GW - 001

GENERAL CORRESPONDENCE

2007 - 1982
8 of 11

REPORT OF ANALYTICAL RESULTS

FOR

ENGINEERING SCIENCE
BLOOMFIELD REFINING COMPANY

Prepared By:

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May 28, 1986

I. INTRODUCTION

On October 19, 1985 Rocky Mountain Analytical Laboratory received 29 soil samples from Bloomfield Refining Company, collected by Engineering Science. The analyses performed on these samples have been categorized as follows:

- o Analyses for Appendix VIII organic constituents, and
- o Analyses for selected constituents and phenolics.

Appendix VIII Constituents

The analytical parameters selected were based on recent communication with EPA concerning RCRA monitoring requirements for petroleum companies. The parameters selected were based on a subset of Appendix VIII hazardous constituents commonly referred to as the "Skinner" list. Communications from EPA in late 1984 contained various versions of this list. During this time RMAL, under contract to the American Petroleum Institute, performed several studies evaluating analytical methods proposed for measuring the constituents in these various lists. Due in part to efforts by RMAL and others, the EPA in early 1985 revised this list. The documents which were used by RMAL in defining the analytical parameters are listed in a bibliography at the end of this report. This list, as revised, contains 46 organic compounds and is presented in Table 1. The organic compounds are further subdivided into volatile and semivolatile (extractable) compounds.

Additional Tests

In addition to the tests for the full "Skinner" list, some samples were analyzed only for a specific subset of this list. The subset was benzene, toluene, xylene, lead, chromium and total phenolics.

All samples were shipped by air freight to RMAL's Denver, Colorado laboratory. Each sample was assigned a unique RMAL sample number as shown in the enclosed Sample Description Information sheet. These sample numbers were used throughout the project to track and control the analytical work and are used in this document for reporting the results from each analyses.

SAMPLE DESCRIPTION INFORMATION

for

Engineering Science - Bloomfield Refining Company

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51469-01	L1 & L2, 0-6" Quadrant #1 - Landfill	Soil	10/16/85	10/19/85
51469-02	L3 & L4, 6-12" Quadrant #1 - Landfill	Soil	10/16/85	10/19/85
51469-03	L5 & L6, 0-6" Quadrant #2 - Landfill	Soil	10/16/85	10/19/85
51469-04	L7 & L8, 6-12" Quadrant #2 - Landfill	Soil	10/16/85	10/19/85
51469-05	L9 & L10, 0-6" Quadrant #3 - Landfill	Soil	10/16/85	10/19/85
51469-06	L11 & L12, 6-12" Quadrant #3 - Landfill	Soil	10/16/85	10/19/85
51469-07	L13 & L14, 0-6" Quadrant #4 - Landfill	Soil	10/16/85	10/19/85
51469-08	L15 & L16, 6-12" Quadrant #4 - Landfill	Soil	10/16/85	10/19/85
51469-09	LP1 & LP2, 0-6" Points 1 & 2 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-10	LP3 & LP4, 6-12" Points 1 & 2 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-11	LP5 & LP6, 0-6" Points 3 & 4 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-12	LP7 & LP8, 6-12" Points 3 & 4 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-13	LP9 & LP10, 0-6" Points 5 & 6 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-14	LP11 & LP12, 6-12" Points 5 & 6 @ Landfill Pond	Soil	10/16/85	10/19/85
51469-15	LP13 & LP14, 0-6" S. Evaporation Pond - Landfill Pond	Soil	10/16/85	10/19/85
51469-16	MS1 & MS2, Mystery Sample	Soil	10/16/85	10/19/85
51469-17	APS1 & APS2, 0-6" NE & SE of South API Pond	Soil	10/15/85	10/19/85
51469-18	APS3 & APS4, 6-12" NE & SE of South API Pond	Soil	10/15/85	10/19/85
51469-19	APS5 & APS6, 0-6" N & S of South API Pond	Soil	10/15/85	10/19/85
51469-20	APS7 & APS8, 6-12" N & S of South API Pond	Soil	10/15/85	10/19/85

SAMPLE DESCRIPTION INFORMATION

for

Engineering Science - Bloomfield Refining Company

(Continued)

RMA Sample No.	Sample Description	Sample Type	Date Sampled	Date Received
51469-21	APS9 & APS10, 0-6" NW & SW of South API Pond	Soil	10/15/85	10/19/85
51469-22	APS11 & APS12, 6-12" NW & SW of South API Pond	Soil	10/15/85	10/19/85
51469-23	APS13, 0-6" SE near influent S. API Pond	Soil	10/15/85	10/19/85
51469-24	APN1 & APN2, 0-6" NE & SE of North API Pond	Soil	10/15/85	10/19/85
51469-25	APN3 & APN4, 6-12" NE & SE of North API Pond	Soil	10/15/85	10/19/85
51469-26	APN5 & APN6, 0-6" N & S of North API Pond	Soil	10/15/85	10/19/85
51469-27	APN7 & APN8, 6-12" N & S of North API Pond	Soil	10/15/85	10/19/85
51469-28	APN9 & APN10, 0-6" NW & SW of North API Pond	Soil	10/15/85	10/19/85
51469-29	APN11 & APN12, 6-12" NW & SW of North API Pond	Soil	10/15/85	10/19/85

May 28, 1986

TABLE 1. APPENDIX VIII HAZARDOUS CONSTITUENT SUBSET FOR PETROLEUM REFINERY STUDIES*

Volatile Organics

Benzene
Carbon Disulfide
Chlorobenzene
Chloroform
1,2-Dibromoethane
1,2-Dichloroethane
1,4-Dioxane
Methyl ethyl ketone
Styrene
Ethyl Benzene
Toluene
Xylenes
  Xylenes, m
  Xylenes, o & p

Base/Neutral Organics

Anthracene
Benz(a)anthracene
Benzo(b)fluoranthene
Benzo(j)fluoranthene
Benzo(k)fluoranthene
Benzo(a)pyrene
Bis(2-ethylhexyl)phthalate
Butyl benzyl phthalate
Chrysene
Dibenz(a,h)acridine
Dibenz(a,h)anthracene
Di-n-butyl phthalate

Base/Neutral Organics (Cont.)

Dichlorobenzenes
  o-Dichlorobenzene
  m-Dichlorobenzene
  p-Dichlorobenzene
Diethyl phthalate
7,12-Dimethylbenz(a)anthracene
Dimethyl phthalate
Di-n-octyl phthalate
Fluoranthene
Indene
Methyl chrysene
1-Methylnaphthalene
Naphthalene
Phenanthrene
Pyrene
Pyridine
Quinoline

Acid Organics

Benzenethiol
Cresols
  o-Cresol
  p&m-Cresol
2,4-Dimethylphenol
2,4-Dinitrophenol
4-Nitrophenol
Phenol

*"Petitions to Delist Hazardous Wastes, A Guidance Manual," EPA/530-SW-85-003, April, 1985.

II. RESULTS

The analytical results are presented in the data tables in this section. The data are organized into the tables described below:

- o Phenolics,
- o Total Chromium and Lead,
- o Skinner Volatile Organics,
- o Skinner Base/Neutral Organics,
- o Skinner Acid Organics, and
- o Volatile Aromatics.

For each of the parameters in the phenolics and the metals tables, the result and detection limit is present for each sample. The term ND is used to indicate the parameter was not detected at the detection limit shown.

The term BDL (Below Detection Limit) is used in the skinner organic results tables to indicate that the compound is not present at the detection limit shown. The detection limits for the Appendix VIII organic compounds were obtained from a study of the analytical methods performed by RMAL under contract to the American Petroleum Institute (API)[1]. Analytical standards are not available for three compounds. These compounds cannot be measured; they have been listed in the results tables and have been footnoted to show that standards were not available.

As explained in more detail in the analytical methodology section, the samples were screened prior to analysis in order to optimize the detection limit for each sample and minimize instrumental problems associated with analyzing samples containing

[1]"Recovery and Detection Limits of Organic Compounds in Petroleum Refinery Wastes", January 25, 1985.

relatively high concentrations. This process resulted in high dilutions for several samples containing high concentrations of the target compounds. For these samples, the detection limits for compounds not detected are proportionately high. Also, the compounds which were reported close to (less than two times) the detection limits may be suspect.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PHENOLICS

Parameter	Units	51469-01	51469-02	51469-03	51469-04
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-05	51469-06	51469-07	51469-08
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-09	51469-10	51469-11	51469-12
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-13	51469-14	51469-15	51469-16
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-17	51469-18	51469-19	51469-20
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-21	51469-22	51469-23	51469-24
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

ND = Not detected.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PHENOLICS (Continued)

Parameter	Units	51469-25	51469-26	51469-27	51469-28
Phenolics	mg/kg	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

Parameter	Units	51469-29
Phenolics	mg/kg	ND (0.1)

ND = Not detected.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

CHROMIUN AND LEAD

Parameter	Units	51469-01		51469-02		51469-03		51469-04	
Chromium	mg/kg	11	(0.5)	8.9	(0.5)	9.9	(0.5)	7.6	(0.5)
Lead	mg/kg	10	(2.5)	9.8	(2.5)	9.0	(2.5)	6.7	(2.5)

Parameter	Units	51469-05		51469-06		51469-07		51469-08	
Chromium	mg/kg	7.8	(0.5)	7.4	(0.5)	9.1	(0.5)	7.0	(0.5)
Lead	mg/kg	7.6	(2.5)	7.0	(2.5)	8.2	(2.5)	7.7	(2.5)

Parameter	Units	51469-09		51469-10		51469-11		51469-12	
Chromium	mg/kg	6.2	(0.5)	8.1	(0.5)	7.8	(0.5)	10	(0.5)
Lead	mg/kg	9.0	(2.5)	8.5	(2.5)	8.9	(2.5)	12	(2.5)

Parameter	Units	51469-13		51469-14		51469-15		51469-16	
Chromium	mg/kg	8.0	(0.5)	7.8	(0.5)	2.3	(0.5)	2.4	(0.5)
Lead	mg/kg	12	(2.5)	13	(2.5)	4	(2.5)	4	(2.5)

Parameter	Units	51469-17		51469-18		51469-19		51469-20	
Chromium	mg/kg	4.4	(0.5)	5.3	(0.5)	5.5	(0.5)	14	(0.5)
Lead	mg/kg	5	(2.5)	5	(2.5)	5	(2.5)	4	(2.5)

Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

CHROMIUM AND LEAD (Cont.)

Parameter	Units	51469-21		51469-22		51469-23		51469-24	
Chromium	mg/kg	6.8	(0.5)	27	(0.5)	4.9	(0.5)	7.8	(0.5)
Lead	mg/kg	5.1	(2.5)	5.9	(2.5)	6.0	(2.5)	4	(2.5)

Parameter	Units	51469-25		51469-26		51469-27		51469-28	
Chromium	mg/kg	3.2	(0.5)	3.6	(0.5)	2.3	(0.5)	2.9	(0.5)
Lead	mg/kg	3	(2.5)	5	(2.5)	3	(2.5)	3	(2.5)

Parameter	Units	51469-29	
Chromium	mg/kg	12	(0.5)
Lead	mg/kg	4	(2.5)

Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

VOLATILE AROMATICS - GC/PID

Parameter	Units	51469-01	51469-02	51469-03	51469-04
Benzene	ug/kg	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene, m	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylenes, o & p	ug/kg	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Parameter	Units	51469-05	51469-06	51469-07	51469-08
Benzene	ug/kg	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene, m	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylenes, o & p	ug/kg	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Parameter	Units	51469-09	51469-10	51469-11	51469-12
Benzene	ug/kg	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene, m	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylenes, o & p	ug/kg	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

Parameter	Units	51469-13	51469-14	51469-15	51469-16
Benzene	ug/kg	1.3 (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Toluene	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylene, m	ug/kg	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Xylenes, o & p	ug/kg	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)

ND = Not detected. Detection limits in parentheses.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

(Continued)

VOLATILE AROMATICS - GC/PID

Parameter	Units	51469-17		51469-18		51469-19		51469-20	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	5.3	(1.0)	ND	(3.0)	ND	(4.0)	ND	(2.0)
Xylenes, o & p	ug/kg	2.1	(2.0)	ND	(3.0)	ND	(2.0)	ND	(4.0)

Parameter	Units	51469-21		51469-22		51469-23		51469-24	
Benzene	ug/kg	ND	(0.5)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(4.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(2.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(25)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(4.0)	ND	(25)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-25		51469-26		51469-27		51469-28	
Benzene	ug/kg	ND	(0.5)	ND	(0.5)	ND	(0.5)	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Toluene	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)	ND	(1.0)	ND	(1.0)	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)	ND	(2.0)	ND	(2.0)	ND	(2.0)

Parameter	Units	51469-29	
Benzene	ug/kg	ND	(0.5)
Ethylbenzene	ug/kg	ND	(1.0)
Toluene	ug/kg	ND	(1.0)
Xylene, m	ug/kg	ND	(1.0)
Xylenes, o & p	ug/kg	ND	(2.0)

ND = Not detected. Detection limits in parentheses. *Analyses incomplete.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

PERCENT MOISTURE

Sample Number	Percent Moisture	Sample Number	Percent Moisture
51469-01	4%	51469-16	4%
51469-02	5%	51469-17	9%
51469-03	4%	51469-18	10%
51469-04	3%	51469-19	10%
51469-05	3%	51469-20	8%
51469-06	3%	51469-21	6%
51469-07	6%	51469-22	6%
51469-08	4%	51469-23	8%
51469-09	23%	51469-24	5%
51469-10	14%	51469-25	5%
51469-11	18%	51469-26	7%
51469-12	13%	51469-27	5%
51469-13	22%	51469-28	4%
51469-14	14%	51469-29	4%
51469-15	28%		

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER VOLATILE ORGANICS, SOIL

Parameter	Units	51469-15		51469-16		51469-23	
Acrolein	ug/kg	BDL	(30)	BDL	(30)	BDL	(30)
Acrylonitrile*	ug/kg	-	-	-	-	-	-
Benzene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Carbon disulfide	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Carbon tetrachloride	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Chlorobenzene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Chloromethane	ug/kg	BDL	(10)	BDL	(10)	BDL	(10)
1,2 Dibromoethane	ug/kg	BDL	(20)	BDL	(20)	BDL	(20)
Chloroform	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Dichloromethane	ug/kg	BDL	(10)	BDL	(10)	BDL	(10)
1,1-Dichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,2-Dichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1-Dichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Dichloropropane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Methyl ethyl ketone	ug/kg	BDL	(10)	53	(10)	BDL	(10)
Styrene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,2,2-Tetrachloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Tetrachloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Toluene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,2-trans-Dichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,1-Trichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
1,1,2-Trichloroethane	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)
Trichloroethylene	ug/kg	BDL	(5)	BDL	(5)	BDL	(5)

BDL = Below detection limit. Detection limits in parentheses.
*Not consistantly recovered using Method 8240.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER BASE/NEUTRAL ORGANICS, SOILS

Parameter	Units	51469-15		51469-16		51469-23	
Anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzidine	ug/kg	BDL	(4000)	BDL	(4000)	BDL	(4000)
Benz(c)acridine**	ug/kg	-	-	-	-	-	-
Benzo(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo(a)pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo (b) fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Benzo (k) fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-chloroethyl)ether	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-chloroisopropyl)ether	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Bis (2-ethylhexyl)phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Butyl benzyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2-Chloronaphthalene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Chrysene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dibenz(a,h)acridine**	ug/kg	-	-	-	-	-	-
Dibenz(a,j)acridine	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
7,12-DimethylBenz(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dibenz(a,h) anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
7H Dibenzo(c,g)carbazole	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,3-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,4-Dichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Diethyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Dimethyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Di-n-butyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4-Dinitrotoluene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,6-Dinitrotoluene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Di-n-octyl phthalate	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2-Diphenylhydrazine*	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Fluoranthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

BDL = Below detection limit. Detection limits in parentheses. *Measured as azobenzene.
**Not consistantly recovered using Method 8270, or no analytical standard available.

ANALYTICAL RESULTS

for

Engineering Science - Bloomfield Refining Company

SKINNER BASE/NEUTRAL ORGANICS, SOIL (Cont.)

Parameter	Units	51469-15		51469-16		51469-23	
Indene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Indeno(1,2,3-cd)pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Methyl Benz(c)phenanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
3-Methylcholanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Methyl Chrysene**	ug/kg	-	-	-	-	-	-
Naphthalene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Nitrobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
n-Nitrosodiethylamine	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
5-Nitroacenapthene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Quinoline	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Phenanthrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Pyrene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
1,2,4-Trichlorobenzene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Trimethyl Benz(a)anthracene	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

SKINNER ACID ORGANICS

Parameter	Units	51469-15		51469-16		51469-23	
2-Chlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
o-Cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
m/p-Cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4-Dimethylphenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
4,6-Dinitro-o-phenol	ug/kg	BDL	(2000)	BDL	(2000)	BDL	(2000)
2,4-Dinitrophenol	ug/kg	BDL	(4000)	BDL	(4000)	BDL	(4000)
2-Nitrophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
4-Nitrophenol	ug/kg	BDL	(800)	BDL	(800)	BDL	(800)
p-Chloro-m-cresol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Pentachlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
Phenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)
2,4,6-Trichlorophenol	ug/kg	BDL	(400)	BDL	(400)	BDL	(400)

BDL = Below detection limit. Detection limits in parentheses.
**Not consistantly recovered using Method 8270, or no analytical standard available.

III. ANALYTICAL METHODOLOGY

The methods for the metals and organic compounds were derived from three sources of EPA methods,. 1) the methods promulgated in 40 CFR 136 for priority pollutants, 2) the methods published in SW-846 and 3) methods developed by the EPA-EMSL/LV for Superfund investigations, as well as several documents published by the EPA and RMAL in 1984 and 1985. These methods all use the same generic technology as summarized below:

- o Metals, acid digestion followed by analysis by ICP supported by graphite furnace AA,
- o Volatile Organics, purge and trap GC/MS, and
- o Semivolatile (base/neutral and acid) organics, solvent extraction followed by capillary column GC/MS.

The EPA (40 CFR 136, SW-846 and Superfund) methods were, to a large degree, developed and validated to determine the priority pollutants in a broad spectrum of environmental samples. Between October 1983 and July 1985 the EPA released three methods manuals and a "Guidance Manual" which were compendiums of modified SW-846 methods specifically adapted for the analysis of Appendix VIII constituents in petroleum refining wastes (not water samples). The most useful of these documents was an October, 1984 draft methods manual which unfortunately was never formally distributed by EPA, apparently in order to avoid a conflict with a proposed rule in the October 1, 1984 Federal Register. However, even this document (as discussed by an RMAL review for API in December, 1984) lacked many important details that are critical to the successful analysis of environmental samples impacted by petroleum refineries.

Thus, although the methods used by RMAL were based on these various EPA documents, the actual details of each method were implemented by RMAL as explained in more detail below. The various documents which were used to establish RMAL's approach are listed in a bibliography. The discussion below references method numbers in SW-846. However, it should be noted that several different versions of these methods are cited in the various EPA documents. In addition to the documents listed in the bibliography, RMAL has continued a dialogue through phone conversations and meetings with EPA/OSW to ensure that this approach is in line with the Agency's expectations. Much of RMAL's approach is being incorporated in pending Agency promulgations.

Total Metals

Metals were determined using inductively coupled plasma-atomic emission spectroscopy (ICP). Prior to analysis, the samples were prepared using Method 3050. The ICP was preprogrammed to perform off peak background correction on both the high and low wavelength sides of the analytical peaks of interest as appropriate. One hundred interelemental corrections were also automatically applied to the analysis. A matrix spike is analyzed as a quality control check for the ICP analyses.

Skinner Volatile Organics

Volatile organic compounds were determined by purge and trap gas chromatography/mass spectrometry (GC/MS) using Method 8240 with the appropriate sample introduction procedure. The appropriate procedure was determined using a screening procedure consisting of a liquid-liquid extraction with hexadecane followed by direct injection of an aliquot of the extract into a gas chromatograph with flame ionization detection (GC/FID). All volatile samples were screened in this way before GC/MS analysis. The GC/FID screening results were evaluated to determine the amount of sample to use that provides the lowest detection limits possible without overloading the GC/MS system.

Skinner Semivolatile Organics

Semivolatile organics were determined by capillary column GC/MS using SW-846 Method 8270. Soil samples were extracted using SW-846 Sonication Method 3550. After extraction, the samples were subjected to Method 3530 to separate the extract into acidic and basic fractions. The basic fraction was then cleaned up using Method 3570 to generate aliphatic and aromatic fractions. GC/MS analyses were then performed on the acidic and aromatic fractions.

Identification and quantitation of the target compounds determined by GC/MS were performed according to the process described in Methods 8240 and 8270. In summary, this process has the following features:

- Multipoint calibration for each compound to establish instrument response using multiple internal standards,

- Identification of compounds using a computerized reverse search with selected key fragment ions, and

- Quantitation using the previously determined response factors.

Volatile Aromatics

The samples were analyzed for benzene, ethyl benzene, toluene, and xylenes using purge and trap methodology to extract and concentrate the volatile compounds. The samples were desorbed into a gas chromatograph equipped with a photoionization detector (P.I.D.). Identification and quantitation were determined using internal and external standards.

Phenolics

Phenolics were determined colorimetrically using SW-846 Method 9065.

V. BIBLIOGRAPHY

A. Documents Pertaining to Appendix VIII Constituents

1) January, 1984 letter form Myles Morse pertaining to delisting petitions as well as land treatment demonstrations, including sampling procedures and data requirements.

2) March, 1984 letter to delisting petitioners from Barbara Bush revising target parameters.

3) April, 1984 memo from John Skinner to Permit Branch Chiefs concerning land treatment containing target parameters and analytical methods.

4) May, 1984 memo from John Skinner clarifying previous memo.

5) September, 1984 letter to Petitioners from Barbara Bush distributing Refinery Handbook.

6) November, 1984 letter from Eileen Claussen to all delisting petitioners describing new RCRA requirements.

7) May 3, 1985 RMAL Memo.

8) January 8, 1985 RMAL letter to Eileen Claussen, EPA-OSW.

B. Documents Pertaining to Analytical Methods

1) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", October, 1984 - prepared by Radian Corporation for EPA/OSW.

2) "Evaluation of the Applicability of the SW-846 Manual To Support All RCRA Subtitle C Testing", December 20, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

3) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, October, 1984'", December 12, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

4) "Comments on the 'Handbook for the Analysis of Petroleum Refinery Residuals and Waste, April 2, 1984", August 15, 1984 - prepared by Rocky Mountain Analytical Laboratory for API.

5) "Handbook for the Analysis of Petroleum Refinery Residuals and Waste", April 2, 1984 - prepared by S-Cubed for EPA/OSW.

6) EPA document "Guidance for the Analysis of Refinery Wastes", July 5, 1985.

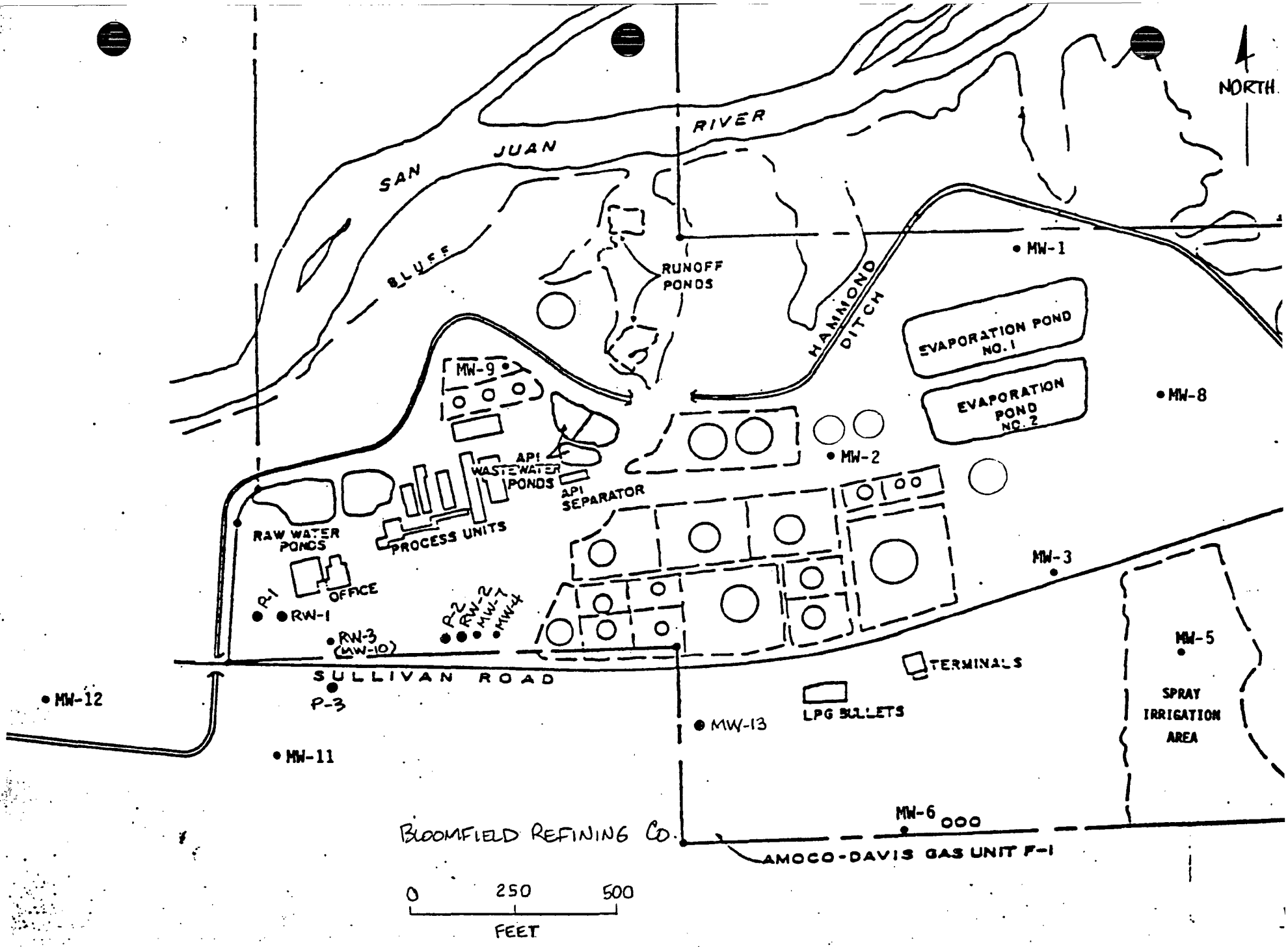
7) "Recovery and Detection Limits of Organic Compounds in Petroleum Refinery Wastes", January 25, 1985.

8) SW-846 - "Test Methods for Evaluating Solid Waste, Physical Chemical Methods" USEPA, 2nd Edition, 1982.

9) 40CFR136 - "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act."

Attachment 9

Monitoring Well Details


NORTH
SAN JUAN RIVER
BLUFF
RUNOFF PONDS
MANNING DITCH
EVAPORATION POND NO. 1
EVAPORATION POND NO. 2
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
MW-11
MW-12
MW-13
API WASTEWATER PONDS
API SEPARATOR
RAW WATER PONDS
PROCESS UNITS
OFFICE
P-1
P-2
P-3
RW-1
RW-2
RW-3
SULLIVAN ROAD
TERMINALS
LPG BULLETS
SPRAY IRRIGATION AREA
BLOOMFIELD REFINING CO.
AMOCO-DAVIS GAS UNIT F-1
0
250
500
FEET

MONITORING WELLS MW 1 THRU MW-6

Six monitoring wells were drilled by Earl and Sons Inc. of Cedar Crest, New Mexico at the Plateau refinery located at Bloomfield, New Mexico. The wells are numbered in accordance with the numbering system used at the refinery such that the northwestern-most well is P-1. The wells are located on Plate 1. The order of drilling and the drilling dates are shown in Table 1.

Table 1. Monitoring wells at Plateau's Bloomfield refinery shown in order drilled with drilling dates and approximate yields and depth at which water was first encountered.

WELL	DRILLING BEGAN	DRILLING FINISHED	DEPTH TO WATER (ft)	YIELD (gpm)
5	2/6/84	2/6/84	42	1
6	2/7/84	2/7/84	dry	
2	2/7/84	2/8/84	23	3-4
1	2/8/84	2/8/84	18	1
3	2/8/84	2/9/84	35	<1
4	2/9/84	2/9/84	26	2

The wells were drilled with an Ingersol-Rand TH-60 rig with casing hammer using air rotary methods and a down-the-hole air hammer. No drilling mud was used in the drilling process. The hole was drilled to the cobble bed at which point six-inch black steel casing was set. As drilling continued through the cobble bed, the casing was driven simultaneously. Some water was required while drilling through the cobble bed, but the drillers used as little water as possible. The drilling water was obtained from the San Juan River. The drill bits were washed between holes with methanol or acetone. Upgradient wells were drilled first to minimize contamination from one well to the next. That is, the wells were drilled in the order of expected increase in contaminated ground water.

Drilling stopped when certain determination of the Nacimiento Formation was obtained from the drill cuttings. The holes were developed with air. Drill samples were collected every five (5) feet and described at the site. Casing lengths were measured to the nearest tenth (1/10th) of foot before they went down the hole. The first casing section of approximately 20 feet was slotted every four inches with an oxy-acetylene torch. A slit cut with the torch in the top of the set casing serves as a measuring point for water levels.

Water levels were taken on February 9, 1984 in all holes. These data are presented in Table 2. Well 6 was dry.

Hydrocarbons were encountered during drilling in hole 4, the last hole drilled, as evidenced by smell, oil slicks in water coming up the hole and appearance and smell of the drill cuttings.

Temporary caps were placed on all wells. At the time of this writing permanent locked caps have been placed on all monitoring wells.

Table 2. Depth to water and total well depth in Plateau monitoring wells on February 9, 1984.

WELL	TIME	TOTAL DEPTH (ft)	DEPTH TO WATER (ft)
5	1:00	51.61	42.67
6	1:30	49.63	dry
2	3:43	26.90	19.11
1	4:10	24.65	16.56
3	4:30	39.35	34.06
4	4:50	32.5	24.94

On February 14 and 15, 1984 water levels were again measured in the new monitoring wells and in the neutron-probe holes (NP) holes along the northern evaporation pond. These data are presented in Table 3.

Table 3. Water-level data in neutron-probe holes and monitoring wells.

WELL	DATE	DEPTH TO WATER (ft)
5	2-14-84	43.73
3	2-14-84	34.26
2	2-15-84	19.90
1	2-15-84	17.01
4	2-15-84	24.97
NP-8	2-15-84	23.91*
NP-7	2-15-84	24.44
NP-6	2-15-84	23.71
NP-5	2-15-84	23.19
NP-3	2-15-84	23.09
NP-2	2-15-84	31.00*
NP-1	2-15-84	39.04
NP-9	2-15-84	22.72

* No temperature probe tube. All other NP holes have tubes along their total length. Water levels were measured with the temperature probe tubes in the holes.

The four down-gradient wells (P-1,P-2,P-3,P-4) were sampled on the afternoon of February 15, 1984. Samples were collected with a bailer. Repeated attempts to pump the wells with two different pumps failed because of sand-lock. The wells in which the worst quality water was suspected were sampled last in order to minimize contamination of samples by the bailer in the event the bailer cleaning was ineffective. The sampling order was therefore P-3, P-2, P-1, P-4. The bailer was thoroughly washed with methanol between samples. The samples were collected according to instructions supplied by each of two labs, Hauser Labs of Boulder, Colorado, and Controls for Environmental Pollution of Santa Fe, New Mexico. Each lab was sent a complete sample from each well. The samples were shipped via UPS to the labs and approved chain of custody procedures were followed.

Lithologic logs for each of the monitoring wells drilled by Earl and Sons, Inc. are given hereafter.

MW-1

WELL NUMBER: 1
DATE: 8 February 1984
LOCATION: 29.11.27.24221

DEPTH IN FEET	DESCRIPTION
0-5	Light brown clayey sand, coarse, poorly sorted, quartzose and slightly calcareous
5-10	Yellowish gray sandy pebbles and cobbles, poorly sorted, rounded to subrounded
10-12	Yellowish gray pebbly sand, very coarse, poorly sorted, feldspathic and noncalcareous
12-22	Dark gray pebbly and sandy cobbles, some quartz pebbles, most are volcanic, subrounded coboles and pebbles, some clay, a little water at about 15 feet
22-25	Gray-green clayey sand becoming light yellow clayey sandstone and sandy claystone

MW-2

WELL NUMBER: 2
DATE: 7 February 1984
LOCATION: 29.11.27.24321

DEPTH IN FEET	DESCRIPTION
0-5	Light yellow brown silty sandy clay, very calcareous
5-10	Light yellow brown clayey sand, subrounded to subangular, moderately to poorly sorted, very calcareous
10-15	Light brown pebbly sand, clayey, very calcareous, cobbles at 15 feet
15-20	Gray sandy pebbles, poorly sorted coarse quartzose sand, pebbles are dark gray and volcanic
20-25	Dark gray cobbles, some quartz pebbles, mostly volcanic, some sand
25-26	Yellow gray clayey sandstone and sandy claystone

MW-3

WELL NUMBER: 3
DATE: 8 February 1984
LOCATION: 29.11.27.24442

DEPTH IN FEET	DESCRIPTION
0-5	Yellow brown sandy silt and clay, very calcareous quartzose
5-10	yellow brown sand, calcareous, silty and clayey, quartzose
10-15	Yellow brown sand, silty and clayey, fine-grained, very calcareous, quartzose
15-27	Light brown clay, sandy, very calcareous, becoming pebbly with depth
27-35	Gray yellow brown cobbly sand, coarse, poorly sorted, silty and clayey, volcanic pebbles small amount of water at about 35 feet
35-40	Gray cobbles, pebbly and sandy, coarse sand, yellow gray clayey sandstone at about 40 feet

mw-4

WELL NUMBER: 4
DATE: 9 February 1984
LOCATION: 29.11.27.23344

DEPTH IN FEET	DESCRIPTION
0-5	Yellow gray-brown sandy silt and clay, calcareous
5-10	Yellow brown silty sandy clay and clayey silt, very slightly calcareous
10-15	Reddish yellow-brown clayey sandy silt, silty clay, fine-grained quartzose sand, noncalcareous
15-19	Light brown coarse sand with clay and pebbles, calcareous
19-25	Gray pebbly sand, very coarse, poorly sorted, some clay and silt, subrounded to subangular, quartzose, pebbles rounded, slightly calcareous
25-30	Gray cobbles and pebbles, subrounded to rounded, volcanic; at about 28 feet, hydrocarbon smell and color
30-32	Gray cobbly sand, with hydrocarbon smell and color, coarse grained, sand is quartzose and feldspathic, subrounded and subangular quartz grains are clear
32	Yellow gray clayey sandstone

MW-5

WELL NUMBER: 5
DATE: 6 February 1934
LOCATION: 29.11.26.31112

DEPTH IN FEET	DESCRIPTION
0-5	Pale yellow brown clay, silty, some sand, calcareous
5-10	Pale yellow brown clayey sand and quartzose silt, poorly sorted, calcareous
10-15	Yellow brown sand, subrounded quartzose sand slightly calcareous
15-20	Yellow brown sand, clayey, moderately coarse grained, very slightly calcareous
20-25	Yellow brown sand, clayey, silty, fine to medium grained, moderately sorted, noncalcareous
25-35	Yellow brown sand, silty and slightly clayey, fine-to-medium grained, well sorted, subangular, noncalcareous, becoming more clayey with depth
35-37	Yellow brown pebbly and cobbly sand, clayey, calcareous
37-47	Dark gray sandy and clayey cobbles and pebbles, water at 42 feet
47-50	Dark gray cobbles with greenish clay
50-54	Green-gray pebbly clay

MW-6

WELL NUMBER: 6
DATE: 7 February 1984
LOCATION: 29.11.27.42144 or 42233

DEPTH IN FEET	DESCRIPTION
0-15	Pale yellow brown sand, clayey and silty, subangular, poorly sorted, quartzose, very calcareous, becoming more clayey with depth
15-20	Pale yellow brown silt, sandy and clayey, silt is coarse, sand is very fine, moderate sorting, quartzose and calcareous
20-25	Pale yellow sand, slightly clayey, subrounded, well sorted, quartzose, noncalcareous
25-35	Pale yellow sand, coarse to medium grained, quartzose, noncalcareous
35-41	Pale yellow sand, clayey, fine grained, silty, quartzose, slightly calcareous
41-49	Gray-black cobbles and pebbles, volcanic
49-52	Gray-green clayey sandstone and sandy claystone

TABLE 3.1

WELL LOG FOR MONITORING WELL NUMBER 7

Drilling Date: February 25

Depth in Feet	Description
0-1	Gravel fill
1-5	Brown sandy silt and clay with small gravels
5-10	Brown sandy silt and clay, more firm and sticky
10-15	Lighter brown sandy silt and sticky clay
15-20	Lighter brown sandy silt and clay, larger cobbles and pebbles
20-25	Sand with cobbles and pebbles
25-30	Sand
30-35	Greenish clay with pebbles, top of Nacimiento estimated at 32 feet
35-40	Greenish clay, few pebbles
40-45	Green to gray clay, smooth drilling
45-50	Green to gray clay, smooth drilling
50-65	Sticky gray to green clay

Elevation of Top of Pipe: 5524.09 feet

Total Depth of Casing: 62.11 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by a 10 foot section of 6" I.D. stainless steel screen, in turn followed by 6" I.D. schedule 40 PVC casing to the top of pipe. Sand was added to 45 feet below grade, bentonite to 41 feet below grade, and grout to the surface.

TABLE 3.2

WELL LOG FOR MONITORING WELL NUMBER 8

Drilling Date: February 28, 1986

Depth in Feet	Description
0-20	Light brown sandy clay, similar to that found on the ground surface
20-34	Cobbles and pebbles
34	Green-gray clay and sandstone, intermixed with small pebbles and sand. Top of Nacimiento.

Elevation of Top of Casing: 5531.12 feet

Total Depth of Casing: 34.94 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.

TABLE 3.3

WELL LOG FOR MONITORING WELL NUMBER 9

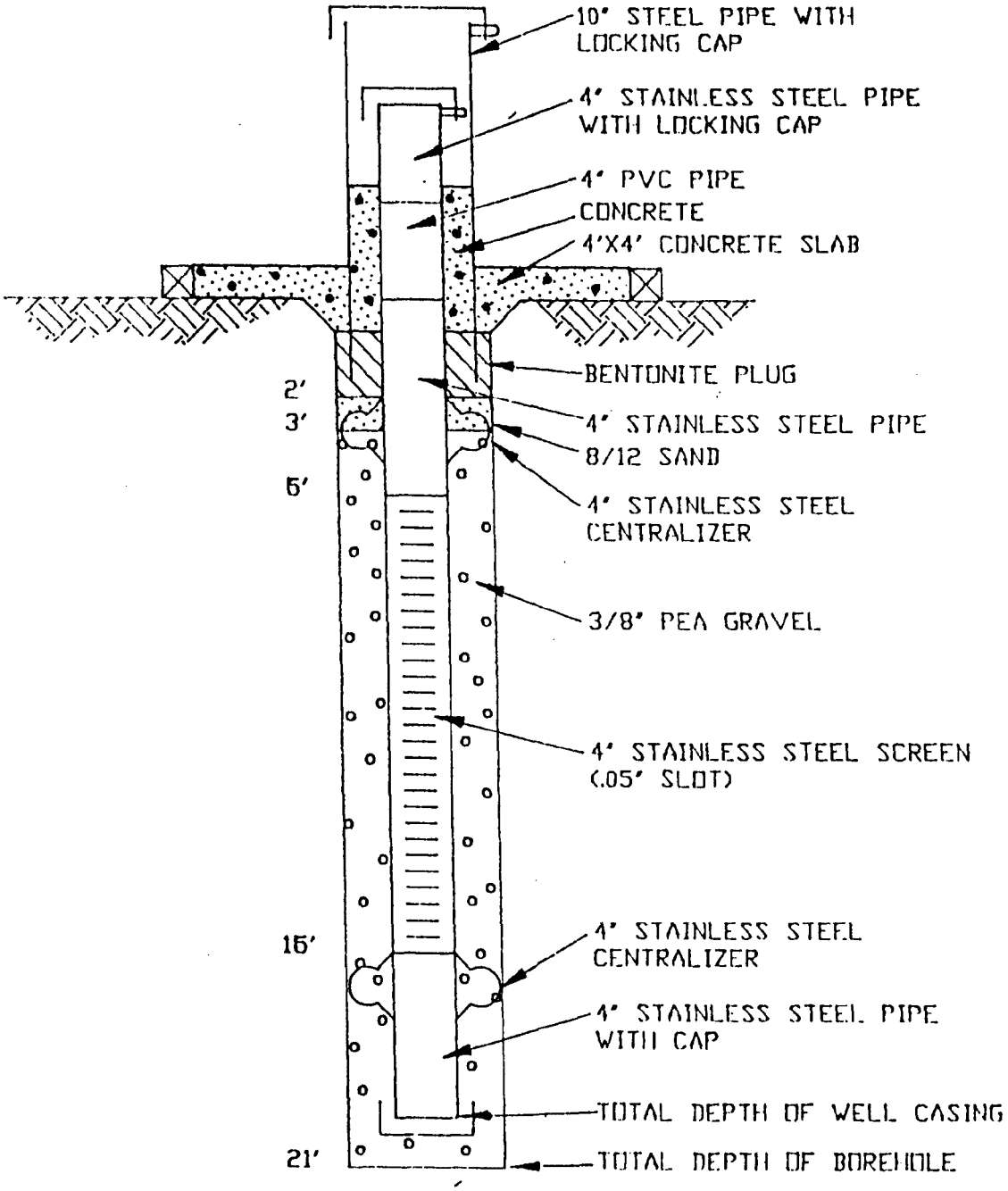
Drilling Date: March 3, 1986

Depth in Feet	Description
0-5	Fill material, some rock
5-10	Sticky reddish brown silty clay
10-15	Lighter color silty clay, some pebbles
15-20	Lighter color silty clay, some pebbles
20-25	Cobbles, pebbles, sand
25-30	Cobbles, greenish clay, top of Nacimiento

Elevation of Top of Casing: 5519.70 feet

Total Depth of Casing: 33.99 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.



MONITOR WELL MW-11

LITHOLOGIC LOG

LOCATION MAP:

__1/4 __1/4 __1/4 __1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: MW-11

SITE COORDINATES (FT.):

N _____ E _____

GROUND ELEVATION (FT. MSL): _____

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR CASING DRIVER ROTARY

DRILLING CONTR.: BEEMAN

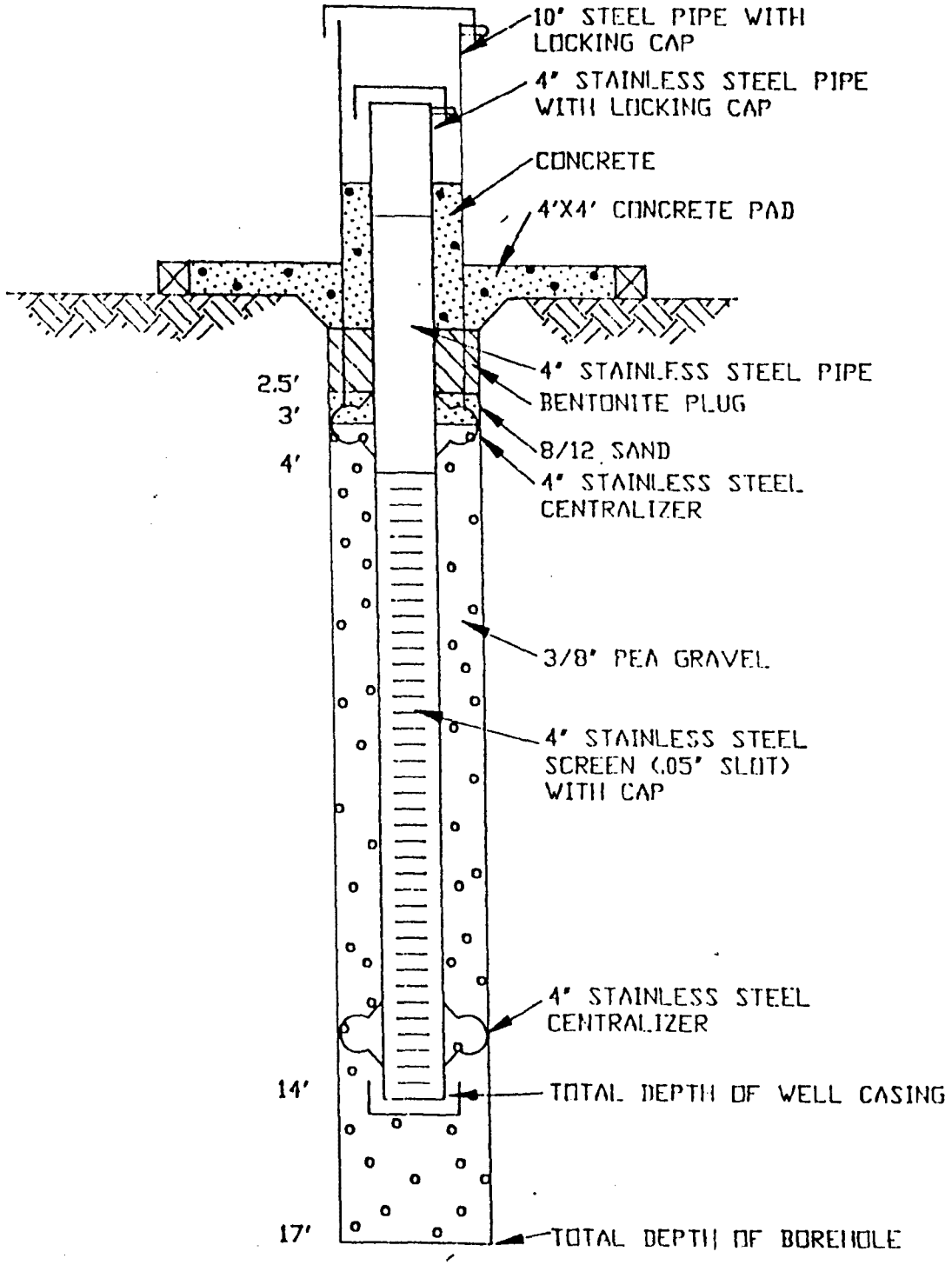
DATE STARTED: 7-31-87 DATE COMPLETED: 7-31-87

FIELD REP.: KASZUBA/SELKE

COMMENTS: STEAM CLEANED RIG AND ALL TOOLS PRIOR TO DRILLING.

LOCATION DESCRIPTION: ID 21'

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description	
5				0- 5'	0 - 5'	SAND, mod yelsh brn (10YR5/4), fine to med. gr. sand w/minor crs gr. sand and pebble gravel (up to 1"). Unconsolidated, moderately well sorted, subrounded, no odor.
10				5-10'	5 -10'	GRAVELLY SAND, olive gray (5Y4/1), fine to med. gr. sand w/minor crs gr. sand unconsolidated, mod. well sorted, subrounded, gravel clasts (¼" to 2") subrounded. Moderate degradation odor.
15				10-12⅓'	10 -12.⅓'	SANDY CLAY, lt. olive gray (5Y5/2), fine to med. gr. sand in clay matrix no odor.
20				12⅓-15'	12⅓-15'	SANDY CLAY, as above.
				15-21'	15 -21'	SANDY CLAY, yelsh gray (5Y7/2), fine gr. sand in clay matrix, clay chips up to 1½" from moderately consolidated clay (or weathered shale).
25					NOTE:	Saturation from ~7-8' to ~12⅓'
30						
35						
40						
45						
50						



MONITOR WELL MW-12

LITHOLOGIC LOG

LOCATION MAP:

__1/4 __1/4 __1/4 __1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: MW-12

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (FT. MSL): _____

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR CASING DRIVER ROTARY

DRILLING CONTR.: BEEMAN BROTHERS

DATE STARTED: 8-1-87 DATE COMPLETED: 8-1-87

FIELD REP.: KASZUBA

COMMENTS: SATURATED FROM ~5'--12'. TD-17'.
STEAM-CLEANED ALL TOOLS PRIOR TO DRILLING.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5				0- 5'	0- 5' SAND, mod yellowish brwn (10YR5/4), fine-to med-grained sand, unconsolidated, well-sorted, subrounded. No HC odor. Saturated @ ~5'.
				5- 9'	5- 9' SAND, as above. Saturated. Gravelly sand @ 9'. Subrounded gravel, 2" dia.
10				9-10'	9-10' SANDY CLAY, dusky yellow (5Y6/4). Fine-to med-gr sand in clay matrix. No HC odor. Saturated.
				10-15'	10-15' SANDY CLAY, as above. Minor chips of clay (shale), ~10%. Saturated to ~12'.
15				15-16'	15-16' SANDY CLAY, as above. Clay chips up to ½" (moderately consolidated clay or weathered shale). Contains ~10% gypsum. No HC odor.
				16-17'	16-17' CLAYEY SAND, dusky yellow (5Y6/4), sand is fine grained, well-sorted, No HC odor.
20					
25					
30					
35					
40					
45					
50					

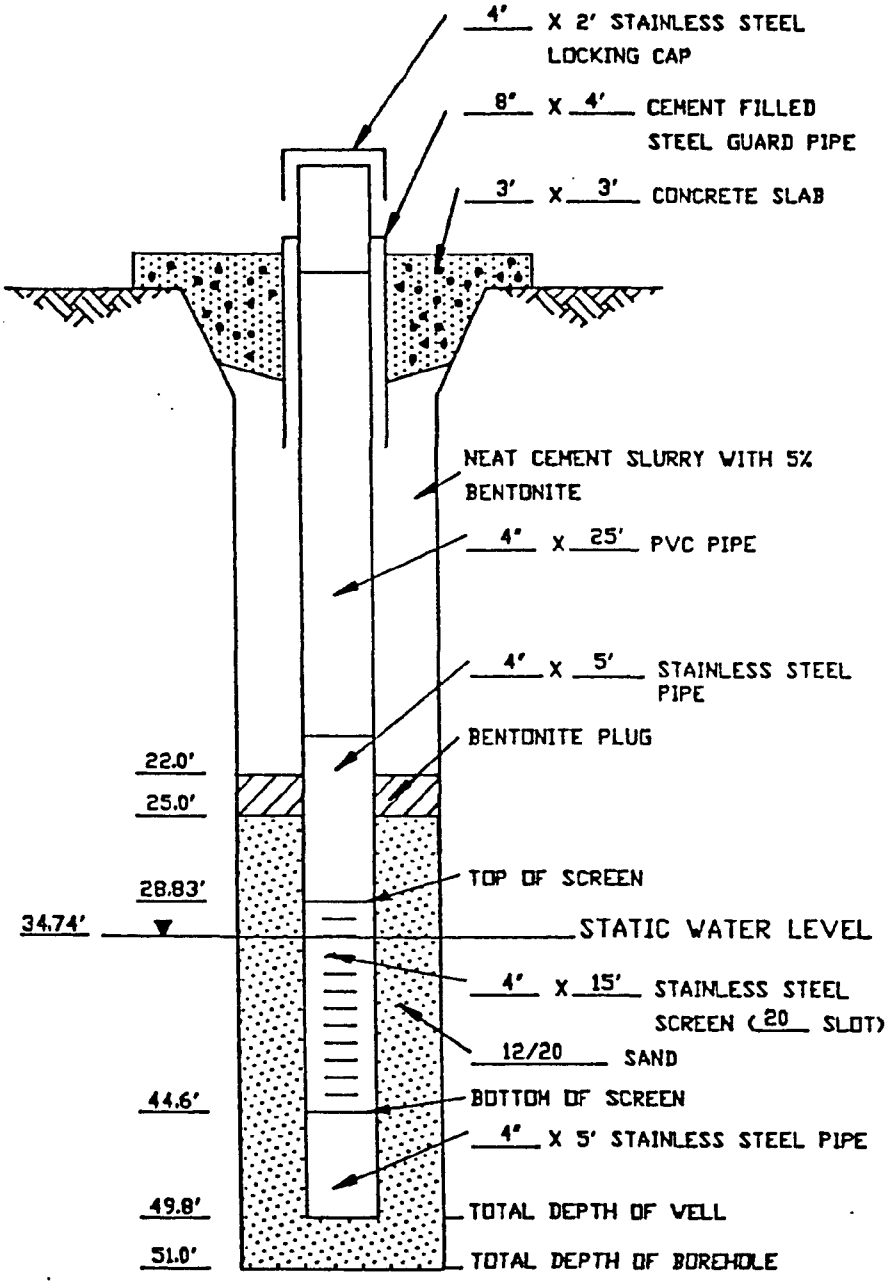


FIGURE B-7

COMPLETION DIAGRAM
PIEZOMETER P-4

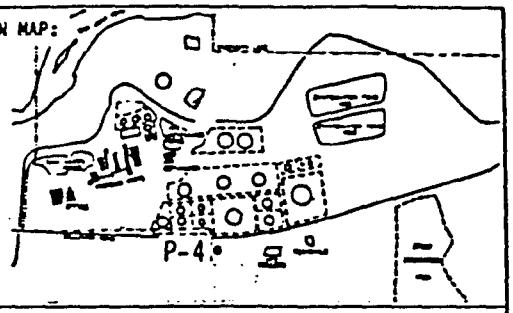
(MW-13)

FIGURE B-14

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-4

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: P-4 (MW-13)
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5538.42
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 2 September 1988 DATE COMPLETED: 3 September 1988
FIELD REP.: W.S. Dubyk
COMMENTS: Static on September 9, 1988: 37.91' from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5					0'-27' Silt and Clay - Moderate brown (5 YR 4/4) to light brown (5 YR 5/6).
10					
15					
20					
25			1233		27'-30' Sand - Very pale or (5 YR 8/2) fine to coarse grained, angular to subangular predominantly quartz.
30					30'-40' Gravel and Sand - Light gray (N7). Sand is medium to coarse grained, subrounded to rounded. Gravel is subangular to rounded, up to 3" diameter.
35					
40			1415		41'-43' Clay - Pale olive (10 Y 6/2), plastic.
					43'-45' Gravel and Sand - As above.
45			1420		45'-51' Sand ; Nacimiento Formation -light bluish grey (5B7/1) Fine grained, silty.
50		T.D. 51'	1455		

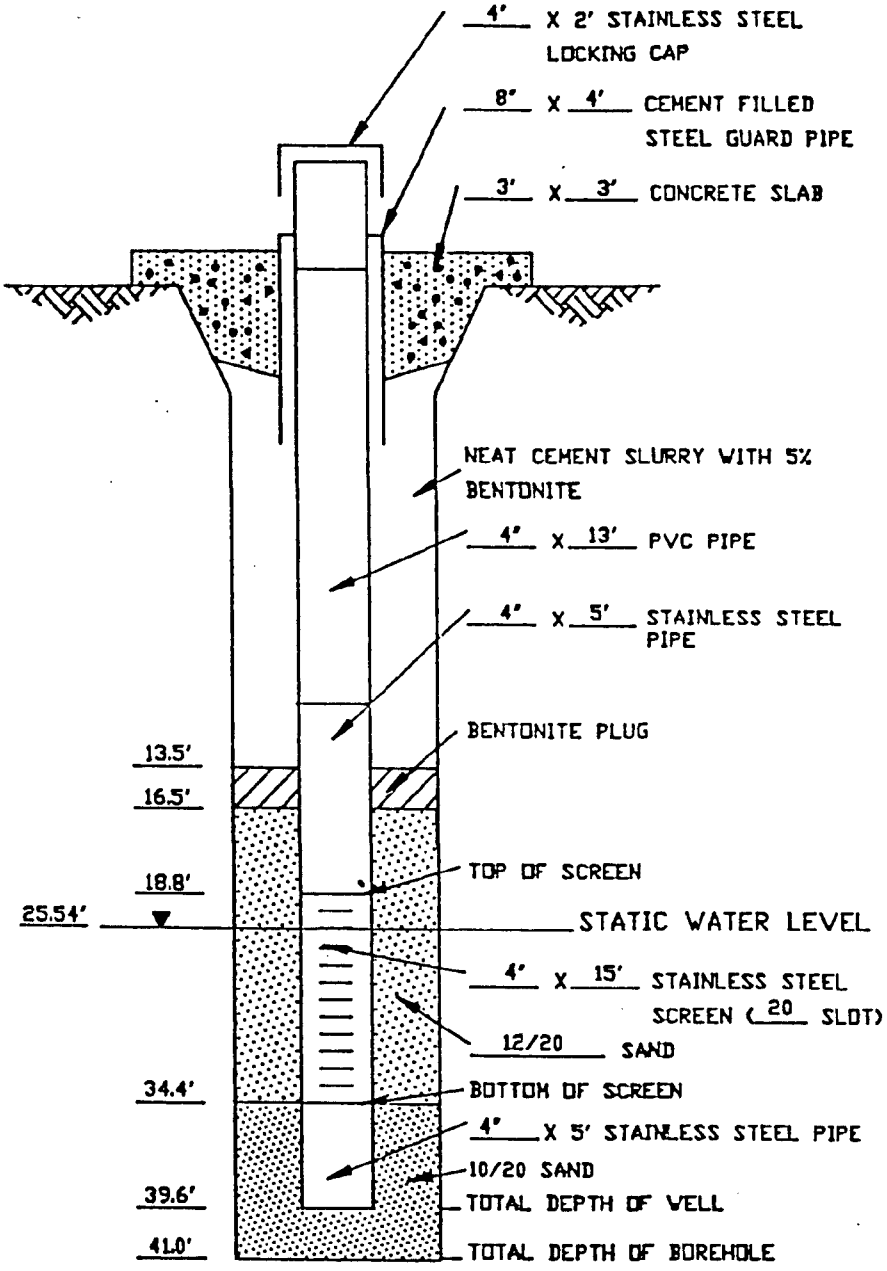


FIGURE B-1

COMPLETION DIAGRAM

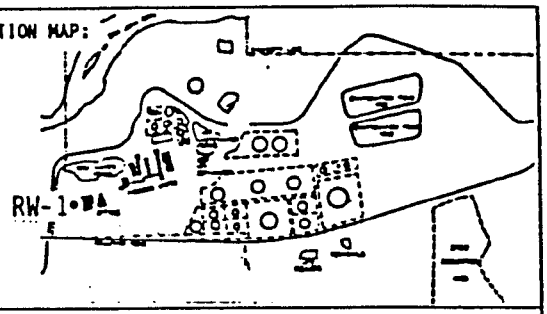
RECOVERY WELL RW-1

FIGURE B-8

LITHOLOGIC LOG (SOIL)

RECOVERY WELL RW-1

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: RW-1
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5525.92
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 30 August 1988 DATE COMPLETED: 31 August 1988
FIELD REP.: W.S. Dubyk
COMMENTS: Static on September 2, 1988: 26.65 from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			1642		0'-18' Silt and Sand - Dark yellowish brown (10 YR 4/2) to grayish brown (5 YR 3/2). Minor to strong hydrocarbon odor.
10			1646		
15			1710		
20			1720		18'-34' Sand and Gravel - Medium dark gray (N4). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subrounded to well rounded, to 2" diameter. Strong hydrocarbon odor.
25			1725		
30			1730		
35			1738		34'-41' Shale - Nacimiento Formation - Dusky yellow (5 YR 6/4) to light olive gray (5 Y 6/1) shale.
40			1758		
		T.D. 41'			
45					
50					

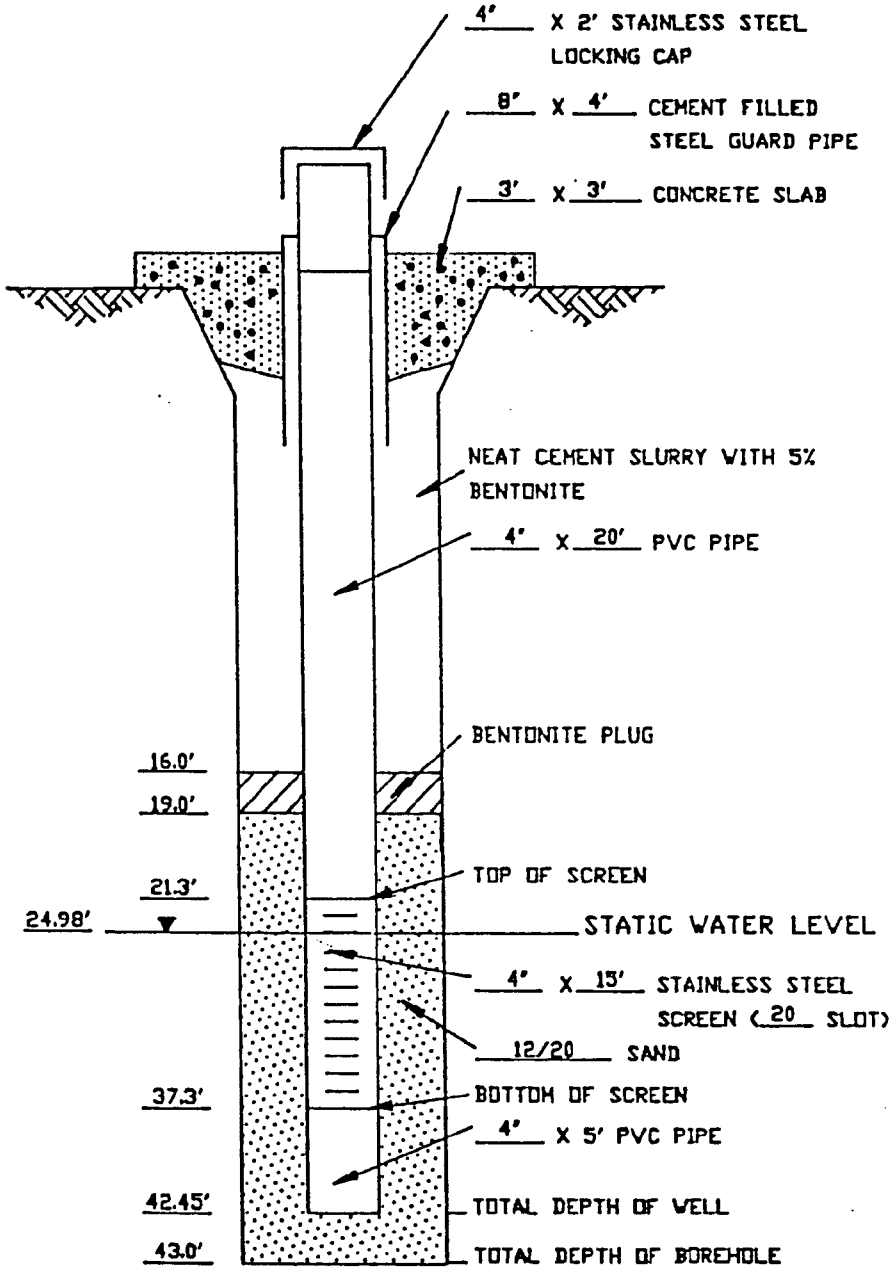


FIGURE B-4

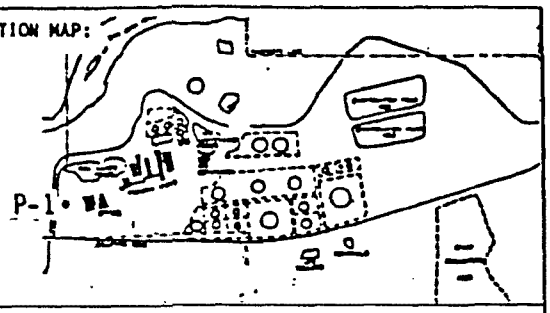
COMPLETION DIAGRAM
PIEZOMETER P-1

FIGURE B-11

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-1

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: P-1
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5524.62
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 30 August 1988 DATE COMPLETED: 30 August 1988
FIELD REP.: W.S. Dubyk
COMMENTS: This well replaced by P-1a on August 31, 1988.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			1135		0'-20' Silt and Clay - Dark yellowish brown (10 YR 4/2) to grayish brown (5 YR 3/2). Weak hydrocarbon odor.
10			1140		
15			1145		
20			1200		20'-36.5' Sand and Gravel - Dark gray (N3) to grayish black (N2). Sand is fine to very coarse grained, subangular to rounded. Gravel is subangular to well rounded, to 2" diameter. Very strong to intense hydrocarbon odor.
25			1205		
30			1210		
35			1220		36.5'-42.0' Shale - Nacimiento Formation - Dusky yellow (5 Y 6/4) to olive gray (5 Y 3/2) shale.
40			1225		
		T.D. 42'	1240		
45					
50					

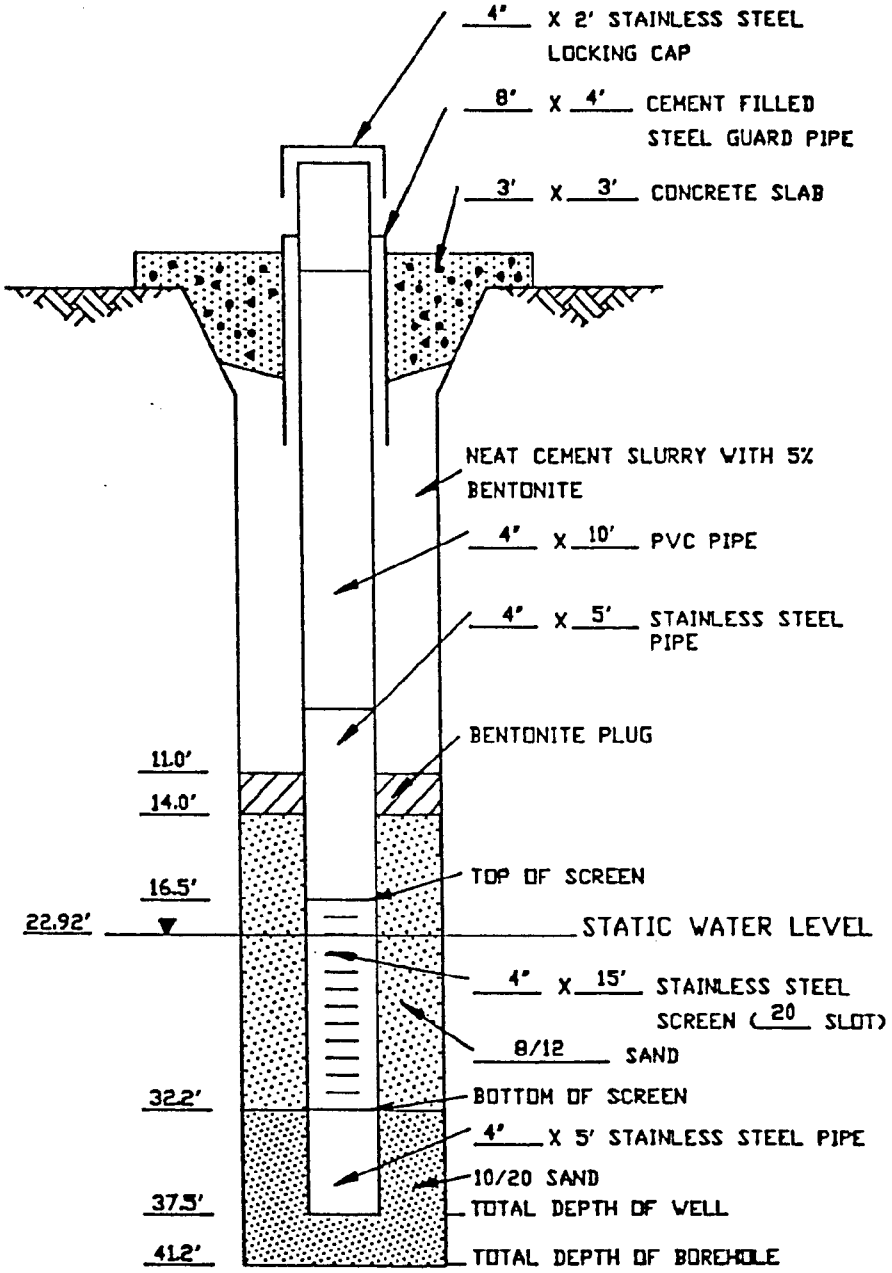


FIGURE B-2

COMPLETION DIAGRAM

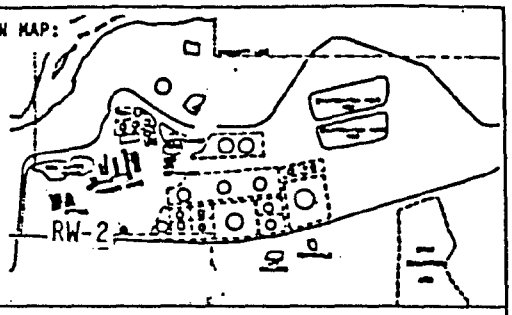
RECOVERY WELL RW-2

FIGURE B-9

LITHOLOGIC LOG (SOIL)

RECOVERY WELL RW-2

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: RW-2
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5523.48
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 29 August 1988 DATE COMPLETED: 29 August 1988
FIELD REP.: W.S. Dubyk
COMMENTS: Static on September 2, 1988: 23.42 from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			0948		0'-10' Silt and Clay - Medium dark gray (N4) to brownish gray (5 YR 4/1). Slightly effervescent in HCl. Faint hydrocarbon odor.
10			0953		10'-15' Sand and Silt - Moderate brown (5 YR 4/4), very fine grained and well sorted.
15			0958		15'-32' Sand and Gravel - Olive gray (5 Y 4/1) to brownish gry (5 YR 4/1). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subangular to well rounded, to 2" diameter. Noticeable hydrocarbon odor below 25'.
20			1024		
25			1029		
30			1033		32'-41.2' Shale - Nacimiento Formation - Dusky yellow (5 Y 6/4) to olive gray (5 Y 3/2).
35			1050		
40			1100		
45		T.D. 41.2'			
50					

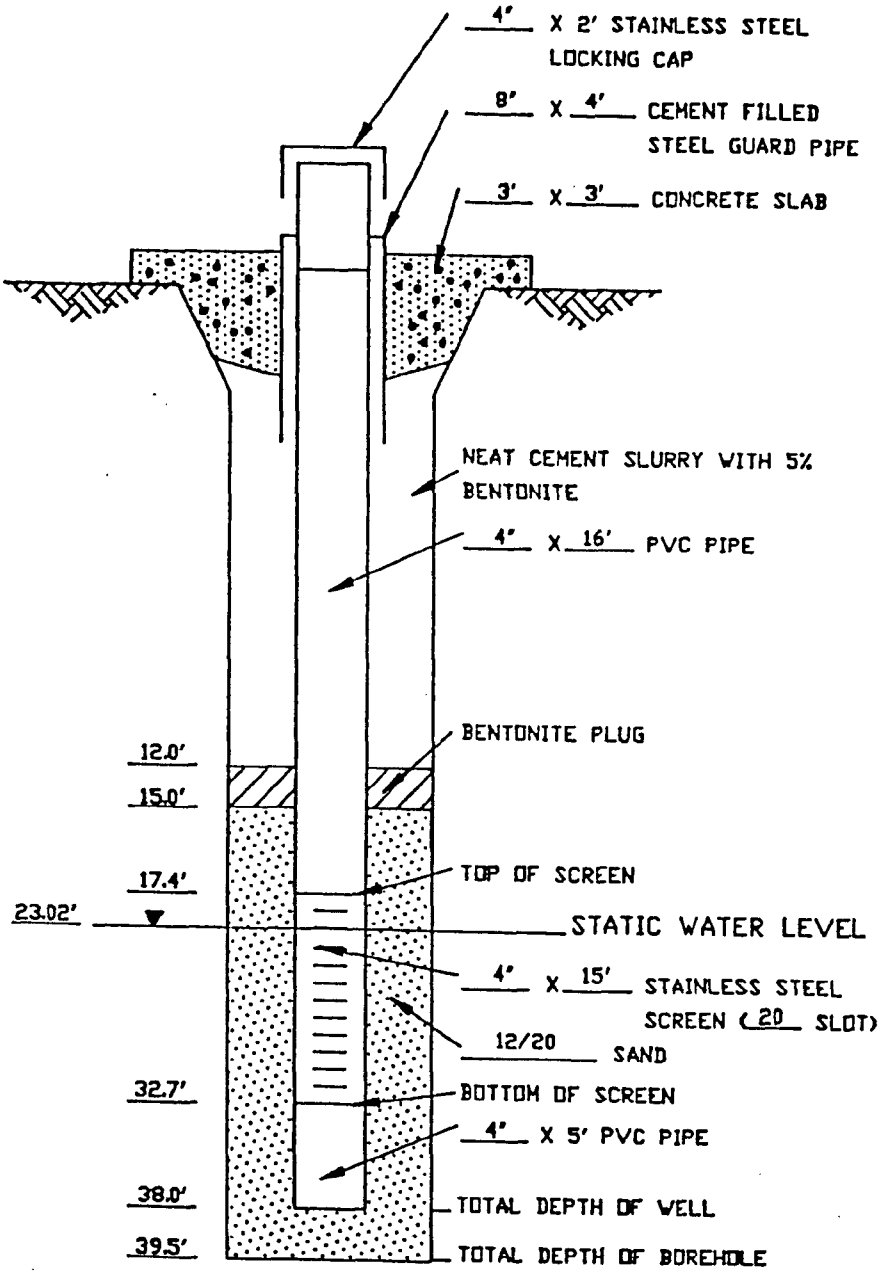


FIGURE B-5

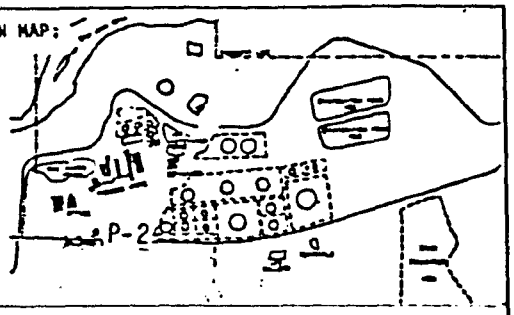
COMPLETION DIAGRAM
PIEZOMETER P-2

FIGURE B-12

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-2

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: P-2
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5523.73
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 29 August 1988 DATE COMPLETED: 29 August 1988
FIELD REP.: W.S. Dubyk
COMMENTS: This well replaced by P-2a. Static on September 2, 1988: 23.75 from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			1650		0'-13' Silty and Clay - Dark gray (N3) to grayish black (N2) to dark yellowish brown (10 YR 4/2). Intense hydrocarbon odor.
10			1656		
15			1710		13'-31.5' Sand and Gravel - Moderate yellowish brown (10 YR 5/4) to medium gray (N5). Sand is medium to very coarse grained, subangular to subrounded. Gravel is subangular to well rounded, to 2" diameter. Strong hydrocarbon odor below 25'.
20			1720		
25			1730		
30			1734		31.5'-39.5' Shale - Nacimiento Formation - Dusky yellow (5 Y 6/4) to olive gray (5 Y 3/2).
35			1752		
40		T.D. 39.5'	1808		
45					
50					

TABLE 3.4

WELL LOG FOR MONITORING WELL NUMBER 10

Drilling Date: March 4, 1986

Depth in Feet	Description
0-5	Topsoil, roadbase, reddish brown sandy clay
5-10	Reddish brown silty, sandy clay
10-15	Cobbles, pebbles
15-20	Gravel, cobbles, pebbles
20-25	Greenish clay at 23 feet, top of Nacimiento
25-30	Greenish clay, Nacimiento
30-35	Nacimiento, color changed from yellow-green to blue-gray

Elevation of Top of Casing: 5516.86 feet

Total Depth of Casing: 33.93 feet

Description of Casing: Bottom of casing has a 2 foot stainless steel blank section for a silt trap, followed by 20 feet of 6" I.D. stainless steel screen, followed by 6" I.D. schedule 40 PVC to the surface. The screened section of the hole was sanded to within 7 feet of the surface, a bentonite seal (1/2 bucket) was added and concrete was used for a surface seal.

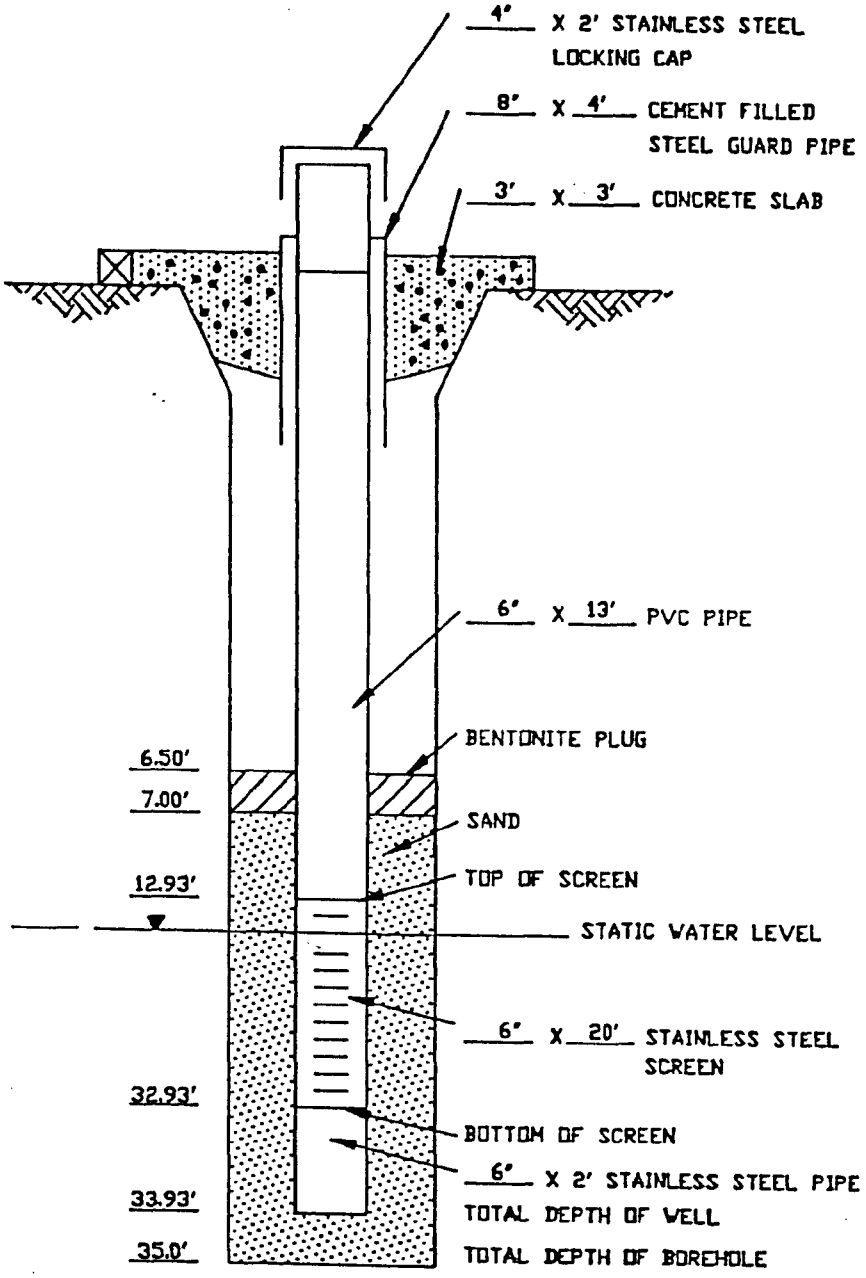


FIGURE B-3

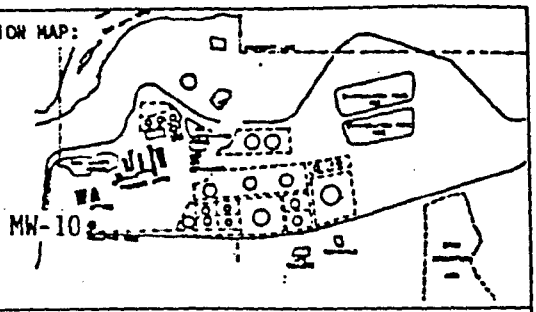
COMPLETION DIAGRAM
RECOVERY WELL HW-10 (RW-3)
(RECONSTRUCTED FROM VERBAL DESCRIPTION
SUPPLIED BY ENGINEERING-SCIENCE, 1987)

FIGURE B-10

LITHOLOGIC LOG (SOIL)

RECOVERY WELL MW-10 (RW-3)

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: MW-10 (RW-3)
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): ~5516
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Auger
DRILLING CONTR.: Earl & Sons, Inc.
DATE STARTED: 4 March 1986 DATE COMPLETED: 4 March 1986
FIELD REP.: Engineering-Science, Inc.
COMMENTS:

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
0					0'-5' Topsoil, Roadbase, Sandy Clay
5					5'-10' Silty, Sandy Clay
10					10'-15' Cobbles and Pebbles
15					15'-20' Gravel, Cobbles, and Pebbles
20					20'-30' Green Clay: Nacimiento Formation
25					30'-35' Nacimiento Formation - Yellow-green to blue-gray.
30					
35		T.D. 35'			
40					
45					
50					

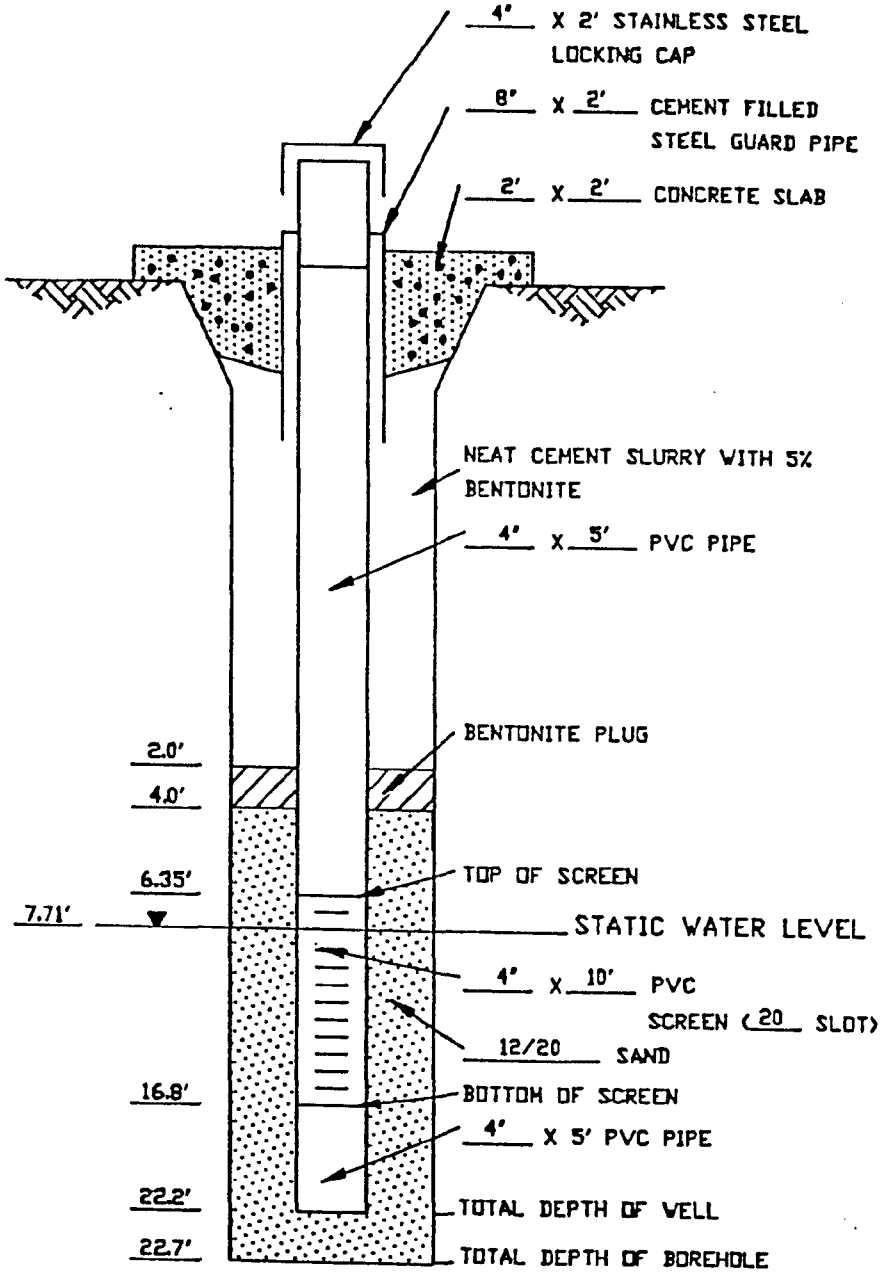


FIGURE B-6

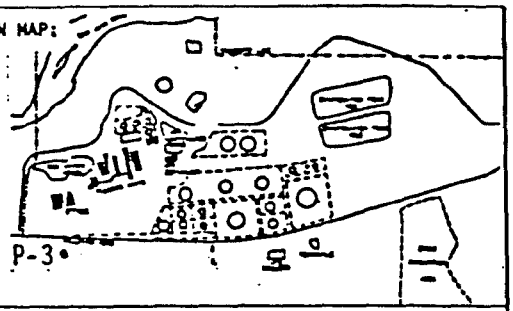
COMPLETION DIAGRAM
PIEZOMETER P-3

FIGURE B-13

LITHOLOGIC LOG (SOIL)

PIEZOMETER P-3

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: P-3
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5507.20
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Casing Driver
DRILLING CONTR.: Beeman Brothers
DATE STARTED: 1 September 1988 DATE COMPLETED: 1 September 1988
FIELD REP.: W.S. Dubyk
COMMENTS: Static on September 2, 1988: 8.30' from TOC.

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5			0902		0'-14' Sand and Gravel - Medium gray (N5) to dark gray (N3). Sand is medium to coarse grained, subangular to subrounded. Gravel is subrounded to rounded, to 2" diameter. Strong hydrocarbon odor.
10			0913		
15			0920		14'-22.7' Shale: Nacimiento Formation - Dusky yellow (5 YR 6/4) to light olive gray (5 Y 6/1) shale.
20			0925		
25		T.D.22.7'	1000		
30					
35					
40					
45					
50					

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

March 6, 1989

Mr. David G. Boyer
State of New Mexico
Energy, Minerals and Natural Resources Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: Discharge Plan Renewal

Dear Mr. Boyer:

Please find enclosed three (3) copies of Bloomfield Refining Company's application to renew our discharge plan, GW-1, for our facility as required pursuant to Water Quality Control Commission regulations.

Since the approval of the last renewal on June 7, 1984, our facility has made substantial progress toward both understanding the effect of our facility upon the environment, and implementing procedural and physical changes to our facility to minimize these effects. During the period, we have done exhaustive groundwater contamination studies, finally resulting in a groundwater remediation system. We rebuilt the refinery sewer system and added curbed, concrete slabs in the process areas. We implemented a systematic inspection/repair program for facility tankage and are in the process of bringing on line a cathodic protection system for the tankage and underground piping. We relocated the spent caustic and crude slop tanks onto concrete slabs with concrete retaining walls. We removed all underground tanks. And probably, most importantly, we began a more conscientious effort to reduce the impact of our effluent through source control and prevention.

In our renewal application, we have proposed additional improvements to our effluent system with a phased program of adding double-lined evaporation ponds. With your concurrence we are prepared to begin this activity this year.

Hopefully, our renewal application will meet with your approval. Mr. Chris Hawley will be sending you an updated aerial photograph as soon as possible.

He and I are available to discuss additional information you may require.

Sincerely yours,

R W Traylor

Richard Traylor
Refinery Manager

RT/jm

Enclosure

cc: Joe Warr
Chris Hawley
Mike Macy

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 8:15 | Date 3/2/89

Originating Party	Other Parties
Keith Phillips*, USEPA RCRA Dallas (214/655-6790)	Dave Boger-OCD

Subject: Gary Bloomfield Refinery

Discussion: Phillips has taken over RCRA Enforcement and will be doing inspection in August or Sept. Immediate purpose of call was to inform me the BOR returned Dahl contacted them to ask if Gary was in compliance. Otherwise they would not tell anymore info. Told him there were but current permit was inadequate and would be stabilized before reissuance this year. I briefed him on current status of DP and remedial efforts.

Conclusions or Agreements: Told him I would send him correspondence (including comments & info) and will contact BOR with same info.

*Address: 6H-EX, 1445 Ross Ave, Dallas 75202

Distribution: Gary File

Signed: David L. Boger

ALBUQUERQUE JOURNAL Tuesday, February 21, 1989

Refinery Blast Investigated

BLOOMFIELD — Investigators said Monday they still aren't sure what caused an explosion and fire at a Bloomfield refinery over the weekend that injured 13 people.

The explosion occurred at 4:10 p.m. Saturday at the Bloomfield Refining Co. southeast of Bloomfield in the refinery's depropanizer section, said Don Warren, a chief operator at the refinery.

Warren said the section is considered to be the most volatile at the refinery. It is where butane and propane gas are made.

Jim Stiffler, safety supervisor at the refinery, said it may be the end of the week before refinery officials know what caused the explosion. Stiffler also couldn't estimate the damage, but said he anticipates it would be substantial.

The 13 people injured in the explosion were treated and released from San Juan Regional Medical Center in Farmington Saturday, hospital spokesman Mark Timney said. Twelve were treated for chlorine gas inhalation and one for chemical burns to the eyes.

The company is owned by Gary Energy of Denver.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 3:15 PM | Date 2/7/89

Originating Party	Other Parties
Chris Hawley - Bloomfield Refinery 632-8013	David Boyer (OCD)

Subject: Gary Bloomfield Refinery

Discussion: Chris called to bring me up to date on several issues. (1) Gary is going to pursue double lined evaporation ponds phased in over several years instead of NPDES permit. Will submit as part of D.P. renewal application. (2) Recovery system started before X-mas but only completely operational since 1/4/89. Will submit report after 10 weeks of data. (3) They still have not started work on contamination at Hwy 44 & Sullivan Rd - South west result of a spill. Told him OCD was going to investigate it.

Conclusions or Agreements:

Distribution: Gary Bloomfield File

Signed: David F Boyer

NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

ENVIRONMENTAL IMPROVEMENT DIVISION
Harold Runnels Bldg.-1190 St. Francis Drive
Santa Fe, New Mexico 87503

Richard Mitzelfelt
Director

GARREY CARRUTHERS
Governor
CARLA L. MUTH
Secretary
MICHAEL J. BURKHART
Deputy Secretary

February 1, 1989

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Chris Hawley
Bloomfield Refining Company
P.O. Box 159
Bloomfield, NM 87413

SUBJECT: Water Quality Certification For Activity Proposed Under Permit Application NO. NM-OYT-0577, Dated December 22, 1988

Dear Mr. Hawley:

Pursuant to Section 401(a)(1) of the Clean Water Act, the Surface Water Quality Bureau has examined an application from the Bloomfield Refining Company for a Section 404 permit to place dredged material into the San Juan River in association with the periodic cleaning of a river water intake structure. The project is located along the south bank of the San Juan River, upstream of the State Highway 44 bridge at Bloomfield, San Juan County, New Mexico. The application is for a permit to authorize this activity for a ten-year period from January 1989 to December 1998.

The activity proposed under this new permit has been conducted periodically by the Bloomfield Refining Company and its predecessor, Plateau, Inc., under Section 404 Permit No. NM-OYT-0115 issued to Plateau, Inc., for the period of December 28, 1978, to December 31, 1988. The Surface Water Quality Bureau is concerned about the long-term, cumulative effects of this activity, particularly, its contribution to recurring turbidity, sediment transport and deposition, and general degradation of the fishery habitat in this reach of the San Juan River.

After consideration of the applicable provisions of the Clean Water Act and appropriate requirements of state law, the bureau has determined that state certification for activity proposed in this application shall be limited to a period of one year. During this period the applicant, Bloomfield Refining Company, is encouraged to design and implement a permanent solution for diversion of water from the San Juan River. The bureau would prefer a solution which would eliminate the need for the periodic disturbance of in-stream sediments.

Under authority delegated by the New Mexico Water Quality Control Commission, the Surface Water Quality Bureau hereby provides state certification for activity proposed by the Bloomfield Refining Company under permit application No. NM-OYT-0577 subject to the condition that this certification shall be limited to one year commencing with the issuance of Permit No. NM-OYT-0577 by the U.S. Army Corps of Engineers, Albuquerque District. The division reserves the right to amend or revoke this certification if such action is necessary to ensure compliance with the state's water quality standards.

Sincerely,

Kathleen M. Sisneros
Chief
Surface Water Quality Bureau

xc: Members of the New Mexico Water Quality Control Commission
District Manager, Environmental Improvement Division
District Engineer, U. S. Army Corps of Engineers

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

January 30, 1989

CERTIFIED MAIL
RETURN RECEIPT NO. P-106 675-553

Mr. Chris Hawley
Environmental Engineer
BLOOMFIELD REFINING COMPANY
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Discharge Plan GW-1
Bloomfield Refinery

Dear Mr. Hawley:

On June 7, 1984, the ground water discharge plan, GW-1, for the Bloomfield Refinery located in San Juan County, New Mexico, was approved by the Director of the Oil Conservation Division. This discharge plan was required and submitted pursuant to Water Quality Control Commission (WQCC) Regulations and was approved for a period of five years. The approval will expire on June 7, 1989.

If your facility continues to have effluent or leachate discharges and wish to continue discharging, please submit your application for renewal of plan approval as quickly as possible. The OCD is reviewing discharge plans, submittals, and renewals carefully and the review time can extend for several months. Please be advised the regulations do not allow for an extension of the present discharge plan expiration date and all discharges must cease on the expiration date if approval of plan renewal has not been obtained. Please indicate whether you have made, or intend to make, any changes in your discharge system, and if so, include an application for plan amendment with your application for renewal. To assist you in preparation of your renewal application. I have enclosed a copy of the OCD's guidelines for preparation of ground water discharge plans. The guidelines will be used in review of your renewal application.

If you no longer have such discharges and discharge plan renewal is not needed, please notify this office.

If you have any questions, please do not hesitate to contact me or Roger Anderson at (505) 827-5994.

Sincerely,

Roger C. Anderson

for David G. Boyer, Hydrogelogist
Environmental Bureau Chief

DGB/RCA/sl

Enclosure

cc: OCD Aztec Office

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

May 18, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Richard W. Traylor
Refinery Manager
Bloomfield Refining Company
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Ground Water Remedial Action at Bloomfield Refining Company

Dear Mr. Traylor:

In my letter of May 13, 1988, commenting on proposed remedial action at the refinery, I stated that air stripping would not be necessary if recovered water/hydrocarbon fluids were disposed of through the existing wastewater system (General Comment 3, p. 2). On May 17, the Oil Conservation Division received a copy of the laboratory analysis for MW-11 sampled in September of 1987. The analysis shows detectable levels of chlorinated hydrocarbons for 4 of the 5 analyzed constituents, with 3 of the 5 exceeding NMWQCC standards.

Since entry of these hydrocarbons into the refinery's wastewater system may raise RCRA-related regulatory issues, such discharges should be avoided until additional testing is performed. Confirmatory samples should be taken from MW-11, and any other wells having suspected contamination, and analyzed for the full range of dissolved hydrocarbons using EPA method 601/602 or 624. If chlorinated hydrocarbons are confirmed, or strongly suspected to be present, air stripping may well be necessary prior to discharge to the current wastewater system. Please provide this agency with any additional analyses obtained from resampling of the well.

If you have any questions, please contact me at the above address or by phone at 827-5812.

Sincerely

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB:sl

cc: OCD-General Counsel
OCD-Aztec
John Gould, EID-Hazardous Waste
Guy Tidmore, EPA-RCRA, Dallas
Chris Hawley, BRC

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

May 13, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Richard W. Traylor
Refinery Manager
Bloomfield Refining Company
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Ground Water Remedial Action at Bloomfield Refining Company

Dear Mr. Traylor:

The Oil Conservation Division (OCD) received on March 14, 1988 the report entitled "Site Investigation and Remedial Action Conceptual Design for the Bloomfield Refining Company" dated March 4, 1988, and prepared by Geoscience Consultants, Ltd. This agency has reviewed this report along with other previously supplied information and provides the following comments and guidance on future work that needs to be performed at the site. OCD's response will provide general comments on the report followed by specific comments, and requirements for further investigation and final design of the remedial action plan.

General Comments

1. Bloomfield Refining Company (BRC) needs to perform further subsurface work towards defining plume definition. This need was acknowledged in the report and a limited program proposed (Section 8.0). In addition to the boring locations proposed and shown on Plate 8.1, OCD will require investigation east of MW-11 and borehole 5, and west of borehole 2 if hydrocarbons are detected in borehole 2. Also, a borehole investigation program should be conducted between MW-12 and the Hammond Ditch, and west of MW-12 to at least Highway 44. The OCD has previously confirmed the presence of hydrocarbons in the drainage south of Sullivan Road near Highway 44.

2. Additional aquifer tests should not be necessary if the primary material at the top of the saturated zone, as seen in MW-10 (Figure 4-1), continues to be coarse grained material such as sand, gravel, cobbles and pebbles. Previous pumping and borehole slug tests have resulted in aquifer hydraulic conductivities within a small range (less than one order of magnitude, Table 4-1, P. 28). The monitor wells drilled to date all contain between

9 and 20 feet of coarse grained material (Quarternary sediments) overlying the fine grained Tertiary Nacimiento Formation. Saturated thicknesses in these deposits range from about 5 to 10 feet. Since the aquifer is clearly unconfined (water table conditions), an estimate of S=0.1 to 0.2 should be sufficient for modeling purposes*. Given the thin zone of saturation, and the high permeability of the sediments, I believe the planned long-term aquifer test will provide little additional significant information and need not be performed.

3. Disposal of recovered water under both the long-term aquifer test (if conducted) and under the proposed recovery system (up to 4 wells pumping 1 to 2 gpm, P. 42) should be through the refinery's current wastewater system. This should be only a small additional burden on the current 60 gpm discharged. If this disposal method is used, air stripping will not be necessary. If separate trenches, infiltration galleries, etc. are used, the water will likely need to be air stripped, but in any event must meet WQCC standards (including TDS, sulfate, and chloride).

4. The plan only addresses proposed off-site investigation and remediation. At some point in the future BRC will need to address recovery of hydrocarbons that seep to the ditch segment in the main refinery area east and upstream of the raw water ponds.

Specific Comments

1. P. 1. Provide a map showing land ownership south and west of the refinery in the area of the proposed investigation. Include the first property immediately west of Highway 44 at Sullivan Road.

2. P. 5. Although MW-12 located between Sullivan Road and Hammond Ditch may not contain hydrocarbons, other locations topographically lower than the ditch in the vicinity have documented hydrocarbon presence. The ditch is not necessarily a hydraulic barrier as evidenced by hydrocarbon presence on the bluff face northwest of the ditch opposite the Flare Tower. Soil borings are needed in the drainage bottom along Sullivan Road from west of MW-12 to Highway 44.

3. P. 11. Provide the dates of the MW-10 aquifer test.

4. P. 30. The finite-difference grid (Plate 5-1) assumes constant head nodes SW to NE along the 5503-foot head contour. However, MW-6 located about one-third of the distance along the contour is dry to a depth of 5501.6 feet and completed in the Nacimiento. The well has never detected water. Therefore, the grid cannot be used in the vicinity of MW-6 nor south of MW-6 for simulation of ground water movement.

*F.G. Driscoll, 1986, "Groundwater and Wells," 2nd ed. Johnson Division, p. 260.

5. P. 35-36. Using the finite-difference grid shown in Plate 5-1, a computer generated hydraulic head distribution map was prepared (Plate 5-2). Use of the map would indicate that the source of hydrocarbon in MW-11 is the transportation and terminal area directly east of MW-11. Even if the map is incorrect, soil borings to the east of MW-11 need to be made to determine whether leaks from the terminal area have contributed to the observed contamination. (See General Comment #1).

6. P. 36. If flow is as shown in Plate 5-4, it is unlikely that the three-well recovery system will capture hydrocarbons in MW-11. The proposed recovery system will need to be reevaluated after soil borings provide increased plume definition.

7. P. 40. Water samples for MW-11 and 12 do not include analyses for major cations/anions although chloride, sulfate and TDS were analyzed. Future analyses should include sodium, potassium, calcium and magnesium cations; and chloride, sulfate, bicarbonate-carbonate anions. Analyses for WQCC heavy metals shall be for the dissolved constituents and the sample shall be filtered prior to acid preservation. EPA may require that total (vs. dissolved) constitutents be analyzed.

8. P. 40. Appendix A. The copy of the Assaigai analyses provided in Appendix A is unreadable. Provide a legible copy.

9. P. 42. Use of infiltration trenches to dispose of wastewater will not be authorized by OCD as described below. However, use of fresh water barrier trenches, if desired, will be considered.

   WQCC regulations specifically include natural salts as contaminants to be regulated when discharges of effluent are made to the subsurface (WQCC 3-109.D.2.b.) Increased salt from leaching of material beneath the infiltration trench must be prevented. Additionally, water recovered contains increased levels of salt that has likely come from discharges to the spray irrigation area, and leaching due to seepage of the wastewater. These captured salts will not be allowed to be released to infiltration trenches for movement offsite. If trenches are necessary to provide a hydraulic barrier, water from the raw water ponds should be considered for use.

   Likewise, use of Hammond Ditch as an "infiltration trench" for salt wastewater will require a Federal NPDES permit that must include State salinity certification. The time period before a decision would be made on the permit could be considerable.

   OCD prefers that any wastewater recovered be recycled through the refinery's current wastewater system. Though the current system is flawed in that land application is the cause of some of the salt that would be captured during hydrocarbon recovery, the salt recovered with the hydrocarbons is prevented from moving and discharging to the west. BRC was previously notified of deficiencies in the land application/spray irrigation system and will need to propose modifications in sufficient time to allow OCD review prior to discharge plan expiration in June 1989.

10. P. 43-47. If BRC discharges wastewater back to the refinery's current disposal system, the necessity for air-stripping will be eliminated.

11. P. 48. As stated in the General Comments section, BRC will need to address on-site hydrocarbon recovery at some future time.

12. P. 48. In the area west of MW-12 the shallow depth to the top of the Nacimiento may allow use of a backhoe to investigate hydrocarbon presence.

13. P. 48. Additional piezometers will not need to be drilled as observation wells if the long-term aquifer test is not conducted.

14. P. 49. As discussed in the General Comments, OCD believes additional aquifer tests are not needed.

15. P. 49. Due to the low pumping rate proposed for recovery, and water table conditions, I expect that final modeling, based on updated information, will show the need for several more recovery wells.

16. P. 50. It would seem more logical to install recovery wells parallel to Hammond Ditch rather than in line and perpendicular to the ditch as shown on Plate 5-4. Wells should be located at a sufficient distance from the ditch to avoid excessive capture of ditch water but allow for interception of westward flow components. The revised model will be closely examined for recommended well placement.

Future Work

BRC must perform the following work as part of the required remedial action plan at the refinery:

1. Respond within 60-days to the requests made in this letter for additional clarifying information. This includes providing revised modeling information on ground water flow directions. Indicate in the response changes from proposals made in the March 4 remedial action design.

2. Mr. Guy Tidmore of EPA's RCRA section in Dallas indicates that EPA will complete review of the plan and provide comments to you within several weeks. Within 14-days of receipt of EPA's comments, but no later than July 1, 1988, BRC must begin the soil boring program for plume definition outlined in the GCL report as modified to include work required by comments in this letter. The boring program should be completed within two weeks of initiation and a report on the findings submitted within 30-days of work completion. Since most proposed boring locations will be on BLM land, you are requested to immediately contact Mr. Bob Moore in Farmington at 327-5344 to obtain clearance for proposed exploratory activities.

3. After completion of the borings, provide maps with the report of findings showing structure contours on the top of the Nacimiento Formation and saturated thicknesses of the gravel deposits. This will establish the erosion surface of the Nacimiento and aid in locating buried drainages where petroleum may have migrated prior to construction of Hammond Ditch and subsequent saturation of surficial materials. A review of geologic information included in discharge plan work previously performed by American Ground Water Consultants of Albuquerque will be helpful in preparing the contour maps.

4. Within 60-days of boring completion provide a final report for hydrocarbon recovery including proposed recovery well locations and capture zones. The recovery area should extend from southwest of the raw water ponds down-ditch until non-detection of hydrocarbons. It should also include a plan for recovery of hydrocarbons along the Sullivan Road drainage, and should provide a schedule for timely installation and operation of the wells.

To the extent that the deadlines for information to be submitted to OCD and action required of BRC by this letter conflict with completion dates required in OCD's letter of February 23, 1988, those dates are waived and replaced by the dates in this letter.

OCD will be glad to meet with you, your consultants or other regulatory agency staff to discuss this letter, and our requirements for investigation and remedial action at your site. In the meantime if you have any questions, please contact me at the above address or by phone at 827-5812.

Sincerely

David G. Boyer, Hydrogeologist
Environmental Bureau Chief

DGB:sl

cc: OCD-General Counsel
OCD-Aztec
John Gould, EID-Hazardous Waste
Guy Tidmore, EPA-RCRA, Dallas
Chris Hawley, BRC

RESPONSE TO NMOCD COMMENTS OF APRIL 29, 1988
ON BLOOMFIELD REFINERY DISCHARGE PLAN

General Comments

1. In the future, treated ground water may be applied to the land surface through sprinkler irrigation methods. Giant will seek prior authorization from NMOCD for approval of the site and methods. Giant will not land apply treated ground water at any location without prior written approval for that particular location.

2. As stated in the Discharge Plan, the first controlled flooding land applications would be for the purpose of conducting a field test of the system. Eighteen inches of treated water would be applied to the site over a 5-day period. Every 2 weeks after the application, water levels, product thickness and specific conductance would be monitored in the recovery wells and the following monitor wells: GBR 5, 7, 13 and 20. If no response was observed after one month of observation, a second application of 36 inches would be conducted and monitored as described above. If required, a third application of 54 inches over a 10-day period would be conducted. The monitoring data from the test applications would be evaluated and a final proposal for application in this area would be submitted to NMOCD. It should be noted that a response is anticipated if 36 inches are applied over a 5-day period. Attachment #1 shows the redesign for the berm to be constructed in connection with the land application site.

   It should be noted that a principal objective of the test applications would be to determine the potential for degradation of the aquifer due to leaching of salts from the native material of the unsaturated zone. See Responses #9 & #10 under Specific Comments for more information.

3. If an infiltration trench is to be installed at the downgradient edge of the property, a letter proposal will be sent to NMOCD for approval prior to construction.

   The upgradient infiltration trench has been completed and is not located west of the current monitoring well network. Information concerning the upgradient infiltration trench has been provided to NMOCD in connection with Giant's June 1, 1988 temporary discharge application. The impact of the infiltration trench will be demonstrated by the monitoring program agreed to by Giant in connection with the temporary application and the discharge permit application.

4. Giant will move the fueling facility from the site and flush all fuel lines before the end of 1988.

5. Although monitoring wells do not have to be permitted by the State Engineer's office, State Engineer regulations require recovery wells to be permitted. The State Engineer's office has given Giant permission to pump from the recovery wells. Giant is submitting periodic reports to that office concerning volumes of pumped water.

6. The aquifer simulation model was utilized as a starting point for the design of a treatment/recovery system. The model was not intended to demonstrate "that approval of the discharge plan will not result in either concentrations in excess of the standards of Section 3-103 or the presence of any toxic pollutant at any place of withdrawal of water for present or reasonably foreseeable future use" (See Section 3-109. C.2). Giant is now able to use field data for that demonstration, and is not presently pursuing the aquifer simulation model.

   The enclosed ground water elevation maps (Attachment #2) were constructed from recent data and show that the system is operating as predicted. Best professional judgement was employed in areas of closely-spaced data. Not all data points were utilized in the construction of the map. A data point was not employed if it was determined that the well measured a perched water table (GBR-23) or if the well was not deep enough (GBR-10). All of the data from which these maps were based are included in Attachment #3.

   The water table elevation maps show that the recovery system is working as predicted. The hydrocarbons released by the refinery are being effectively captured by the recovery wells. Accordingly, GCL does not believe that additional work on model review is warranted.

   Giant plans to install one or two 4-inch stainless steel monitor wells in the arroyo area of the Southern Refinery in order to monitor water levels and ensure that the existing recovery system is containing and capturing hydrocarbons which may have entered the aquifer as a result of past refinery operations. One well will be located approximately 100 feet west of GRW-6 (GBR-44). The additional well may be installed on the west side of the active arroyo.

Specific Comments

1. A new affirmation page is appended as Attachment #4.

2. The requested samples have been obtained and the results are appended as Attachment #5.

3. The second page of Table 2-1 was omitted from the text. The full table is appended as Attachment #6.

4. The refinery has been resurveyed. A new map, and well head elevations and coordinates are appended as Attachment #7.

5. All water produced as part of the hydrocarbon recovery system will be treated by air stripping. Specifications of the treatment unit have been submitted to NMOCD by Giant.

6. Attachment #7 shows the truck maintenance facility and leach field. The truck maintenance facility has been in use at this location since sometime in 1986 and will be moved from the refinery site before December 31, 1988

   Any spills or leaks in the truck maintenance facility would not have commingled with domestic wastewater. As a precaution against the loss of any spilled materials, in the late summer of 1986 all of the floor drains in the facility were plugged with cement. The drains did not flow into the facility's sanitary system and are believed to have flowed into the oil/water separator.

7. Giant has no plans to treat ground water by sprinkling. If treatment by sprinkling is proposed in the future, data on the treatability of Polynuclear Aromatic Hydrocarbons (PAHs) will be submitted.

8. Upon closure of the infiltration gallery, injection lines will be disconnected and capped.

9. GBR-25 should have read GBR-29.

   All of the wells proposed for monitoring the controlled flooding site (GBR-5, GBR-7, GBR-13, GBR-20, GBR-29) have responded to the pumping of the recovery system. Accordingly, it is apparent that the proposed monitor wells are hydraulically connected to the recovery system.

   The response of these proposed monitor wells to infiltration of water from the surface is evidenced by a comparison of meteorological data for July, 1986 with water levels. During this time period (July 15 through July 31), hydrocarbon thicknesses in GBR-13, GBR-29 and, presumably, GBR-6 increased significantly. GCL believes that the rise in water levels and increases in product thickness are related to the significant rainfall received in the area between July 15, and 31, 1986 (see Attachment #8 for Aztec Ruins and Bloomfield 3 SE reporting stations).

   The presence of floating hydrocarbon in GBR-20 also attests to its utility for monitoring the aquifer beneath the proposed controlled flooding site. Therefore, all of the proposed monitor wells appear to be well connected to the recovery system and infiltration from the unsaturated zone.

   As seen from recent water level maps, the three well recovery system is effectively capturing hydrocarbons at the site. During flooding of the controlled flooding site, all six recovery wells, GRW 1-6 (formerly GBR-38, GBR-42, GBR-29, GBR-43, GBR-37, GBR-44), will be

actively pumping to maintain a southerly gradient.

Close surveillance of fluid levels in the proposed monitor wells will permit immediate adjustment of pumping rates in the recovery system. Appropriate adjustment will ensure that the six well recovery system will prevent off-site migration of hydrocarbons. If the first, second or third controlled flooding applications (field tests) do not flush hydrocarbons from the soil, the practice will not be continued.

To measure the potential for degradation of water quality due to salt leaching, specific conductance will be monitored from samples withdrawn from all recovery wells and the proposed monitor wells.

Response #1 under General Comments also addresses controlled flooding.

10. Giant estimates that the total dissolved solids of the aquifer may increase significantly as saline water from landfill releases is drawn into the recovery system. The actual increase in TDS due to the operation of Giant's treatment system will have to be determined after the entire system has been operational for 3-6 months. Giant will make the estimate based upon data collected during treatment and discharge of recovered ground water. Specific conductance of influent to and effluent from the air-stripper will be monitored. Specific conductance of ground water near the infiltration trench and controlled flooding areas will also be evaluated. At present, data do not exist to make this estimate. Giant requests that NMOCD approve the discharge plan on the condition that an accurate estimate is provided within 6 months of the plan's approval.

11. Noted.

12. An SPCC plan is presently being prepared. Preparation of such a plan should not prevent approval of the discharge plan and possible discontinuation of treatment system operation. Giant requests that the submission of an SPCC plan be a condition of discharge plan approval.

13. All berms will be inspected after significant rainfall.

14. The fueling station will be moved from the site before December 31, 1988. No pressure tests are planned.

15. See above response.

16. After the truck maintenance facility is moved, Giant anticipates that no chemicals will be used or stored at the site which are subject to OSHA Material Safety Data Sheet requirements.

17. Noted and accepted.

18. The fire water pond is in the process of being drained. Giant will not utilize this pond for water storage without prior NMOCD approval.

19. See Response #6 under General Comments.

20. A corrected table is appended as Attachment #9.

21. Giant proposes to conduct sampling for and analysis of major cations and anions, TDS and WQCC PAHs on a quarterly basis. Quarterly monitoring is sufficient because the concentration of the influent is not expected to change significantly on a monthly basis. Monthly analysis of VOCs at the air stripper will provide a sensitive monitor of influent and effluent water quality.

22. Noted and accepted.

23. Samples for analysis for metals will be field-filtered prior to acidification.

24. Noted and accepted.

25. Noted and accepted.

26. Noted and accepted.

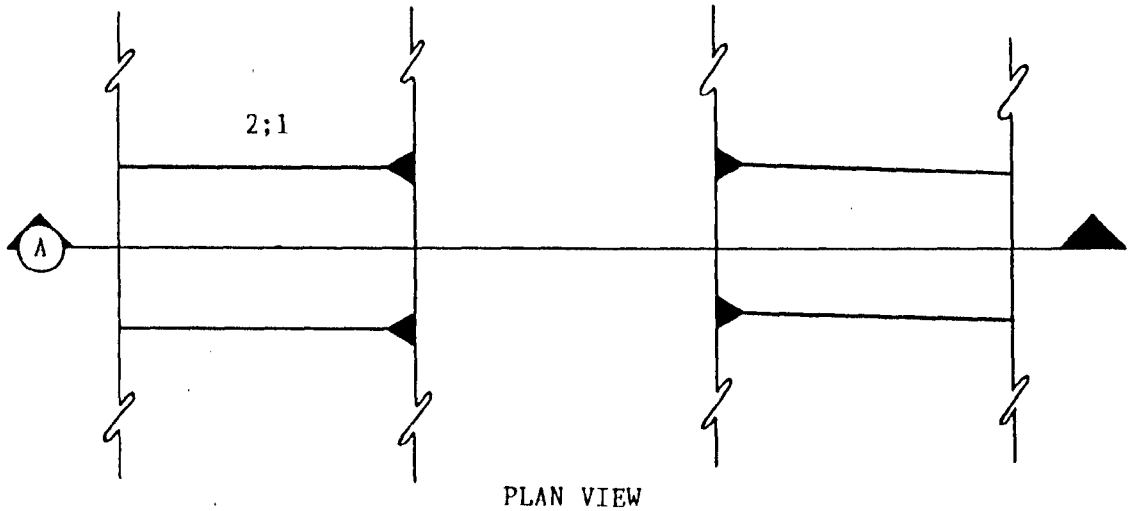
27. See Response #6 under General Comments.

28. Logs for GBR 40-46 are appended as Attachment #10.

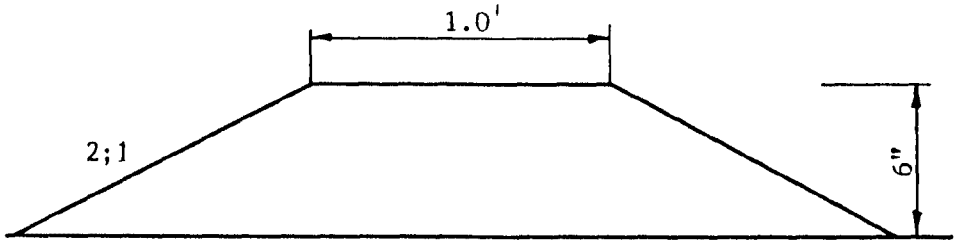
LIST OF ATTACHMENTS

ATTACHMENT #1

TYPICAL BERM SOUTH REFINERY AREA



PLAN VIEW



SECTION A

GRADATION

SCREEN SIZE	PERCENT PASSING
1.5"	100
#4 SEIVE	60-100
#200 SEIVE	15-40

NOTES

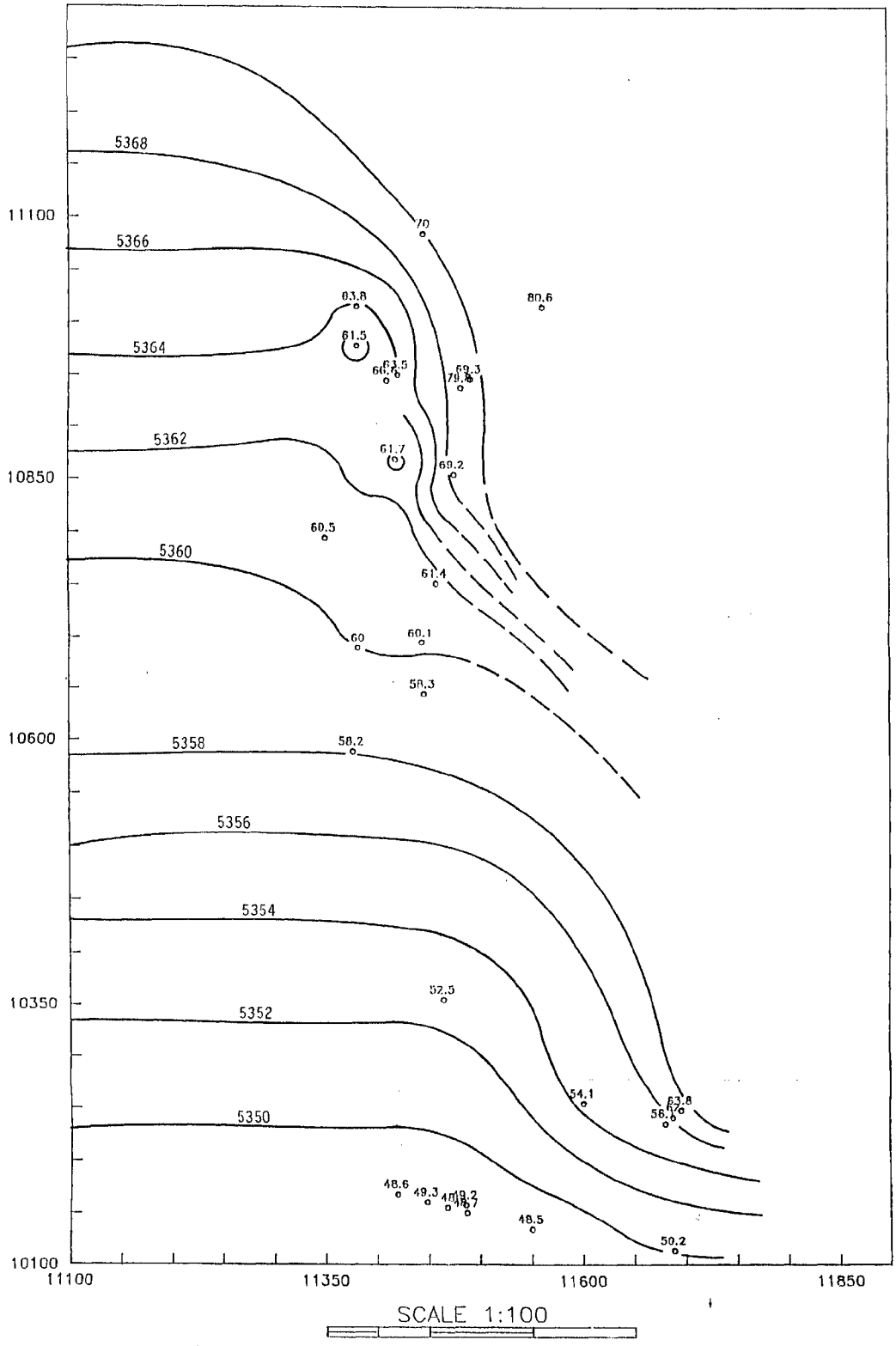
BERM SHALL BE CONSTRUCTED OF NATIVE MATERIAL. ANY FILL WILL BE REMOVED IN THE AREA OF THE BERM

TYPICAL BERM SOUTH REFINERY AREA

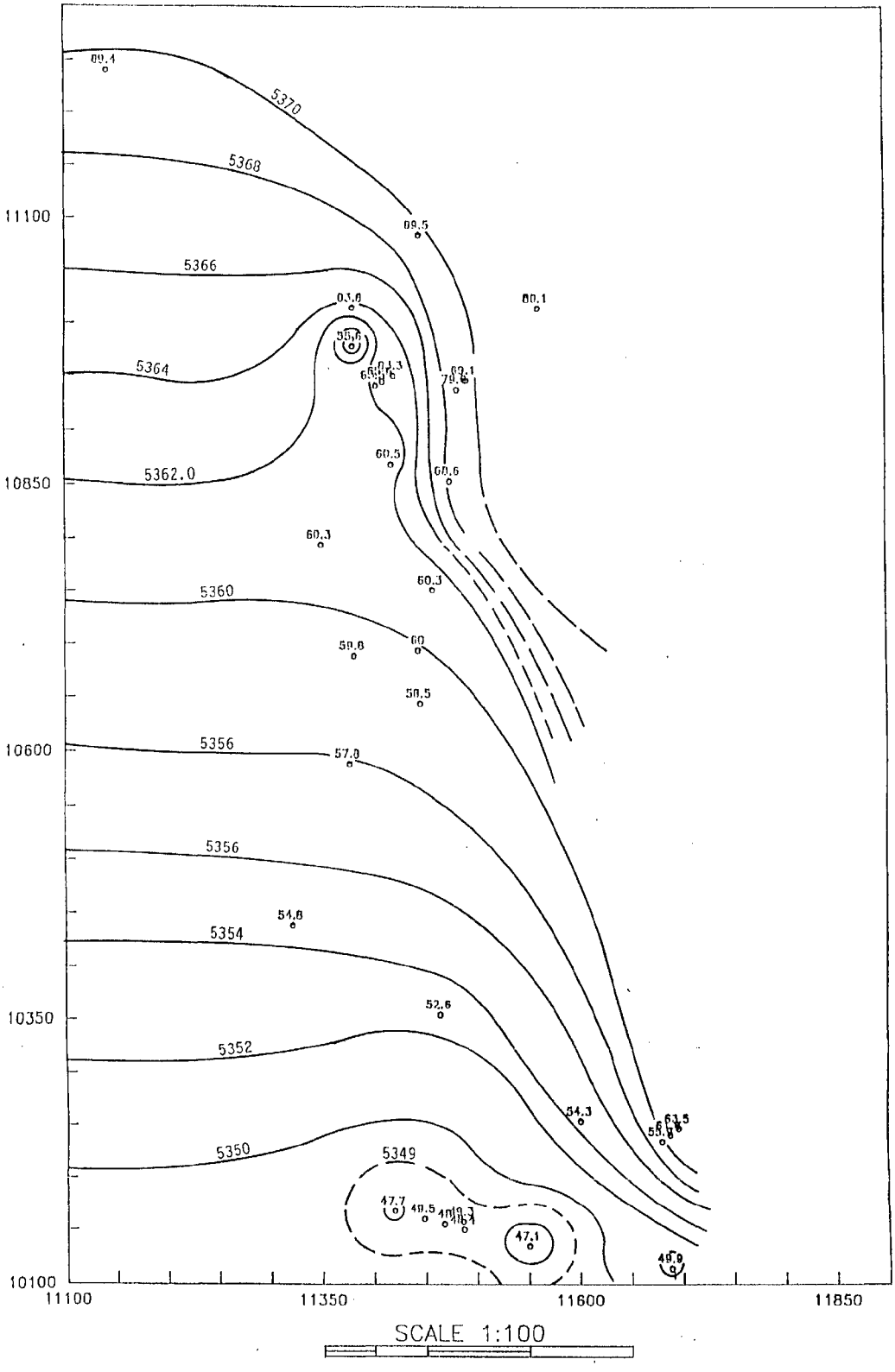
ATTACHMENT #2

WATER LEVEL MAPS

WATER TABLE IN SEPTEMBER, 1987

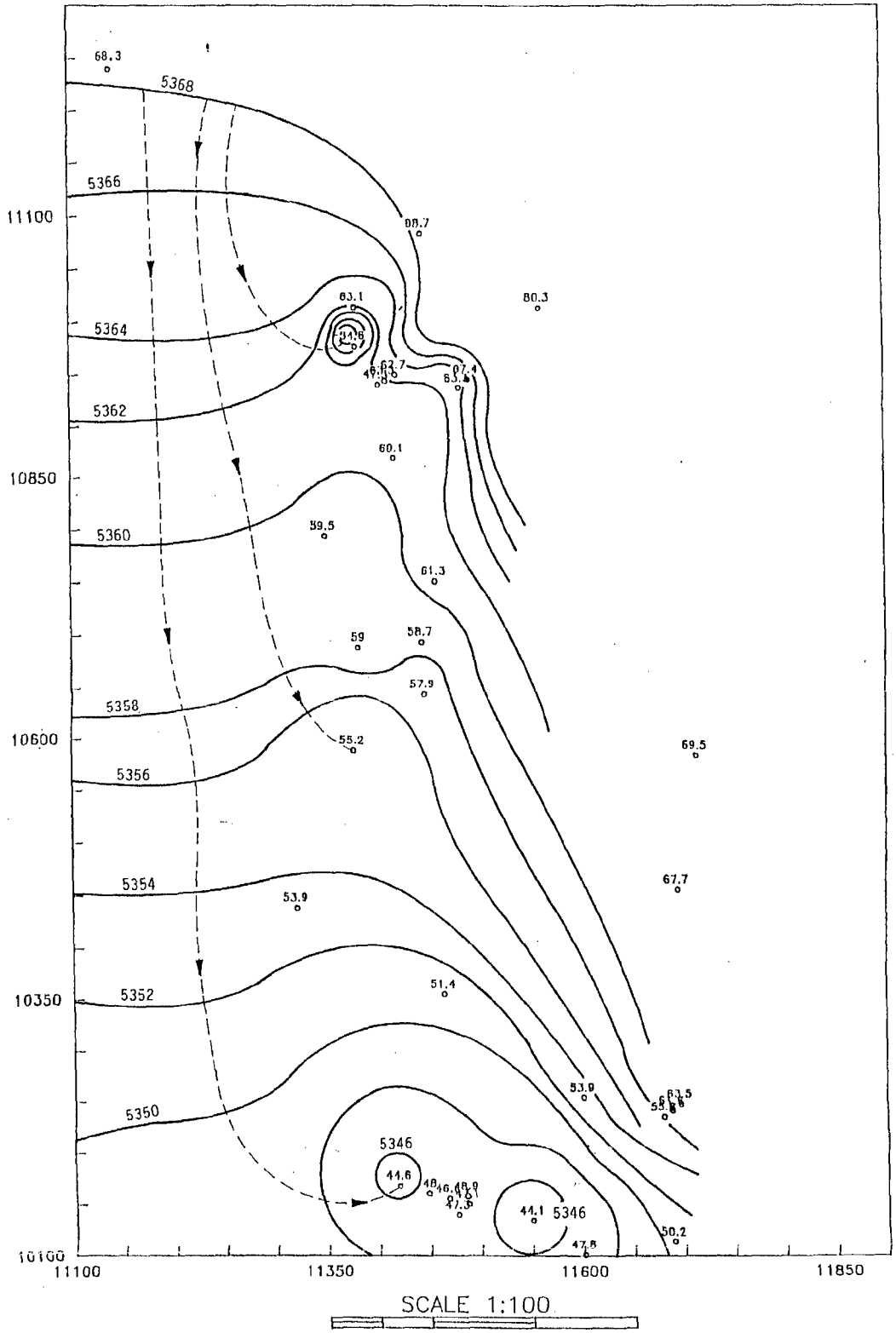


WATER TABLE IN NOVEMBER, 1987



WATER TABLE IN MAY 1988

SHOWING SELECTED FLOWLINES TO PUMPING WELLS



ATTACHMENT #3

CHRONOLOGY OF STATIC WATER LEVELS
AND PETROLEUM THICKNESS IN FEET

GIANT INDUSTRIES BLOOMFIELD REFINERY

CHRONOLOGY OF STATIC WATER LEVELS AND PETROLEUM THICKNESS IN FEET

WELL NUMBER
GBR-05

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/15/86	5343.10	0.00	5343.10
04/23/86	5341.20	0.00	5341.20
04/30/86	5342.54	0.00	5342.54
05/29/86	5358.21	1.38	5359.31
07/31/86	5351.93	11.04	5360.76
08/12/86	5351.63	11.49	5360.82
10/07/86	5362.31	1.00	5363.11
10/08/86	5362.89	0.75	5363.49
10/08/86	5362.81	0.83	5363.47
11/04/86	5363.10	0.71	5363.67
11/19/86	5363.39	0.67	5363.93
04/21/87	5363.60	0.17	5363.74
08/11/87	5363.18	1.08	5364.04
09/09/87	5362.95	1.14	5363.86
09/24/87	5362.88	1.13	5363.78
10/06/87	5362.74	1.19	5363.69
10/22/87	5362.74	1.19	5363.69
11/10/87	5362.59	1.13	5363.49
12/15/87	5362.55	1.13	5363.45
01/19/88	5362.73	0.93	5363.47
02/26/88	5362.26	1.17	5363.20
03/11/88	5362.59	1.10	5363.47
05/17/88	5362.59	1.10	5363.47
06/09/88	5362.37	1.10	5363.25

WELL NUMBER
GBR-06

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/07/86	5359.50	0.00	5359.50
10/08/86	5359.54	0.00	5359.54
10/08/86	5358.58	0.00	5358.58
11/04/86	5360.17	0.04	5360.20
11/19/86	5360.33	0.08	5360.39
04/21/87	5355.81	0.05	5355.85
08/11/87	5356.47	0.00	5356.47
09/09/87	5356.30	0.00	5356.30
09/24/87	5356.13	0.00	5356.13
10/06/87	5355.99	0.02	5356.01
10/22/87	5356.01	0.00	5356.01
11/04/87	5360.95	0.02	5360.97
11/10/87	5355.93	0.00	5355.93
05/17/88	5355.84	0.00	5355.84
06/09/88	5355.79	0.00	5355.79

WELL NUMBER
GBR-07

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/08/86	5363.00	0.00	5363.00
10/08/86	5363.30	0.00	5363.30
10/16/86	5362.80	0.00	5362.80
11/04/86	5362.50	0.00	5362.50
11/19/86	5363.21	0.00	5363.21
04/21/87	5362.53	0.25	5362.73
08/11/87	5362.15	0.00	5362.15
09/09/87	5362.03	0.00	5362.03
09/24/87	5362.03	0.00	5362.03
10/06/87	5361.90	0.00	5361.90
10/22/87	5361.84	0.00	5361.84
11/04/87	5361.78	0.02	5361.80
11/10/87	5361.82	0.00	5361.82
12/15/87	5361.65	0.00	5361.65
01/19/88	5361.74	0.00	5361.74
02/26/88	5361.57	0.00	5361.57
03/11/88	5361.70	0.00	5361.70
04/08/88	5361.85	0.00	5361.85
05/17/88	5361.65	0.00	5361.65
06/09/88	5361.57	0.00	5361.57

WELL NUMBER
GBR-08

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/08/86	5348.33	0.00	5348.33
10/08/86	5348.42	0.00	5348.42
10/09/86	5348.42	0.00	5348.42
10/09/86	5348.33	0.00	5348.33
10/16/86	5348.38	0.00	5348.38
10/17/86	5348.42	0.00	5348.42
11/04/86	5348.46	0.04	5348.49
11/19/86	5348.79	0.04	5348.82
04/21/87	5347.95	1.66	5349.28
05/06/87	5347.68	1.71	5349.05
08/11/87	5347.51	1.91	5349.04
09/09/87	5347.59	1.90	5349.11
09/24/87	5347.32	1.71	5348.69
10/06/87	5347.24	1.77	5348.66
10/22/87	5347.26	1.38	5348.36
11/10/87	5347.26	1.40	5348.38
12/15/87	5347.24	1.79	5348.67
01/19/88	5348.32	0.92	5349.06
02/26/88	5347.03	1.42	5348.17
03/11/88	5346.91	1.16	5347.84
04/08/88	5346.66	1.40	5347.78
05/17/88	5345.96	1.40	5347.08
06/09/88	5346.32	1.12	5347.22

WELL NUMBER
GBR-09

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/09/86	5348.50	0.00	5348.50
10/16/86	5348.54	0.00	5348.54
10/17/86	5347.92	0.00	5347.92
11/04/86	5348.71	0.00	5348.71
11/19/86	5349.12	0.00	5349.12
04/21/87	5348.62	1.E-2	5348.63
05/06/87	5348.56	0.00	5348.56
08/11/87	5348.54	0.00	5348.54
09/09/87	5348.44	0.00	5348.44
09/24/87	5348.02	0.00	5348.02
10/06/87	5348.06	0.02	5348.08
10/22/87	5348.55	0.00	5348.55
11/10/87	5348.04	0.00	5348.04
12/15/87	5348.09	0.00	5348.09
01/19/88	5348.45	0.00	5348.45
02/26/88	5347.62	0.50	5348.02
03/11/88	5347.42	0.00	5347.42
05/17/88	5346.64	0.00	5346.64
06/09/88	5346.86	0.00	5346.86

WELL NUMBER
GBR-10

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/09/86	5345.50	2.33	5347.36
10/09/86	5345.62	2.38	5347.52
11/04/86	5348.17	2.04	5349.80
11/19/86	5347.42	3.17	5349.96
04/21/87	5348.64	1.30	5349.68
05/06/87	5348.44	1.50	5349.64
08/11/87	5347.84	2.16	5349.57
09/09/87	5347.90	2.06	5349.55
09/24/87	5347.94	1.61	5349.23
10/06/87	5347.88	1.85	5349.36
10/22/87	5347.86	1.52	5349.08
11/04/87	5347.88	1.67	5349.22
11/10/87	5347.90	1.75	5349.30
12/15/87	5347.82	1.91	5349.35
01/19/88	5347.94	1.90	5349.46
02/26/88	5345.98	3.17	5348.52
03/11/88	5346.03	3.00	5348.43
04/08/88	5346.13	2.50	5348.13
05/17/88	5347.98	1.10	5348.86
06/09/88	5345.07	1.16	5346.00

WELL NUMBER
GBR-11

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/03/86	5349.95	0.00	5349.95
04/15/86	5349.91	0.00	5349.91
04/23/86	5349.83	0.00	5349.83
04/30/86	5349.85	0.00	5349.85
07/15/86	5349.75	0.40	5350.07
08/12/86	5346.66	0.17	5346.80
08/12/86	5346.66	0.17	5346.80
10/08/86	5348.87	0.75	5349.47
10/09/86	5348.87	0.75	5349.47
11/04/86	5348.32	1.50	5349.52
11/19/86	5349.08	1.04	5349.91
04/21/87	5349.29	1.04	5350.12
05/06/87	5349.17	1.16	5350.10
08/11/87	5348.75	1.54	5349.98
09/09/87	5348.50	1.73	5349.88
09/24/87	5346.82	3.14	5349.33
10/06/87	5347.58	2.44	5349.53
10/22/87	5346.50	3.30	5349.14
11/10/87	5347.40	2.60	5349.48
12/15/87	5347.58	2.47	5349.56
01/19/88	5347.84	1.41	5348.97
03/11/88	5345.35	4.35	5348.83
05/17/88	5344.80	4.00	5348.00
06/09/88	5345.20	3.75	5348.20

WELL NUMBER
GBR-13

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/03/86	5354.75	0.00	5354.75
04/23/86	5352.68	0.00	5352.68
04/30/86	5352.79	0.00	5352.79
05/29/86	5350.08	0.00	5350.08
07/15/86	5351.77	0.56	5352.22
07/31/86	5350.71	0.83	5351.37
08/12/86	5350.39	1.42	5351.53
10/07/86	5351.50	0.75	5352.10
11/04/86	5351.79	0.38	5352.09
11/19/86	5352.33	0.38	5352.63
04/21/87	5352.91	0.02	5352.93
05/06/87	5352.88	0.04	5352.91
08/11/87	5352.67	0.02	5352.69
09/09/87	5352.63	0.00	5352.63
09/24/87	5352.49	0.00	5352.49
10/06/87	5352.42	0.02	5352.44
10/22/87	5352.26	0.00	5352.26
11/10/87	5351.72	1.04	5352.55
12/15/87	5350.84	1.84	5352.31
01/19/88	5351.13	1.65	5352.45
02/26/88	5351.13	1.42	5352.27
03/11/88	5350.51	1.71	5351.88
04/08/88	5350.33	1.80	5351.77
05/17/88	5349.83	1.90	5351.35
06/09/88	5349.70	1.95	5351.26

WELL NUMBER
GBR-14

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/07/86	5365.83	0.00	5365.83
10/08/86	5365.75	0.00	5365.75
10/09/86	5365.75	0.00	5365.75
10/17/86	5365.50	0.00	5365.50
11/05/86	5366.46	0.00	5366.46
11/19/86	5366.33	0.00	5366.33
11/21/86	5358.58	0.00	5358.58
04/21/87	5363.82	0.02	5363.84
08/11/87	5363.61	0.04	5363.64
09/09/87	5363.53	0.03	5363.55
09/24/87	5361.53	0.00	5361.53
10/06/87	5361.09	0.13	5361.19
10/22/87	5360.41	0.00	5360.41
11/04/87	5361.76	0.02	5361.78
11/10/87	5355.57	0.00	5355.57
12/15/87	5363.24	0.02	5363.26
01/19/88	5363.13	1.E-2	5363.14
02/26/88	5363.07	1.E-2	5363.08
04/08/88	5354.87	0.00	5354.87
05/17/88	5354.62	0.00	5354.62
06/09/88	5355.44	0.01	5355.45

WELL NUMBER
GBR-15

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/07/86	5364.62	0.00	5364.62
10/08/86	5364.50	0.00	5364.50
10/09/86	5364.50	0.00	5364.50
10/16/86	5357.58	0.00	5357.58
10/17/86	5363.46	0.00	5363.46
11/05/86	5365.12	0.00	5365.12
11/19/86	5368.47	0.20	5368.63
11/21/86	5360.37	0.00	5360.37
04/21/87	5368.47	0.02	5368.49
08/11/87	5367.61	0.00	5367.61
09/09/87	5367.38	0.00	5367.38
09/24/87	5366.64	0.00	5366.64
10/06/87	5366.56	0.02	5366.58
10/22/87	5365.68	0.00	5365.68
11/04/87	5366.50	0.02	5366.52
11/10/87	5365.56	0.01	5365.57
12/15/87	5366.72	0.00	5366.72
01/19/88	5367.50	0.02	5367.52
02/26/88	5365.11	0.00	5365.11
03/11/88	5363.47	0.00	5363.47
04/08/88	5361.17	0.00	5361.17
05/17/88	5363.27	0.00	5363.27
06/09/88	5360.92	0.00	5360.92

WELL NUMBER
GBR-17

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/29/86	5367.75	0.00	5367.75
07/15/86	5367.78	0.00	5367.78
07/31/86	5368.31	0.00	5368.31
08/12/86	5367.89	0.00	5367.89
10/16/86	5369.06	0.00	5369.06
10/17/86	5369.06	0.00	5369.06
11/05/86	5369.31	0.00	5369.31
11/19/86	5369.64	0.00	5369.64
08/11/87	5369.69	0.00	5369.69
10/06/87	5369.48	0.00	5369.48
10/22/87	5369.32	0.00	5369.32
11/10/87	5369.36	0.00	5369.36
12/15/87	5369.19	0.00	5369.19
02/26/88	5369.36	0.00	5369.36
05/17/88	5368.30	0.00	5368.30

WELL NUMBER
GBR-18

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
07/15/86	5407.23	0.00	5407.23
07/31/86	5411.46	0.00	5411.46
08/12/86	5410.78	0.00	5410.78
10/16/86	5408.52	0.00	5408.52
10/17/86	5402.72	0.00	5402.72
11/05/86	5408.56	0.00	5408.56
11/19/86	5408.39	0.00	5408.39
08/11/87	5408.19	0.00	5408.19
10/06/87	5408.44	0.00	5408.44
10/22/87	5408.02	0.01	5408.03
11/10/87	5399.82	0.00	5399.82
12/15/87	5408.94	0.00	5408.94
02/26/88	5408.86	0.00	5408.86
05/17/88	5408.60	0.00	5408.60
06/09/88	5401.73		
06/09/88	5401.73	0.00	5401.73

WELL NUMBER
GBR-19

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/09/86	5355.00	0.00	5355.00
10/16/86	5355.00	0.00	5355.00
10/17/86	5355.00	0.00	5355.00
11/05/86	5355.42	0.00	5355.42
11/19/86	5355.62	0.00	5355.62
04/21/87	5355.19	0.15	5355.31
05/06/87	5355.18	0.16	5355.31
08/11/87	5354.82	0.27	5355.04
09/09/87	5354.81	0.25	5355.01
10/06/87	5354.64	0.22	5354.82
10/22/87	5354.56	0.20	5354.72
11/04/87	5354.56	0.25	5354.76
11/10/87	5354.56	0.25	5354.76
12/15/87	5354.47	0.29	5354.70
01/19/88	5354.54	0.39	5354.85
02/26/88	5354.74	0.02	5354.76
03/11/88	5353.86	0.80	5354.50
04/08/88	5353.51	1.00	5354.31
05/17/88	5353.61	0.40	5353.93
06/09/88	5353.56	0.40	5353.88

WELL NUMBER
GBR-20

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/29/86	5352.17	0.00	5352.17
07/15/86	5353.18	0.00	5353.18
07/31/86	5354.20	0.00	5354.20
08/12/86	5354.20	0.00	5354.20
10/16/86	5354.66	0.00	5354.66
10/17/86	5354.50	0.00	5354.50
11/04/86	5354.87	0.00	5354.87
11/19/86	5355.16	0.00	5355.16
04/21/87	5353.93	0.00	5353.93
08/11/87	5354.60	0.16	5354.73
09/09/87	5354.45	0.27	5354.67
09/24/87	5353.88	0.27	5354.10
10/06/87	5354.29	0.33	5354.55
10/22/87	5354.14	0.33	5354.40
11/10/87	5354.00	0.35	5354.28
12/15/87	5354.22	0.37	5354.52
01/19/88	5354.05	0.51	5354.46
02/26/88	5354.05	0.34	5354.32
05/17/88	5353.37	0.70	5353.93
06/09/88	5353.05	0.80	5353.69

WELL NUMBER
GBR-21S

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/02/86	5370.54	0.00	5370.54
05/29/86	5369.67	0.00	5369.67
07/15/86	5371.58	0.00	5371.58
07/31/86	5371.54	0.00	5371.54
10/07/86	5370.71	0.00	5370.71
10/16/86	5363.58	0.00	5363.58
10/17/86	5360.79	0.00	5360.79
11/05/86	5369.71	0.00	5369.71
11/19/86	5369.92	0.00	5369.92
11/21/86	5369.34	0.00	5369.34
11/21/86	5366.34	0.00	5366.34
04/21/87	5369.91	0.00	5369.91
08/11/87	5369.52	0.00	5369.52
09/09/87	5369.41	0.00	5369.41
09/24/87	5369.31	0.00	5369.31
10/06/87	5369.08	0.00	5369.08
11/04/87	5368.92	0.02	5368.94
11/10/87	5369.06	0.00	5369.06
12/15/87	5368.60	0.00	5368.60
01/19/88	5369.23	0.00	5369.23
02/26/88	5368.85	0.02	5368.87
04/08/88	5367.34	0.00	5367.34
05/17/88	5367.44	0.00	5367.44
06/09/88	5367.39	0.00	5367.39

WELL NUMBER
GBR-21D

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/02/86	5377.50	1.92	5379.04
07/15/86	5368.83	1.04	5369.66
07/31/86	5378.12	0.80	5378.76
08/12/86	5379.04	0.42	5379.38
10/07/86	5379.37	0.50	5379.77
11/05/86	5379.71	0.50	5380.11
11/19/86	5379.79	0.46	5380.16
11/21/86	5379.75	0.33	5380.01
04/21/87	5379.27	0.51	5379.68
08/11/87	5379.41	0.43	5379.75
09/09/87	5379.31	0.58	5379.77
09/24/87	5379.31	0.63	5379.81
10/06/87	5379.20	0.69	5379.75
11/04/87	5379.14	0.67	5379.68
11/04/87	5379.14	0.67	5379.68
11/10/87	5379.17	0.64	5379.68
12/15/87	5378.98	0.75	5379.58
01/19/88	5379.79	0.05	5379.83
02/26/88	5379.79	0.02	5379.81
04/08/88	5380.09	0.10	5380.17
05/17/88	5379.94	0.10	5380.02

WELL NUMBER
GBR-22

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/16/86	5361.33	0.00	5361.33
04/23/86	5361.00	0.00	5361.00
04/30/86	5361.21	0.00	5361.21
05/02/86	5361.11	0.00	5361.11
05/09/86	5361.17	0.00	5361.17
05/29/86	5357.58	0.00	5357.58
07/15/86	5361.07	0.00	5361.07
07/31/86	5360.96	0.00	5360.96
08/12/86	5361.11	0.00	5361.11
10/07/86	5361.84	0.00	5361.84
10/09/86	5361.75	0.00	5361.75
10/16/86	5361.46	0.00	5361.46
10/17/86	5361.38	0.00	5361.38
11/19/86	5359.84	2.96	5362.21
11/21/86	5360.04	2.79	5362.27
04/21/87	5360.82	0.23	5361.00
08/11/87	5362.05	0.25	5362.25
09/09/87	5360.58	0.04	5360.61
09/24/87	5361.35	0.00	5361.35
10/06/87	5359.74	0.65	5360.26
10/22/87	5359.77	0.62	5360.27
11/10/87	5359.60	0.83	5360.26
12/15/87	5359.39	0.96	5360.16
01/19/88	5360.50	1.12	5361.40
02/26/88	5360.14	0.00	5360.14
05/17/88	5360.77	0.70	5361.33
06/09/88	5360.27	1.20	5361.23

WELL NUMBER
GBR-23

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/02/86	5378.71	1.E-2	5378.72
07/15/86	5377.45	0.02	5377.47
07/31/86	5379.23	0.04	5379.26
08/12/86	5379.22	0.03	5379.24
10/07/86	5379.69	0.00	5379.69
10/09/86	5379.69	0.00	5379.69
11/05/86	5379.98	0.02	5380.00
11/19/86	5380.36	0.02	5380.38
11/21/86	5380.36	0.00	5380.36
04/21/87	5380.29	0.02	5380.31
08/11/87	5380.65	1.E-2	5380.66
09/09/87	5380.50	0.03	5380.52
09/24/87	5380.57	0.00	5380.57
10/06/87	5380.50	0.00	5380.50
10/22/87	5380.38	0.00	5380.38
11/10/87	5380.13	0.00	5380.13
12/15/87	5380.04	0.03	5380.06
01/19/88	5380.05	0.02	5380.07
02/26/88	5380.05	0.01	5380.06
03/11/88	5380.59	0.00	5380.59
05/17/88	5380.26	0.00	5380.26
06/09/88	5380.16	0.00	5380.16

WELL NUMBER
GBR-24S

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/23/86	5370.10	0.00	5370.10
04/30/86	5368.62	0.00	5368.62
05/02/86	5368.17	0.00	5368.17
05/09/86	5368.33	0.00	5368.33
05/29/86	5365.12	0.00	5365.12
07/15/86	5368.70	0.00	5368.70
07/31/86	5369.32	0.00	5369.32
08/12/86	5369.08	0.00	5369.08
10/07/86	5369.16	0.00	5369.16
10/09/86	5369.08	0.00	5369.08
10/16/86	5366.62	0.00	5366.62
10/17/86	5368.20	0.00	5368.20
11/05/86	5369.58	0.00	5369.58
11/19/86	5370.03	0.00	5370.03
11/21/86	5367.32	0.00	5367.32
04/21/87	5370.47	0.02	5370.49
08/11/87	5370.79	0.00	5370.79
09/09/87	5370.68	0.00	5370.68
09/24/87	5369.98	0.00	5369.98
11/10/87	5369.50	0.00	5369.50
12/15/87	5369.79	0.00	5369.79
01/19/88	5369.81	0.00	5369.81
02/26/88	5369.37	0.00	5369.37
03/11/88	5368.95	0.00	5368.95
04/08/88	5368.95	0.00	5368.95
05/17/88	5368.65	0.00	5368.65
06/09/88	5368.65	0.00	5368.65

WELL NUMBER
GBR-24D

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/02/86	5368.79	0.08	5368.85
07/15/86	5368.07	1.E-2	5368.08
07/31/86	5369.57	0.00	5369.57
08/12/86	5369.72	0.03	5369.74
10/07/86	5369.87	0.04	5369.90
10/09/86	5369.91	0.04	5369.94
11/05/86	5370.53	0.04	5370.56
11/19/86	5370.91	0.02	5370.93
11/21/86	5369.45	0.00	5369.45
04/21/87	5371.95	0.02	5371.97
08/11/87	5372.49	0.04	5372.52
09/09/87	5372.35	0.02	5372.37
09/24/87	5372.62	0.00	5372.62
10/06/87	5372.45	0.01	5372.46
11/04/87	5372.52	0.02	5372.54
11/10/87	5372.45	0.00	5372.45
12/15/87	5372.45	0.02	5372.47
01/19/88	5372.45	1.E-2	5372.46
02/26/88	5372.41	0.01	5372.42
03/11/88	5372.08	0.00	5372.08
04/08/88	5372.25	0.00	5372.25
05/17/88	5372.05	0.05	5372.09

WELL NUMBER
GBR-25

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/23/86	5367.65	0.00	5367.65
04/30/86	5367.08	0.00	5367.08
05/02/86	5366.17	0.00	5366.17
05/09/86	5367.21	0.00	5367.21
05/29/86	5365.29	0.00	5365.29
07/15/86	5367.55	0.00	5367.55
07/31/86	5367.74	0.04	5367.77
08/12/86	5367.81	0.00	5367.81
10/07/86	5365.90	0.00	5365.90
10/09/86	5367.86	0.00	5367.86
10/16/86	5366.28	0.00	5366.28
10/17/86	5368.20	0.00	5368.20
11/05/86	5368.03	0.00	5368.03
11/19/86	5368.03	0.00	5368.03
11/21/86	5366.95	0.00	5366.95
08/11/87	5369.12	0.04	5369.15
09/09/87	5369.96	0.00	5369.96
09/24/87	5369.24	0.00	5369.24
10/06/87	5369.83	0.00	5369.83
10/22/87	5369.03	0.00	5369.03
11/04/87	5368.99	0.02	5369.01
11/10/87	5368.58	0.00	5368.58
01/19/88	5368.59	0.02	5368.61
02/26/88	5368.53	0.00	5368.53
03/11/88	5368.28	0.00	5368.28
04/08/88	5368.13	0.00	5368.13
06/09/88	5367.73	0.00	5367.73

WELL NUMBER
GBR-26

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/23/86	5362.65	0.00	5362.65
04/30/86	5362.92	0.00	5362.92
05/02/86	5362.85	0.00	5362.85
05/09/86	5362.75	0.00	5362.75
05/29/86	5361.29	0.00	5361.29
07/15/86	5362.62	0.00	5362.62
07/31/86	5362.93	0.00	5362.93
08/12/86	5362.31	0.00	5362.31
10/07/86	5363.72	0.00	5363.72
10/09/86	5363.56	0.04	5363.59
10/16/86	5363.35	0.00	5363.35
10/17/86	5361.26	0.00	5361.26
11/05/86	5364.93	0.08	5364.99
11/19/86	5364.39	0.17	5364.53
11/21/86	5364.01	0.12	5364.11
04/21/87	5363.95	0.12	5364.05
08/11/87	5363.70	0.08	5363.76
09/09/87	5363.65	0.13	5363.75
09/24/87	5363.43	0.10	5363.51
10/06/87	5361.34	2.09	5363.01
10/22/87	5363.28	0.09	5363.35
11/10/87	5363.28	0.00	5363.28
12/15/87	5363.37	0.06	5363.42
01/19/88	5363.28	0.05	5363.32
02/26/88	5363.44	9.998E-3	5363.45
03/11/88	5362.99	0.00	5362.99
05/17/88	5362.68	0.05	5362.72
06/09/88	5362.73	0.05	5362.77

WELL NUMBER
GBR-27

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/02/86	5360.16	7.17	5365.90
05/29/86	5357.67	8.67	5364.61
07/31/86	5364.75	2.91	5367.08
10/07/86	5367.25	0.42	5367.59
10/09/86	5367.08	0.38	5367.38
11/05/86	5368.08	0.29	5368.31
11/19/86	5367.91	0.08	5367.97
11/21/86	5357.16	0.00	5357.16
04/21/87	5379.27	1.E-2	5379.28
08/11/87	5379.71	0.12	5379.81
09/09/87	5379.80	0.00	5379.80
09/24/87	5379.77	0.00	5379.77
10/06/87	5378.60	0.00	5378.60
10/22/87	5375.88	0.01	5375.89
11/04/87	5379.51	0.02	5379.53
11/10/87	5379.61	0.00	5379.61
12/15/87	5379.63	0.00	5379.63
01/19/88	5369.57	0.00	5369.57
02/26/88	5363.65	0.00	5363.65
03/11/88	5366.40	0.00	5366.40
05/17/88	5363.28	0.00	5363.28
06/09/88	5378.98	0.01	5378.99
06/09/88	5379.21	0.00	5379.21

WELL NUMBER
GBR-28

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/29/86	5359.87	0.17	5360.01
07/15/86	5361.95	0.50	5362.35
07/31/86	5360.59	0.58	5361.05
08/12/86	5360.43	1.22	5361.41
10/07/86	5362.18	0.00	5362.18
10/09/86	5361.47	0.00	5361.47
11/05/86	5362.26	0.02	5362.28
11/19/86	5362.64	0.12	5362.74
11/21/86	5361.93	0.00	5361.93
04/21/87	5362.73	0.05	5362.77
08/11/87	5362.48	0.02	5362.50
09/09/87	5362.43	0.03	5362.45
09/24/87	5361.52	0.17	5361.66
10/06/87	5360.98	0.35	5361.26
10/22/87	5360.86	0.45	5361.22
11/04/87	5360.23	0.96	5361.00
11/10/87	5360.46	0.00	5360.46
12/15/87	5361.85	0.32	5362.11
01/19/88	5361.73	0.27	5361.95
02/26/88	5361.56	0.00	5361.56
03/11/88	5361.52	0.00	5361.52
04/08/88	5360.66	0.00	5360.66
05/17/88	5359.81	0.40	5360.13
06/09/88	5360.31	9.998E-3	5360.32

WELL NUMBER
GBR-29

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/29/86	5345.00	0.00	5345.00
07/15/86	5342.85	4.50	5346.45
07/31/86	5341.02	7.34	5346.89
08/12/86	5341.61	6.50	5346.81
10/07/86	5342.27	6.25	5347.27
11/04/86	5343.02	5.58	5347.48
11/05/86	5345.94	2.04	5347.57
11/19/86	5345.52	2.96	5347.89
04/21/87	5348.66	0.02	5348.68
08/11/87	5348.43	1.E-2	5348.44
09/09/87	5348.96	0.00	5348.96
09/24/87	5348.47	0.00	5348.47
10/06/87	5347.74	0.00	5347.74
10/22/87	5347.72	0.00	5347.72
11/04/87	5347.09	0.03	5347.11
12/15/87	5348.22	0.10	5348.30
01/19/88	5348.43	0.41	5348.76
02/26/88	5347.18	0.08	5347.24
03/11/88	5347.29	0.00	5347.29
04/08/88	5346.89	0.00	5346.89
05/17/88	5342.09	2.50	5344.09
06/09/88	5341.27	5.87	5345.97

WELL NUMBER
GBR-30

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/07/86	5366.00	0.00	5366.00
10/09/86	5365.92	0.00	5365.92
10/16/86	5365.79	0.00	5365.79
10/17/86	5365.83	0.00	5365.83
11/05/86	5367.00	0.25	5367.20
11/19/86	5366.50	0.17	5366.64
11/21/86	5366.42	0.00	5366.42
04/21/87	5364.32	0.50	5364.72
08/11/87	5364.03	0.12	5364.13
09/09/87	5363.93	0.08	5363.99
09/24/87	5363.80	0.02	5363.82
10/06/87	5363.67	0.06	5363.72
10/22/87	5363.63	0.09	5363.70
11/10/87	5363.65	0.00	5363.65
12/15/87	5363.67	0.02	5363.69
01/19/88	5363.53	0.04	5363.56
02/26/88	5363.82	1.E-2	5363.83
03/11/88	5363.44	0.00	5363.44
05/17/88	5363.07	0.03	5363.09
06/09/88	5362.99	9.998E-3	5363.00

WELL NUMBER
GBR-31

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
10/07/86	5362.30	0.00	5362.30
10/09/86	5362.21	0.00	5362.21
10/16/86	5362.00	0.00	5362.00
10/17/86	5362.00	0.00	5362.00
11/05/86	5362.42	0.00	5362.42
11/19/86	5362.84	0.00	5362.84
04/21/87	5360.92	0.00	5360.92
08/11/87	5360.62	0.04	5360.65
09/09/87	5360.63	0.00	5360.63
09/24/87	5360.52	0.00	5360.52
10/06/87	5360.35	0.00	5360.35
11/10/87	5360.27	0.00	5360.27
02/26/88	5360.33	0.00	5360.33
03/11/88	5359.91	0.00	5359.91
05/17/88	5359.53	0.00	5359.53
06/09/88	5362.43	0.00	5362.43

WELL NUMBER
GBR-32

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
08/11/87	5382.27	0.00	5382.27
10/06/87	5391.86	0.00	5391.86
10/22/87	5381.75	0.00	5381.75
11/10/87	5381.73	0.00	5381.73
12/15/87	5381.50	0.00	5381.50
02/26/88	5381.52	0.00	5381.52
05/17/88	5381.52	0.00	5381.52

WELL NUMBER
GBR-33

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/06/87	5358.48	1.00	5359.28
08/11/87	5359.31	0.15	5359.43
09/09/87	5359.23	1.04	5360.06
09/24/87	5359.19	1.06	5360.04
10/06/87	5358.83	1.21	5359.80
10/22/87	5359.06	0.88	5359.76
11/04/87	5358.98	1.00	5359.78
11/10/87	5359.06	0.92	5359.80
12/15/87	5359.31	0.66	5359.84
01/19/88	5359.31	0.71	5359.88
02/26/88	5359.48	0.33	5359.74
03/11/88	5358.31	1.25	5359.31
04/08/88	5358.04	1.50	5359.24
05/17/88	5358.09	1.10	5358.97
06/09/88	5358.04	1.10	5358.92

WELL NUMBER
GBR-34

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/06/87	5359.14	1.80	5360.58
08/11/87	5359.89	0.83	5360.55
09/09/87	5359.85	0.21	5360.02
09/24/87	5360.02	0.08	5360.08
10/06/87	5359.76	0.09	5359.83
10/22/87	5359.93	0.02	5359.95
11/10/87	5360.02	0.00	5360.02
12/15/87	5359.89	0.02	5359.91
01/19/88	5360.00	0.08	5360.06
02/26/88	5359.04	0.01	5359.05
05/17/88	5357.26	1.79	5358.69
06/09/88	5358.17	1.30	5359.21

WELL NUMBER
GBR-35

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/06/87	5356.00	4.40	5359.52
08/11/87	5355.59	4.46	5359.16
09/09/87	5354.11	5.81	5358.76
09/24/87	5352.71	7.00	5358.31
10/06/87	5354.50	4.98	5358.48
10/22/87	5352.50	6.98	5358.08
11/10/87	5354.92	4.50	5358.52
12/15/87	5355.46	4.00	5358.66
01/19/88	5357.21	2.17	5358.95
02/26/88	5354.92	3.67	5357.86
05/17/88	5355.25	3.25	5357.85
06/09/88	5353.15	5.40	5357.47

WELL NUMBER
GBR-36

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
05/06/87	5356.39	0.08	5356.45
08/11/87	5356.39	2.46	5358.36
09/09/87	5355.64	3.09	5358.11
09/24/87	5356.85	1.71	5358.22
10/06/87	5354.77	3.18	5357.31
10/22/87	5356.35	1.92	5357.89
11/10/87	5356.02	2.23	5357.80
12/15/87	5356.98	1.24	5357.97
01/19/88	5357.02	1.31	5358.07
03/11/88	5352.69	4.50	5356.29
04/08/88	5349.29	1.15	5350.21
05/17/88	5354.04	1.50	5355.24
06/09/88	5353.94	2.75	5356.14

WELL NUMBER
GBR-37

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
08/11/87	5348.94	0.08	5349.00
09/09/87	5348.88	0.02	5348.90
09/24/87	5348.57	0.00	5348.57
10/06/87	5348.53	0.00	5348.53
10/22/87	5347.20	0.04	5347.23
11/04/87	5348.76	0.02	5348.78
11/10/87	5347.74	0.00	5347.74
12/15/87	5348.61	0.02	5348.63
01/19/88	5348.68	0.02	5348.70
02/26/88	5346.57	0.00	5346.57
03/11/88	5346.00	0.00	5346.00
04/08/88	5346.10	0.00	5346.10
05/17/88	5344.60	0.00	5344.60
06/09/88	5347.37	0.00	5347.37

WELL NUMBER
GBR-38

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
08/11/87	5352.21	0.00	5352.21
09/09/87	5354.78	0.00	5354.78
09/24/87	5350.20	0.00	5350.20
10/06/87	5350.09	0.00	5350.09
10/22/87	5349.82	0.00	5349.82
11/04/87	5350.42	0.03	5350.44
11/04/87	5350.42	0.03	5350.44
11/10/87	5349.95	0.00	5349.95
12/15/87	5354.55	0.00	5354.55
01/19/88	5354.55	0.00	5354.55
02/26/88	5350.58	9.998E-3	5350.59
03/11/88	5349.67	0.00	5349.67
04/08/88	5350.12	0.00	5350.12
05/17/88	5350.22	0.00	5350.22
06/09/88	5349.90	0.01	5349.91

WELL NUMBER
GBR-39

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
04/15/86	5363.17	0.00	5363.17
04/16/86	5363.08	0.00	5363.08
04/23/86	5362.80	0.00	5362.80
05/02/86	5363.12	0.00	5363.12
05/09/86	5362.92	0.00	5362.92
05/29/86	5363.04	0.00	5363.04
07/15/86	5362.96	0.00	5362.96
10/07/86	5363.71	0.00	5363.71
10/09/86	5363.56	0.00	5363.56
10/16/86	5362.79	0.00	5362.79
10/17/86	5363.04	0.00	5363.04
11/05/86	5364.21	0.00	5364.21
11/19/86	5364.17	0.00	5364.17
11/21/86	5363.79	0.00	5363.79
04/21/87	5364.76	0.06	5364.81
08/11/87	5364.49	0.00	5364.49
11/10/87	5363.53	0.00	5363.53
12/14/87	5374.02	0.00	5374.02
01/19/88	5363.85	9.998E-3	5363.86
02/26/88	5363.77	0.00	5363.77
03/11/88	5363.23	0.00	5363.23
05/17/88	5362.97	0.00	5362.97
06/09/88	5362.90	0.00	5362.90

WELL NUMBER
GBR-40

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
12/14/87	5370.35	0.00	5370.35
02/26/88	5370.27	0.00	5370.27
03/11/88	5370.14	0.00	5370.14
05/17/88	5369.45	0.00	5369.45
06/09/88	5368.60	0.00	5368.60

WELL NUMBER
GBR-41

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
11/11/87	5366.80	0.00	5366.80
12/14/87	5368.03	0.00	5368.03
02/26/88	5367.85	0.00	5367.85
03/11/88	5368.90	0.00	5368.90
05/17/88	5367.69	0.00	5367.69
06/09/88	5375.19	0.00	5375.19

WELL NUMBER
GBR-42

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
01/19/88	5349.05	0.00	5349.05
02/26/88	5347.07	0.02	5347.09
03/11/88	5348.55	0.00	5348.55
04/08/88	5348.25	0.00	5348.25
05/17/88	5347.75	0.00	5347.75
06/09/88	5347.80	0.00	5347.80

WELL NUMBER
GBR-43

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
01/19/88	5348.74	0.25	5348.94
02/26/88	5348.48	0.00	5348.48
03/11/88	5348.30	0.00	5348.30
05/17/88	5347.30	0.00	5347.30
06/09/88	5347.40	0.00	5347.40

WELL NUMBER
GBR-44

SAMPLE DATE	WATER ELEVATION	PRODUCT THICKNESS	CORRECTED WATER ELEVATION
01/19/88	5351.00	9.998E-3	5351.01
02/26/88	5349.76	0.00	5349.76
03/11/88	5348.89	0.00	5348.89
04/08/88	5349.19	0.00	5349.19
05/17/88	5349.64	0.00	5349.64
06/09/88	5349.79	0.00	5349.79

ATTACHMENT #4

AFFIRMATION BY MR. BOB MCCLENAHAN

AFFIRMATION

I hereby certify that I am familiar with the information contained in and submitted with this application and that such information is true, accurate and complete to the best of my knowledge and belief.

Robert L. McClenahan, Jr.
Environmental Coordinator
Giant Refining Company

7/21/88
Date

ATTACHMENT #5

RESULTS OF STORAGE TANK WATER ANALYSES

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

RECEIVED 6/21/88

06/16/88 rw
MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming Northeast, Suite 104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/15/88 BY: C. Miller
MATRIX: Water

MAJOR CATIONS
TEST RESULTS

GAR-30 GAR-24D TK 22 GAR-31

PARAMETER	UNITS	MDL	LAB # / I.D.#	24480A / 010530	24481A / 010347	24482A / 020135	24483A / 021015
Sodium	mg/L	0.1		578	491	686	769
Potassium	mg/L	1.0		3.3	5.3	3.4	3.5
Calcium	mg/L	0.1		586	500	558	598
Magnesium	mg/L	0.1		50	75	52	51

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

RECEIVED 6/21/89

MANAGER: Michael Wood
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

MAJOR CATIONS
TEST RESULTS

MATRIX: Water

PARAMETER	UNITS	MDL	LAB # / I.D.#	GBR-17 24484A 021220	Tk32 24485A 020205	Tk 24 24486A 020105	Tk 22 24487A 020135
Sodium	mg/L	0.1		281	620	700	752
Potassium	mg/L	1.0		1.1	2.9	3.5	3.8
Calcium	mg/L	0.1		411	474	521	579
Magnesium	mg/L	0.1		44	48	50	54

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

RECEIVED 6/21/93

MANAGER: Michael Wood
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

MAJOR CATIONS
TEST RESULTS

MATRIX: Water

TLC 32

PARAMETER	UNITS	MDL	LAB # / I.D.#	24488A / 020205
Sodium	mg/L	0.1		570
Potassium	mg/L	1.0		3.1
Calcium	mg/L	0.1		456
Magnesium	mg/L	0.1		47

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

Safy Khalifa

SAFY KHALIFA, Ph.D., Director

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

RECEIVED 7/13/88

07/12/88 JP
MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming N.E. Suite 104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-9
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/07/88 BY: R. Heines
MATRIX: Water
UNITS: mg/L

TEST RESULTS

PARAMETER	MDL	LAB # / I.D.#	GBR-30 24480 010530	GBR-24D 24481 010347	TK 22 24482 020135	GBR-31 24483 021015	GBR-17 24484 021220
Total Dissolved Solids	10		3996	3487	4094	4374	2382
Bicarbonate	20		124	130	297	211	140
Carbonate	20		<20	<20	<20	<20	<20
Chloride	1		370	630	910	850	190
Sulfate	1		2270	1640	1570	1920	1350

MDL = Method Detection Limit; compound below this level would not be detected.
METHOD: TDS by Standard Method 209B
Bicarbonate by Standard Method 403
Carbonate by Standard Method 403
Chloride by Standard Method 429
Sulfate by Standard Method 429

GTEL
Environmental
Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

MANAGER: Michael Wood
PROJECT#: 232-799-5009-9
LOCATION: Farmington, NM

TEST RESULTS

MATRIX: Water
UNITS: mg/L

PARAMETER	MDL	LAB # / I.D.#	Tk 32 24485 020205	Tk 24 24486 020105	Tk 22 24487 020135	Tk 32 24488 020205
Total Dissolved Solids	10		4274	4031	4218	4256
Bicarbonate	20		200	311	284	80
Carbonate	20		<20	<20	<20	<20
Chloride	1		940	690	915	1050
Sulfate	1		1510	1370	1580	1630

MDL = Method Detection Limit; compound below this level would not be detected.
METHOD: TDS by Standard Method 209B
Bicarbonate by Standard Method 403
Carbonate by Standard Method 403
Chloride by Standard Method 429
Sulfate by Standard Method 429

Safy Khalifa/EM7

SAFY KHALIFA, Ph.D., Director

Geoscience Consultants, Ltd.

500 Copper Avenue NW, Suite 200
Albuquerque, New Mexico 87102
(505) 842-0001 FAX (505) 842-0595

1109 Spring Street, Suite 706
Silver Spring, Maryland 20910
(301) 587-2088

June 17, 1988

Mr. Edmund H. Kendrick
Montgomery & Andrews, P.A.
P O Box 2307
Santa Fe, New Mexico 87504-2307

RE: SAMPLE RESULTS

Dear Ned,

Enclosed are the sample test results you requested. These results are of:

Sample I.D.	Description	Test
8801200830	Tank (37)	Metals
8801201200	GBR 15	Metals
8801201550	GBR 8	Metals
8801200830	Tank 37	601/602
8801201200	GBR 15	601/602
8801201550	GBR 8	601/602
8801201800	GBR 100	601/602
System Blank		

If you have any questions, please feel free to call me at (505)-842-0001.

Yours very truly,
GEOSCIENCE CONSULTANTS, LTD.

D. L. Tompkins for

Randall T. Hicks, CPG
Senior Vice President
Technical Services

rth/dlt/M&A/KENDR031.LTR

ENCLOSURE

cc: Mr. Robert McClenahan, Giant Bloomfield Refinery
Mr. Kim Bullerdick, Giant Industries, Inc.
Mr. Michael Wood, Groundwater Technology, Inc.

Analytical Technologies, Inc.

(00021)

FEBRUARY 9, 1988

GEOSCIENCE CONSULTANTS, LTD.
500 COPPER AVE. NW
SUITE 200
ALBUQUERQUE, NM 87102

Accession: 3873

Date Received: 1/22/88

Attention: CLAUDE SCHLEYER

Project: M & A

M. G. Barry
Michael G. Barry
Project Manager

Robert V. Woods
Robert V. Woods
Laboratory Manager

RVW/jlf

Note: Samples will be disposed of within 30 days unless otherwise notified.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801200830
LOCATION: TANK 37
LAB SAMPLE #: 3873-1
UNITS: ug/l
DILUTION FACTOR: 10

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	2.0	ND
BROMOMETHANE	2.0	ND
DICHLORODIFLUOROMETHANE	2.0	ND
VINYL CHLORIDE	2.0	ND
CHLOROETHANE	2.0	ND
METHYLENE CHLORIDE	20.0	ND
TRICHLOROFLUOROMETHANE	20.0	ND
1,1-DICHLOROETHENE	2.0	ND
1,1-DICHLOROETHANE	2.0	2
TRANS-1,2-DICHLOROETHENE	2.0	3
CHLOROFORM	2.0	ND
1,2-DICHLOROETHANE	2.0	7
1,1,1-TRICHLOROETHANE	2.0	ND
CARBON TETRACHLORIDE	2.0	ND
BROMODICHLOROMETHANE	2.0	ND
1,2-DICHLOROPROPANE	2.0	ND
TRANS-1,3-DICHLOROPROPENE	2.0	ND
TRICHLOROETHENE	2.0	ND
DIBROMOCHLOROMETHANE	2.0	ND
1,1,2-TRICHLOROETHANE	2.0	ND
CIS-1,3-DICHLOROPROPENE	2.0	ND
2-CHLOROETHYLVINYL ETHER	5.0	ND
BROMOFORM	5.0	ND
1,1,2,2-TETRACHLOROETHANE	2.0	ND
TETRACHLOROETHENE	2.0	ND
BENZENE	5.0	150
TOLUENE	5.0	23
CHLOROBENZENE	5.0	ND
ETHYLBENZENE	5.0	20
1,3-DICHLOROBENZENE	5.0	ND
1,2-DICHLOROBENZENE	5.0	ND
1,4-DICHLOROBENZENE	5.0	ND
M-XYLENE	5.0	9
O,P-XYLENE	5.0	63

% SURROGATE RECOVERY
95.3% BROMOCHLOROMETHANE
77.9% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION

PROJECT MANAGER: [signature]

DATE: 2/9/88

21

AnalyticalTechnologies,Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201200
LOCATION: GBR 15
LAB SAMPLE #: 3873-2
UNITS: ug/l
DILUTION FACTOR: 10

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	2.0	ND
BROMOMETHANE	2.0	ND
DICHLORODIFLUOROMETHANE	2.0	ND
VINYL CHLORIDE	2.0	ND
CHLOROETHANE	2.0	ND
METHYLENE CHLORIDE	20.0	ND
TRICHLOROFLUOROMETHANE	20.0	ND
1,1-DICHLOROETHENE	2.0	ND
1,1-DICHLOROETHANE	2.0	ND
TRANS-1,2-DICHLOROETHENE	2.0	ND
CHLOROFORM	2.0	ND
1,2-DICHLOROETHANE	2.0	54
1,1,1-TRICHLOROETHANE	2.0	ND
CARBON TETRACHLORIDE	2.0	ND
BROMODICHLOROMETHANE	2.0	ND
1,2-DICHLOROPROPANE	2.0	ND
TRANS-1,3-DICHLOROPROPENE	2.0	ND
TRICHLOROETHENE	2.0	ND
DIBROMOCHLOROMETHANE	2.0	ND
1,1,2-TRICHLOROETHANE	2.0	ND
CIS-1,3-DICHLOROPROPENE	2.0	ND
2-CHLOROETHYLVINYL ETHER	5.0	ND
BROMOFORM	5.0	ND
1,1,2,2-TETRACHLOROETHANE	2.0	ND
TETRACHLOROETHENE	2.0	ND
BENZENE	5.0	106
TOLUENE	5.0	ND
CHLOROBENZENE	5.0	ND
ETHYLBENZENE	5.0	ND
1,3-DICHLOROBENZENE	5.0	ND
1,2-DICHLOROBENZENE	5.0	ND
1,4-DICHLOROBENZENE	5.0	ND
M-XYLENE	5.0	ND
O,P-XYLENE	5.0	ND

% SURROGATE RECOVERY
87.9% BROMOCHLOROMETHANE
86.1% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION

PROJECT MANAGER: [illegible]

DATE: 2/9/88

Analytical Technologies, Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201550
LOCATION: GBR 8
LAB SAMPLE #: 3873-3
UNITS: ug/l
DILUTION FACTOR: 100

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	20.0	ND
BROMOMETHANE	20.0	ND
DICHLORODIFLUOROMETHANE	20.0	ND
VINYL CHLORIDE	20.0	ND
CHLOROETHANE	20.0	ND
METHYLENE CHLORIDE	200.0	ND
TRICHLOROFLUOROMETHANE	200.0	ND
1,1-DICHLOROETHENE	20.0	ND
1,1-DICHLOROETHANE	20.0	ND
TRANS-1,2-DICHLOROETHENE	20.0	ND
CHLOROFORM	20.0	ND
1,2-DICHLOROETHANE	20.0	ND
1,1,1-TRICHLOROETHANE	20.0	ND
CARBON TETRACHLORIDE	20.0	ND
BROMODICHLOROMETHANE	20.0	ND
1,2-DICHLOROPROPANE	20.0	ND
TRANS-1,3-DICHLOROPROPENE	20.0	ND
TRICHLOROETHENE	20.0	ND
DIBROMOCHLOROMETHANE	20.0	ND
1,1,2-TRICHLOROETHANE	20.0	ND
CIS-1,3-DICHLOROPROPENE	20.0	ND
2-CHLOROETHYLVINYL ETHER	50.0	ND
BROMOFORM	50.0	ND
1,1,2,2-TETRACHLOROETHANE	20.0	ND
TETRACHLOROETHENE	20.0	ND
BENZENE	50.0	10,000
TOLUENE	50.0	940
CHLOROBENZENE	50.0	ND
ETHYLBENZENE	50.0	1,000
1,3-DICHLOROBENZENE	50.0	ND
1,2-DICHLOROBENZENE	50.0	ND
1,4-DICHLOROBENZENE	50.0	ND
M-XYLENE	50.0	1,700
O,P-XYLENE	50.0	2,000

% SURROGATE RECOVERY
96.2% BROMOCHLOROMETHANE
90.7% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION.

PROJECT MANAGER: [signature] DATE: 2/9/88

Analytical Technologies, Inc.

TRIP BLANK

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201800
LOCATION: GBR 100
LAB SAMPLE #: 3873-4
UNITS: ug/l
DILUTION FACTOR: 1

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	0.2	ND
BROMOMETHANE	0.2	ND
DICHLORODIFLUOROMETHANE	0.2	ND
VINYL CHLORIDE	0.2	ND
CHLOROETHANE	0.2	ND
METHYLENE CHLORIDE	2.0	ND
TRICHLOROFLUOROMETHANE	2.0	ND
1,1-DICHLOROETHENE	0.2	ND
1,1-DICHLOROETHANE	0.2	ND
TRANS-1,2-DICHLOROETHENE	0.2	ND
CHLOROFORM	0.2	ND
1,2-DICHLOROETHANE	0.2	ND
1,1,1-TRICHLOROETHANE	0.2	ND
CARBON TETRACHLORIDE	0.2	ND
BROMODICHLOROMETHANE	0.2	ND
1,2-DICHLOROPROPANE	0.2	ND
TRANS-1,3-DICHLOROPROPENE	0.2	ND
TRICHLOROETHENE	0.2	ND
DIBROMOCHLOROMETHANE	0.2	ND
1,1,2-TRICHLOROETHANE	0.2	ND
CIS-1,3-DICHLOROPROPENE	0.2	ND
2-CHLOROETHYLVINYL ETHER	0.5	ND
BROMOFORM	0.5	ND
1,1,2,2-TETRACHLOROETHANE	0.2	ND
TETRACHLOROETHENE	0.2	ND
BENZENE	0.5	ND
TOLUENE	0.5	ND
CHLOROBENZENE	0.5	ND
ETHYLBENZENE	0.5	ND
1,3-DICHLOROBENZENE	0.5	ND
1,2-DICHLOROBENZENE	0.5	ND
1,4-DICHLOROBENZENE	0.5	ND
M-XYLENE	0.5	ND
O,P-XYLENE	0.5	ND

COMMENTS: ND = NOT DETECTED

% SURROGATE RECOVERY
84.2% BROMOCHLOROMETHANE
72.2% BROMOFLUOROBENZENE

PROJECT MANAGER: [illegible]

DATE: 2/9/88

Analytical Technologies, Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: N/A
LAB RECEIPT DATE: N/A
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: SYSTEM BLANK
LOCATION:
LAB SAMPLE #: 3873
UNITS: ug/l
DILUTION FACTOR: 1

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	0.2	ND
BROMOMETHANE	0.2	ND
DICHLORODIFLUOROMETHANE	0.2	ND
VINYL CHLORIDE	0.2	ND
CHLOROETHANE	0.2	ND
METHYLENE CHLORIDE	2.0	2.3
TRICHLOROFLUOROMETHANE	2.0	ND
1,1-DICHLOROETHENE	0.2	ND
1,1-DICHLOROETHANE	0.2	ND
TRANS-1,2-DICHLOROETHENE	0.2	ND
CHLOROFORM	0.2	ND
1,2-DICHLOROETHANE	0.2	ND
1,1,1-TRICHLOROETHANE	0.2	ND
CARBON TETRACHLORIDE	0.2	ND
BROMODICHLOROMETHANE	0.2	ND
1,2-DICHLOROPROPANE	0.2	ND
TRANS-1,3-DICHLOROPROPENE	0.2	ND
TRICHLOROETHENE	0.2	ND
DIBROMOCHLOROMETHANE	0.2	ND
1,1,2-TRICHLOROETHANE	0.2	ND
CIS-1,3-DICHLOROPROPENE	0.2	ND
2-CHLOROETHYLVINYL ETHER	0.5	ND
BROMOFORM	0.5	ND
1,1,2,2-TETRACHLOROETHANE	0.2	ND
TETRACHLOROETHENE	0.2	ND
BENZENE	0.5	ND
TOLUENE	0.5	ND
CHLOROBENZENE	0.5	ND
ETHYLBENZENE	0.5	ND
1,3-DICHLOROBENZENE	0.5	ND
1,2-DICHLOROBENZENE	0.5	ND
1,4-DICHLOROBENZENE	0.5	ND
M-XYLENE	0.5	ND
O,P-XYLENE	0.5	ND

% SURROGATE RECOVERY
81.6% BROMOCHLOROMETHANE
81.7% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED

PROJECT MANAGER: [signature]

DATE: 2/9/88

(21)

Geoscience Consultants, Ltd.

☒ Albuquerque
500 Copper N.W.
Suite 200
Albuquerque, NM 87102
(505) 842-0001

☐ Silver Spring
1109 Spring St.
Suite 706
Silver Spring, MD 20910
(301) 587-2088

☐ Newport Beach
5000 Birch Street
West Tower, Suite 3000
Newport Beach, CA 92660
(714) 476-3650

☐ Las Cruces
P.O. Drawer MM
Las Cruces, NM 88004
(505) 524-5364

№ 00021

Chain of Custody

DATE 1-2?-88 PAGE 1 OF 1

LAB NAME [illegible]
ADDRESS [illegible]
TELEPHONE (???) [illegible]-1530
SAMPLERS (SIGNATURE) [signature]

ANALYSIS REQUEST

SAMPLE NUMBER	MATRIX	LOCATION	BASE/NEU/ACID CMPDS. GC/MS/ 625/8270	VOLATILE CMPDS. GC/MS/ 624/8240	PESTICIDES/PCB 608/8080	POLYNUCLEAR AROMATIC 610/8310	PHENOLS, SUB PHENOLS 604/8040	HALOGENATED VOLATILES 601/8010	AROMATIC VOLATILES 602/8020	TOTAL ORGANIC CARBON 415/9060	TOTAL ORGANIC HALIDES 9020	PETROLEUM HYDROCARBONS 418			PRIORITY POLLUTANT METALS (13)	CAM METALS (18) TTLC/STLC	EP TOX METALS (8)	SWDA-INORGANICS PRIMARY/SECONDARY	HAZARDOUS WASTE PROFILE				NUMBER OF CONTAINERS
[illegible]	[illegible]	[illegible]						X	X		headspa												
[illegible]	[illegible]	[illegible]						X	X		OK												
[illegible]	[illegible]	[illegible]						X	X		OK												
[illegible]	[illegible]	[illegible]						X	X		OK												

PROJECT INFORMATION	
PROJECT:	M + A
PROJECT MANAGER	[illegible]
CHARGE CODE NO.	[illegible] · 402
SHIPPING ID. NO.	
VIA:	

SAMPLE RECEIPT	
TOTAL NO. OF CONTAINERS	
CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	
LAB NO.	03

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
(Signature) [signature] (Time)	(Signature) (Time)	(Signature) (Time)
(Printed Name) JACK [illegible] (Date) 1-2?-88	(Printed Name) (Date)	(Printed Name) (Date)
(Company)	(Company)	(Company)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 3.**
(Signature) (Time)	(Signature) (Time)	(Signature) [signature] 1-22 (Time)
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) [illegible] (Date)
(Company)	(Company)	(Company) ATI

SPECIAL INSTRUCTIONS/COMMENTS
[illegible]

003873

Analytical Technologies, Inc

DISTRIBUTION: WHITE, CANARY — GEOSCIENCE CONSULTANTS, LTD. • — LABORATORY

Analytical Technologies, Inc.

RECEIVED MAR 6 1988
(00021)

MARCH 1, 1988

GEOSCIENCE CONSULTANTS, LTD.
500 COPPER AVE. NW
SUITE 200
ALBUQUERQUE, NM 87102

Accession: 3873

Date Received: 1/22/88

Attention: JACK KIRBY

Project: M & A

This is an amended report to the one dated February 9, 1988 as requested by Jack Kirby.

Michael G. Barry
Project Manager

Robert V. Woods
Laboratory Manager

RVW/jlf

Note: Samples will be disposed of within 30 days unless otherwise notified.

Analytical Technologies, Inc.

METALS
PROJECT: M&A

SAMPLE DATE: 01/20/88
SAMPLE ID: 8801200830 TANK (37)

LAB RECEIPT DATE: 01/22/88
LOCATION:

MATRIX: WATER
LAB SAMPLE #: 3873-1

UNITS: mg/l

ANALYST	ANALYSIS DATE	CONSTITUENT NAME	DILUTION FACTOR	DETECTION LIMIT	RESULT
RC	01/27/88	ARSENIC (As)	1	0.010	ND
RC	02/01/88	BARIUM (Ba)	1	0.060	ND
RC	01/26/88	LEAD (Pb)	1	0.002	0.002
RC	01/29/88	MERCURY (Hg)	1	0.0002	ND
JH	01/28/88	SELENIUM (Se)	1	0.010	ND
JH	02/01/88	SILVER (Ag)	1	0.010	0.015

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: RW DATE: 03/01/88

Analytical Technologies, Inc.

8801201200

METALS
PROJECT: M&A

SAMPLE DATE: 01/20/88
SAMPLE ID: 8801201200
GBR 15

LAB RECEIPT DATE: 01/22/88
LOCATION:

MATRIX: WATER
LAB SAMPLE #: 3873-2

UNITS: mg/l

ANALYST	ANALYSIS DATE	CONSTITUENT NAME	DILUTION FACTOR	DETECTION LIMIT	RESULT
RC	01/27/88	ARSENIC (As)	1	0.010	ND
RC	02/01/88	BARIUM (Ba)	1	0.060	ND
RC	01/26/88	LEAD (Pb)	1	0.002	ND
RC	01/29/88	MERCURY (Hg)	1	0.0002	ND
JH	01/28/88	SELENIUM (Se)	1	0.010	ND
JH	02/01/88	SILVER (Ag)	1	0.010	0.010

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: R.U DATE: 03/01/88

21

Analytical Technologies, Inc.

METALS
PROJECT: M&A

SAMPLE DATE: 01/20/88
SAMPLE ID: 8801201550
GBR 8

LAB RECEIPT DATE: 01/22/88
LOCATION:

MATRIX: WATER
LAB SAMPLE #: 3873-3

UNITS: mg/l

ANALYST	ANALYSIS DATE	CONSTITUENT NAME	DILUTION FACTOR	DETECTION LIMIT	RESULT
RC	01/27/88	ARSENIC (As)	1	0.010	ND
RC	02/01/88	BARIUM (Ba)	1	0.060	ND
RC	01/26/88	LEAD (Pb)	1	0.002	0.005
RC	01/29/88	MERCURY (Hg)	1	0.0002	ND
JH	01/28/88	SELENIUM (Se)	1	0.010	ND
JH	02/01/88	SILVER (Ag)	1	0.010	0.018

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

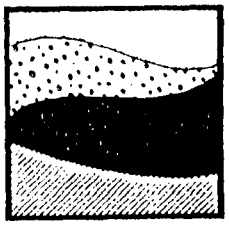
NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: [signature] DATE: 03/01/88

Geoscience Consultants, Ltd.

500 Copper Avenue NW, Suite 200
Albuquerque, New Mexico 87102
(505) 842-0001 FAX (505) 842-0595

1109 Spring Street, Suite 706
Silver Spring, Maryland 20910
(301) 587-2088



April 22, 1988

Mr. Bob McClenahan
Environmental Coordinator
Giant Refining Company
Route 3, Box 7
Gallup, NM 87301

Through:

Mr. Ned Kendrick
Montgomery & Andrews, P.A.
325 Paseo de Peralta
P.O. Box 2307
Sante Fe, NM 87504-2307

Dear Bob:

Enclosed are the sample analyses you requested from Claude Schleyer. Location GBR-100 refers to the trip blank.

If I can be of any further assistance, please do not hesitate to contact Claude or myself.

Yours very truly,
GEOSCIENCE CONSULTANTS, LTD.

Randall T. Hicks, CPG
Senior Vice President
Technical Services

RTH/lf/M&A/MCCLE012.LTR

Enclosure

cc w/enclosures: Mr. Kim Bullerdick, Giant Industries, Inc.
Mr. Mike Wood, Groundwater Technologies

Analytical Technologies, Inc.

(00021)

FEBRUARY 9, 1988

GEOSCIENCE CONSULTANTS, LTD.
500 COPPER AVE. NW
SUITE 200
ALBUQUERQUE, NM 87102

Accession: 3873

Date Received: 1/22/88

Attention: CLAUDE SCHLEYER

Project: M & A

Michael G. Barry
Project Manager

Robert V. Woods
Laboratory Manager

RVW/jlf

Note: Samples will be disposed of within 30 days unless otherwise notified.

Analytical Technologies, Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801200830
LOCATION: TANK 37
LAB SAMPLE #: 3873-1
UNITS: ug/l
DILUTION FACTOR: 10

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	2.0	ND
BROMOMETHANE	2.0	ND
DICHLORODIFLUOROMETHANE	2.0	ND
VINYL CHLORIDE	2.0	ND
CHLOROETHANE	2.0	ND
METHYLENE CHLORIDE	20.0	ND
TRICHLOROFLUOROMETHANE	20.0	ND
1,1-DICHLOROETHENE	2.0	ND
1,1-DICHLOROETHANE	2.0	2
TRANS-1,2-DICHLOROETHENE	2.0	3
CHLOROFORM	2.0	ND
1,2-DICHLOROETHANE	2.0	7
1,1,1-TRICHLOROETHANE	2.0	ND
CARBON TETRACHLORIDE	2.0	ND
BROMODICHLOROMETHANE	2.0	ND
1,2-DICHLOROPROPANE	2.0	ND
TRANS-1,3-DICHLOROPROPENE	2.0	ND
TRICHLOROETHENE	2.0	ND
DIBROMOCHLOROMETHANE	2.0	ND
1,1,2-TRICHLOROETHANE	2.0	ND
CIS-1,3-DICHLOROPROPENE	2.0	ND
2-CHLOROETHYLVINYL ETHER	5.0	ND
BROMOFORM	5.0	ND
1,1,2,2-TETRACHLOROETHANE	2.0	ND
TETRACHLOROETHENE	2.0	ND
BENZENE	5.0	150
TOLUENE	5.0	23
CHLOROBENZENE	5.0	ND
ETHYLBENZENE	5.0	20
1,3-DICHLOROBENZENE	5.0	ND
1,2-DICHLOROBENZENE	5.0	ND
1,4-DICHLOROBENZENE	5.0	ND
M-XYLENE	5.0	9
O,P-XYLENE	5.0	63

% SURROGATE RECOVERY
95.3% BROMOCHLOROMETHANE
77.9% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION

PROJECT MANAGER: [signature]

DATE: 2/9/88

Analytical Technologies, Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201200
LOCATION: GBR 15
LAB SAMPLE #: 3873-2
UNITS: ug/l
DILUTION FACTOR: 10

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	2.0	ND
BROMOMETHANE	2.0	ND
DICHLORODIFLUOROMETHANE	2.0	ND
VINYL CHLORIDE	2.0	ND
CHLOROETHANE	2.0	ND
METHYLENE CHLORIDE	20.0	ND
TRICHLOROFLUOROMETHANE	20.0	ND
1,1-DICHLOROETHENE	2.0	ND
1,1-DICHLOROETHANE	2.0	ND
TRANS-1,2-DICHLOROETHENE	2.0	ND
CHLOROFORM	2.0	ND
1,2-DICHLOROETHANE	2.0	54
1,1,1-TRICHLOROETHANE	2.0	ND
CARBON TETRACHLORIDE	2.0	ND
BROMODICHLOROMETHANE	2.0	ND
1,2-DICHLOROPROPANE	2.0	ND
TRANS-1,3-DICHLOROPROPENE	2.0	ND
TRICHLOROETHENE	2.0	ND
DIBROMOCHLOROMETHANE	2.0	ND
1,1,2-TRICHLOROETHANE	2.0	ND
CIS-1,3-DICHLOROPROPENE	2.0	ND
2-CHLOROETHYLVINYL ETHER	5.0	ND
BROMOFORM	5.0	ND
1,1,2,2-TETRACHLOROETHANE	2.0	ND
TETRACHLOROETHENE	2.0	ND
BENZENE	5.0	106
TOLUENE	5.0	ND
CHLOROBENZENE	5.0	ND
ETHYLBENZENE	5.0	ND
1,3-DICHLOROBENZENE	5.0	ND
1,2-DICHLOROBENZENE	5.0	ND
1,4-DICHLOROBENZENE	5.0	ND
M-XYLENE	5.0	ND
O,P-XYLENE	5.0	ND

% SURROGATE RECOVERY
87.9% BROMOCHLOROMETHANE
86.1% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION

PROJECT MANAGER: _____ DATE: 2/9/88

Analytical Technologies, Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201550
LOCATION: GBR 8
LAB SAMPLE #: 3873-3
UNITS: ug/l
DILUTION FACTOR: 100

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	20.0	ND
BROMOMETHANE	20.0	ND
DICHLORODIFLUOROMETHANE	20.0	ND
VINYL CHLORIDE	20.0	ND
CHLOROETHANE	20.0	ND
METHYLENE CHLORIDE	200.0	ND
TRICHLOROFLUOROMETHANE	200.0	ND
1,1-DICHLOROETHENE	20.0	ND
1,1-DICHLOROETHANE	20.0	ND
TRANS-1,2-DICHLOROETHENE	20.0	ND
CHLOROFORM	20.0	ND
1,2-DICHLOROETHANE	20.0	ND
1,1,1-TRICHLOROETHANE	20.0	ND
CARBON TETRACHLORIDE	20.0	ND
BROMODICHLOROMETHANE	20.0	ND
1,2-DICHLOROPROPANE	20.0	ND
TRANS-1,3-DICHLOROPROPENE	20.0	ND
TRICHLOROETHENE	20.0	ND
DIBROMOCHLOROMETHANE	20.0	ND
1,1,2-TRICHLOROETHANE	20.0	ND
CIS-1,3-DICHLOROPROPENE	20.0	ND
2-CHLOROETHYLVINYL ETHER	50.0	ND
BROMOFORM	50.0	ND
1,1,2,2-TETRACHLOROETHANE	20.0	ND
TETRACHLOROETHENE	20.0	ND
BENZENE	50.0	10,000
TOLUENE	50.0	940
CHLOROBENZENE	50.0	ND
ETHYLBENZENE	50.0	1,000
1,3-DICHLOROBENZENE	50.0	ND
1,2-DICHLOROBENZENE	50.0	ND
1,4-DICHLOROBENZENE	50.0	ND
M-XYLENE	50.0	1,700
O,P-XYLENE	50.0	2,000

% SURROGATE RECOVERY
96.2% BROMOCHLOROMETHANE
90.7% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED
HIGH LEVELS REQUIRED DILUTION.

PROJECT MANAGER: [signature]
DATE: 2/9/88

Analytical Technologies, Inc.

TRIP BLANK

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: 1/20/88
LAB RECEIPT DATE: 1/22/88
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: 8801201800
LOCATION: GBR 100
LAB SAMPLE #: 3873-4
UNITS: ug/l
DILUTION FACTOR: 1

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	0.2	ND
BROMOMETHANE	0.2	ND
DICHLORODIFLUOROMETHANE	0.2	ND
VINYL CHLORIDE	0.2	ND
CHLOROETHANE	0.2	ND
METHYLENE CHLORIDE	2.0	ND
TRICHLOROFLUOROMETHANE	2.0	ND
1,1-DICHLOROETHENE	0.2	ND
1,1-DICHLOROETHANE	0.2	ND
TRANS-1,2-DICHLOROETHENE	0.2	ND
CHLOROFORM	0.2	ND
1,2-DICHLOROETHANE	0.2	ND
1,1,1-TRICHLOROETHANE	0.2	ND
CARBON TETRACHLORIDE	0.2	ND
BROMODICHLOROMETHANE	0.2	ND
1,2-DICHLOROPROPANE	0.2	ND
TRANS-1,3-DICHLOROPROPENE	0.2	ND
TRICHLOROETHENE	0.2	ND
DIBROMOCHLOROMETHANE	0.2	ND
1,1,2-TRICHLOROETHANE	0.2	ND
CIS-1,3-DICHLOROPROPENE	0.2	ND
2-CHLOROETHYLVINYL ETHER	0.5	ND
BROMOFORM	0.5	ND
1,1,2,2-TETRACHLOROETHANE	0.2	ND
TETRACHLOROETHENE	0.2	ND
BENZENE	0.5	ND
TOLUENE	0.5	ND
CHLOROBENZENE	0.5	ND
ETHYLBENZENE	0.5	ND
1,3-DICHLOROBENZENE	0.5	ND
1,2-DICHLOROBENZENE	0.5	ND
1,4-DICHLOROBENZENE	0.5	ND
M-XYLENE	0.5	ND
O,P-XYLENE	0.5	ND

% SURROGATE RECOVERY
84.2% BROMOCHLOROMETHANE
72.2% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED

PROJECT MANAGER: [illegible]

DATE: 2/9/88

AnalyticalTechnologies,Inc.

EPA METHOD 601/602
PROJECT: M & A

SAMPLE DATE: N/A
LAB RECEIPT DATE: N/A
ANALYSIS DATE: 1/26/88
MATRIX: WATER
ANALYST: TMG

SAMPLE ID: SYSTEM BLANK
LOCATION:
LAB SAMPLE #: 3873
UNITS: ug/l
DILUTION FACTOR: 1

CONSTITUENT NAME	DETECTION LIMIT	RESULT
CHLOROMETHANE	0.2	ND
BROMOMETHANE	0.2	ND
DICHLORODIFLUOROMETHANE	0.2	ND
VINYL CHLORIDE	0.2	ND
CHLOROETHANE	0.2	ND
METHYLENE CHLORIDE	2.0	2.3
TRICHLOROFLUOROMETHANE	2.0	ND
1,1-DICHLOROETHENE	0.2	ND
1,1-DICHLOROETHANE	0.2	ND
TRANS-1,2-DICHLOROETHENE	0.2	ND
CHLOROFORM	0.2	ND
1,2-DICHLOROETHANE	0.2	ND
1,1,1-TRICHLOROETHANE	0.2	ND
CARBON TETRACHLORIDE	0.2	ND
BROMODICHLOROMETHANE	0.2	ND
1,2-DICHLOROPROPANE	0.2	ND
TRANS-1,3-DICHLOROPROPENE	0.2	ND
TRICHLOROETHENE	0.2	ND
DIBROMOCHLOROMETHANE	0.2	ND
1,1,2-TRICHLOROETHANE	0.2	ND
CIS-1,3-DICHLOROPROPENE	0.2	ND
2-CHLOROETHYLVINYL ETHER	0.5	ND
BROMOFORM	0.5	ND
1,1,2,2-TETRACHLOROETHANE	0.2	ND
TETRACHLOROETHENE	0.2	ND
BENZENE	0.5	ND
TOLUENE	0.5	ND
CHLOROBENZENE	0.5	ND
ETHYLBENZENE	0.5	ND
1,3-DICHLOROBENZENE	0.5	ND
1,2-DICHLOROBENZENE	0.5	ND
1,4-DICHLOROBENZENE	0.5	ND
M-XYLENE	0.5	ND
O,P-XYLENE	0.5	ND

% SURROGATE RECOVERY
81.6% BROMOCHLOROMETHANE
81.7% BROMOFLUOROBENZENE

COMMENTS: ND = NOT DETECTED

PROJECT MANAGER: [signature]

DATE: 2/9/88

(21)

Analytical Technologies, Inc.

RECEIVED MAR 6 1988

(CCC21)

MARCH 1, 1988

GEOSCIENCE CONSULTANTS, LTD.
500 COPPER AVE. NW
SUITE 200
ALBUQUERQUE, NM 87102

Accession: 3873

Date Received: 1/22/88

Attention: JACK KIRBY

Project: M & A

This is an amended report to the one dated February 9, 1988 as requested by Jack Kirby.

Michael G. Barry
Project Manager

Robert V. Woods
Laboratory Manager

RVW/jlf

Note: Samples will be disposed of within 30 days unless otherwise notified.

Analytical Technologies, Inc.

METALS
PROJECT: M&A

SAMPLE DATE: 01/20/88
SAMPLE ID: 8801200830 TANK (37)

LAB RECEIPT DATE: 01/22/88
MATRIX: WATER
LOCATION:
LAB SAMPLE #: 3873-1
UNITS: mg/l

ANALYST	ANALYSIS DATE	CONSTITUENT NAME	DILUTION FACTOR	DETECTION LIMIT	RESULT
RC	01/27/88	ARSENIC (As)	1	0.010	ND
RC	02/01/88	BARIUM (Ba)	1	0.060	ND
RC	01/26/88	LEAD (Pb)	1	0.002	0.002
RC	01/29/88	MERCURY (Hg)	1	0.0002	ND
JH	01/28/88	SELENIUM (Se)	1	0.010	ND
JH	02/01/88	SILVER (Ag)	1	0.010	0.015

* THE LISTED DETECTION LIMITS REFLECT ANY SAMPLE DILUTION.

NOTE: ND = NOT DETECTED
NA = NOT ANALYZED

PROJECT MANAGER: RW DATE: 03/01/88

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 2, 1988

Geologist: T. Le Page

Weather: ~75, warm/breezy

Well: GBR-17

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-17	33.65	---	---

Description of Water:
clear, no hydrocarbon odor

pH Readings:
initial: 7.02
after 5 gallons: 7.03
prior to sampling: 7.00

Conductivity:
initial: 2990 uMohs/cm
after 5 gallons: 3000 uMohs/cm
prior to sampling: 2970 uMohs/cm

Amount bailed:
~15 gallons
well recharged ~10 min.

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^{+} and An^{-}

Sample ID #: 8806021220

GROUNDWATER TECHNOLOGY, INC.

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 1, 1988

Geologist: T. Le Page

Weather:~72, warm/breezy

Well: GBR-24D

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-24D	28.13	---	---

Description of Water:
Dark gray color, strong hydrocarbon odor

pH Readings:
initial: 7.53
after 5 gallons: 7.75
prior to sampling: 8.02

Conductivity:
initial: 3280 uMohs/cm
after 5 gallons: 4190 uMohs/cm
prior to sampling: 4450 uMohs/cm

Amount bailed:
~13 gallons
well recharged ~20 min.

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^+ and An^-

Sample ID #: 8806010347

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 1, 1988

Geologist: T. Le Page

Weather: ~72, warm/breezy

Well: GBR-30

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-30	33.10	33.09	0.01

Description of Water:
clear, strong hydrocarbon odor

pH Readings:
initial: 6.95
after 5 gallons: 7.05
prior to sampling: 7.02

Conductivity:
initial: 4460 uMohs/cm
after 5 gallons: 4570 uMohs/cm
prior to sampling: 4620 uMohs/cm

Amount Bailed:
~13 gallons
well recharged ~15 min.

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^+ and An^-

Sample ID #: 8806010530

GROUNDWATER TECHNOLOGY, INC.

GIANT BLOOMFIELD REFINERY

Project No.: 232-799-5009

Date: June 2, 1988

Geologist: T. Le Page

Weather: ~75, warm/breezy

Well: GBR-31

Initial Liquid Levels:

Well #	DTW	DTP	PT
GBR-31	34.37	---	---

Description of Water:
clear, slight hydrocarbon odor, no sheen

pH Readings:
initial: 7.17
after 5 gallons: 6.96
prior to sampling: 7.01

Conductivity:
initial: 4190 uMohs/cm
after 5 gallons: 5420 uMohs/cm
prior to sampling: 5910 uMohs/cm

Amount bailed:
~15 gallons
well recharged ~15 min.

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^{+} and An^{-}

Sample ID #: 8806021015

GIANT BLOOMFIELD REFINERY

Project No. : 232-799-5009

Date: June 2, 1988

Geologist: T. Le Page

Weather: ~75, warm/breezy

Tank: 22

Description of Water:
clear, strong hydrocarbon odor

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^+ and An^-

Sample ID #: 8806020135

Tank: 24

Description of Water:
clear, strong hydrocarbon odor and rust odor

Samples Taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^+ and An^-

Sample ID #: 8806020105

Tank: 32

Description of Water:
pale yellow, strong H_2S odor

Samples taken:
4 40 ml vials
4 1 liter bottles

Analyses Performed:
601 and 602, PAH
TDS, Major Ca^+ and An^-

Sample ID #: 8806020205

GROUNDWATER
TECHNOLOGY, INC.

3620 Wyoming, NE. Suite 104. Albuquerque, NM 87111
(505) 298-5562

August 3, 1988

232-799-5009

Ned Kendrick
Montgomery and Andrews, P.A.
325 Paseo de Peralta
P.O. Box 2307
Santa Fe, New Mexico 87504-2307

RE: Analytical results, Giant Bloomfield Refinery.

Dear Mr. Kendrick:

Enclosed are complete sets of analytical results of water samples taken from the Giant Bloomfield Refinery on June 1,2 and June 23, 1988. A sheet which correlates sample I.D. and sample location has been included.

The samples taken from the airstripper on June 23 have been identified using AS INF for the influent sample and AS EFF for the effluent sample.

If you have questions regarding these analyses, please contact me at (505) 298-5562.

Sincerely,

GROUNDWATER TECHNOLOGY, INC.

Michael Wood
Territory Manager
Hydrogeologist

enclosures

cc: Kim Bullerdick, Giant Industries, Inc.
Robert McClenahan, Jr., Giant Industries, Inc.
Randy Hicks, Geoscience Consultants, Ltd.

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

06/28/88 mh

PROJECT MGR: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming, NE
Albuquerque, NM 87111
PROJECT#: 232-799-5009-12
LOCATION: Farmington, NM

SAMPLED: 06/23/88 BY: M. Wood
RECEIVED: 06/25/88 BY: K. Biava
ANALYZED: 06/27/88 BY: P. Sra
MATRIX: Water
UNITS: ug/L (ppb)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	26059 AS INF	26060 AS EFF		
Benzene	0.5		700	9.5		
Bromodichloromethane	0.5		<0.5	<0.5		
Bromoform	0.5		<0.5	<0.5		
Bromomethane	0.5		<0.5	<0.5		
Carbon tetrachloride	0.5		<0.5	<0.5		
Chlorobenzene	0.5		<0.5	<0.5		
Chloroethane	0.5		<0.5	<0.5		
2-Chloroethylvinyl ether	1.0		<1.0	<1.0		
Chloroform	0.5		<0.5	<0.5		
Chloromethane	0.5		<0.5	<0.5		
Dibromochloromethane	0.5		<0.5	<0.5		
1,2-Dichlorobenzene	0.5		<0.5	<0.5		
1,3-Dichlorobenzene	0.5		<0.5	<0.5		
1,4-Dichlorobenzene	0.2		<0.5	<0.5		
Dichlorodifluoromethane	0.5		<0.5	<0.5		
1,1-Dichloroethane	0.5		4.5	<0.5		
1,2-Dichloroethane	0.5		42	0.87		
1,1-Dichloroethene	0.2		<0.2	<0.2		
trans-1,2-Dichloroethene	0.5		14	<0.5		
1,2-Dichloropropane	0.5		<0.5	<0.5		
cis-1,3-Dichloropropene	0.5		<0.5	<0.5		
trans-1,3-Dichloropropene	0.5		<0.5	<0.5		
Ethylbenzene	0.5		79	1.3		
Methylene chloride	0.5		4.7	3.0		
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5		
Tetrachloroethene	0.5		<0.5	<0.5		
Toluene	0.5		490	7.8		
1,1,1-Trichloroethane	0.5		1.6	<0.5		
1,1,2-Trichloroethane	0.5		<0.5	<0.5		
Trichloroethene	0.5		1.7	<0.5		
Trichlorofluoromethane	0.5		<0.5	<0.5		
Vinyl Chloride	1.0		<1.0	<1.0		
Xylenes	0.5		800	28		

MDL = Method Detection Limit.
METHODS: EPA 601/602.

SAFY KHALIFA, Ph.D., Director

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

07/11/88 JP

CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming, NE
Albuquerque, NM 87111
PROJECT#: 232-799-5009-13
LOCATION: Farmington, NM
SAMPLED: 06/23/88 BY: M. Wood
RECEIVED: 06/25/88 BY: K. Biava
ANALYZED: 07/07/88 BY: L. Hinson
MATRIX: Water
UNITS: ug/L (ppb)

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	26061 AS INF	26062 AS EFF		
Acenaphthene	10		<10	<10		
Acenaphthylene	10		<10	<10		
Anthracene	10		<10	<10		
Benzo (a) anthracene	10		<10	<10		
Benzo (a) pyrene	10		<10	<10		
Benzo (b) fluoranthene	10		<10	<10		
Benzo (ghi) perylene	10		<10	<10		
Benzo (k) fluoranthene	10		<10	<10		
Chrysene	10		<10	<10		
Dibenzo (a,h) anthracene	10		<10	<10		
Fluoranthene	10		<10	<10		
Fluorene	10		<10	<10		
Indeno (1,2,3-cd) pyrene	10		<10	<10		
Naphthalene	10		51	<10		
Phenanthrene	10		<10	<10		
Pyrene	10		<10	<10		

MDL=Method Detection Limit.
METHOD: EPA Method 610.

Safy Khalifa 7/8/88

SAFY KHALIFA, Ph.D., Director

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

06/30/88 mh

CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming, NE
Albuquerque, NM 87111
PROJECT#: 232-799-5009-14
LOCATION: Farmington, NM

SAMPLED: 06/23/88 BY: M. Wood
RECEIVED: 06/25/88 BY: K. Biava
ANALYZED: 06/29/88 BY: C. Miller
MATRIX: Water
UNITS: mg/L

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	26063A AS INF	26064A AS EFF		
Calcium	0.5		570	480		
Sodium	0.5		770	640		
Magnesium	0.5		49	50		
Potassium	0.5		2.9	2.4		

MDL = Method Detection Limit; compound below this level would not be detected.
METHOD: EPA 3020/6010.

Emma P. Popek

SAFY KHALIFA, Ph.D., Director

GTEL
Environmental
Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

07/15/88 rw
CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming, NE
Albuquerque, NM 87111
PROJECT#: 232-799-5009-15
LOCATION: Farmington, NM

SAMPLED: 06/23/88 BY: M. Wood
RECEIVED: 06/25/88 BY: K. Biava
ANALYZED: 06/30/88 BY: R. Heines
MATRIX: Water R. Bly

TEST RESULTS

PARAMETER	UNITS	MDL	LAB # / I.D.#	26063B AS INF	26064B AS EFF		
Chloride	mg/L	1		765	790		
Bicarbonate	mg CaC03/L	12		330	310		
Sulfate	mg/L	1		1335	1380		
Carbonate	mg CaC03/L	12		<12	<12		

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD:SM429

Safy Khalifa 8/8/88

SAFY KHALIFA, Ph.D., Director

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming, NE
Albuquerque, NM 87111
PROJECT#: 232-799-5009-16
LOCATION: Farmington, NM

SAMPLED: 06/23/88 BY: M. Wood
RECEIVED: 06/25/88 BY: K. Biava
ANALYZED: 07/05/88 BY: R. Heines
MATRIX: Water

TEST RESULTS

PARAMETER	UNITS	MDL	LAB # I.D.#	26065 AS INF	26066 AS EFF		
Total Dissolved Solids	mg/L	10		3,803	3,903		

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD:SM209B

SAFY KHALIFA, Ph.D., Director

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. 232-799-5009 -16

PROJECT NAME Montgomery and Andrews

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s) 601, 602	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TPH METALS	OTHER PAH	Cation + Anions	TDS	SPECIAL DETECTION LIMIT	REMARKS
AS-INF	8	✓				6/23	4:30		✓	✓	26065	✓	✓	✓		Cations + Anions: Calcium, Sodium, Magnesium, Chloride, Potassium, Bi Carb. Sulfate, Carbonate, PAH by EPA 610 ★ 24 hr Turnaround on AS-Eff 601, 602 only
AS-Eff	8	✓				6/23	4:35		✓	✓	26066	✓	✓	✓		

4° 2

RMB 7/18/88

Relinquished by:	Date	Time	Received by:
M. Wood	6/24		Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/25/88	10:20	Kathy Blair

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Michael Wood

PROJECT MANAGER: Michael Wood

ADDRESS: 3020 Wyoming, NE Suite 107 Albuquerque NM 87111

PHONE NO (505) 298-5562

GT Environmental Laboratories
A Division of Groundwater Technology, Inc
Western Region
4080-C Pike Ln., Concord, CA 94520
(415) 685-7852
In CA: (800) 544-3422
Outside CA: (800) 423-7143

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. 232-799-5009 -13

PROJECT NAME Montgomery and Andrews

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s) 601, 602,	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH	METALS	OTHER PAH	CATION + ANIONS	TDS	SPECIAL DETECTION LIMIT	REMARKS
AS-INF	8	✓				6/23	1:30	✓	✓	26061			✓	✓	✓		Cations+Anions: Calcium, Sodium, Magnesium, Chloride, Potassium, Bi Carb. Sulfate, Carbonate, PAH by EPA 610 ★ 24 hr Turnaround on AS-Eff 601, 602 only
AS-Eff	8	✓				6/23	1:35	✓	✓	26062			✓	✓	✓		

4° C

L Hunter 7/11/96

Relinquished by:	Date	Time	Received by:
M. Wood	6/24		Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/25/96	10:20	Kathy Burns

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Michael Wood

PROJECT MANAGER: Michael Wood

ADDRESS: 3620 Wyoming, NE Suite 107 Albuquerque NM 87111

PHONE NO (505) 298-5562

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Outside CA: (800) 423-7143

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. 232-799-5009 - 12

PROJECT NAME Montgomery and Andrews

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s) 601, 602	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH METALS	OTHER PAH-12	Cation + Anions -14	TDS -15	SPECIAL DETECTION LIMIT	REMARKS
AS-INF	8	✓				6/23	4:30		✓	✓	26059	✓	✓	✓		Cationic + Anions: Calcium, Sodium, Magnesium, Chloride, Potassium, Bicarb. Sulfate, Carbonate, PAH by EPA 610
AS-Eff	8	✓				6/23	4:35		✓	✓	26060	✓	✓	✓		

★ 24 hr Turnaround on AS-Eff 601, 602 only

4° C

Relinquished by:	Date	Time	Received by:
M. Wood	6/24		Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/25/88	10:20	Kathy Biaca

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Michael Wood

PROJECT MANAGER: Michael Wood

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CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. 232-799-5009-14

PROJECT NAME Montgomery and Andrews

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s) 601, 602	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH METALS	OTHER PAH Cation* Anions	TDS	SPECIAL DETECTION LIMIT	REMARKS
AS-INF	8	✓				6/23	4:30		✓	✓	260634 ✓	✓	✓		Cations+Anions: Calcium, Sodium, Magnesium, Chloride, Potassium, Bicarb. Sulfate, Carbonate, PAH by EPA 610 * 24 hr Turnaround on AS-Eff 601, 602 only
AS-Eff	8	✓				6/23	4:35		✓	✓	260641A ✓	✓	✓		

4 of N

Relinquished by:	Date	Time	Received by:
Michael Wood	6/24		Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/25/93	10:20	Kathy Biava

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Michael Wood

PROJECT MANAGER: Michael Wood

ADDRESS: 3630 Wyoming, NE Suite 107 Albuquerque NM 87111

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CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

PROJECT NO. 232-799-5009 - 15

PROJECT NAME Montgomery and Andrews

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s) 601, 602,	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH / METALS	OTHER PAH	CATION + ANIONS	TDS	SPECIAL DETECTION LIMIT	REMARKS
AS-INF	8	✓				6/23	4:30		✓	✓	26063B		✓	✓		Cation + Anions:
AS-Eff	8	✓				6/23	4:35		✓	✓	26064B		✓	✓		Calcium, Sodium
																Magnesium, Chloride
																Potassium, Bi Carb.
																Sulfate, Carbonate,
																PAH by EPA 610
															★	24 hr Turnaround
																on AS-Eff
																601, 602 only

4°

RUSH

7/5/88 7/15/88

Relinquished by:	Date	Time	Received by:
M. Wood	6/24		Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/25/88	10:20	Kathy Biria

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Michael Wood

PROJECT MANAGER: Michael Wood

ADDRESS: 3020 Wyoming, NE Suite 107 Albuquerque NM 87111

PHONE NO (505) 298-5562

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Outside CA: (800) 423-7143

WATER SAMPLE I.D. CORRELATION SHEET
GIANT BLOOMFIELD REFINERY
DATE: 01-Jun-88
SAMPLER: T. Le Page

Sample I.D.	Well #	Analysis
8806010347	GBR 24D	601,602 Cations, anions TDS, PAH
8806010530	GBR 30	"
8806021220	GBR 17	"
8806021015	GBR 31	"
8806020105	Tank 24	"
8806020135	Tank 22	"
8806020205	Tank 32	"

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(800) 423-7143 *from outside California*

PROJECT MGR: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming N.E. Suite 104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-10
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/15/88 BY: P. Sra
MATRIX: Water
UNITS: ug/L (ppb)

TEST RESULTS

COMPOUND	MDL	LAB #	24489	24490	24491	24492
		I.D.#	010530	010347	TRIPBLANK	021015
Benzene	0.5		<0.5	63	<0.5	<0.5
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	1.3	<0.5	<0.5
1,4-Dichlorobenzene	0.2		<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		0.98	<0.5	<0.5	4.6
1,2-Dichloroethane	0.5		<0.5	55	<0.5	<0.5
1,1-Dichloroethene	0.2		<0.2	<0.2	<0.2	<0.2
trans-1,2-Dichloroethene	0.5		1.0	<0.5	<0.5	53
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	73	<0.5	<0.5
Methylene chloride	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		0.61	0.69	<0.5	5.0
1,1,1-Trichloroethane	0.5		<0.5	<0.5	<0.5	1.8
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		0.52	<0.5	<0.5	7.6
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0
Xylenes	0.5		20	40	<0.5	<0.5
Toluene	0.5		<0.5	11	<0.5	<0.5

MDL = Method Detection Limit.
METHODS: EPA 8010/8020.

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(800) 423-7143 *from outside California*

RECEIVED

PROJECT MGR: Michael Wood
PROJECT#: 232-799-5009-10
LOCATION: Farmington, NM
MATRIX: Water
UNITS: ug/L (ppb)

TEST RESULTS

COMPOUND	MDL	LAB # I.D.#	24493 021220	24494 020205	24495 TripBlank	24496 020105
Benzene	0.5		<0.5	360	<0.5	1100
Bromodichloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Bromoform	0.5		<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5		<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	0.5		<0.5	<0.5	<0.5	<0.5
Chlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
Chloroethane	0.5		<0.5	<0.5	<0.5	<0.5
2-Chloroethylvinyl ether	1.0		<1.0	<1.0	<1.0	<1.0
Chloroform	0.5		<0.5	<0.5	<0.5	<0.5
Chloromethane	0.5		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5		<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.2		<0.2	<0.2	<0.2	<0.2
Dichlorodifluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5		<0.5	12	<0.5	8.0
1,2-Dichloroethane	0.5		<0.5	10	<0.5	130
1,1-Dichloroethene	0.2		<0.2	0.51	<0.2	0.61
trans-1,2-Dichloroethene	0.5		<0.5	18	<0.5	13
1,2-Dichloropropane	0.5		<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropene	0.5		<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5		<0.5	82	<0.5	2.5
Methylene chloride	0.5		<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Tetrachloroethene	0.5		<0.5	1.5	<0.5	1.8
1,1,1-Trichloroethane	0.5		3.1	2.3	<0.5	5.5
1,1,2-Trichloroethane	0.5		<0.5	<0.5	<0.5	<0.5
Trichloroethene	0.5		<0.5	4.9	<0.5	4.1
Trichlorofluoromethane	0.5		<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	1.0		<1.0	<1.0	<1.0	<1.0
Xylenes	0.5		<0.5	300	<0.5	1300
Toluene	0.5		<0.5	15	<0.5	940

MDL = Method Detection Limit.
METHODS: EPA 8010/8020.

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(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

PROJECT MGR: Michael Wood
PROJECT#: 232-799-5009-10
LOCATION: Farmington, NM

TEST RESULTS

MATRIX: Water
UNITS: ug/L (ppb)

COMPOUND	MDL	LAB # / I.D.#	24497 / 020135
Benzene	0.5		290
Bromodichloromethane	0.5		<0.5
Bromoform	0.5		<0.5
Bromomethane	0.5		<0.5
Carbon tetrachloride	0.5		<0.5
Chlorobenzene	0.5		<0.5
Chloroethane	0.5		<0.5
2-Chloroethylvinyl ether	1.0		<1.0
Chloroform	0.5		<0.5
Chloromethane	0.5		<0.5
Dibromochloromethane	0.5		<0.5
1,2-Dichlorobenzene	0.5		<0.5
1,3-Dichlorobenzene	0.5		<0.5
1,4-Dichlorobenzene	0.2		<0.2
Dichlorodifluoromethane	0.5		<0.5
1,1-Dichloroethane	0.5		10
1,2-Dichloroethane	0.5		7.4
1,1-Dichloroethene	0.2		0.32
trans-1,2-Dichloroethene	0.5		17
1,2-Dichloropropane	0.5		<0.5
cis-1,3-Dichloropropene	0.5		<0.5
trans-1,3-Dichloropropene	0.5		<0.5
Ethylbenzene	0.5		21
Methylene chloride	0.5		<0.5
1,1,2,2-Tetrachloroethane	0.5		<0.5
Tetrachloroethene	0.5		0.50
1,1,1-Trichloroethane	0.5		1.7
1,1,2-Trichloroethane	0.5		<0.5
Trichloroethene	0.5		3.0
Trichlorofluoromethane	0.5		<0.5
Vinyl Chloride	1.0		<1.0
Xylenes	0.5		480
Toluene	0.5		7.4

MDL = Method Detection Limit.
METHODS: EPA 8010/8020.

SAFY KHALIFA, Ph.D., Director

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(800) 423-7143 *from outside California*

07/14/88 MH

CLIENT: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming Northeast #104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-17
LOCATION: Farmington, NM
SAMPLED: 06/1,2/88 BY: T. LePage
RECEIVED: 06/27/88 BY: K. Biava
ANALYZED: 7/6-8,11/88 BY: L. Hinson
MATRIX: Water
UNITS: ug/L

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	24480C 010530	24481C 010347	24482C 020135	24483C 021015
Acenaphthene	10		<10	<10	<10	<10
Acenaphthylene	10		<10	<10	<10	<10
Anthracene	10		<10	<10	<10	<10
Benzo (a) anthracene	10		<10	<10	<10	<10
Benzo (a) pyrene	10		<10	<10	<10	<10
Benzo (b) fluoranthene	10		<10	<10	<10	<10
Benzo (ghi) perylene	10		<10	<10	<10	<10
Benzo (k) fluoranthene	10		<10	<10	<10	<10
Chrysene	10		<10	<10	<10	<10
Dibenzo (a,h) anthracene	10		<10	<10	<10	<10
Fluoranthene	10		<10	<10	<10	<10
Fluorene	10		<10	<10	<10	<10
Indeno (1,2,3-cd) pyrene	10		<10	<10	<10	<10
Naphthalene	10		<10	<10	<10	<10
Phenanthrene	10		<10	<10	<10	<10
Pyrene	10		<10	<10	<10	<10

MDL=Method Detection Limit.
METHOD: EPA Method 610.

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(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

CLIENT: Michael Wood
PROJECT#: 232-799-5009-17
LOCATION: Farmington, NM

TEST RESULTS

MATRIX: Water
UNITS: ug/L

COMPOUNDS	MDL	LAB # I.D.#	24484C 021220	24485C 020205	24486C 020105	24487C 020135
Acenaphthene	10		<10	<10	<10	<10
Acenaphthylene	10		<10	<10	<10	<10
Anthracene	10		<10	<10	<10	<10
Benzo (a) anthracene	10		<10	<10	<10	<10
Benzo (a) pyrene	10		<10	<10	<10	<10
Benzo (b) fluoranthene	10		<10	<10	<10	<10
Benzo (ghi) perylene	10		<10	<10	<10	<10
Benzo (k) fluoranthene	10		<10	<10	<10	<10
Chrysene	10		<10	<10	<10	<10
Dibenzo (a,h) anthracene	10		<10	<10	<10	<10
Fluoranthene	10		<10	<10	<10	<10
Fluorene	10		<10	<10	<10	<10
Indeno (1,2,3-cd) pyrene	10		<10	<10	<10	<10
Naphthalene	10		<10	42	39	10
Phenanthrene	10		<10	<10	<10	<10
Pyrene	10		<10	<10	<10	<10

MDL=Method Detection Limit.
METHOD: EPA Method 610.

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Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

CLIENT: Michael Wood
PROJECT#: 232-799-5009-17
LOCATION: Farmington, NM

MATRIX: Water
UNITS: ug/L

TEST RESULTS

COMPOUNDS	MDL	LAB # I.D.#	24488C 020205
Acenaphthene	10		<10
Acenaphthylene	10		<10
Anthracene	10		<10
Benzo (a) anthracene	10		<10
Benzo (a) pyrene	10		<10
Benzo (b) fluoranthene	10		<10
Benzo (ghi) perylene	10		<10
Benzo (k) fluoranthene	10		<10
Chrysene	10		<10
Dibenzo (a,h) anthracene	10		<10
Fluoranthene	10		<10
Fluorene	10		<10
Indeno (1,2,3-cd) pyrene	10		<10
Naphthalene	10		96
Phenanthrene	10		<10
Pyrene	10		<10

MDL=Method Detection Limit.
METHOD: EPA Method 610.

SAFY KHALIFA, Ph.D., Director

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(800) 423-7143 *from outside California*

06/16/88 rw
MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming Northeast, Suite 104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/15/88 BY: C. Miller
MATRIX: Water

MAJOR CATIONS
TEST RESULTS

PARAMETER	UNITS	MDL	LAB # / I.D.#	24480A 010530	24481A 010347	24482A 020135	24483A 021015
Sodium	mg/L	0.1		578	491	686	769
Potassium	mg/L	1.0		3.3	5.3	3.4	3.5
Calcium	mg/L	0.1		586	500	558	598
Magnesium	mg/L	0.1		50	75	52	51

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520

(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

MANAGER: Michael Wood
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

MAJOR CATIONS
TEST RESULTS

MATRIX: Water

PARAMETER	UNITS	MDL	LAB # / I.D.#	24484A 021220	24485A 020205	24486A 020105	24487A 020135
Sodium	mg/L	0.1		281	620	700	752
Potassium	mg/L	1.0		1.1	2.9	3.5	3.8
Calcium	mg/L	0.1		411	474	521	579
Magnesium	mg/L	0.1		44	48	50	54

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

GTEL
Environmental
Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520

(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

MANAGER: Michael Wood
PROJECT#: 232-799-5009-11
LOCATION: Farmington, NM

MAJOR CATIONS
TEST RESULTS

MATRIX: Water

PARAMETER	UNITS	MDL	LAB # / I.D.#	24488A / 020205
Sodium	mg/L	0.1		570
Potassium	mg/L	1.0		3.1
Calcium	mg/L	0.1		456
Magnesium	mg/L	0.1		47

MDL = Method Detection Limit; compound below this level would not be detected.

METHOD: EPA 3005/6010

SAFY KHALIFA, Ph.D., Director

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

06/17/88 rw
MANAGER: Michael Wood
Groundwater Technology, Inc.
3620 Wyoming N.E. Suite 104
Albuquerque, NM 87111
PROJECT#: 232-799-5009-9
LOCATION: Farmington, NM

SAMPLED: 06/01/88 BY: T. LePage
RECEIVED: 06/03/88 BY: J. Floro
ANALYZED: 06/07/88 BY: R. Heines
MATRIX: Water
UNITS: mg/L

TEST RESULTS

PARAMETER	MDL	LAB # I.D.#	24480 010530	24481 010347	24482 020135	24483 021015	24484 021220
Total Dissolved Solids	10		3996	3487	4094	4374	2382
Bicarbonate	20		124	130	297	211	140
Carbonate	20		<20	<20	<20	<20	<20
Chloride	1		370	630	910	850	190
Sulfate	1		2270	1640	1570	1920	1350

MDL = Method Detection Limit; compound below this level would not be detected.
METHOD: TDS by Standard Method 209B
Bicarbonate by Standard Method 403
Carbonate by Standard Method 403
Chloride by Standard Method 429
Sulfate by Standard Method 429

GTEL Environmental Laboratories
A division of Groundwater Technology, Inc.

Western Region
4080-C Pike Lane
Concord, CA 94520
(415) 685-7852
(800) 544-3422 *from inside California*
(800) 423-7143 *from outside California*

RECEIVED 12/4/92

MANAGER: Michael Wood
PROJECT#: 232-799-5009-9
LOCATION: Farmington, NM

TEST RESULTS

MATRIX: Water
UNITS: mg/L

PARAMETER	MDL	LAB # I.D.#	24485 020205	24486 020105	24487 020135	24488 020205
Total Dissolved Solids	10		4274	4031	4218	4256
Bicarbonate	20		200	311	284	80
Carbonate	20		<20	<20	<20	<20
Chloride	1		940	690	915	1050
Sulfate	1		1510	1370	1580	1630

MDL = Method Detection Limit; compound below this level would not be detected.
METHOD: TDS by Standard Method 209B
Bicarbonate by Standard Method 403
Carbonate by Standard Method 403
Chloride by Standard Method 429
Sulfate by Standard Method 429

SAFY KHALIFA, Ph.D., Director

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

P.1

PROJECT NO. 232-799-5009

PROJECT NAME Montgomery & Andrews

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s)	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH / METALS	OTHER	SPECIAL DETECTION LIMIT	REMARKS
8806010530	4	✓				6/1/88			✓	40ml	601 & 602			
8806010530	4	✓				6/1/88			✓	1 Liter	TDS + Major Cations & Ions			24480
8806010347	4	✓				6/1/88			✓	40ml	601 + 602			
8806010347	4	✓				6/1/88			✓	1 Liter	TDS + Major Cations & Ions			24481
8806020135	1	✓				6/2/88			✓	1 Liter	TDS + Major Cations & Ions			(8806020135) 24482
Rinsate	2	✓				6/1/88			✓	40ml				→ Throw away per Mike Wood 6/3/88
Trip Blank	1	✓				6/1/88			✓	40ml	601 + 602			

4

SPECIFY ANALYSIS REQUESTED

Relinquished by:	Date	Time	Received by:
Tina Lafage	6/2/88	3:30	Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:
	6/3/88	10:00	

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Tina Lafage

PROJECT MANAGER: Michael Wood

ADDRESS: GTI Albuquerque, NM PHONE NO. (505) 298-5582

GT Environmental Laboratories
A Division of Groundwater Technology, Inc.
Western Region
4080-C Pike Ln., Concord, CA 94520
(415) 685-7852
In CA: (800) 544-3422
Outside CA: (800) 423-7143

Over →

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

P.2

PROJECT NO. 232-799-5009

PROJECT NAME Montgomery + Andrews

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s)	GASOLINE ☐ HYDROCARBONS BY ☐ BTEX ☐ TVH	METALS	OTHER			SPECIAL DETECTION LIMIT	REMARKS
[illegible]	1	✓				6/2/88			✓	40ml	6011	6012					
[illegible]6/021015	4	✓				6/2/88			✓	1 Liter	TDS +	Major Cations	+ Anions				24483
[illegible]021220	1	✓				6/2/88			✓	40ml	6011	012					
[illegible]021220	4	✓				6/2/88			✓	1 Liter	TDS +	Major Cations	+ Anions				24484
[illegible]020205	4	✓				6/2/88			✓	40ml	6011	6012					
[illegible]020205	2	✓				6/2/88			✓	1 Liter	TDS	+ Major Cations	+ Anions				24485
Trip Blank	1	✓				6/2/88			✓	40ml	[illegible]						
[illegible]	2	✓				6/2/88			✓	40ml	[illegible]						

Relinquished by:	Date	Time	Received by:
Tina Ortega	6/2/88	5:36	Fed Ex.
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: [illegible]

SAMPLER: SIGNATURE [illegible]

PROJECT MANAGER: [illegible]

ADDRESS: [illegible] PHONE NO. [illegible]

GT Environmental Laboratories
A division of Groundwater Technology, Inc.
Western Region
4080-C Pike Ln., Concord, CA 94520
(415) 685-7852
In CA: (800) 544-3422
Outside CA: (800) 423-7143

OVER →

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST

P.3

OJECT NO. 232-777-5009

PROJECT NAME Maintenance + Analysis

SPECIFY ANALYSIS REQUESTED

SAMPLE I.D. NUMBER	# OF CONTAINERS	WATER	SOIL	SED.	COMP	DATE	TIME	ACIDIFIED	ICED	EPA METHOD (specify #s)	GASOLINE HYDROCARBONS BY ☐ BTEX ☐ TVH	METALS	OTHER			SPECIAL DETECTION LIMIT	REMARKS
[illegible]-02-0105	1	✓				6/2/88			✓	40ml	GCL	GCL					
[illegible]-02-0105	1	✓				6/2/88			✓	1 Liter	TDS +	Major Cations + Anions					24486
[illegible]-02-0135	1	✓				6/2/88			✓	40ml	GCL +	GCL					
[illegible]-02-0135	3	✓				6/2/88			✓	1Liter	TDS +	Major Cations + Anions					24487
[illegible]-02-0205	2	✓				6/2/88			✓	1Liter	TDS +	Major Cations + Anions					
														✓24488			

Relinquished by:	Date	Time	Received by:
Tim Colyer	6/2/88	3:30	Fed Ex
Relinquished by:	Date	Time	Received by:
Relinquished by:	Date	Time	Received by laboratory:

SPECIAL REPORTING REQUIREMENTS ☐ (see attached)

JOB SITE LOCATION: Farmington, NM

SAMPLER: SIGNATURE Tim Colyer

PROJECT MANAGER: Michael Hood

ADDRESS: 611 Aztec PHONE NO. (505) 325-1556

GT Environmental Laboratories
A division of Groundwater Technology, Inc
Western Region
4080-C Pike Ln., Concord, CA 94520
(415) 685-7852
In CA: (800) 544-3422
Outside CA: (800) 423-7143

ATTACHMENT #6

ALL WELLS WITHIN A 1 MILE RADIUS OF THE
GIANT BLOOMFIELD REFINERY
(FEBRUARY, 1988)

TABLE 2-1

ALL WELLS WITHIN A 1 MILE RADIUS OF THE
GIANT BLOOMFIELD REFINERY
(FEBRUARY 1988)

WELL LOCATION	DEPTH (ft)	DATA SOURCE
29.12.14.11	180	State Engineers Office
29.12.15.143	155	State Engineers Office
29.12.20.333	28	State Engineers Office
29.12.21.4222A	55	U.S. Geological Survey
29.12.21.4222B	46.5	U.S. Geological Survey
29.12.21.4244A	42.5	U.S. Geological Survey
29.12.21.4422	43.5	U.S. Geological Survey
29.12.21.4444	57	U.S. Geological Survey
29.12.22.1321	61.5	U.S. Geological Survey
29.12.22.1331	52.5	U.S. Geological Survey
29.12.26.21	47	State Engineers Office
29.12.26.211	100	State Engineers Office
29.12.26.24	38	State Engineers Office
29.12.26.34	47	State Engineers Office
29.12.26.42	70	State Engineers Office
29.12.26.42	50	State Engineers Office
29.12.26.422	45	State Engineers Office
29.12.26.422	45	State Engineers Office
29.12.27.13	63	State Engineers Office
29.12.27.131	50	State Engineers Office
29.12.27.133	55	State Engineers Office
29.12.27.133	51	State Engineers Office
29.12.27.134	35	State Engineers Office
29.12.27.234	36	State Engineers Office
29.12.27.234	65	State Engineers Office
29.12.27.442	NA	State Engineers Office
29.12.27.41	40	State Engineers Office
29.12.27.31	45	State Engineers Office
29.12.27.31	35	State Engineers Office
29.12.27.31	87	State Engineers Office
29.12.27.31	25	State Engineers Office
29.12.27.311	25	State Engineers Office
29.12.27.311	32	State Engineers Office
29.12.27.313	32	State Engineers Office
29.12.27.414	24	State Engineers Office
29.12.28.224	NA	State Engineers Office
29.12.28.420	39	State Engineers Office
29.12.28.420	40	State Engineers Office
29.12.28.421	NA	N.M.E.I.D.
29.12.29.114	20	State Engineers Office
29.12.29.114	21	State Engineers Office
29.12.29.114	19	State Engineers Office

TABLE 2-1
CONTINUED

WELL LOCATION	DEPTH (ft)	DATA SOURCE
29.12.29.124	20	State Engineers Office
29.12.29.132	16	State Engineers Office
29.12.29.133	18	State Engineers Office
29.12.33.2411	850	N.M. Bureau of Mines
29.12.33.2	51	State Engineers Office
29.12.34.11	15	State Engineers Office
29.12.34.113	15	State Engineers Office
29.12.34.421	43	N.M. Bureau of Mines
29.12.34.4341	100	N.M. Bureau of Mines
29.12.35.342	20	N.M. Bureau of Mines

ATTACHMENT #7

REVISED REFINERY MAP

GIANT BLOOMFIELD REFINERY
WELL HEAD ELEVATIONS AND COORDINATES
(Data from Brewer Associates)

Well I.D.	Well Head Elev.	Concrete Elev.	Ground Elev.	North Coord.	East Coord.
GBR-05	5395.07	5393.18	5392.82	10248.00	11696.18
GBR-06	5395.70	5392.79	5392.31	10235.41	11679.98
GBR-07	5395.85	5393.06	5392.49	10241.55	11687.80
GBR-08	5390.50	5388.04	5387.53	10150.28	11486.73
GBR-09	5389.92	5388.14	5387.66	10155.35	11467.59
GBR-10	5390.57	5388.22	5387.71	10157.79	11458.56
GBR-11	5389.43	5388.22	5387.69	10160.42	11447.98
GBR-13	5393.04	5390.73	5390.6	10355.10	11465.23
GRW-13	5396.90	5393.93	5393.44	10977.84	11382.00
GBR-15	5397.99	5395.18	5394.99	10944.47	11411.38
GBR-17	5402.69	5401.73	5401.24	11240.19	11141.69
GBR-18	5421.68	5420.38	5420.28	12021.64	11528.06
GBR-19	5393.83	5392.24	5391.55	10438.60	11321.53
GBR-20	5393.47	5392.07	5391.65	10254.66	11601.00
GBR-21D	5400.19	5297.90	5397.68	10945.78	11492.75
GBR-21S	5400.65	5297.90	5397.68	10945.78	11492.75
GBR-22	5395.91	5394.35	5393.90	10751.42	11458.80
GBR-23	5403.72	5401.22	5400.84	11014.34	11563.06
GBR-24D	5396.77	5394.00	5393.75	11083.96	11447.00
GBR-24S	5396.08	5394.00	5393.75	11083.96	11447.00
GBR-25	5396.72	5395.39	5394.97	10853.81	11476.29
GBR-26	5395.59	5394.55	5394.42	10949.97	11421.89
GRW-11	5397.85	5397.48	5397.13	10937.41	11483.66
GRW-12	5397.24	5395.75	5395.25	10868.86	11419.18
GRW-03	5388.77	5388.31	5387.75	10134.61	11550.03
GBR-30	5396.58	5394.76	5394.26	11014.84	11382.06
GBR-31	5394.86	5391.90	5391.54	10794.15	11350.85
GBR-32	5416.77	5413.23	5412.72	12061.95	11143.06
GBR-33	5396.28	5393.84	5393.35	10689.08	11382.64
GBR-34	5394.00	5393.84	5393.63	10694.24	11445.12
GBR-35	5393.66	5393.64	5393.38	10644.16	11447.15
GRW-10	5395.02	5392.89	5392.31	10588.79	11377.90
GRW-05	5390.56	5388.17	5387.81	10167.89	11419.53
GRW-01	5394.30	5391.91	5391.59	10114.02	11688.26
GBR-39	5397.55	5394.92	5394.57	10940.69	11404.59
GBR-40	5400.76	5401.16	5400.60	10584.07	11713.64
GBR-41	5396.35	5396.62	5396.15	10455.92	11694.52
GRW-02	5391.28	5390.43	5389.90	10099.54	11598.80
GRW-04	5390.02	5388.03	5387.46	10136.32	11472.88
GRW-06	5390.81	5389.03	5388.43	10225.60	11402.59

ATTACHMENT #8

CLIMATOLOGICAL DATA

ISSN 0364-5622

CLIMATOLOGICAL DATA

NEW MEXICO

JULY 1986

VOLUME 90 NUMBER 7

"I CERTIFY THAT THIS IS AN OFFICIAL PUBLICATION OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION AND IS COMPILED FROM INFORMATION RECEIVED AT THE NATIONAL CLIMATIC DATA CENTER, ASHEVILLE NORTH CAROLINA" 28801

Kenneth D Hadeen

DIRECTOR
NATIONAL CLIMATIC DATA CENTER

noaa

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

NATIONAL ENVIRONMENTAL SATELLITE, DATA AND INFORMATION SERVICE

NATIONAL CLIMATIC DATA CENTER ASHEVILLE NORTH CAROLINA

MONTHLY SUMMARIZED STATION AND DIVISIONAL DATA

NEW MEXICO
JUNE 1986

STATION	TEMPERATURE (°F)										NO. OF DAYS				PRECIPITATION (IN)				SNOW, SLEET			NO. OF DAYS		
	AVERAGE MAXIMUM	AVERAGE MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	HIGHEST	DATE	LOWEST	DATE	HEATING DEGREE DAYS	COOLING DEGREE DAYS	MAX 90 OR ABOVE	MIN 32 OR BELOW	MIN 32 OR BELOW	MIN 0 OR BELOW	TOTAL	DEPARTURE FROM NORMAL	GREATEST DAY	DATE	TOTAL	MAX. DEPTH ON GROUND	DATE	.10 OR MORE	.50 OR MORE	1.00 OR MORE
NEW MEXICO																								
NORTHWESTERN PLATEAU 01																								
AZTEC RUINS NAT MON	87.0	50.3	68.7	-.6	97	14	42	10	28	145	16	0	0	0	1.08	.79	.55	25	.0	0		3	1	0
BLOOMFIELD 3 SE	86.6	54.7	70.7	-.3	95	28+	46	2	15	192	14	0	0	0	.50	.22	.17	1	.0	0		3	0	0
CHACO CANYON NAT MON	83.8	51.4	67.6	1.3	96	22	40	10	37	122	7	0	0	0	.97	.58	.42	1	.0	0		3	0	0
DULCE	80.4	39.3	59.9		87	28+	32	16+	164	17	0	0	5	0	2.54	1.87	1.00	24	.0	0		6	1	1
EL MORRO NAT MON	80.8	44.9	62.9	-.1	90	16	33	10	85	26	1	0	0	0	1.60	1.13	.90	30	.0	0		3	1	0
FARMINGTON AG SCI CNTR	84.3	54.8	69.6		94	29	42	10	28	171	11	0	0	0	.74		.21	25	.0	0		4	0	0
FENCE LAKE	82.4	44.9	63.7		94	22	34	2+	73	38	2	0	0	0	1.31		.41	25	.0	0		4	0	0
FRUITLAND 2 E	86.8	52.9	69.9	.4	97	28	42	12	9	161	13	0	0	0	.88	.66	.40	25	.0	0		2	0	0
GALLUP FAA AP	82.3	49.5	65.9		92	28+	38	10+	51	85	3	0	0	0	1.06		.40	25	.0	0		4	0	0
LYBROOK	M	M	M																M	M				
MC GAFFEY 4 SE	74.7	39.8	57.3	-1.1	84	28+	28	10	228	0	0	0	2	0	2.67	2.13	.52	23	.0	0		7	1	0
NAVAJO DAM	85.3	54.6	70.0		94	29+	45	10+	25	181	13	0	0	0	1.48		.45	26	.0	0		6	0	0
OTIS	79.9	52.5	66.2		88	23+	42	10	54	97	0	0	0	0	1.34		.39	23	.0	0		3	0	0
SHIPROCK	90.8	52.7	71.8		98	17	42	22+	4	214	21	0	0	0	.75	.47	.54	3	.0	0		2	1	0
STAR LAKE	82.9	47.8	65.4		91	22	37	10	61	81	4	0	0	0	.71	.28	.22	24	.0	0		3	0	0
TOHATCHI 6 NE	85.5	56.4	71.0		94	22	45	1	16	203	11	0	0	0	1.47				.0	0		1	0	0
ZUNI	85.4	47.9	66.7		94	22	34	10	41	101	10	0	0	0	.78	.44	.45	25	.0	0		3	0	0
--DIVISIONAL DATA------->			66.7	.3											1.24	.84			.0					
NORTHERN MOUNTAINS 02																								
ABIQUIU DAM	78.7M	53.0	65.9M		91	23+	43	1	64	96	2	0	0	0	2.15		1.14	18	.0	0		5	1	1
ALCALDE	83.5	50.4	67.0		93	29+	42	10+	36	102	9	0	0	0	2.37		.67	9	.0	0		6	1	0
CERRO	74.6	42.8	58.7	-2.5	85	16	35	10	183	0	0	0	0	0	2.87	2.02	.69	30	.0	0		10	1	0
CHAMA	73.1	39.9	56.5	-1.6	83	22	30	10	246	0	0	0	1	0	1.47	.68	.30	3	.0	0		6	0	0
CIMARRON 4 SW	77.4	48.4	62.9	-2.3	85	30+	40	10	79	26	0	0	0	0	4.49	2.87	1.80	1	.0	0		9	3	1
COCHITI DAM	83.2	56.0	69.6		97	17	45	10	34	180	8	0	0	0	3.11		.81	25	.0	0		7	3	0
CUBA	78.3	41.8	60.1	-2.5	90	17	30	11	152	10	1	0	2	0	1.82	1.19	.45	18	.0	0		6	0	0
DES MOINES	76.1	51.7	63.9	-2.0	85	30	43	11+	69	42	0	0	0	0	5.29	3.61	1.51	1	.0	0		13	3	1
EAGLE NEST	71.9	39.1	55.5	.9	83	17	32	10	276	0	0	0	1	0	3.80	2.71	.66	1	.0	0		10	2	0
EL RITO	78.1	48.4	63.3		87	30+	36	10	86	39	0	0	0	0	2.73	2.10	.57	24	.0	0		9	2	0
EL VADO DAM	77.7	43.4	60.6	.3	89	17	34	15	148	21	0	0	0	0	2.35	1.73	.98	27	.0	0		6	1	0
ESPANOLA	83.7	52.8	68.3		95	22+	43	10	29	135	8	0	0	0	1.80	1.14	.57	9	.0	0		6	1	0
GASCON	69.7	41.8	55.8		81	16	35	11	268	0	0	0	0	0	5.84		.73	1	.0	0		13	5	0
JEMEZ SPRINGS	85.3	49.9	67.6	-.2	94	16	42	12+	26	113	9	0	0	0	3.23	2.34	1.24	24	T	T		7	1	1
LAKE MALOYA	72.9	44.7	58.8	-.7	82	22+	38	10	179	0	0	0	0	0	2.58	.54	.94	9	.0	0		7	1	0
LAS VEGAS FAA AP	76.7	50.1	63.4	-1.6	90	15	42	3+	80	38	1	0	0	0	3.83	2.48	.83	9	.0	0		10	3	0
LAS VEGAS SEWAGE PLT	77.6	48.3	63.0		88	17	40	10+	82	28	0	0	0	0	6.58		1.34	9	.0	0		16	6	2
LINDRITH 3 NE	81.4	44.5M	63.0M		93	7	34	10	80	34	3	0	0	0	.84		.45	25	.0	0		1	0	0
LOS ALAMOS	74.5	49.3	61.9	-3.2	87	16	40	10	112	26	0	0	0	0	5.67	4.55	1.58	3	.0	0		9	6	1
OCATE 1 N	73.0	44.1	58.6		82	16	38	15	185	0	0	0	0	0	4.56		1.34	1	.0	0		12	2	1
PECOS RANGER STATION	79.2	46.1	62.7		90	17+	36	10	103	37	2	0	0	0	3.89	2.85	.78	24	.0	0		10	3	0
RATON FILTER PLANT	74.9	50.4	62.7		87	14	41	10	100	39	0	0	0	0	4.38		.88	9	.0	0		12	3	0
RATON RADIO KRTN	76.0	48.0	62.0		85	30+	40	10	95	13	0	0	0	0	4.84		.92	9	.0	0		11	5	0
RED RIVER	71.2	37.2	54.2	.7	80	22	28	10	314	0	0	0	3	0	4.27	3.02	.73	23	.0	0		12	1	0
SANTA FE 2	81.9	53.3	67.6		95	16	42	10	38	123	4	0	0	0	2.26		.52	25	.0	0		7	1	0
TAOS	77.5	47.3	62.4		89	23+	38	10	98	27	0	0	0	0	2.24	1.37	.50	9	.0	0		8	1	0
TIERRA AMARILLA 4 NNW	75.3	42.4	58.9		85	22	33	10	181	3	0	0	0	0	1.26	.62	.35	24	.0	0		6	0	0
TORREON NAVAJO MISSION	84.4	50.8	67.6		94	15	40	11	30	117	9	0	0	0	1.20		.55	24	.0	0		5	1	0
TRES PIEDRAS	73.0	42.6	57.8		82	28	34	10	210	0	0	0	0	0	3.26	2.47			.0	0		6	1	0
VALMORA	78.0	49.4	63.7	-.4	90	17	43	10	72	40	1	0	0	0	3.06	1.32	1.60	9	.0	0		5	2	1

SEE REFERENCE NOTES FOLLOWING STATION INDEX

MONTHLY SUMMARIZED STATION AND DIVISIONAL DATA

NEW MEXICO
JULY 1986

STATION	TEMPERATURE (°F) AVERAGE MAXIMUM	AVERAGE MINIMUM	AVERAGE	DEPARTURE FROM NORMAL	HIGHEST	DATE	LOWEST	DATE	HEATING DEGREE DAYS	COOLING DEGREE DAYS	NO. OF DAYS MAX 90 OR ABOVE	MAX 32 OR BELOW	MIN 32 OR BELOW	MIN 0 OR BELOW	PRECIPITATION (IN) TOTAL	DEPARTURE FROM NORMAL	GREATEST DAY	DATE	SNOW, SLEET TOTAL	MAX. DEPTH ON GROUND	DATE	NO. OF DAYS .10 OR MORE	.50 OR MORE	1.00 OR MORE
NEW MEXICO																								
NORTHWESTERN PLATEAU 01																								
AZTEC RUINS NAT MON	68.3	53.2	70.8	-3.9	98	13	46	27	3	189	13	0	0	0	3.02	2.12	1.02	23	.0	0		7	3	1
BLOOMFIELD 3 SE	68.0	58.7	73.4	-3.0	97	13	52	24	0	268	13	0	0	0	3.27	2.34	1.20	19	.0	0		6	3	1
CHACO CANYON NAT MON	85.7	54.2	70.0	-2.7	96	13	45	29	0	163	9	0	0	0	2.03	.93	.47	7	.0	0		7	0	0
DULCE	M	M	M																M	M				
EL MORRO NAT MON	80.5	51.5	66.0	-2.7	90	31 +	43	29	22	62	2	0	0	0	3.78	1.92	.96	20	.0	0		8	3	0
FARMINGTON AG SCI CNTR	85.9	58.7	72.3		96	15	53	28	1	234	9	0	0	0	4.10		.80	22	.0	0		8	4	0
FENCE LAKE	83.2	50.5	66.9		93	13	42	28	16	79	6	0	0	0	2.85		1.07	20	.0	0		7	1	1
FRUITLAND 2 E	89.2	57.1	73.2	-2.1	98	31	48	29 +	0	262	12	0	0	0	4.17	3.38	1.57	20	.0	0		6	3	2
GALLUP FAA AP	84.2	54.6	69.4		95	31	45	28	3	145	8	0	0	0	2.28		1.01	16	.0	0		5	2	1
LYBROOK	80.9	56.1	68.5		89	30 +	51	23 +	11	126	0	0	0	0	2.50	1.17	.91	22	.0	0		4	3	0
MC GAFFEY 4 SE	75.8	45.4	60.6	-3.3	85	31	37	28	128	2	0	0	0	0	1.91	-.41	.40	16	.0	0		6	0	0
NAVAJO DAM	86.5	57.7	72.1		97	14 +	50	6	1	228	10	0	0	0	3.54		.80	22	.0	0		8	3	0
OTIS	80.9	56.0	68.5		90	14 +	50	27 +	12	126	2	0	0	0	2.75		.69	17	.0	0		7	1	0
SHIPROCK	91.2	57.0	74.1		100	14 +	48	29 +	0	291	21	0	0	0	2.22	1.62	.64	22	.0	0		5	1	0
STAR LAKE	84.4	52.0	68.2		92	31 +	46	28 +	5	109	5	0	0	0	2.78	1.44	1.09	4	.0	0		6	1	1
TOHATCHI 6 NE	86.7	58.3	72.5		96	30	49	22	1	242	11	0	0	0	1.70		.60	16	.0	0		7	1	0
ZUNI	86.1	54.0	70.1		96	13	45	28	0	165	8	0	0	0	2.68	.80	1.04	16	.0	0		5	2	1
--DIVISIONAL DATA-------->			69.8	-2.3											2.85	1.49			.0					
NORTHERN MOUNTAINS 02																								
ABIQUIU DAM	81.8	57.3	69.6		92	13	52	29 +	12	159	3	0	0	0	2.91		1.03	23	.0	0		6	2	1
ALCALDE	86.9	53.4	70.2		96	30	44	29	0	165	9	0	0	0	1.76		.54	5	.0	0		6	1	0
CERRO	77.8	47.1	62.5	-3.7	86	29	37	28	79	6	0	0	0	0	3.61	1.69	.71	17	.0	0		8	4	0
CHAMA	77.5	43.3	60.4	-3.6	88	14	34	27	136	3	0	0	0	0	3.38	1.36	1.28	16	.0	0		9	1	1
CIMARRON 4 SW	83.1	52.3	67.7	-1.2	92	29	46	29	2	94	2	0	0	0	2.38	-.51	.95	5	.0	0		8	1	0
COCHITI DAM	86.7	59.2	73.0		97	31	55	28 +	1	256	12	0	0	0	2.70		.69	10	.0	0		8	1	0
CUBA	81.4	46.9	64.2	-4.6	90	31 +	36	28	58	39	3	0	0	0	2.42	-.23	.50	5	.0	0		8	1	0
DES MOINES	82.1	56.2	69.2	-1.1	91	13	46	11	3	139	1	0	0	0	3.41	-.13	1.47	20	.0	0		6	2	2
EAGLE NEST	77.5	42.4	60.0	.7	86	31	30	29	152	3	0	0	2	0	1.16	-1.74	.43	6	.0	0		3	0	0
EL RITO	80.6	51.6	66.1		89	13	44	27	22	64	0	0	0	0	2.65	1.04	.98	16	.0	0		7	1	0
EL VADO DAM	79.7	47.5	63.6	-3.5	91	5	36	29	71	35	1	0	0	0	2.95	1.14	.58	22	.0	0		9	2	0
ESPANOLA	86.8	55.7	71.3		97	30	47	29	0	204	12	0	0	0	2.55	1.10	.84	9	.0	0		5	3	0
GASCON	75.1	44.8	60.0		82	30 +	41	5	149	0	0	0	0	0	4.24		1.26	20	.0	0		8	3	1
JEMEZ SPRINGS	85.9	54.7	70.3	-1.9	96	30	49	24	0	173	8	0	0	0	1.97	-.59			.0	0		4	0	0
LAKE MALOYA	79.3	46.7	63.0	-.6	88	30	42	29 +	63	10	0	0	0	0	4.12	.62	1.30	11	.0	0		8	2	1
LAS VEGAS FAA AP	81.9	53.2	67.6	-.9	92	29	48	11	4	92	2	0	0	0	1.79	-1.43	.78	7	.0	0		6	1	0
LAS VEGAS SEWAGE PLT	83.7	50.5	67.1		93	30	40	27	4	79	3	0	0	0	1.99		.70	10	.0	0		7	1	0
LINDRITH 3 NE	82.7	47.8	65.3		91	31	41	28 +	30	45	3	0	0	0	1.45		.50	23	.0	0		6	1	1
LOS ALAMOS	79.9	53.3	66.6	-1.7	90	30	48	24 +	29	84	1	0	0	0	2.19	-.99	.41	16	.0	0		8	0	0
OCATE 1 N	79.2	47.4	63.3		88	29	36	28	56	10	0	0	0	0	2.38		.62	1	.0	0		6	1	0
PECOS RANGER STATION	82.9	50.7	66.8		92	31	42	26	17	79	4	0	0	0	1.86	-1.04	.68	1	.0	0		7	1	0
RATON FILTER PLANT	80.7	53.7	67.2		89	29	50	23 +	10	88	0	0	0	0	2.14		.58	21	.0	0		8	1	0
RATON RADIO KRTN	82.5	50.4	66.5		92	29	40	29	9	61	2	0	0	0	3.04		.68	20	.0	0		10	2	0
RED RIVER	75.1	41.0	58.1	-.3	82	30 +	31	29	210	0	0	0	2	0	2.10	-.69	.60	6	.0	0		7	1	0
SANTA FE 2	84.6	56.3	70.5		95	30	51	24	0	176	6	0	0	0	2.14		1.08	16	.0	0		5	1	1
TAOS	81.6	50.4	66.0		91	31	44	29 +	24	60	3	0	0	0	2.32	.62	.41	17	.0	0		9	0	0
TIERRA AMARILLA 4 NNW	78.6	45.2	61.9		88	1	35	29	96	5	0	0	0	0	2.87	.77	.91	16	.0	0		6	1	0
TORREON NAVAJO MISSION	85.8	54.6	70.2		95	31 +	48	25	0	169	7	0	0	0	1.96		1.07	5	.0	0		4	1	1
TRES PIEDRAS	75.7	45.5	60.6		83	31	38	27	129	1	0	0	0	0	3.68	1.60	1.22	8	.0	0		10	3	2
VALMORA	85.3	51.8	68.6	-.3	95	30	45	29 +	1	118	8	0	0	0	2.20	-.83	1.20	22	0	0		5	1	1

SEE REFERENCE NOTES FOLLOWING STATION INDEX

DAILY PRECIPITATION (INCHES)

NEW MEXICO
JULY 1986

STATION	TOTAL	DAY OF MONTH														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NEW MEXICO																
NORTHWESTERN PLATEAU 01																
AZTEC RUINS NAT MON	3.02				.26	T	.02			.03			.15			.15
BLOOMFIELD 3 SE	3.27		T		.01	T	.02									.03
CHACO CANYON NAT MON	2.03				.11	.04		.47	.10							
DULCE	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL MORRO NAT MON	3.78				.06					.72	.20					.61
FARMINGTON AG SCI CNTR	4.10		T			.10		T	.01	.53						.47
FENCE LAKE	2.85				.05				.12	.13					T	T
FRUITLAND 2 E	4.17			.01	1.03	.05		.02								
GALLUP FAA AP	2.28				T			T	.04	.15						.10
LYBROOK	2.50				.01	.70					.07					
MC GAFFEY 4 SE	1.91	.17			.06	.36				.05	.06					.03
NAVAJO DAM	3.54							.05	.05	.03	.05					.60
OTIS	2.75				.30	.01										.35
SHIPROCK	2.22				.09										.05	.35
STAR LAKE	2.78		T		1.09	.06			.23	.04	.02					
TOHATCHI 6 NE	1.70				.01				.13	.17						
ZUNI	2.68				.04					.56					.05	.07
NORTHERN MOUNTAINS 02																
ABIQUIU DAM	2.91	.02				.04			.10	.04	.08					
ALCALDE	1.76	.03		.04	T	.54			T	.29	.08					
BLACK LAKE	5.31		.22			.14	.31	.42	.30	.60					.50	.12
BRAZOS LODGE	2.25					.52	.21	T		T	.18				T	
CANJILON RANGER STN	1.56		.08		.13		.03	.03							.03	.03
CERRO	3.61				.53		.26	.10	.37	.51						
CHACON 2 S	5.73			.03	.05	.41		.25	.40	.03						
CHAMA	3.38				.25	.14	.05	.01		.17	.05					.41
CIMARRON 4 SW	2.38					.95	.04	.01	.10	.31					.10	
COCHITI DAM	2.70	.26	.07			.01			.39	.34	.69	.02				
CUBA	2.42					.50			.26		.39					.15
DES MOINES	3.41					T	.20		T	.03	T	T		T	T	
EAGLE NEST	1.16	.04				.02	.43		.07	T	.03	T		.02	.02	
EL RITO	2.65	.03	T		.30	.03	.16	.01	.24	.11	.01					
EL VADO DAM	2.95					.54	.03				.32					.13
ESPANOLA	2.55				.02	.50			.30	.84						
GASCON	4.24				T	.04	.10		.76	.84	T			T		
GHOST RANCH	1.94				.06			T	T	.01						
GLORIETA	3.30		.40					.56	.10		.07					.14
JEMEZ SPRINGS	1.97	.06				.38			.38	.03	.09					*
JOHNSON RANCH	2.54		.12			.81					T				T	
LAKE MALOYA	4.12		.07				.27		.08	.22	.05	1.30		.28	.02	
LAS VEGAS FAA AP	1.79	.10	.18				.12	.78		.02						
LAS VEGAS SEWAGE PLT	1.99	.20	.37				.10		.30		.70					
LINDRITH 3 NE	1.45				.10	.14										
LOS ALAMOS	2.19	.04			.16	.02		.13	.15	.34	.01		T	T	T	.28
OCATE 1 N	2.38	.62			.08	.18	.45	.06	.46	.22						
PECOS RANGER STATION	1.86	.68						.16	.16							
RATON FILTER PLANT	2.14	T	.10				.28		.19	.01	.01	.01		.16		
RATON RADIO KRTN	3.04	T	.23			.28	.17	.12	.07	.08	T			.10	T	
RED RIVER	2.10		.03		.40	.06	.60	.06	.22	.16					T	
SANTA FE 2	2.14	T	T	T		.10		T	.37		T				.12	T
TAOS	2.32			.03	T	.09	.15		.39	.18		.17				
TIERRA AMARILLA 4 NNW	2.87							.47		.29	.03					
TORREON NAVAJO MISSION	1.96				T	1.07	.02	T		.19						
TRES PIEDRAS	3.68								1.22	.25					1.05	
TURQUOISE	1.94						.25		.38	.12	.02					
VALMORA	2.20	.10	.05				.23		.08		.14					
WOLF CANYON	3.70	.03	.30		.06	.46		T	.74	T				.02	.16	

DAILY PRECIPITATION (CONT)

STATION	DAY OF MONTH															
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
NEW MEXICO																
NORTHWESTERN PLATEAU 01																
AZTEC RUINS NAT MON	.08	.50			.65	.03	.11	1.02		.02						
BLOOMFIELD 3 SE	.30			1.20	.76	.13	.53	.29		T						
CHACO CANYON NAT MON	.46		.01			.41	.29	.14								
DULCE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
EL MORRO NAT MON		.46	.32	.01	.96	.27	.01	.10	.06							
FARMINGTON AG SCI CNTR	.06	.25			.78	.69	.80	.39	T	.02						
FENCE LAKE	.45	.07	.13	.08	1.07	.09	T	.16	.40	.04						
FRUITLAND 2 E					1.57	.97	.25	.17		.10						
GALLUP FAA AP	1.01	.01	.04	.71	.09	.01	.11	T	.01							T
LYBROOK	.14			.60	.02		.91	.02		.03						
MC GAFFEY 4 SE	.40	.32		.05		.20	.06	.11	.04							
NAVAJO DAM	.30	.07	.10	.30	.25	.23	.80	.66	.05							
OTIS	.01	.69	.02	.01	.23	.37	.45	.31								
SHIPROCK					.48	.09	.64	.32	.05	.15						
STAR LAKE	.01		.35		.26			.46	.23	.03						
TOHATCHI 6 NE	.60	.17		.10	.12	.38	.02									
ZUNI	1.04	.07	.14		.01	.02	.09	.26	.33							
NORTHERN MOUNTAINS 02																
ABIQUIU DAM	.28	.19		.01	.76	.30	.03	1.03	.02		.01					
ALCALDE	.18	.19		T	.14		.02	.25								
BLACK LAKE	.30		.55	1.00	T	.85										
BRAZOS LODGE	.13	.27	.02	.09	.10	.19	.11	.15	.28							
CANJILON RANGER STN	.16	.01	.06	.26	.32		.19	.02		.21						
CERRO	.08	.71		*	.21			.21		.53						.10
CHACON 2 S	.40		.67	.33	1.35	1.52	.29									
CHAMA	1.28	T	.08	.10	.40	.18	.04	.14	.08							
CIMARRON 4 SW				.27	.36	.10	T			.14						
COCHITI DAM	.13	.30			.01	.22	.24	.01					.01			
CUBA	.15	.39	.37	T	.21											
DES MOINES		.11		T	1.47	.11	1.10			T	.39					T
EAGLE NEST	T	.23	.04	.05	T	.06	T	.15								
EL RITO	.98	.05			.21	T	.09	.43								
EL VADO DAM	.35	.18			.05	.24	.58	.32	.21							
ESPANOLA	.56			.05				.28								
GASCON	.13		.03	.20	1.26	.09	.26	.03		.03					T	.47
GHOST RANCH	.30	.01		.70	.41	.07	T	.35		.03						
GLORIETA	.57		.14	.50	.10		.72									T
JEMEZ SPRINGS	.53	.01		T	.36	.10	*	.03			T					T
JOHNSON RANCH		.26	.28	.83	.12	T		.12								
LAKE MALOYA		.16	.01		.23	.92	.43	.02			.02	.05				
LAS VEGAS FAA AP					.21			.30		.04						.04
LAS VEGAS SEWAGE PLT			.10		.06			.16								
LINDRITH 3 NE	.05		T		.17	.17	.32	.50								
LOS ALAMOS	.41			.22	.36		.02	.04		T	T					.01
OCATE 1 N					.20	.08	.03									
PECOS RANGER STATION	.35				.29	.12		.10								
RATON FILTER PLANT		.17			.28	.58	.21	.02			.06					.06
RATON RADIO KRTN	.03	.13	.01	T	.68	.62	.12	.06			.04					.30
RED RIVER	.02	.18	T	.10	.12		.04	.04	.03	.02						.02
SANTA FE 2	1.08						T	.47								T
TAOS	.10	.41	T	.36	.25	.01		.18								T
TIERRA AMARILLA 4 NNW	.91					.40	.05	.26	.46							
TORREON NAVAJO MISSION	.33				.05		.09	.18		.03						
TRES PIEDRAS	.28		.71				.02	.15								
TURQUOISE		.62				.13	.02	.40								
VALMORA							1.20	.40								
WOLF CANYON	.83	.22	.15	.13	.45	T		.15								

SEE REFERENCE NOTES FOLLOWING STATION INDEX

ATTACHMENT #9

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

TABLE 5-3

SUMMARY OF TRANSMISSIVITIES (T)
AND STORATIVITIES (S)
GIANT BLOOMFIELD REFINERY

DIESEL SPILL AREA	T(gpd/ft)	S
GBR 14	9.6	NA
GBR 15	NA	NA
GBR 25	183.0	.00028
GBR 27	20.2	NA
SOUTHERN REFINERY AREA		
GBR 8	2340	0.051
GBR 29	1040	NA

NA = Not Available
(S cannot be estimated at pumped wells due to borehole storage effects)

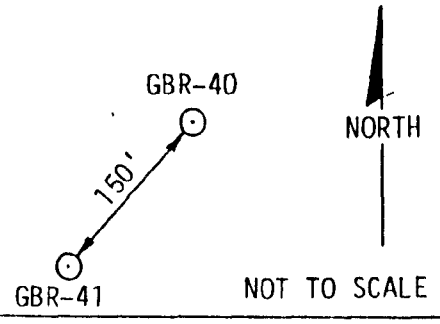
ATTACHMENT #10

LITHOLOGIC LOGS OF GBR-40 THROUGH GBR-46

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



__1/4 __1/4 NW 1/4 NW 1/4 S27 T29N R12W

SITE ID: MONT & AND LOCATION ID: (EX-5)GBR-40

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HSA W/SPLIT SPOONS. 7" BOREHOLE.

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: 4/24/87 DATE COMPLETED: PLUGGED4/24/87

FIELD REP.: J.P. KASZUBA

COMMENTS: BOREHOLE NOT COMPLETED AS A WELL. SATURATED @ 33.0-34.5'. TD=38'.

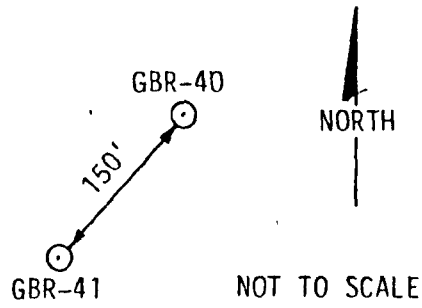
LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	3.0	4.5				3.0-3.3' Road Gravel. 3.3-4.5' SAND, tan, med- to cs- gr, mod sorting. No HC odor.
5				2	8.0	9.5				8.0-9.5' No Returns.
10				3	13.0	14.5				13.0-13.6' SAND, lt brn, med- to cs- gr, mod sorting. No HC odor. 13.6-14.5' SAND, lt brn, fn- to med- gr, minor cs- gr, mod sorting. No HC odor.
15				4	18.0	19.5				18.0-18.9' SAND, brn, med- to cs- gr, mod sorting. Angular pebble fragments (up to 2 cm across) @ 18.7-18.9'. No HC odor. 18.9-19.5' SAND, lt brn, fn- to med- gr, mod sorting. No HC odor.
20				5	23.0	24.5				23.0-23.5 SAND, lt brn, fn- to cs- gr, minor silt & pebbles (up to 2 cm across), poorly sorted, no HC odor. 23.5-24.1' SAND, tan, fn- to med- gr, minor silt & cs- gr, mod sorting. No HC odor. 24.1-24.5' SAND, tan, med- to cs- gr, minor fn- gr, well-sorted. No HC odor.
25				6	28.0	29.5				28.0-29.5' CLAY, olive brn. No HC odor.
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



__1/4 __1/4 __1/4 __1/4 S__ T__ R__

SITE ID: MONT & AND LOCATION ID: (EX-5) GBR-40

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: SAME

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: SAME DATE COMPLETED: SAME

FIELD REP.: SAME

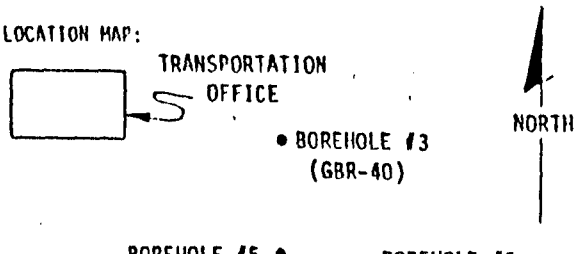
COMMENTS: MINOR DIESEL ON SPLIT SPOONS FROM SATURATED ZONE. BEDROCK @ 39'.

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
30				7	33.0	34.5				33.0-33.8' CLAYEY SAND, dark olive brn, sand is fn-gr, well-sorted. Saturated. Faint HC odor.
										33.8-34.5 CLAY, as @ 28.0-29.5, but saturated & faint HC odor(?).
35				8	38.0	39.5				38.0-38.9' CLAYEY SAND, brn, sand is fn- to med- gr, mod sorting. Saturated. Faint HC odor(?).
										38.9-39.5' SANDSTONE, mottled tan/brn, med- gr, minor cs- gr, mod sorting. Poorly cemented, friable. Saurated.
40										
45										
50										
55										
60										

LITHOLOGIC LOG

LOCATION MAP:



__1/4 __1/4 ___1/4 __1/4 S22 T29N R12W

SITE ID: GBR-41 LOCATION ID: BOREHOLE #5

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): _____

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HOLLOW STEM AUGER, 7" BIT

DRILLING CONTR.: WESTERN TECH

DATE STARTED: 10/6/87 DATE COMPLETED: 10/7/87

FIELD REP.: J.P. KASZUBA

COMMENTS: SPLIT SPOONS AND CUTTINGS. BEDROCK @ ~30½'. TD=35'. SATURATED @ ~27'.

LOCATION DESCRIPTION: _____

Depth	Visual %	Lith	Blow Counts	Sample Type and Interval	Lithologic Description
					0' - 5'6" SAND: lt brn; fn- to med- grain, minor coarse-, granules to 1/8"; mod sorting. No HC stain or odor.
5			2, 4, 4	5'0"-6'6"	5'6" - 10'5" SAND: brn; fn- to med- grain, minor silt; mod sorting. No HC stain or odor.
10			3, 5, 4	10.0"-11'6"	10'5" - 12'6" SAND: lt brn (grysh), fn-grain, minor silt. Mod. sorted. No HC stain or odor.
15			3, 3, 3	15'0"-16'6"	12'6" - 30'0" SAND: brn, fn-grain w/minor med. grain. Mod sorting. No HC stain or odor.
20			3, 3, 5	20'0"-21'6"	20'0" - 21'3" SAND: greenish gray. Fn- to med-grain. Minor clay, mod sorting. Faint HC odor (?).
25			5, 5, 6	25'0"-26'6"	21'3" - 22'6" SAND: brn, med-grain w/minor fn & crs grains. Mod sorting. Faint HC odor (?).
30			50	30'0"-30'5½"	22'6" - 26'4" SAND: dk gray, med-grained w minor fn-, crs-; mod sorting; HC stain and odor.
35			18, 50	35'0"-36'1"	26'4" - ~27'6" SAND: brnsh gray; med-grained, minor crs- mod sorting. HC stain & odor.
40					~27'6" - 30'3" SAND: mottled gray & brn, fn-grained w minor crs, clay; mod sorting. HC stain, faint HC odor. Saturated.
45					30'3" - ~32'6" SANDSTONE: mottled gray and brn; fn-grained, minor med-brn clay lenses; mod sorting; lithified, poorly-cemented. Faint HC odor no HC stain. Not saturated.
50					32'6" - 35'1" SANDSTONE: lt brn, fn-grained, minor med-, crs-; mod sorting. No HC stain, no HC odor. Lithified, poorly cemented. Not saturated.
					35'1" - 35'8" SANDSTONE: lt brn, fn-grained, well sorted, lithified. Moderately cemented. Minor Fe-oxide stain. Minor black, carbon stain. No HC stain or odor. Not saturated.

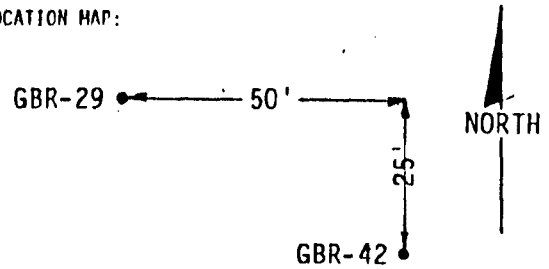
LOCATION ID:

BOREHOLE #5

Depth	Visual %	Lith	Blow Counts	Sample Type and Interval	Lithologic Description
50					35'8" - 36'1" SANDSTONE: mottled gray & brn, fn- to med-grained, minor crs-; poorly sorted; lithified, mod cemented. No HC stain or odor. Not saturated.
55					TD=35'. Completed w 2" PVC & stainless steel. PVC blank 32'-35', 020 stainless steel screen 2'6"-32', PVC blank to surface sand (10/40) 16'6" - 35', bentonite 11'6" - 16'6", sand (10/40) 11'0" - 11'6", cement grout w 5% bentonite to surface.
60					
65					
70					
75					
80					
85					
90					
95					
100					
105					
110					
115					

LITHOLOGIC LOG

LOCATION MAP:



1/4 SW1/4 NW1/4 NW1/4 S27 T29N R12W

SITE ID: GIANT LOCATION ID: GBR-42

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5293 (topo)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR ROTARY W/ CASING DRIVER

DRILLING CONTR.: BEEMAN BROTHERS DRILLING COMPANY

DATE STARTED: 12/15/87 DATE COMPLETED: 12/15/87

FIELD REP.: J.P. KASZUBA, J.F. KIRBY

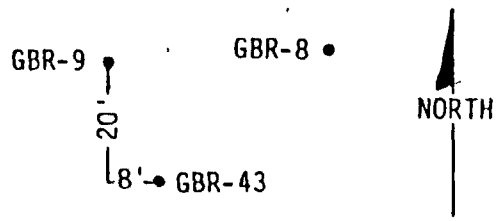
COMMENTS: STEAM CLEAN ALL DRILLING EQUIP. BOREHOLE = 9 7/8". BEGAN USING WATER @25'. CONTAMINATION @38'. BEDROCK @57'. TD = 63'

LOCATION DESCRIPTION: _____

Depth	Visual %	Lith	Drilling Time Scale	Sample Type and Interval	Lithologic Description
5 10 15 20 25 30 35 40 45 50				0' - 63' cuttings	0' - 10' SAND - lt brn; med-grain, well sorted, uncons. minor clays (<10%). No hydrocarbon stain/odor. 10' - 15' CLAYEY SAND - lt brn, med-grain, mod sorting. Minor (<10%) crs grains. No. HC stain-/odor. 15' - 25' CLAYEY SAND - lt to med brn, med-grain, well sorted. No HC stain/odor. 25' - 30' CLAY - lt brn, minor (<15%) sand. Sand is med- to fn-grain with moderate sorting. No HC stain/ odor. 30' - 35' CLAY - lt brn, 30% cobbles up to 1" diam. No HC stain/odor. 35' - 40' SAND - Blk, med grain, well to very well sorting. Hydrocarbon stain/strong hydrocarbon odor. 40' - 50' SAND - blk. fn grain, very well sorted, strong HC stain/odor. 50' - 57' GRAVELLY SAND - lt brn. fn to crs grain, poorly sorted. Gravels up to 1/2" diameter. No noticable stain/odor. 57' - 63' CLAYSTONE - brnsh grey, cons. No HC stain/odor. Completed as 6-inch recovery well with flush joint pipe. ID well = 62.6, SS blank 52.3' - 62.6', SS screen (020 slot) 36.6' - 52.3', SS blank 31.6' - 36.6', PVC blank 0' - 31.6'. SS centralizers @ 36.6' and 52.3'. Sand (10120) 27.8' - 63', bentonite powder 21.8' - 27.8', sand (10120) 21.0' - 21.8', cement grout w/5% bentonite to surface.

LITHOLOGIC LOG

LOCATION MAP:



1/4 SW1/4 NW1/4 NW1/4 S27 T29N R12W

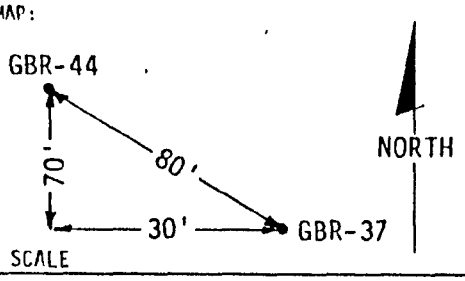
SITE ID: GIANT LOCATION ID: GBR-43
SITE COORDINATES (ft.):
N E
GROUND ELEVATION (ft. MSL): 5389 (topo)
STATE: NEW MEXICO COUNTY: SAN JUAN
DRILLING METHOD: AIR ROTARY W/ CASING DRIVER
DRILLING CONTR.: BEEMAN BROTHERS DRILLING COMPANY
DATE STARTED: 12/16/87 DATE COMPLETED: 12/17/87
FIELD REP.: J.P. KASZUBA,
COMMENTS: BOREHOLE = 9 7/8". BEGIN USING WATER @20'. HC CONTAMINATION @ 33', BOULDERS/COBBLES @ 38', BEDROCK @55'. TD = 62'

LOCATION DESCRIPTION:

Depth	Visual %	Lith	Drilling Time Scale	Sample Type and Interval	Lithologic Description
5 10 15 20 25 30 35 40 45 50				0' - 62' cuttings	0' - 10' SAND - lt brn; fn- to med-grain, sbrndd to sbang poorly sorted. Minor silt (<10%) pebbles (<10%) w/max. dia. 1 inch. Uncons. No HC stain/ odor. 10' - 20' SAND - as above, but more tan in color and gravel fraction decreases w/depth. 20' - 28' SAND - tan, med-grain, rndd to sbang, mod sorting. Minor silt (<10%) and crs-grain sand (<10%). Unconsolidated. No HC stain or odor. 28' - 32' CLAY - brn, uncons. No HC stain/ odor. 32' - 34' SAND - brn, fn- to med-grain, sbrndd, mod sorting. Uncons. HC stain and odor 33' - 34'. 34' - 37' CLAY - brn, unconsolidated. HC stain and odor 34' - 35'. 37' - 55' GRAVELLY SAND - olive brn crs-grain, sbrndd sand to ang pebble fragments w/1 inch max dia. Poorly sorted. Unconsolidated. Faint HC stain and odor (?). 55' - 62' CLAYSTONE - blue-gray, cons. No HC stain or odor. Completed as 6-inch recovery well, with flush joint pipe. TD well = 60.5, SS blank 50.2' - 60.5'; SS screen (020 slot) 34.5' - 50.2', SS blank 29.5' - 34.5', PVC blank to surface. SS centralizers @ 34.5' and 50.2'. Sand (10/20) 50' - 62', sand (8/12) 29' - 50', bentonite powder 23' 29', native backfill 19.8 - 23', cement grout w/5% bentonite to surface.

LITHOLOGIC LOG

LOCATION MAP:



NOT TO SCALE

1/4 SW1/4 NW1/4 NW1/4 S27 T29N R12W

SITE ID: GIANT LOCATION ID: GBR-44

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5390 (topo)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR ROTARY W/ CASING DRIVER

DRILLING CONTR.: BEEMAN BROTHERS DRILLING COMPANY

DATE STARTED: 12/17/87 DATE COMPLETED: _____

FIELD REP.: J.P. KASZUBA

COMMENTS: BOREHOLE = 9 7/8". BEGIN USING WATER @12', HC CONTAMINATION @ 38'. BEDROCK @ 56. TD = 59'.

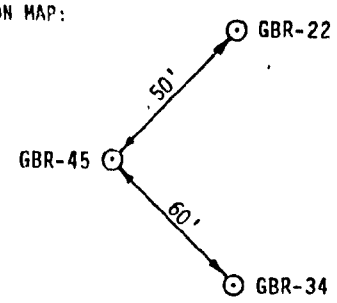
LOCATION DESCRIPTION: _____

Depth	Visual %	Lith	Drilling Time Scale	Sample Type and Interval	Lithologic Description
5 10 15 20 25 30 35 40 45 50				0' - 59' cuttings	0' - 12' SAND - brn, fn- to med-grain, sbang to sbrndd, mod sorting. Uncons. No HC stain or odor. Becomes coarser-grained and poorly sorted w/depth. 12' - 30' GRAVELLY SAND - tan, fn-grain sand to pebbles w/max dia of 1 inch, sbrndd, poorly sorted. Unconsolideated. No HC stain or odor. 30' - 34' CLAY - brn, uncons. No Hc stain or odor. 34' - 38' SAND - brn, fn- to med-grain, sbrndd, mod sorting. Unconsolidated. HC odor and stain @37' - 38'. 38' - 40' CLAY - brn, unconsolidated. Faint HC stain and odor 38' - 39'. 40' - 45' GRAVELLY SAND - grysh tan, fn-grain sand to pebbles w/max dia of 1 inch sbrndd poorly sorted. Uncons. Faint HC stain and odor (?). 45' - 50' SAND - yelsh brn, fn- to med-grain sbrndd to sbang, mod sorting. Uncons. No HC stain or odor. 50' - 56' GRAVELLY SAND - tan, fn-grain sand to pebbles w/max dia of 1 inch, sbrndd, poorly sorted. Unconsolidated. No HC stain or odor. 56' - 59' CLAYSTONE - bluelsh gray, consolidated. No HC stain or odor. Completed as 6-inch recovery well, with flush joint pipe. TD well = 58.6, SS blank 48.3' - 58.6'; SS screen (020 slot) 32.6' - 48.3', SS blank 27.6' - 32.6', PVC blank 0' - 27.6', SS centralizers @ 32.6' and 48.3'. Sand (8/12) 27' - 59', bentonite powder 21' 27', cement grout w/5% bentonite to surface.

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



___1/4 ___1/4 NW 1/4 NW 1/4 S27 T29N R12W

SITE ID: MONT & AND LOCATION ID: (EX-3) GBR-45

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HSA W/SPLIT SPOONS, 7" BOREHOLE

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: 4/23/87 DATE COMPLETED: PLUGGED 4/24/87

FIELD REP.: J.P. KASZUBA

COMMENTS: BOREHOLE NOT COMPLETED AS A WELL. GRAVELS @ 32'. SATURATED @ ~ 33.5'. BEDROCK @ ~ 38'. TD=43'.

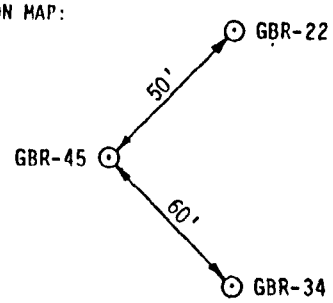
LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	3.0	4.5				3.0-4.5' SAND, tan, fn- to med- gr, minor cs- gr, mod sorting. No HC odor.
5				2	8.0	9.5				8.0-9.1' SAND, lt brn, fn- gr, minor med- gr, well-sorted. No HC odor. 9.1-9.4' SAND, brn, fn- gr, well-sorted. Abundant silt & clay. No HC odor. 9.4-9.5' SAND, as @ 8.0-9.1'.
10				3	13.0	14.5				13.0-13.4' No Returns. 13.4-13.8 SAND, lt brn, med- gr, poor sorting. Minor cs- gr. No HC odor. 13.8-14.1' SAND, brn, fn- to cs- gr, poorly sorted. Abundant silt & clay. No HC odor. 14.1-14.2' SAND, lt brn, med- to cs- gr, poorly sorted. No HC odor. 14.2-14.5' SAND, brn, fn- gr, well-sorted. Abundant silt & clay. No HC odor.
15				4	18.0	19.5				18.0-18.8' CLAY, brn, minor fn- gr sand. No HC odor. 18.8-19.5 SAND, lt brn, fn- gr, well-sorted. No HC odor.
20				5	23.0	24.5				23.0-23.2' CLAY, brn, minor cs- gr sand & <0.5 cm dia pebbles. No HC odor. 23.2-23.7' SAND, lt brn, med- to cs- gr, poor sorting. No HC odor. 23.7-24.5' CLAY, as @ 23.0-23.2'. Sandy @ 24.2-24.3'. No HC odor.
25				6	28.0	29.5				28.0-29.5' CLAY, as @ 23.0-23.2', but lacks pebbles. No HC odor.
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: MONT & AND LOCATION ID: (EX-3) GBR-45

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: SAME

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: SAME DATE COMPLETED: SAME

FIELD REP.: SAME

COMMENTS: NO DIESEL NOTED DURING DRILLING.

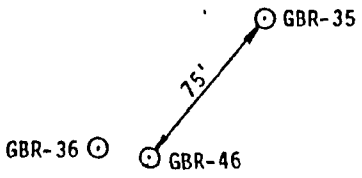
LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
30				7	33.0	34.5				33.0-33.4' CLAY, as above. No HC odor. 33.4-33.5' GRAVEL, rounded, 2-5 cm dia. 33.5-34.5' SAND, lt brn, med- gr, well-sorted. Minor pebbles (up to 2 cm dia). Saturated. Strong HC odor. Black HC stain @ 33.5-34.0. Grey HC stain @ 34.0-34.2'. Lt grey stain @ 34.2-34.5'.
35				8	38.0	38.3				38.0-38.3' SANDSTONE, med- gr, minor fn-, cs- gr, pebbles (2-4 cm dia), mod sorting. Friable, poorly cemented. Limonite stain. Saturated. Faint HC odor (?).
40				9	43.0	43.3				43.0-43.3' SANDSTONE, as above, but lt brn color, cs-gr more abundant.
45										
50										
55										
60										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



NOT TO SCALE

___1/4 ___1/4 NW 1/4 NW 1/4 S27 T29N R12W

SITE ID: MONT & AND LOCATION ID: (EX-5)GBR-46

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: HSA W/SPLIT SPOONS, 7" BOREHOLE.

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: 4/24/87 DATE COMPLETED: PLUGGED4/24/87

FIELD REP.: J.P. KASZUBA

COMMENTS: BOREHOLE NOT COMPLETED AS A WELL. SATURATED @ 33.0-34.5', TD=38'.

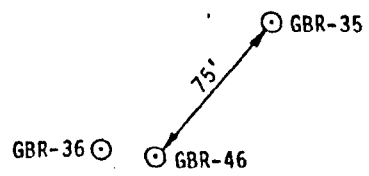
LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	3.0	4.5				3.0-3.3' Road Gravel. 3.3-4.5' SAND, tan, med- to cs- gr, mod sorting. No HC odor.
5										
				2	8.0	9.5				8.0-9.5' No Returns.
10				3	13.0	14.5				13.0-13.6' SAND, lt brn, med- to cs- gr, mod sorting. No HC odor. 13.6-14.5' SAND, lt brn, fn- to med- gr, minor cs- gr, mod sorting. No HC odor.
15				4	18.0	19.5				18.0-18.9' SAND, brn, med- to cs- gr, mod sorting. Angular pebble fragments (up to 2 cm across) @ 18.7-18.9'. No HC odor. 18.9-19.5' SAND, lt brn, fn- to med- gr, mod sorting. No HC odor.
20				5	23.0	24.5				23.0-23.5 SAND, lt brn, fn- to cs- gr, minor silt & pebbles (up to 2 cm across), poorly sorted, no HC odor. 23.5-24.1' SAND, tan, fn- to med- gr, minor silt & cs- gr, mod sorting. No HC odor. 24.1-24.5' SAND, tan, med- to cs- gr, minor fn- gr, well-sorted. No HC odor.
25										
				6	28.0	29.5				28.0-29.5' CLAY, olive brn. No HC odor.
30										

BOREHOLE LOG (WELL)

GCL

LOCATION MAP:



NOT TO SCALE

___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: MONT & AND LOCATION ID: (EX-5) GBR-46

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): 5394 (TOPO)

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: SAME

DRILLING CONTR.: WESTERN TECH.

DATE STARTED: SAME DATE COMPLETED: SAME

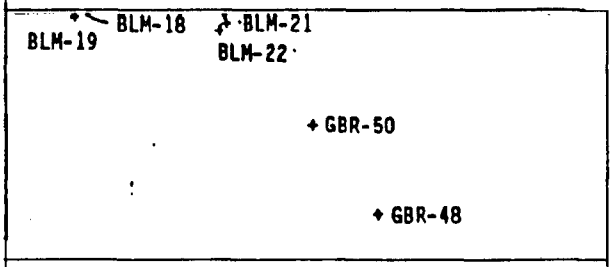
FIELD REP.: SAME

COMMENTS: MINOR DIESEL ON SPLIT SPOONS FROM SATURATED ZONE. BEDROCK @ 39'.

LOCATION DESCRIPTION: _____

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
30				7	33.0	34.5				33.0-33.8' CLAYEY SAND, dark olive brn, sand is fn-gr, well-sorted. Saturated. Faint HC odor.
										33.8-34.5 CLAY, as @ 28.0-29.5, but saturated & faint HC odor(?).
35				8	38.0	39.5				38.0-38.9' CLAYEY SAND, brn, sand is fn- to med- gr, mod sorting. Saturated. Faint HC odor(?).
										38.9-39.5' SANDSTONE, mottled tan/brn, med- gr, minor cs- gr, mod sorting. Poorly cemented, friable. Saurated.
40										
45										
50										
55										
60										

BOREHOLE LOG (SOIL)



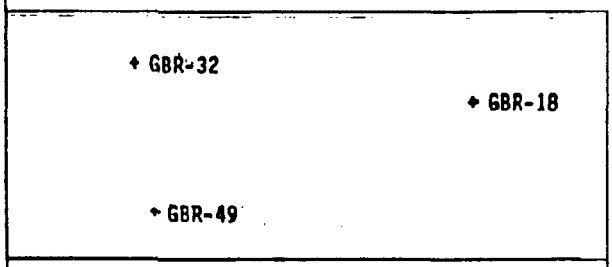
___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

Giant Bloomfield
SITE ID: Refinery LOCATION ID: GBR-48
SITE COORDINATES (ft.):
N 12159.02 E 11142.65
GROUND ELEVATION (ft. MSL): 5416.14
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Hollow Stem Auger/Continuous Sampler
DRILLING CONTR.: Western Technologies
DATE STARTED: 17 Oct 1988 DATE COMPLETED: 18 Oct 1988
FIELD REP.: Martin Nee
COMMENTS:

LOCATION DESCRIPTION:

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	0	3			SP	0'-23' Sand - Mod yelsh brn, 10 YR 5/4, v fn to crs sand, uncons, subangular to subrounded, well sorted moist from 13-14', v minor grv at 23'.
				2	3	8				
5										
				3	8	13				
10										
				4	13	18				
15										
				5	18	23				
20										
				6	23	28			SM	23'-26.5' Silty Sand - Mod yelsh brn, 10 YR 5/4, 75% v fn to med sand, 20% silt, 5% clay, uncons, subangular to subrounded, mod well sorted.
25										
				7	28	33			SC	26.5'-27.5' Clayey Sand - Mod yelsh brn, 10 YR 5/4, 70% v fn to med grained sand, 20% clay, 10% silt, uncons, subangular to subround, mod well sorted.
30										
									CL	27.5'-31' Silty Clay - Mod yelsh brn, 10 YR 5/4, 80% clay, 15% silt, 5% v fn sand.
				8	33	38			SP	31'-35' Sand - Mod yelsh brn, 10 YR 5/4, fn to coarse grained sand, uncons, mod well sorted, subangular to subrounded, minor gravel <3%.
35										
				9	38	43				35'-37' Cobbles/Gravel Refusal - No core.
40										37'-44' Shale - Light olive grey, 5 YR 2/2.
										TD = 44.0', 2" ss blank 43.6' to 38.4', ss 20 slot screen 38.4-28.4', 2" ss to 3' above surface, 10-20 sand to 23', bentonite to 17.5', grout w/5% bentonite to surface, 5"x6' cement filled steel guard pipe. 4'x4' concrete slab.
45										
50										

BOREHOLE LOG (SOIL)



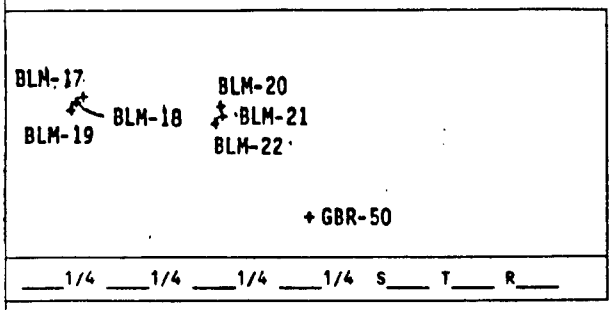
___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

Giant Bloomfield
SITE ID: Refinery LOCATION ID: GBR-49
SITE COORDINATES (ft.):
N 11908.13 E 11168.02
GROUND ELEVATION (ft. MSL): 5410.76
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Hollow Stem Auger/Continuous Sampler
DRILLING CONTR.: Western Technologies
DATE STARTED: 17 Oct 1988 DATE COMPLETED: 17 Oct 1988
FIELD REP.: Martin Nee
COMMENTS:

LOCATION DESCRIPTION:

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	0	3			SP	0'-22' Sand - Mod yelsh brn, 10 YR 5/4, v fn to coarse sand, uncons, sbang to sbrndd, minor slt.
				2	3	8				
5										7'-9' As above w/cobblers or boulders.
				3	8	13				
10										
				4	13	18				
15										15'-16' Same as 0-22 with 5% fn to med pebble gravel.
				5	18	23				
20										
				6	23	28			SM	22'-25' Silty Sand - Mod yelsh brn, 10 YR 5/4, 70% sand, v fn to coarse, moderately well sorted, uncons, sbang to sbrndd, 20% silt, 10% clay, minor, v fn to med pebble gravel.
25										
				7	28	33			SC	25'-33' Clayey Silty Sand - Silty sand and stringers (6") of silty clay, mod yelsh brn, 10 YR 5/4, v fn to med grained sand, uncons, sbang to sbrndd.
30										28' Appears moist.
									SM	33'-36.5' Silty Sand - Dk yelsh or, 10 YR 6/6, 80% sand, v fn to crs, uncons, sbang to sbrndd, well sorted, 20% silt, v minor clay.
35										
									SM	36.5'-40' Silty Sand - Lt olv brn, 5 YR 5/6, v fn to med grained sand, uncons, mod well sorted, sbang to sbrndd, 5% clay, 15% silt.
40										
									SC	40'-42.5' Clay - Lt blsh grey, 5B 7/11.
										TD = 42.5', 2" ss blank 38.5' to 36.3', ss 20 slot screen 36.3' to 25.9' 2" ss blank to 2.1' above surface, 10-20 sand to 21.0', bentonite to 16.45', grout with 5% bentonite to surface. 5"x6' cement filled steel guard pipe. 4'x4' concrete slab.
45										
50										

BOREHOLE LOG (SOIL)



___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

Giant Bloomfield
SITE ID: Refinery LOCATION ID: GBR-50
SITE COORDINATES (ft.):
N 12257.74 E 11067.82
GROUND ELEVATION (ft. MSL): 5413.13
STATE: New Mexico COUNTY: San Juan
DRILLING METHOD: Hollow Stem Auger/Continuous Sampler
DRILLING CONTR.: Western Technologies/Continuous Sampler
DATE STARTED: 19 Oct 1988 DATE COMPLETED: 19 Oct 1988
FIELD REP.: Martin Nee
COMMENTS:

LOCATION DESCRIPTION:

DEPTH	LITH.	REC	SAM	RUN #	RUN FROM	RUN TO	SAMPLE I.D.	SAMPLE TYPE	USCS	VISUAL CLASSIFICATION
0				1	0	3			SM	0'-15' Silty Sand - Mod yelsh brn, 10 YR 5/4, v fn to coarse sand, <5% fn to med pebble gravel, approx 15% silt, uncons, well sorted, sbang to sbrndd.
				2	3	8				
5										
				3	8	13				
10										
				4	13	18				
15										15'-23' Same as 0-15 with no gravel.
				5	18	23				
20										
				6	23	28			CL	23'-31' Clayey Sand - Mod yelsh brn, 10 YR 5/4, 20% clay, 10% silt, v fn to coarse sand, uncons, well sorted, sbang to sbrndd.
25										
				7	28	33				
30									SP	31'-37' Sand - Mod yelsh brn, 10 YR 5/4, <5% silt, <5% gravel, fn to coarse sand, uncons, mod well sorted, sbang to sbrndd.
				8	33	38				
35										
				9	38	42.5				37'-43.0' Carbonaceou Shale - dusty yelsh brn, 10 YR 2/2, mod well cons, minor Fe staining, <2% gravel.
40										
										TD = 43.0', 2" ss blank 42.5' to 37.26', ss 20 slot screen 37.26' to 26.91' 2" ss blank to 4.14' above surface, 10-20 sand to 20.19', bentonite to 15.44', grout with 5% bentonite to surface, 5"x6' cement filled steel guard pipe, 4'x4' concrete slab.
45										
50										

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

April 25, 1988

New Mexico Environmental Improvement Division
Groundwater/Hazardous Waste Bureau
P. O. Box 968
Santa Fe, New Mexico 87504

New Mexico Oil Conservation Division
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501

RE: Underground Storage Tanks

Gentlemen:

Please find enclosed an amended "Notification for Underground Storage Tanks" that reflects our removal of the tanks that were the subject of our April 1, 1986 notification.

Please call Chris Hawley of my staff if you need additional details.

Sincerely yours,

R W Traylor

Richard Traylor
Refinery Manager

RT/jm

Enclosure

cc: Joe Warr
Chris Hawley
Mike Macy

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 8-30-88

FOR TANKS IN NM

RETURN COMPLETED FORM TO

New Mexico Environmental Improvement Division
Ground Water/Hazardous Waste Bureau
P.O. Box 968 (505) 827-2933
Santa Fe, NM 87504 (505) 827-2918

STATE USE ONLY

I.D. Number

Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means:

(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances; and

(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:

1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. This form must by completed for each location containing underground storage tanks. If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached: 0

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)
Bloomfield Refining Company, Inc.

Street Address
P. O. Box 159, Sullivan Road

County
San Juan

City: Bloomfield, State: New Mexico ZIP Code: 87413

Area Code: (505) Phone Number: 632-8013

Type of Owner *(Mark all that apply [X])*

- [X] Current
- [ ] Former
- [ ] State or Local Gov't
- [ ] Federal Gov't (GSA facility I.D. no. _____)
- [X] Private or Corporate
- [ ] Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section I, mark box here [ ])

Facility Name or Company Site Identifier, as applicable

Street Address or State Road, as applicable

County

City (nearest) State ZIP Code

Indicate number of tanks at this location: 0

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands [ ]

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here [ ])	Job Title	Area Code	Phone Number
Chris Hawley	Environmental Engineer	(505)	632-8013

IV. TYPE OF NOTIFICATION

[X] Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed
Richard W. Traylor, Refinery Manager	R W Traylor	April 25, 1988

CONTINUE ON REVERSE SIDE

Owner Name (from Section I) Bloomfield Refining Co Location (from Section II) Bloomfield, N.M. Page No. 2 of 2 Pages

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location.)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
1. Status of Tank (Mark all that apply ☒) — Currently in Use	☐	☐	☐	☐	☐
Temporarily Out of Use	☐	☐	☐	☐	☐
Permanently Out of Use	☒	☒	☒	☐	☐
Brought into Use after 5/8/86	☐	☐	☐	☐	☐
2. Estimated Age (Years) at removal	7	7	7		
3. Estimated Total Capacity (Gallons)	12,000	5,000	500		
4. Material of Construction (Mark one ☒) — Steel	☒	☒	☒	☐	☐
Concrete	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
5. Internal Protection (Mark all that apply ☒) — Cathodic Protection	☐	☐	☐	☐	☐
Interior Lining (e.g., epoxy resins)	☐	☐	☐	☐	☐
None	☒	☒	☒	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
6. External Protection (Mark all that apply ☒) — Cathodic Protection	☐	☐	☐	☐	☐
Painted (e.g., asphaltic)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic Coated	☐	☒	☒	☐	☐
None	☒	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
7. Piping (Mark all that apply ☒) — Bare Steel	☒	☒	☒	☐	☐
Galvanized Steel	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Cathodically Protected	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify					
8. Substance Currently or Last Stored in Greatest Quantity by Volume (Mark all that apply ☒) — a. Empty	☐	☐	☐	☐	☐
b. Petroleum					
Diesel	☒	☐	☐	☐	☐
Kerosene	☐	☐	☐	☐	☐
Gasoline (including alcohol blends)	☐	☒	☐	☐	☐
Used Oil	☐	☐	☒	☐	☐
Other, Please Specify					
c. Hazardous Substance	☐	☐	☐	☐	☐
Please Indicate Name of Principal CERCLA Substance					
OR Chemical Abstract Service (CAS) No.					
Mark box ☒ if tank stores a mixture of substances	☐	☐	☐	☐	☐
d. Unknown	☐	☐	☐	☐	☐
9. Additional Information (for tanks permanently taken out of service) *					
a. Estimated date last used (mo/yr)	4 / 88	4 / 88	10/ 87	/	/
b. Estimated quantity of substance remaining (gal.)	0	0	0		
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)	☐	☐	☐	☐	☐

*TANKS WERE REMOVED

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 11:45 AM | Date 2/23/88

Originating Party: Howard Pollicoff (713) 664-7357 PCT Consultants, Houston P.O. Box 26901, 77207

Other Parties: David Boyer OCD

Subject: Gary Bloomfield Refinery

Discussion: Pollicoff called to ask about Gary's remedial efforts. He was up-to-date through 1987 on what had been done, and wanted our feeling on what progress had been made. He is doing this as part of a review for a letter of credit to finance their expansion and needs to know their environmental liabilities. I explained that they were behind in their work for us and that we were sending them letters requiring that they complete needed work. I told him letters were public and he could have copies. I told him to contact Guy Tidmore EPA RCRA Dallas (214 655-6775) for further information on EPA actions classifying them as TSD. Copies of letters sent as requested.

~~Conclusions or Agreements~~

Distribution: Gary File, Chris Hawley

Signed: David Boyer

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

February 23, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Chris Hawley
Bloomfield Refining Company
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Bloomfield Refinery Hydrocarbon Contamination; Proposed Remedial Action Plan.

Dear Mr. Hawley:

A review of the Bloomfield Refinery Company (BRC) file for contamination remediation schedules for implementation reveals the following time frames and deadlines. On March 4, 1986, the Oil Conservation Division (OCD) directed you to determine:

1. The lateral extent of the floating hydrocarbon zone in the vicinity of Hammond Ditch and Sullivan Road;

2. The extent of the dissolved hydrocarbon contamination of ground water in the cobble beds;

3. The direction and rate of movement of both the liquid hydrocarbon and dissolved contaminant phase. The study was directed to include investigation to the south of Sullivan Road and to the west of Hammond Ditch between the ditch and NM Highway 44.

In the letter you were also required to prepare an appropriate remedial action plan for Division review and approval. The plan was to be submitted no later than July 1, 1986, and would cover placement and design of recovery wells, a schedule for operation, and fluid treatment/disposal plans. Recovery activities pursuant to an approved remedial plan were to commence on or before October 1, 1986.

On July 30, 1986, the OCD commented on your submittal of June 30, and emphasized that the information provided and the installation of two recovery wells by October 1 were only the first step in defining and remediating the hydrocarbon contamination at the site. Additional information was required within 60 days.

On September 26, 1986, BRC proposed locations for two off-site monitoring wells and requested permission for installation of an initial recovery well, all to be completed within eight weeks after OCD's approval of locations and approval of the off-site property owners.

The OCD issued approval for the locations on October 24, 1986, at the same time informing you of our discovery of hydrocarbon contamination at the junction of Sullivan Road and Highway 44. The determination was made that additional wells would be required to verify the interpretation of the previously submitted Engineering Science data.

On August 26, 1987, the OCD was informed that BRC had installed monitor wells BRC-11 and BRC-12. Locations of these wells were not submitted with the lithologic logs and completion diagrams.

On October 9, 1987, BRC reported that samples from the monitor wells had been taken and that a pumping test had been performed on BRC-10 (the recovery well?) As of this date, the locations of these three wells have not been reported; neither the analyses nor the results of the pumping test have been submitted.

In light of this summary of events and failure of BRC to define the contamination plume in extent and magnitude, and to submit a valid recovery plan, Bloomfield Refining Company is hereby directed to perform the following:

1. Within 30 days from receipt of this letter, the recovery well pump test will be evaluated and submitted for OCD review along with the locations of all monitor and recovery wells and analyses of samples from BRC-11 and BRC-12.

2. Within 90 days, BRC will:

    a. define the hydrocarbon contamination plume in extent and magnitude using the presence of floating oil, 1, 2-dichloroethane (EDC) and/or BTX (benzene, toluene, xylene) as parameters;

    b. submit a schedule for the timely installation and completion of additional recovery and/or monitor wells;

    c. submit a schedule for operation of the recovery system; and

    d. submit plans for recovered fluid treatment and disposal.

Your cooperation in fully meeting these deadlines is necessary to preclude enforcement action.

Sincerely,

W. J. LeMay

William J. LeMay
Director

WJL:JB:sl

cc: OCD-Aztec

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 2:30 PM | Date 4/15/88

Originating Party: Hoyt Ambrosius (714) 240-6595
PILKO & Ass. Inc - Main Office Houston

Other Parties: David Boyer (OCD)

Subject: Gary Bloomfield Refinery

Discussion: Ambrosius called to ask about Gary's remedial efforts. He was up-to-date through summer '87 on what had been done and wanted our feeling on what progress had been made. He is doing this as part of their annual insurance renewal for environmental liability. I explained that they had been behind in their work for us, and we had just gotten their remedial plan. I explained that any remedial action would also have to consider salt extraction since their pollution also has high salt levels some of which is due to leaching from land application. Told him our decision is pending; My review has been delayed to staff dit.

Conclusions or Agreements:

Distribution:

Signed: David L Boyer

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

April 13, 1988

New Mexico Environmental Improvement Division
Groundwater/Hazardous Waste Bureau
P. O. Box 968
Santa Fe, New Mexico 87504

New Mexico Oil Conservation Division
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501

RE: Underground Storage Tanks

Gentlemen:

Please be advised that the removal of the underground storage tanks located at Bloomfield Refining Company was completed on April 11, 1988.

The excavated holes were inspected for evidence of hydrocarbon contamination. There was none. The removed tanks were inspected and found to be in excellent condition with no leaks. They are currently being stored at our facility and are available for your inspection if you so desire.

Please remove our facility from your records as an operator of underground storage tanks. Please call Chris Hawley of my staff if you need additional details.

Sincerely yours,

R W Traylor

Richard Traylor
Refinery Manager

RT/jm

cc: Joe Warr
Chris Hawley
Mike Macy

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
ALLIED BANK TOWER AT FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202

MAR 04 1988

Mr. Jack Ellvinger
Program Manager
Hazardous Waste Section
Groundwater and Hazardous Waste Bureau
Environmental Improvement Division
New Mexico Health and Environment Department
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Subject: Bloomfield Refining Company final closure plan, July 1986.
EPA I.D. No. NMD089416416

Dear Mr. Ellvinger:

My staff has reviewed the July 1986, closure plan submitted by Bloomfield Refining Company (BRC) in accordance with the U.S. EPA Consent Agreement and Final Order (Docket No. RCRA VI-501-H) signed November 26, 1985. This closure plan addresses closure of the API Wastewater Ponds, Landfill and Landfill Pond, as well as maintenance of the API Separator, North and South Evaporation Ponds, Slop Oil Tank, and Spent Caustic Tank. We offer the following comments on the closure plan to assist you in your review.

On the sampling conducted to determine closure methodology, it appears that all soil samples taken to determine the presence or absence of volatile aromatics were composite samples. If standard compositing techniques were followed, the procedure is to blend the aliquots to be composited until a homogeneous mixture is obtained and then sample a portion of the mixture to have analyzed for constituents. Such procedures are not appropriate when using volatile aromatics as the indicator parameters, as this methodology would tend to drive off the volatiles. Therefore, before a determination can be made about the presence of contaminants beneath the API Wastewater Pond liners, beneath the visible contamination zone in the Landfill Area, or in the sediments of the Landfill Pond, discrete samples must be taken and analyzed. The number of sample locations and depths used in proposing the July 1986 closure alternatives appears appropriate. However, sample handling should be as directed by SW-846. Head space analysis as well as residual volatiles analysis should be determined in each sample. Based on the results of these analyses, a determination should be made, consistent with SW-846, on the number of additional samples that will be necessary to confirm or deny the presence of contaminants at a confidence interval of 95% before developing the method of closure.

If BRC desires to close in place, or cannot show clean closure, they have the option of capping and groundwater monitoring the units to be closed, in conjuction with conducting the necessary corrective action.

BRC has demonstrated groundwater and surface water contamination, but has not defined the source of contamination. It must be assumed that this contamination originated from the units being closed until otherwise demonstrated. It is this Agency's position that if groundwater contamination exists and could have realistically been a result of migration from a land treatment unit, that unit cannot be clean-closed. We would therefore expect to see groundwater monitoring included in the closure plan. The closure plan as submitted would not be deemed adequate by EPA.

If you have any questions concerning this review, please do not hesitate to have your staff contact Guy L. Tidmore of my staff at (214)655-6775.

Sincerely,

William H. Taylor, Jr.

William H. Taylor
Chief
Enforcement Section

cc: Dave Boyer, NMOCD

STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

February 24, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Chris Hawley
Bloomfield Refining Company
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Discharge Plan Renewal

Dear Mr. Hawley:

The renewal of Bloomfield Refining Company's ground water discharge plan, GW-1, was approved for a five year term on June 7, 1984. This discharge plan was required and submitted pursuant to Water Quality Control Commission (WQCC) regulations and it will expire on June 7, 1989.

As part of the discharge plan renewal process, the following areas will need to be addressed in addition to updating those issues covered in the approved plan.

1. Land application area. Discontinuance of this method of effluent disposal will be required unless ponding, seepage, and nitrate and high total dissolved solids (TDS) leaching will be eliminated.

2. You have issued a press release that the refinery will be expanded in 1988. If you intend to make any changes in disposal method or volume of effluents, these changes must be approved by the OCD.

3. A Spill Prevention Control and Countermeasures (SPCC) plan must be submitted and approved. A contingency plan for the reporting of spills or accidental releases must be enforced.

   Enclosed for your use is a copy of the API Bulletin and federal guidelines for preparation of an SPCC Plan. If you have already submitted an SPCC plan to the appropriate federal agency, a copy of the plan with spill/leak reporting to the OCD added will be sufficient. If you have not developed and submitted an SPCC plan previously, you must develop a plan that includes the information in the guidelines and that designates the NMOCD as the regulating and reporting authority.

4. All underground piping older than 25 years in age must be scheduled for pressure testing and repair or replacement where necessary.

5. All underground storage tanks must be scheduled for pressure testing, repair or replacement. Where replacement is necessary, a leak detection system will be installed.

Due to the length of time involved in the review and renewal of a discharge plan, you are urged to begin submittals of the required information by June, 1988. You are cautioned that pursuant to WQCC regulations, you have used your sole 120-day extension authorized in WQCC Regulation 3-106.B for discharging without an approved plan. An extension of time to complete the renewal process can only be granted by the Water Quality Control Commission via an "Assurance of Discontinuance."

If you have any questions, please contact Jami Bailey at 827-5884.

Sincerely,

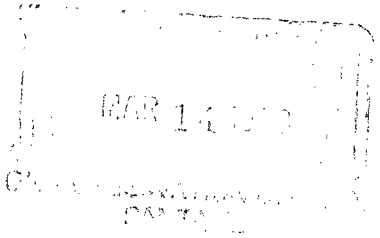
David G. Boyer
Environmental Bureau Chief

DGB:JB:sl

cc: OCD - Aztec

Encl.

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary



March 8, 1988

Mr. David G. Boyer
State of New Mexico
Oil Conservation Division
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501

Mr. John Gould
State of New Mexico
Environmental Improvement Division
Hazardous Waste Management Section
1190 St. Francis Drive
P. O. Box 968
Santa Fe, New Mexico 87504-0968

Mr. Guy L. Tidmore
EPA Region VI
Hazardous Waste Management Division
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: Groundwater Remedial Action at Bloomfield Refining Company

Gentlemen:

As we indicated in our meeting with you on January 26, 1988, a "Site Investigation and Remedial Action Conceptual Design for the Bloomfield Refining Company" was recently completed by Geoscience Consultants, Ltd. of Albuquerque, New Mexico. A report of this investigation has been provided for your information. The report also contains the information requested by William J. LeMay in his letter of February 23, 1988 concerning the recovery pump test on monitoring well 10 and the data concerning locations of all monitor wells and analyses of samples from monitor wells 11 and 12.

Geoscience Consultants were directed to continue a site investigation for the purpose of identifying offsite migration of hydrocarbons and providing a "conceptual" design of a remedial action for the existing and any offsite contamination. In addition, their investigation provided the basis for planning additional work. Based on the conclusion of their report (primarily that dissolved hydrocarbons have reached offsite monitoring well 11), Bloomfield Refining Company proposes to proceed immediately, upon receiving your mutual approval, with the following action:

1. Conduct a soil boring program (see GCL report for details) designed to determine the extent of the plume along the south side of Hammond Ditch. If BLM and your approval can be promptly obtained, this can be easily completed within 90 days as requested by Mr. LeMay's letter of February 23, 1988.

2. Simultaneously with the soil boring program, perform a long-term pump test on monitoring wells 4 and 10 (determined by GCL to be strategically located as part of a 3-well recovery system) to provide the data necessary to locate a third recovery well.

3. Plan and specify a remedial action to include implementation schedules, tentatively proposed as air-stripping. The specifications will propose that the treated groundwater be returned via infiltration trenches located downstream of the plume provided that this is practical based on the soil boring program.

Since the soil boring and infiltration trenches will be located on BLM managed property, Bloomfield Refining Company requests your direction on how to best proceed with obtaining the necessary permits. If you feel that we need to get the remedial action started immediately, we request that you suggest alternative infiltration trench locations.

Again, we would like to reiterate our commitment toward making our facility as environmentally sound as possible. In addition to our ongoing study and plan development for groundwater remediation, we have been pursuing an active program of source reduction that will substantially reduce the potential of future releases to the groundwater.

We are pleased that all interested agencies are working jointly with us concerning our groundwater remedial action plan. This allays our concerns about duplication of work that could have resulted in further delays in our proposed plan. Please contact me or Chris Hawley of my staff if you need any additional information.

Sincerely yours,

R W Traylor

Richard W. Traylor
Refinery Manager

RWT/jem

cc: Joe Warr
Chris Hawley
Mike Macy

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

)

GARREY CARRUTHERS
GOVERNOR

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

February 8, 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Chris Hawley
Bloomfield Refining Company
P. O. Box 159
Bloomfield, New Mexico 87413

RE: Removal of Water from Hammond Ditch

Dear Mr. Hawley:

On January 26, 1988, personnel from the Oil Conservation Division (OCD), EPA and EID walked along Hammond Ditch with you, inspecting oil seeps along the banks of the ditch from near the bridge on Sullivan Road around to the weir on the northeast corner of the property. At that time, I also broke through the ice and took specific electrical conductivity measurements (enclosed) and a sample of the ditch water. There was clear evidence of oil and high total dissolved solids (TDS) water seeping into the ditch from the surface water impoundments and from other sources on the refinery property.

Prior to the opening of the ditch for irrigation, Bloomfield Refining Company will be required to remove all fluid from the ditch from the east Sullivan Road siphon to the earthen dam in the ditch south of Sullivan Road. Such fluid is to be disposed in a manner approved by the OCD. This work is to be completed within the week prior to the removal of dams on the ditch, or use of the ditch for irrigation purposes. Close coordination between BRC and the Hammond Conservancy District is obviously necessary to prevent the present high TDS water from being allowed to move downstream.

You are required to notify this office one week prior to the date you will begin cleanup of the ditch, and also the date the ditch will open for the irrigation season.

If you have any questions, please contact Jami Bailey at 827-5884.

Sincerely,

David G. Boyer
Environmental Bureau Chief

DGB:JB:sl

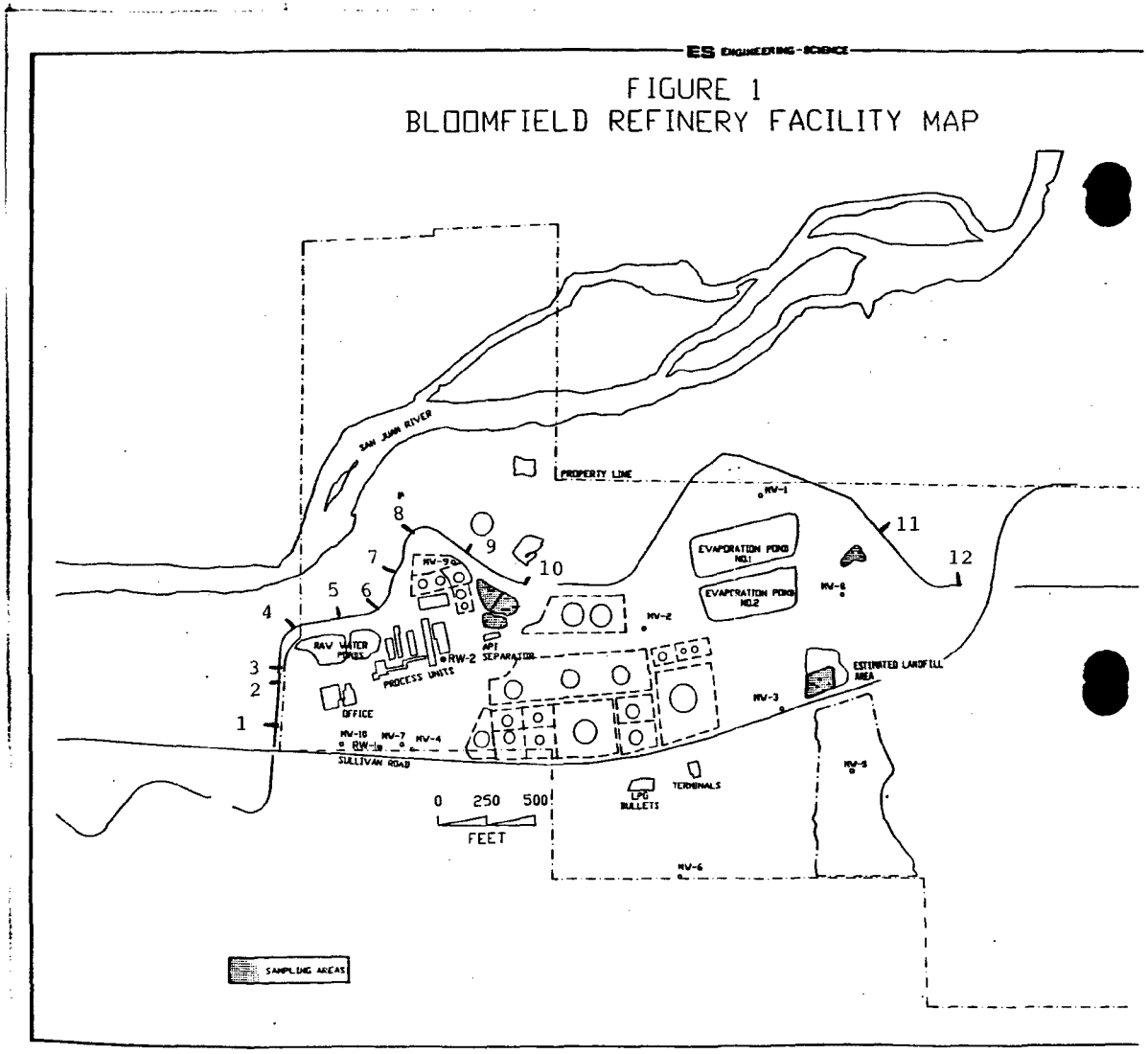
Enc.

cc: OCD - Aztec

SPECIFIC ELECTRICAL CONDUCTIVITY
MEASUREMENTS -- January 26, 1988
(D. Boyer, J. Bailey, NMOCD)

1. 2320 umhos @ 2° (Hydrocarbon odor)*
2. 2300 umhos @ 2°C.
3. 2250 umhos @ 2°C.
4. 800 umhos @ 2°C.
5. 750 umhos @ 2°C.
6. 750 umhos @ 4°C.
7. 2450 umhos @ 1.5°C. (H.C. sheen)
8. 2000 umhos @ 1.5°C.
9. 1790 umhos @ 0.5°C. (Oil on ice)
10. 1900 umhos @ 3°C. (Oil on ice)
11. 3420 umhos @ 5°C. (Thin ice)
12. Dry ditch at siphon exit.

*Oil seeping from bank onto ice at this location. EC and water sample taken from oil-free area at center of ditch several feet downstream from seep area. Sample to be analyzed for aromatic hydrocarbons and major salts (TDS, Cl, SO_4, etc.). Oil seen on ice at other locations near sampling locations 7 - 10. All EC measurements taken by breaking through 4 to 6 inches of ice and dropping probe through hole.



NEW MEXICO
HEALTH AND ENVIRONMENT
DEPARTMENT

Post Office Box 968
Santa Fe, New Mexico 87504-0968

GARREY CARUTHERS
Governor

LARRY GORDON
Secretary

CARLA L. MUTH
Deputy Secretary

January 12, 1988

INSPECTION REPORT
BLOOMFIELD REFINING COMPANY
NOVEMBER 3, 1987

BY: Mike Sanders and John Gould

The inspectors arrived at 8:26 A.M., on November 3rd, met Chris Hawley (Environmental Engineer) and Richard Traylor, (Refinery Manager) and conducted a pre-inspection interview. The following information is derived from file reviews, the on-site inspection and information provided by the facility representatives.

On August 13, 1986, a CEI was conducted at BRC by James Henderson of NMEID. This inspection resulted in a NOV (11/21/86) listing 28 violations of the NMHWMR. Of these 28 violations:

2 concerned training of personnel,
2 concerned caustic (NaOH) storage tank,
23 concerned issues relating to TSD status of facility, and
1 concerned submittal of new Part A when ownership changed from Plateau to Bloomfield Refining Company.

BRC responded to this NOV in a lengthy response through their legal counsel Gardere & Wynne dated 12/23/86. In this response, BRC again categorically denied TSD status and the allegations in the NOV. However, during this must recent inspection it was determined that the non-TSD related issues had been addressed at the facility. General refinery training procedures as described to the inspectors were determined to be adequate in regard to hazardous waste handling procedures at the facility. The two violations covering the caustic tank were:

1) Failure to have formal closure plan, and
2) Failure to submit such plan to EID

The tank has been cleaned and the waste properly manifested and shipped to a disposal facility. Although such closure without an approved closure plan is a violation of the regulations, the fact remains that closure has been completed, and was verified as satisfactory by the inspectors. Although technically a violation, the issue is considered moot at this point.

No revised Part "A" notifying change in ownership from Plateau to BRC (1984) was located in the file. Since this is a TSD requirement, BRC probably never renotified, as this would in a sense be admitting TSD status.

As stated above, BRC had to-date not corrected any of the TSD related violations cited in the 11/21/86 NOV. The inspectors therefore felt that it would be pointless to complete another TSD checklist when nothing had changed since the Henderson inspection. A meeting of NMEID and EPA personnel has been scheduled for the week of January 25-29, 1988, and will include an on-site inspection at BRC and completion of the TSD checklist. It is anticipated that during this meeting the process of resolving the TSD/Generator controversy can begin.

The TSD status of BRC is based on what has been considered to be a HW landfill on the facility property. The material in the landfill was derived from the process of installing polyethylene liners in the North Oily Water Pond and the South Oily Water Pond at the direction of the New Mexico Oil Conservation Division (OCD). When liners were installed, the sludge in the bottom of the ponds was believed to have contained at least some API separator sludge which is a listed HW, and was handled and disposed of as such. According to BRC, only visibly contaminated soil underlying the sludge (not sludge itself) was removed to a landfill on BRC property after testing showed that the material was not E.P. Toxic for lead or chromium. This information has not been substantiated by EID inspectors. Because the soil contamination resulted from contact with sludge derived from an API separator regulatory agencies have contended that BRC is a TSD because a listed hazardous waste has been disposed of on company property. However, BRC contends that because the disposed material is not actual API separator sludge, and since it displayed no hazardous waste characteristics at the time of disposal, it is not a hazardous waste and may be legally disposed of on-site, and does not result in TSD status.

In order to settle this issue Bloomfield Refinery Company has offered to remove landfilled-material, and dispose of it as a hazardous waste.

Another environmental concern is the contamination the shallow perched alluvial aquifer beneath the complex, as a result of Refinery operations, which contains hazardous constituents. The NMOCD is requiring remedial action to clean up this aquifer. In addition to complying with WQCC regulations in regard to this cleanup, RCRA regulations must also be satisfied. In case of regulatory overlap, those regulations considered most stringent would take precedence. BRC management has expressed willlingness to begin cleanup activities when it becomes clear that such a program will fulfill all applicable and pertinent regulations.

On January 26, 1988, a follow-up visit to Bloomfield was conducted by John Gould and Mike Sanders , of EID, and Guy Tidmore of EPA. Also present at the meeting were Frank Chavez, Jami Bailey and Dave Boyer of OCD, as well as Chris Hawley, Mike Macy and Richard Traylor of Bloomfield Refining.

During the meeting a TSD checklist was completed and discussed. In addition, a plant tour was conducted, including a visit to Hammond Ditch where numerous seeps of what appeared to be hydrocarbons were noted.

I have been informed that EPA has determined that Bloomfield is a TSD facility and that violations discovered during the recent inspection will be addressed through a 3008H to be issued by EPA. The violations will be discussed with Guy Tidmore and will include the fact that Bloomfield did not submit a new Part A following the purchase of the facility from Plateau.

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

December 9, 1987

Mr. David G. Boyer
State of New Mexico
Oil Conservation Division
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501

RE: Discharge Plan GRW-1-A, Bloomfield Refining Company

Dear Mr. Boyer:

Analytical results required by the discharge plan for groundwater monitoring wells P1, P4, and P5 are enclosed. The wells were sampled on November 17, 1987.

Please contact me if there are any questions.

Sincerely,

Chris Hawley
Environmental Engineer

CH/jm

Enclosures

cc: Richard Traylor
Mike Macy
Joe Warr

Wells Sampled for 1,2-dichloroethane analyzed for 1,2-dichloroethene by Lab

BLOOMFIELD REFINING COMPANY
SAMPLE DATE: NOV. 17, 1987

PARAMETER	UNITS	NOMINAL DETECTION LIMITS	NMWQ STANDARD	MONITORING WELL P1	MONITORING WELL P4	MONITORING WELL P5
Arsenic	mg/l	0.005	0.1	<0.005	<0.005	<0.005
Barium	"	0.5	1.0	<0.5	1.8	<0.5
Cadmium	"	0.002	0.01	<0.002	<0.002	<0.002
Chromium	"	0.02	0.05	<0.02	<0.02	<0.02
Lead	"	0.02	0.05	<0.02	<0.02	<0.02
Mercury	"	0.001	0.002	<0.001	<0.001	<0.001
Selenium	"	0.005	0.05	<0.005	<0.005	<0.005
Silver	"	0.01	0.05	<0.01	<0.01	<0.01
Copper	"	0.01	1.0	<0.01	<0.01	0.01
Iron	"	0.05	1.0	<0.05	4.59	<0.05
Manganese	"	0.02	0.2	1.45	4.77	<0.02
Zinc	"	0.01	10.0	<0.01	<0.01	<0.01
Uranium	"	—	5.0	—	—	—
Chloride	"	1	250.	910.	588.	1310.
Sulfate	"	1	600.	655.	<1	1060.
PCB	"	—	0.001	—	—	—
Phenols	"	0.005	0.005	0.02	0.73	<0.005
Cyanide	"	0.005	0.2	<0.005	0.005	0.016
Nitrate as N	"	0.01	10.	5.66	0.03	36.4
Aluminum	"	0.1	5.	<0.1	<0.1	<0.1
Boron	"	0.1	0.75	0.32	0.59	0.54
Cobalt	"	0.02	0.05	<0.02	<0.02	<0.02
Molybdenum	"	0.02	1.0	<0.02	0.03	<0.02
Nickel	"	0.01	0.2	<0.01	<0.01	<0.01
Fluoride	"	0.1	1.6	0.76	0.19	0.24
TDS	"	1	1000.	3050.	2050.	4300.
Benzene	"	0.001	0.01	ND	8.5	ND
Toluene	"	0.001	0.75	ND	0.023	ND
Carbon Tetrachloride	"	0.001	0.01	ND	ND	ND
1,2-Dichloroethane	"	0.001	0.01	ND	ND	ND
1,1-Dichloroethylene	"	0.001	0.005	ND	ND	ND
1,1,2,2-Tetrachloroethylene	"	0.001	0.02	ND	ND	ND
1,1,2-Trichloroethylene	"	0.001	0.01	ND	ND	ND
pH	S.U.	0.1	6 TO 9	7.0	6.5	6.9

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

October 9, 1987

Mr. David Boyer
NMOCD
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501

RE: Progress Report for Groundwater Monitor Well Sampling at Bloomfield Refining Company

Dear Mr. Boyer:

Bloomfield Refining Company is pleased to submit the September progress report for the groundwater monitor well installation and sampling program at the Bloomfield Refinery. The two monitor wells, BRC-11 and BRC-12, that were installed in July and August were sampled on September 11, 1987. The samples were submitted to Assaigai Analytical Laboratories for analysis. The results are pending.

Additionally, a pumping test has been conducted on BRC-10 and the results are currently being evaluated.

Please call me if you have any questions.

Sincerely yours,

Chris Hawley
Environmental Engineer

CH/jm

Enclosure

cc: Joe Warr
Richard Traylor
Mike Macy
Mike Leger

Gary Refining Company
A Gary Energy Corporation Subsidiary

August 26, 1987

Mr. David Boyer
NMOCD
P.O. Box 2088
Land Office Building
Santa Fe, NM 87501

RE: PROGRESS REPORT FOR INSTALLATION OF MONITOR WELLS AT BLOOMFIELD REFINERY

Dear Mr. Boyer:

Bloomfield Refining Company is pleased to submit the progress report for the monitor well installation program at the Bloomfield Refinery. Two monitor wells were installed and developed on July 31 and August 1, 1987. Lithologic logs and monitor well completion diagrams are enclosed. The wells are scheduled to be sampled, and a pump test conducted, the first week in September.

Please call me if you have any questions.

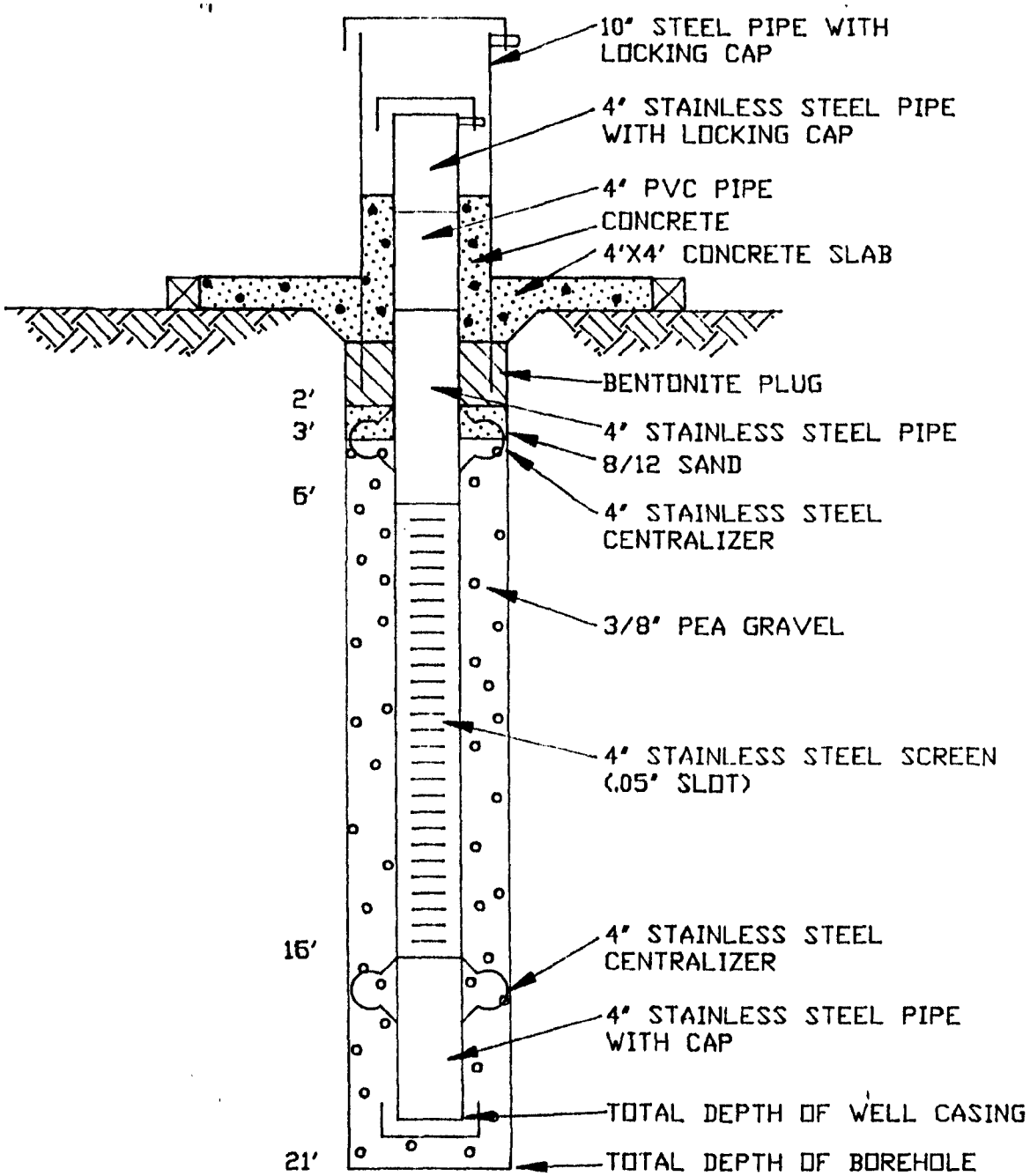
Bloomfield Refining Company

Chris Hawley
Environmental Engineer

CH/jm

Enclosure

cc: Richard Traylor
Joe Warr
Mike Macy
Mike Leger, Turner, Mason & Company



MONITOR WELL BRC-11

LITHOLOGIC LOG

LOCATION MAP:

___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: BRC-11

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): _____

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR CASING DRIVER ROTARY

DRILLING CONTR.: BEEMAN

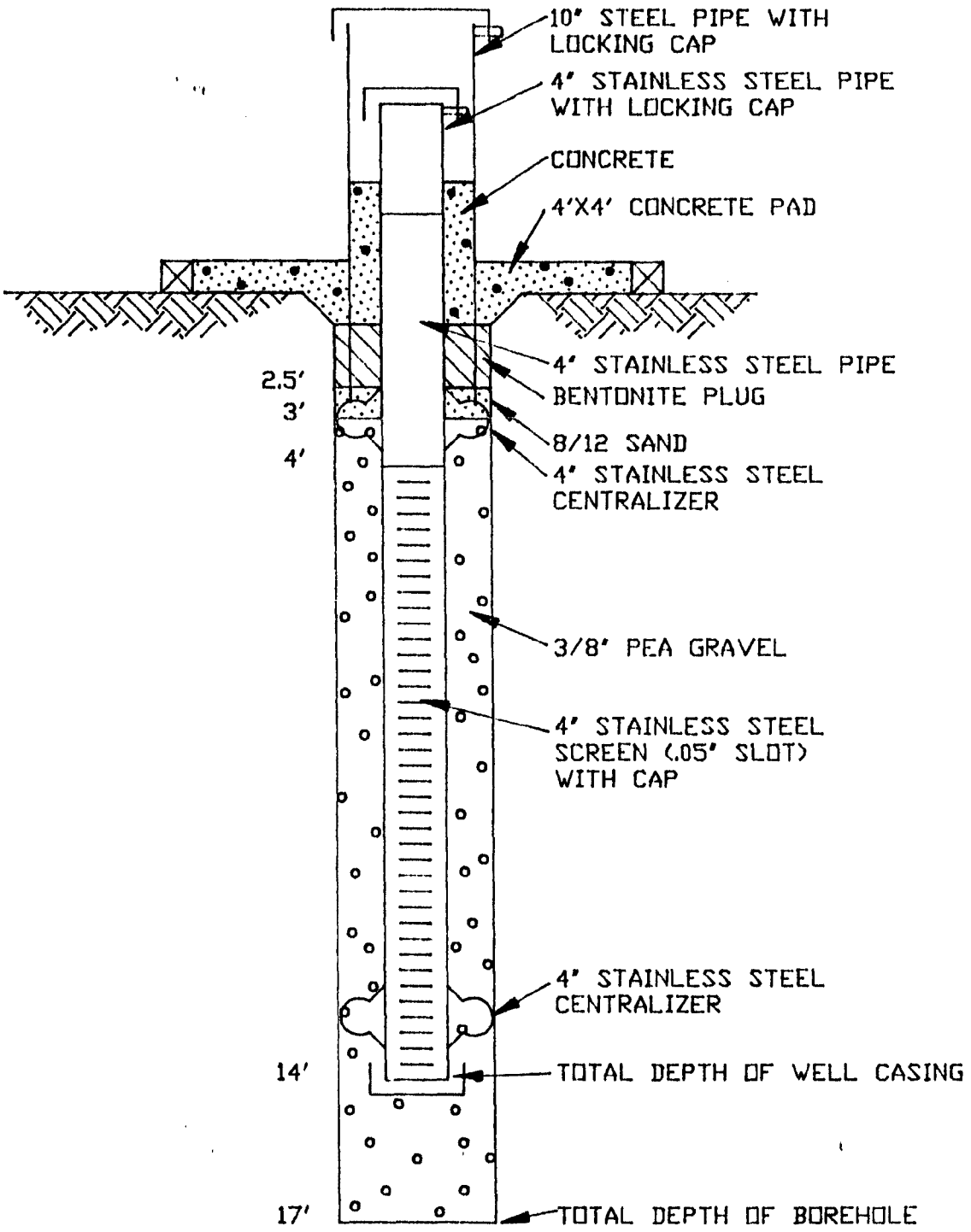
DATE STARTED: 7-31-87 DATE COMPLETED: 7-31-87

FIELD REP.: KASZUBA/SELKE

COMMENTS: STEAM CLEANED RIG AND ALL TOOLS PRIOR TO DRILLING.

LOCATION DESCRIPTION: TD-21'

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description	
5				0- 5'	0 - 5'	SAND, mod yelsh brn (10YR5/4), fine to med. gr. sand w/minor crs gr. sand and pebble gravel (up to 1"). Unconsolidated, moderately well sorted, subrounded, no odor.
10				5-10'	5 -10'	GRAVELLY SAND, olive gray (5Y4/1), fine to med. gr. sand w/minor crs gr. sand unconsolidated, mod. well sorted, subrounded, gravel clasts (⅛" to 2") subrounded. Moderate degradation odor.
15				10-12½'	10 -12.½'	SANDY CLAY, lt. olive gray (5Y5/2), fine to med. gr. sand in clay matrix no odor.
20				12½-15' 15-21'	12½-15' 15 -21'	SANDY CLAY, as above. SANDY CLAY, yelsh gray (5Y7/2), fine gr. sand in clay matrix, clay chips up to 1½" from moderately consolidated clay (or weathered shale).
25					NOTE:	Saturation from ~7-8' to ~12½'
30						
35						
40						
45						
50						



MONITOR WELL BRC-12

LITHOLOGIC LOG

LOCATION MAP:

___1/4 ___1/4 ___1/4 ___1/4 S___ T___ R___

SITE ID: BRC LOCATION ID: BRC-12

SITE COORDINATES (ft.):

N _____ E _____

GROUND ELEVATION (ft. MSL): _____

STATE: NEW MEXICO COUNTY: SAN JUAN

DRILLING METHOD: AIR CASING DRIVER ROTARY

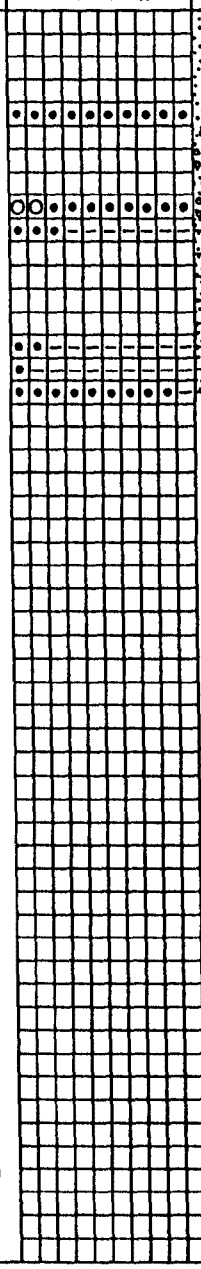
DRILLING CONTR.: BEEMAN BROTHERS

DATE STARTED: 8-1-87 DATE COMPLETED: 8-1-87

FIELD REP.: KASZUBA

COMMENTS: SATURATED FROM ~5'--12'. TD=17'.
STEAM-CLEANED ALL TOOLS PRIOR TO DRILLING.

LOCATION DESCRIPTION: _____

Depth	Visual %	Lith	Drilling Time Scale:	Sample Type and Interval	Lithologic Description
5				0- 5'	0- 5' SAND, mod yellowish brwn (10YR5/4), fine-to med-grained sand, unconsolidated, well-sorted, subrounded. No HC odor. Saturated @ ~5'.
10				5- 9'	5- 9' SAND, as above. Saturated. Gravelly sand @ 9'. Subrounded gravel, 2" dia.
				9-10'	9-10' SANDY CLAY, dusky yellow (5Y6/4), fine-to med-gr sand in clay matrix. No HC odor. Saturated.
15				10-15'	10-15' SANDY CLAY, as above. Minor chips of clay (shale), ~10%. Saturated to ~12'.
				15-16'	15-16' SANDY CLAY, as above. Clay chips up to ½" (moderately consolidated clay or weathered shale). Contains <10% gypsum. No HC odor.
20				16-17'	16-17' CLAYEY SAND, dusky yellow (5Y6/4), sand is fine-grained, well-sorted, No HC odor.
25					
30					
35					
40					
45					
50					

United States Department of the Interior
BUREAU OF RECLAMATION
UPPER COLORADO REGION
DURANGO PROJECTS OFFICE
P.O. BOX 640
DURANGO, COLORADO 81301

IN REPLY
REFER TO: 751
452.

JUL 2 1987

Mr. Roger C. Anderson
Energy and Minerals Department
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87501

RE: Your letter to Mr. Steve Reynolds concerning oil and gas industry related salt loading as discussed in the Department of Interior's Progress Report No. 13 "Quality of Water, Colorado River Basin".

Dear Mr. Anderson:

In July of 1986, we supplied information about three leaking wells or suspected leaking well locations to your office, some of which were not identified by location accurately. On April 3, 1987, you reported a summary of your investigations to Mr. Steve Reynolds conveying as much information as you were able to put together based on our sketchy information. We would like to improve or verify this information and ask a few more specific questions about these areas.

a) Mesa Petroleum, Navajo 32 No. 1 located in section 32 appears to be the leaking well that we were concerned about. We had given you the incorrect section number. This well was reported as being turned over to the Navajo Nation for stock water. At 6,270 mg/l total dissolved solids (TDS), this water is very poor quality for stock water. Additionally, there is a windmill fed stock tank with good quality water about 1/3 mile from this leaking well which makes its flow unnecessary. Is there a mechanism or process by which this well can be released from this use and plugged?

b) A private gas line in the town of Blanco, New Mexico, in the area of Amoco Candelaria Gas Community No. 1 and the Amoco Valencia Gas Community "B" No. 1M was mentioned as having numerous leaks in your summary to Mr. Reynolds. Is it possible that this leaking line could also be leaking saline water? If so, who is responsible for its operation and maintenance, where is it located, and are there procedures and/or funds that are used for repair of such facilities.

c) The well and seep that we identified as being in Section 26, T31N, R20W is actually in the NW1/4 of SE1/4 of NE1/4 of Section 27, T31N, R20W. Again, we had given you the incorrect section number. While ponded water around the leaking well head was about 3000 mg/l TDS (OK for stockwater quality), other seeps in the area had concentrations in excess of 8000 mg/l. Are there records on abandoned wells in this area?

Our concerns about salt loading from the Gary Energy Corporation Refinery in Bloomfield, New Mexico, is related to their on-land application of saline wastewater. Over the past year and a half we have observed frequent applications of an effluent having a TDS of 4,150 mg/l to an area of about 6 acres using three big gun sprinklers. These applications are made on an almost daily basis and by far exceed the potential evaporation rate from the surface of such a small area. Our investigations show this water to be percolating down through permeable upper aeolian soils until reaching a gravel and cobble lense which lies on top of the Niciemento shale. The water then flows through the gravels on the shale contact until daylighting in a small drainage to the east of the plant and along the hillside above the San Juan River. The water, as it emerges in the drainage crossing Sullivan Road, just to the east of the plant has a TDS of 9,380 mg/l.

The disposal area is contributing to a groundwater system which is perched on an impermeable saline aquiclude and is daylighted topographically on three sides, north, east, and west. Because of this, the total dissolved solids disposed of on the surface eventually make it into the San Juan River. Additionally, with little opportunity for concentration through evaporation, the increase in salinity is apparently due to a pick-up of salts from the underlying shale. In this particular case, there would be less total salt loading to the San Juan River if the effluent were directly discharged to the river. Although this does not necessarily hold true for other possible contaminants in the effluent, it is certainly a concept worth considering.

You mentioned in your summary to Mr. Reynolds that the refinery was permitted for unlined ponds as well as land application areas and we have observed two such ponds being built. This is of concern to us because ponding will provide opportunity for significantly increased head on that groundwater system. At present, we estimate about 460 tons per year TDS from the plant effluent are discharged as surface flows from the small drainage crossing Sullivan Road just to the east of the plant. This does not include discharge from the subsurface in the alluvium or from other hydraulic boundaries daylighted to surface drains around the plant. If there are metered records for disposal of this effluent, an accurate estimate of the refinery's salt loading contributions could be made. If these records are available, we would appreciate access to the information. If such records are not being kept, we would suggest that such information would be useful in assessing impacts and feasibility of economic control.

If you have any further information which might be helpful to us or have questions on the subject, please contact Steve Hansen or Errol Jensen of our office at 303-385-6500.

Sincerely yours,

Rick L. Gold

Rick L. Gold
Projects Manager

cc: Mr. S.E. Reynolds, State Engineer
State Engineer Office
Bataan Memorial Building
Santa Fe, New Mexico 87503

United States Department of the Interior
BUREAU OF RECLAMATION
UPPER COLORADO REGION
DURANGO PROJECTS OFFICE
P.O. BOX 640
DURANGO, COLORADO 81301

IN REPLY
REFER TO: 430
160.

APR 23 1987

Mr. David G. Boyer, Environmental Bureau Chief
Oil Conservation Division
New Mexico Energy and Minerals Department
P.O. Box 2088
Santa Fe, New Mexico 87501

Dear Mr. Boyer:

Pursuant to the telephone discussion between yourself and Mr. Pat Schumacher of my staff, the recent use of the Hammond Main Canal by the Bloomfield Refinery in their oil recovery program requires better coordination between the parties involved.

To facilitate better coordination in the future, we would like to recommend a meeting on site to discuss and establish the proper approval process. Please coordinate the meeting time and date with Mr. Schumacher in our office, telephone (303) 385-6558.

Sincerely yours,

Rick L. Gold

Rick L. Gold
Projects Manager

cc: Mr. Nicholas Ashcroft
Hammond Conservancy District
P.O. Box 517
Bloomfield, New Mexico 87413

GARDERE & WYNNE
ATTORNEYS AND COUNSELORS

1500 DIAMOND SHAMROCK TOWER
DALLAS, TEXAS 75201

214-979-4500

TELECOPIER 214-979-4667
CABLE: GARWYN
TELEX 73-0197

WRITER'S DIRECT DIAL NUMBER

214-979-4569

April 9, 1987

VIA FEDERAL EXPRESS

Mr. Harry Peden, Jr.
Whitman & Ransom
100 Field Point Road
Greenwich, Connecticut 06830

Re: Bloomfield Refining Company/Avis Salmon Property

Dear Mr. Peden:

I am writing in further reference to Bloomfield Refining Company's request for permission to install a groundwater monitoring well on property owned by your client, Mrs. Avis Salmon. (See attached correspondence.) I have tried to reach you by phone the last couple of days, but have been unsuccessful.

Yesterday I received a call from the New Mexico Oil Conservation Division (NMOCD) inquiring as to whether or not permission for the well had been received. The NMOCD desires to have this well installed promptly. We, therefore, urge you to review our request at your earliest possible convenience. I will try to contact you by phone again to follow-up further on this letter.

Sincerely,

Joseph F. Guida

JFG/rd/0605S

Attachment

bcc: Mr. Dave Boyer/VIA FEDERAL EXPRESS
Mr. Chris Howley
Mr. Mike Leger

GARDERE & WYNNE
ATTORNEYS AND COUNSELORS

1500 DIAMOND SHAMROCK TOWER
DALLAS, TEXAS 75201

214-979-4500

TELECOPIER 214-979-4667
CABLE: GARWYN
TELEX 73-0197

WRITER'S DIRECT DIAL NUMBER

214-979-4571

March 6, 1987

Mr. Harry Peden, Jr.
100 Field Point Road
Greenwich, Connecticut 06830

Re: Bloomfield Refining Company
Groundwater Monitoring Well

Dear Harry,

As a follow-up to your telephone conversation with Joe Guida yesterday, and pursuant to your request, I am sending you a copy of a letter to Mrs. Avis Salmon requesting authorization to install a groundwater monitoring well on her property.

Please let me know if you have any questions or if I can be of further assistance.

Very truly yours,

Carol L. Dorge

CLD/rd/0176S
Enclosure
bcc: Mike Leger

Sent Fax 3/25/87

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

December 31, 1986

Mr. David G. Boyer
Hydrogeologist/Environmental Bureau Chief
State of New Mexico
Oil Conservation Division
P. O. Box 2088
Land Office Building
Santa Fe, New Mexico 87501-2088

RE: Bloomfield Refining Company Remedial Action Plan

Dear Mr. Boyer:

Please be advised that we have completed the application to install a groundwater monitoring well on the federal land to the south of our refinery. In addition, we are awaiting the written approval of Mrs. Avis Salmon to install a groundwater monitoring well on her land to the west of our refinery. I will notify you when the landowners' approvals are obtained.

Sincerely,

Chris Hawley
Environmental Engineer

CH/jm

Cc: Richard Traylor
Mike Leger
Mike Macy
Joe Warr

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

December 22, 1986

Mrs. Avis Salmon
23 Orchard Hill Lane
Greenwich, Connecticut 06830

Dear Mrs. Salmon

As discussed in the telephone conversation that Mr. Bob McCoy had with you on December 2, 1986 in our office, Bloomfield Refining Company (BRC) would like to install a groundwater monitoring well on your property which is just west of the refinery. The attached map shows the proposed site of the well.

The purpose of the monitoring well will be to periodically obtain small samples of the groundwater for quality analysis. We regularly sample and analyze the shallow water table immediately beneath the refinery and have been asked by the New Mexico Oil Conservation Division to expand our quality monitoring program to include the areas to the west and south of our property.

The monitoring well will consist of a six-inch diameter PVC pipe with a screened section in the saturated zone installed to a maximum of 40 feet below grade. The visible portion will consist of about two feet of pipe extending above grade set in a small (3'x3'x0.5') concrete surface seal. The small amounts of water required for sampling and analysis will filter into the well through the screened section and will be collected on foot with a one-gallon bailer to minimize impact to your property. During the installation, which would take about two days, we propose to work closely with Mr. Bob McCoy to assure that disturbance to your property is minimal. We would install the well within eight weeks after receiving your permission and would probably obtain samples on a quarterly basis for a year. Unless further sampling is required, we could seal the well and remove the surface portion at that time.

If you have any questions regarding this matter, please feel free to contact me. Please indicate your permission to install the proposed monitoring well on your property by signing below.

Sincerely yours,

Richard Traylor
Refinery Manager

RT/jm

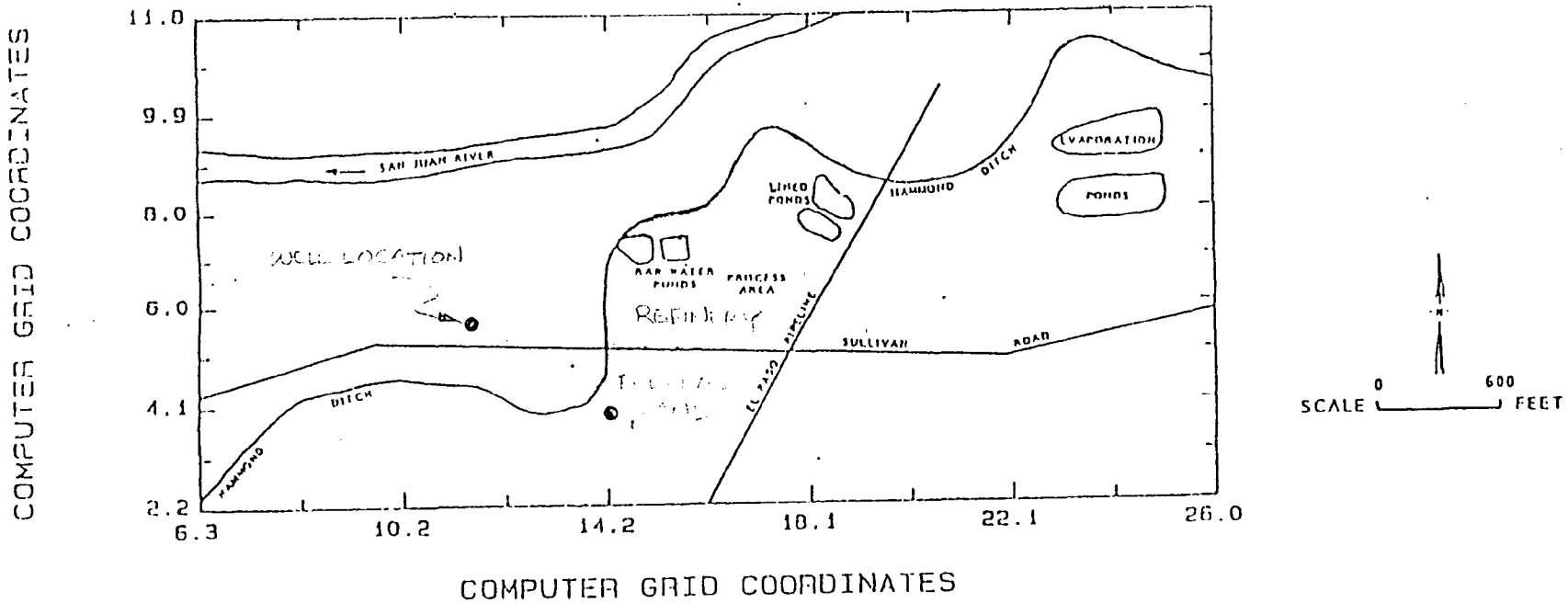
I hereby authorize the installation of the groundwater monitoring well as described in this letter on the condition that Bloomfield Refining Company coordinate the installation and access to the well with my authorized representative, Mr. Bob McCoy.

_____

Mrs. Avis Salmon

bcc: Mike Leger, Turner, Mason & Company
Chris Hawley
Mike Macy
Joe Warr

Proposed Monitoring Well Locations



Gary Energy Corporation

December 3, 1986

Mr. David G. Boyer
Hydrogeologist/Environmental Bureau Chief
State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, NM 87501-2088

Re: Bloomfield Refinery Remedial Action Plan

Dear Mr. Boyer:

Based on your letter of October 24, 1986, we are proceeding to obtain approvals from the property owners to the south and west of the refinery for locating the two off-site monitoring wells identified in Dave Younggren's September 26, 1986 letter. We do not anticipate problems in obtaining cooperation from these parties, but will advise OCD should problems develop. We are still projecting an eight working week schedule for completion of these two wells concurrent with the initial recovery well, from the time that land owners approval is obtained for the off-site wells.

Sincerely,

GARY ENERGY CORPORATION

A. Joe Warr
Vice President
Supply, Refining & Marketing

AJW/aee/07

cc: Chris Hawley
Mike Leger
Richard Traylor

115 Inverness Drive East • Englewood, Colorado 80112-5116 • 303/799-3800 • TWX 910-935-0791

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

October 24, 1986

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David J. Youngren
Vice Pres., Finance & Administration
Bloomfield Refining Company
115 Inverness Drive East
Englewood, Colorado 80112-5116

RE: BLOOMFIELD REFINERY HYDROCARBON CONTAMINATION;
PROPOSED REMEDIAL ACTION

Dear Mr. Youngren:

Your letter of September 26, 1986, providing the requested information has been received and reviewed. We had expected further progress than that reported in your letter. The attached analyses of samples taken at Sullivan Road and Highway 44 at the end of July and received by OCD last month show that hydrocarbon contamination that has the characteristics of gasoline is found at that location. It is imperative that you proceed as soon as possible to install the recovery system and continue the investigation. In the meantime, Hammond Ditch should be kept free of oil that may seep into the now empty ditch.

The location for the first recovery well is approved, and you should proceed to have it completed within the timeframe specified in your letter. As you stated, this first well will provide important information pertinent to the design of your final proposed 3-well recovery system. You are requested to provide the final locations and a schedule as to when the final plan and installation of the other recovery wells may be expected. You are requested to provide all input parameters to the ground water model PLASM and the subsequent results which show drawdown in the aquifer in response to recovery well pumpage for the 2, 3 and 4 well recovery systems considered.

The proposed location of the two monitoring wells is also approved. If Gary will provide OCD with the names and addresses of the land owners, and the type of assistance needed, we will contact the landowners to attempt to obtain their cooperation. Given the variables which can affect the geophysical data and, thus, the interpretation of the results, it becomes obvious that additional wells will be required to verify the interpretation of the ER data.

Your latest water analyses showed elevated levels of cyanide in all but one of your monitor wells. Since this has never occurred before, I suspect a quality control problem. You might wish to split samples with another laboratory for your next sampling.

Regarding your request for information on procedures or equipment to quantify product thickness, we will send you some information on various measuring devices under separate cover. We have no recommended procedures.

If you have any questions, please contact me at the above address or by phone at 827-5812.

Sincerely,

David G. Boyer by J. Bailey

DAVID G. BOYER
Hydrogeologist/Environmental Bureau Chief

DGB:dp

Enclosure

cc: R. L. Stamets
Frank Chavez, Aztec-OCD
Chris Hawley, Bloomfield Refinery

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

September 26, 1986

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. David G. Boyer
Hydrogeologist/Environmental Bureau Chief
State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, NM 87501-2088

RE: Bloomfield Refinery Remedial Action Plan

Dear Mr. Boyer:

In your letter of July 30, 1986, you identified several items of additional information, some requiring significant further investigative work on the part of Bloomfield Refining Company (BRC), as being necessary before finalizing the remedial action plan submitted to Mr. Stamets in our June 30, 1986, transmittal. The following response is organized in the same numerical format as the specific requests in your July 30 letter:

1. **Monitoring Well Water Levels and Chemical Analyses** - Attachment 1 contains the most recent data from the groundwater monitor wells including groundwater elevations and chemical data. The groundwater elevations data are presented as a cumulative tabulation of readings beginning on February 24, 1984, through September 2, 1986. The analytical data are from samples collected on June 23-25, 1986, and therefore represent the most recent results.

   As regards products or hydrocarbon thickness in the monitoring wells, we had not been asked prior to your letter of July 30 to provide this information but believe that based on non-quantitative observations of wells and well samples to date, such measurements would be pertinent to MW-4 only. No measurable thickness has been observed at any of the other monitoring wells. BRC would appreciate receiving any standardized procedures or recommended devices for quantifying product thickness in a monitoring well.

2. **Drillers Logs** - Well logs for monitoring wells 7 to 10 are contained in Attachment 2.

Attachments separate in File

115 Inverness Drive East • Englewood, Colorado 80112-5116 • 303/799-3800 • TWX 910-935-0791

3. **Geophysical Cross Section B-B'** - The ER subsurface cross section B-B' was inadvertently omitted from the Engineering Science report transmitted to you in our June 2, 1986, letter. Figure 2.11 from that report contains the B-B' cross section and is enclosed as Attachment 3.

4. **Geophysical Data Interpretation** - Interpretation of the geophysical data gathered to date at the site is obviously very complex. We believe that the ER field data must be viewed very critically and interpreted only in conjunction with other more direct physical data such as that obtained from the groundwater monitoring wells.

   Overall, the ER data taken indicates that the subsurface geology underlying the refinery and its immediate vicinity is generally homogeneous. The ER subsurface cross sections taken and presented in the Engineering Science subsurface report show the homogeneous nature of the subsurface with a southwest and northwest dip in the top of the Nacimiento Formation.

   Profiles were conducted throughout the refinery and in its immediate vicinity to aid in subsurface interpretations. The profile zones were selected based upon the monitoring well data, sounding data, and outcrops along the San Juan River bluff. The shallow profile zones (10 and 20 feet) were selected to aid in the interpretations of the unconsolidated sediment zone. The deeper profile zones were selected to aid in the interpretations of the cobble and pebble zone just above the top of the Nacimiento and in the very top of the Nacimiento Formation itself.

   The profile maps for each of the depth zones explored were shown as computer generated plots in Figures 2.13 through 2.19 of the ES Subsurface report. With the assistance of our consultant, Engineering Science, we offer the following additional interpretation of the geophysical data generated from the resistivity survey conducted at the site:

   - Low resistivity values are indicated southwest of the process units as shown on the 10, 20, 30, and 40 ft. profile maps. The 30-foot zone contains some clay in the top of the Nacimiento Formation, so the lower values here may be attributed in part to the clay. However, MW-4, which is located in

the vicinity of these low values, has yielded samples containing hydrocarbons. This provided the basis for our original location of RW-1 as shown in Figure 1 of our proposed Remedial Action Plan.

- Relatively low resistivity readings in the area generally north and west of the evaporation ponds were obtained at the 60 ft. and shallower depths as shown in the respective profile maps. MW-1, however, which is in the area north of the ponds and completed to a total depth of 25 feet, yields groundwater samples which are consistently clear of free hydrocarbons. Furthermore, these samples have shown no significant amounts of dissolved hydrocarbons. Given the absence of any corroborative physical data from the monitoring well in this area, we have no reason to suspect a significant hydrocarbon presence here.

- No significant groundwater impacts or evidence of subsurface hydrocarbons are evident from the 80 and 100-foot ER profile maps.

- A southwest trending resistivity high of 320 ohm-feet is located east of the El Paso Pipeline. This high may be the result of sandstone lenses at these depths.

- All available evidence supports the contention that any petroleum hydrocarbons that may exist are confined to the upper layer of sands, silts, and cobbles overlying the Nacimiento Formation.

- There is no indication that the first major potable water aquifer, the Ojo Alamo, has been impacted by subsurface hydrocarbons at the refinery.

5. **Hydrologic Model Results** - Groundwater level response to pumping at the Bloomfield Refinery was simulated using a groundwater model called PLASM. Documentation for this model is provided in "Selected Digital Computer Techniques for Groundwater Resource Evaluation" by Prickett and Londquist, Technical Bulletin No. 55, Illinois State Water Survey.

Significant parameters used by the model include transmissivity, storage factor, initial head, and pumping discharge. These parameters were developed from existing water level data from monitoring wells and from slug test data. A 200' x 200' grid network having eight rows and eight columns was used to represent the groundwater continuum for a selected portion of the site. Groundwater levels were represented by nodes formed by the intersection of row lines with column lines of the network grid.

The natural flow (flux) of groundwater underneath the refinery site was estimated using Darcy's equation as shown in Attachment 4. Using this calculated flux, the model's prediction of groundwater levels was calibrated to water levels measured in monitoring wells to an accuracy of plus or minus 1 foot.

The calibrated model was employed to test the groundwater response to recovery well pumpage using a 2-well, 3-well, or 4-well system. The wells were placed to receive an optimal amount of flow within the study area. A maximum pumping rate of 3 gpm was estimated based on calculations using Jacob's equation as shown in Attachment 4. This pumping rate was uniformly applied to each well within the well systems tested for pumping durations of thirty days to approximately two years.

Model results showed some drawdown definition over the study area using a 2-well recovery system and improved drawdown with a 3-well system. Results suggest that definition is not improved enough with a 4-well system to warrant the additional well.

Location, Design and Schedule of Recovery Well System - The model's predictive response is based on estimates and interpretation of the various geophysical data input gathered to date. As the initial phase of recovery and in an effort to gather important information pertinent to the final design of the system, it is recommended that a single test recovery well be installed. This will permit confirmation or adjustment of the results predicted by the model which can be incorporated into the system's final design. Likewise, the initial recovery well will provide important information and data regarding above ground handling of the material recovered.

On this basis, we propose locating the initial well as shown on the site map contained in Attachment 5. Based on model predictions, drawdowns should be fairly local at the single pumped well. Since product has been detected in MW-4, location near this well is logical.

As regards schedule, we believe that installation of the initial recovery well can be completed in eight working weeks after OCD approval of the remedial plan. We plan to discuss well design details with the selected contractor and submit these to OCD once they are finalized.

6. **Off-Site Investigation** - In an effort to identify the extent of any hydrocarbon migration that may have occurred to the south and west, we propose that two off-site groundwater monitoring wells be installed. The site map contained in Attachment 6 identifies the proposed location of these wells which has been determined from our interpretation of the ER data.

   Since the proposed monitoring wells are located on property not owned by BRC, we will obviously need to obtain the appropriate approvals from property owners before beginning installation. We understand that the property directly to the south is owned by the federal government and that the property to the west is owned by an individual. After OCD approval of the proposed locations, BRC will move to secure approvals from the Bureau of Land Management and the individual who owns the property to the west to locate monitoring wells at these sites.

   We project that both wells could be completed within eight working weeks after receiving OCD approval of location and approval from the respective property owners to complete the wells. Additionally, in an effort to complete the initial recovery well and the proposed new monitoring wells in a cost efficient manner, we would plan to schedule the drilling of these wells at the same time. We would appreciate OCD's assistance in achieving this.

We trust that the preceding information satisfies the conditions which you stated were necessary to preclude enforcement action. If you have any problems or questions concerning the above, please contact Mr. Chris Hawley. We look forward to your response.

Sincerely,

BLOOMFIELD REFINING COMPANY

David J. Younggren
Vice President Finance
and Administration

enclosures

DJY:dam

Dave Bryan OK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1201 ELM STREET
DALLAS, TEXAS 75270

August 29, 1986

Mr. Peter Pache, Manager
Hazardous Waste Section
Groundwater and Hazardous Waste Bureau
Environmental Improvement Division
New Mexico Health and Environment Department
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Re: Visit by Contractor Personnel for File Reviews for RCRA Facility Assessments

Dear Mr. Pache:

I want to confirm the arrangements discussed by Marcus Sides and Boyd Hamilton for one of our contractors to review the files on three facilities in conjunction with RCRA Facility Assessments being conducted for EPA Region VI.

Ms. Deborah English of Black and Veatch will arrive at your offices on Wed. Sept. ~~Monday~~, September ~~8~~, 1986, to begin the file review. She will rent a copying machine to make any necessary copies. We would appreciate your making available to her all pertinent files (RCRA, CERCLA, air, groundwater) on the following facilities: Giant Refinery (NMD000333211), Climax Chemical (NMD990753931), and Bloomfield Refinery (NMD089416416).

Please feel free to call me at (214) 767-2647 if you have any questions.

Sincerely yours,

Thomas D. Clark
Regional Program Manager

cc: Deborah English
Black and Veatch

Bloomfield Refining Company
A Gary Energy Corporation Subsidiary

August 20, 1986

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Ms. Denise Fort, Director
Environmental Improvement Division
New Mexico Health and Environment Department
P. O. Box 968
Santa Fe, NM 87504-0968

RE: Bloomfield Refining Company

Dear Ms. Fort:

Enclosed is the final closure plan for certain waste management units at our petroleum refinery in Bloomfield, New Mexico. This plan provides information that was unavailable in our November 22, 1985, closure plan submittal. Also enclosed is a recent letter from our accounting firm which establishes that the company's working capital is far in excess of the anticipated closure cost, thus proving our financial responsibility for closure.

This plan is being submitted in accordance with the November 26, 1985, USEPA Consent Agreement and Final Order, Docket No. RCRA VI-501-H and nothing herein should be construed as an admission of liability in connection with that action or any other proceeding.

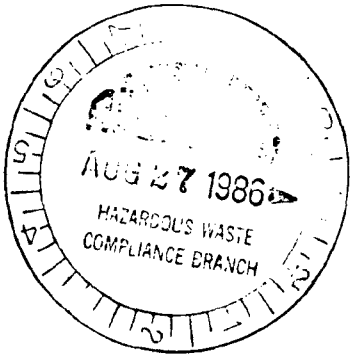
We are prepared to begin the specified activities within thirty (30) days of final NMEID approval. We look forward to receipt of this approval in the near future.

Sincerely,

David J. Younggren
Vice President Finance
and Administration

enclosure

cc: William Rhea
U.S. Environmental Protection Agency
Hazardous Waste Management Division
Interfirst II Building, 28th Floor
1201 Elm Street
Dallas, TX 75270



DJY:dam

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

July 30, 1986

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501-2088
(505) 827-5800

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. David J. Younggren, Vice Pres.
Finance and Administration
Gary Bloomfield Refining Company
115 Inverness Drive East
Englewood, Colorado 80112-5116

RE: BLOOMFIELD REFINERY HYDROCARBON CONTAMINATION; PROPOSED REMEDIAL ACTION

Dear Mr. Younggren:

The Oil Conservation Division (OCD) has received your letters of June 2 and June 30, 1986, to division director, R. L. Stamets, that transmitted the subsurface hydrocarbon data report and the remedial action plan for hydrocarbon contamination at the Bloomfield Refinery. These reports respond to information requests and directives in Mr. Stamets' letter of March 4, 1986. They have been referred to me for review and comment.

The reports and the information and proposals included within them do not completely address the requests in the March 4 letter. At best, they are only a start by Gary at defining the magnitude and extent of the hydrocarbon contamination at the site, especially in the area to the south and west of the main office area. Additional investigation will need to be accomplished to properly characterize the contamination and plan for further remedial action.

The following are our comments on the subsurface hydrocarbon data report:

1. No subsurface information (except that generated in the surface geophysical profiles) was provided for the area south of Sullivan Road and west of Hammond Ditch.

2. No interpretation of the horizontal resistivity geophysical data was provided.

3. No B-B' geophysical cross-section was provided; figures 2.10 and 2.11 are identical.

4. Well logs for monitor wells 7 to 10 were not provided.

5. Product thickness data for the monitor wells were not provided.

6. Ground water elevation and flow data would be enhanced by providing Hammond Ditch water levels in the area northwest of evaporation pond 1 and northeast of MW-8.

Since not all information was available to Gary at the time of submittal, the remedial plan does not contain sufficient information for us to provide detailed review. However, the installation of two proposed recovery wells at the general location as shown in Figure 1 of your June 30, 1986, letter is acceptable to OCD. Gary should provide additional information on the final location of the wells, type of pumping system used, product thickness, model results, etc., as it becomes available. Once the wells are in operation, their effectiveness in recovering product, reducing dissolved hydrocarbon contamination, etc., will need to be evaluated.

As mentioned above, the information provided thus far, and the installation by October 1, 1986, of two recovery wells are only the first steps in defining and remediating the hydrocarbon contamination at the site. To preclude further enforcement action by the OCD, Gary needs to provide OCD with the following information within 60 days from receipt of this letter:

1. Most recent water levels, product thickness, and chemical data in the monitor wells;

2. Driller's logs for monitor wells 7 to 10;

3. Geophysical cross-section B-B';

4. Interpretation of the geophysical data, or a reasonable date when such interpretation will be submitted to OCD;

5. Hydrologic model results and information on the final design and location of the two recovery wells, or a date when such information will be submitted;

6. The investigation plan, including the anticipated date for plan commencement, for defining the extent, volume, direction, and movement of hydrocarbons, and dissolved hydrocarbons in the area south and west of the refinery. If such plan cannot be completed and submitted within sixty days, provide OCD with a reasonable date for plan submittal.

Although current information indicates no known water supply wells are nearby, or are in imminent danger of contamination, the presence of contamination off-property near Highway 44 may pose a threat to shallow alluvial groundwater west of the highway, and to any wells using such groundwater. This off-site investigation is crucial to define the magnitude and extent of the problem. Therefore, your cooperation in immediately

undertaking this investigation is necessary to protect water supplies and to preclude enforcement action.

Sincerely,

DAVID G. BOYER
Hydrogeologist/Environmental Bureau Chief

DGB:dp

cc: R. L. Stamets
Aztec District Office
Chris Hawley, Bloomfield Refinery