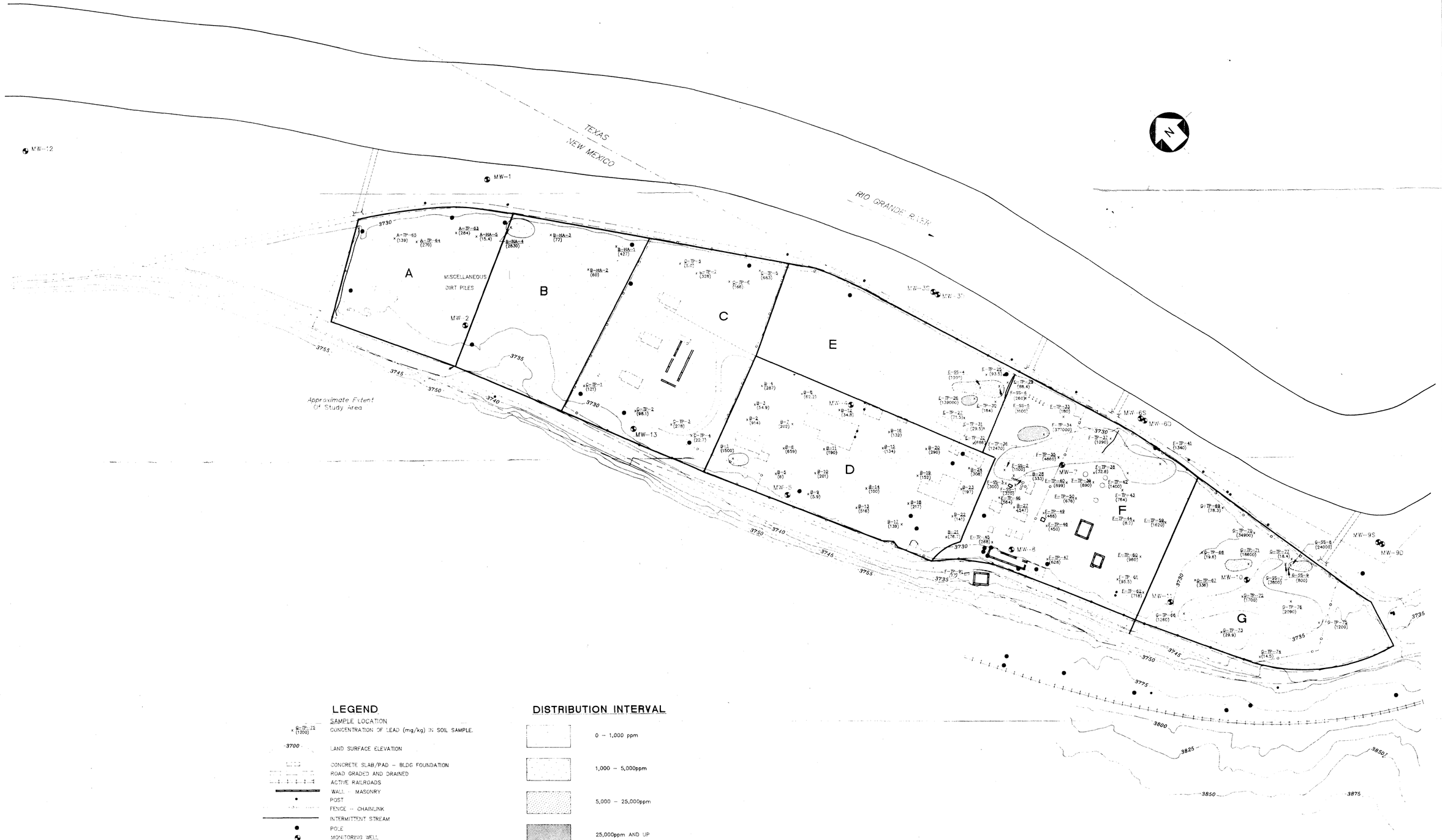
DATE OCTOBER, 1990 | DRAWN BY MJD

DWG 604-9W | APPROVED BY MJM

TITLE – MAGNETOMETER CONTOURED DATA

PROJECT – OLD BRICKLAND REFINERY SITE SUNLAND PARK, NEW MEXICO

III-5



LEGEND

- SAMPLE LOCATION
- CONCENTRATION OF LEAD (mg/kg) IN SOIL SAMPLE.
- 3700 — LAND SURFACE ELEVATION
- CONCRETE SLAB/PAD – BLDG FOUNDATION
- ROAD GRADED AND DRAINED
- ACTIVE RAILROADS
- WALL – MASONRY
- POST
- FENCE – CHAINLINK
- INTERMITTENT STREAM
- POLE
- MONITORING WELL
- STORM WATER OUTFALL WITH A DITCH

DISTRIBUTION INTERVAL

- 0 – 1,000 ppm
- 1,000 – 5,000ppm
- 5,000 – 25,000ppm
- 25,000ppm AND UP

100 0 100 200

SCALE 1"= 100'

CONTOUR INTERVAL : 5'

eder associates, consulting engineers p. c.
85 FOREST AVENUE LOCUST VALLEY, N.Y. 11560
6000 EXCELSIOR DRIVE MADISON, WI. 53717
315 W.HURON STREET ANN ARBOUR, MI. 48104

DATE SEPTEMBER, 1990 | DRAWN BY JW
DWG 6049AA | APPROVED BY MJM

TITLE –
DISTRIBUTION OF LEAD IN SOIL SAMPLES

PROJECT –
OLD BRICKLAND REFINERY SITE
SUNLAND PARK, NEW MEXICO

III-4

SCALE: 1" = 100'

LEGEND

- FENCE
- MW-12 MONITOR WELL POINT
- MONITOR WELL
- SOIL BORING
- TEST TRENCH
- MW-1 GROUNDWATER ELEV.

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DEC 05 1994
OIL CONSERVATION DIV.
SANTA FE

GCL

PLATE A
REMEDIAL INVESTIGATION
MAP FOR THE
FORMER BRICKLAND REFINERY SITE

CLIENT: REXENE
DATE: 10/25/94
DRAWN BY: M.P.
CHECKED BY: BAS
DWG. NO.: \REXENE\INVMAP.DWG