GW - 32

REPORTS

YEAR(S):

1990 GW REPORT

GIANT REFINING COMPANY
CINIZA REFINERY

MAY 26, 1991

1990 OCD ANNUAL GROUNDWATER REPORT

GIANT
REFINING CO.

Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

May 16, 1991

David Boyer
New Mexico Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87504

RE: ANALYTICAL REPORT FOR DISCHARGE PERMIT GW-32

Dear Mr. Boyer:

The attached data includes the hard copy and tabulated analytical for both the waste and groundwater samples required by Discharge Permit GW-32.

If you have any questions, contact my office at (505) 722-0217.

Sincerely,

Claud Rosendale

Claud C. Rosendale
Environmental Manager
Ciniza Refinery

Content of enclosures: Tabulation of all hard copy analytical
Hard copy analytical for ATI and RMAL:
ATI # 102836
ATI # 102837
ATI # 103573
ATI # 103598
ATI # 103660
ATI # 103659
RMAL# 011196
RMAL# 011329
RMAL# 011629

cc w/attachments: Kim Bullerdick, Corporate Counsel -
Giant Industries Arizona, Inc.

File

MW-1 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachoroethene	ND	<1	ug/L	5.0
Tolukebe	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,3-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

MW-1 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chromium	ND	<0.010	mg/L	0.010
Lead	ND	0.010	mg/L	0.0050
Mercury	--	<0.0002	mg/L	0.00020

* Data from Analytical Technologies,Inc.

MW-1 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	Date: 01 APR 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Arsenic	ND	<0.005	mg/L	0.0050
Barium	ND	<0.010	mg/L	0.010
Cadmium	ND	<0.005	mg/L	0.0050
Calcium	1.8	1.9	mg/L	0.20
Magnesium	0.25	0.3	mg/L	0.20
Manganese	ND	<0.010	mg/L	0.010
Potassium	ND	<1.0	mg/L	5.00
Selenium	ND	<0.005	mg/L	0.0050
Silver	ND	<0.010	mg/L	0.010
Sodium	252	267	mg/L	5.0

* Data from Analytical Technologies, Inc.

MW-1 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	304	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	48	mg/L	5.0
Chloride	---	51	mg/L	3.0
pH	8.58	8.92	units	--
pH	8.57	8.92	units	--
pH	8.57	8.94	units	--
pH	8.56	8.94	units	--
Phenolics	---	<0.02	mg/L	0.010
Sulfate	---	160	mg/L	5.0
Specific Conductance at 25 deg.C	1180	1080	umhos/cm	1.0
Specific Conductance at 25 deg.C	1170	1110	umhos/cm	1.0
Specific Conductance at 25 deg.C	1170	1090	umhos/cm	1.0
Specific Conductance at 25 deg.C	1160	1110	umhos/cm	1.0
Total Organic Carbon	0.70	1.9	mg/L	1.0
Total Organic Carbon	0.71	0.8	mg/L	1.0
Total Organic Carbon	0.69	0.6	mg/L	1.0
Total Organic Carbon	0.71	0.7	mg/L	1.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Dissolved Solids	---	710	mg/L	10.0
Water Elevation		---	ft	--

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

MW-2 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	10
1,1,1-Trichloroethane	ND	<1	ug/L	5.0
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	10
Bromodichloromethane	ND	<1	ug/L	5.0
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<1	ug/L	10
Bromoform	ND	<10	ug/L	5.0
4-Methyl-2-pentanone	ND	<5	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<10	ug/L	5.0
Tetrachoroethene	ND	<1	ug/L	5.0
Tolukebe	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	---	ug/L	5.0
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,4-Dichlorobenzene	ND	---	ug/L	5.0
1,3-Dichlorobenzene	ND	---		

* Data from Analytical Technologies, Inc.

MW-2 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chromium	ND	<0.010	mg/L	0.010
Lead	ND	<0.002	mg/L	0.010
Mercury	---	<0.0002	mg/L	0.00020

* Data from Analytical Technologies, Inc.

MW-2 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	Date: 01 APR 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Arsenic	ND	<0.005	mg/L	0.010
Barium	0.019	0.019	mg/L	0.010
Cadmium	ND	<0.005	mg/L	0.0050
Calcium	1.7	1.7	mg/L	0.20
Magnesium	ND	0.2	mg/L	0.20
Manganese	ND	<0.010	mg/L	0.010
Potassium	ND	<1.0	mg/L	5.00
Selenium	ND	<0.005	mg/L	0.0050
Silver	ND	<0.010	mg/L	0.010
Sodium	259	270	mg/L	5.0

* Data from Analytical Technologies, Inc.

MW-2 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	304	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	32	mg/L	5.0
Chloride	---	59	mg/L	3.0
pH	8.62	8.83	units	--
pH	8.62	8.96	units	--
pH	8.62	8.95	units	--
pH	8.63	8.95	units	--
Phenolics	---	<0.02	mg/L	0.010
Sulfate	---	160	mg/L	5.0
Specific Conductance at 25 deg.C	1180	1120	umhos/cm	1.0
Specific Conductance at 25 deg.C	1170	1100	umhos/cm	1.0
Specific Conductance at 25 deg.C	1180	1130	umhos/cm	1.0
Specific Conductance at 25 deg.C	1170	1130	umhos/cm	1.0
Total Organic Carbon	0.57	0.8	mg/L	1.0
Total Organic Carbon	0.59	<0.5	mg/L	1.0
Total Organic Carbon	0.58	1.6	mg/L	1.0
Total Organic Carbon	0.51	0.8	mg/L	1.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Dissolved Solids	---	690	mg/L	10.0
Water Elevation	---	---	ft	--

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

MW-4 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachoroethene	ND	<1	ug/L	5.0
Tolukebe	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	---	ug/L	5.0
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,3-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

MW-4 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chromium	ND	<0.010	mg/L	0.010
Lead	0.0071	0.010	mg/L	0.0050
Mercury	---	<0.0002	mg/L	0.00020

* Data from Analytical Technologies, Inc.

MW-4 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	01 APR 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Arsenic	ND	<0.005	mg/L	0.010
Barium	0.017	0.019	mg/L	0.010
Cadmium	ND	<0.005	mg/L	0.0050
Calcium	2.0	2.0	mg/L	0.20
Magnesium	0.24	0.3	mg/L	0.20
Manganese	ND	0.010	mg/L	0.010
Potassium	ND	<1.0	mg/L	5.00
Selenium	ND	<0.0005	mg/L	0.0050
Silver	ND	0.016	mg/L	0.010
Sodium	277	292	mg/L	5.0

* Data from Analytical Technologies, Inc.

MW-4 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	428	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	28	mg/L	5.0
Chloride	---	19	mg/L	3.0
pH	8.42	8.65	units	--
pH	8.43	8.69	units	--
pH	8.43	8.69	units	--
pH	8.43	8.69	units	--
Phenolics	--	0.02	mg/L	0.010
Sulfate	--	150	mg/L	5.0
Specific Conductance at 25 deg.C	1170	1150	umhos/cm	1.0
Specific Conductance at 25 deg.C	1180	1130	umhos/cm	1.0
Specific Conductance at 25 deg.C	1160	1150	umhos/cm	1.0
Specific Conductance at 25 deg.C	1170	1100	umhos/cm	1.0
Total Organic Carbon	0.65	0.5	mg/L	1.0
Total Organic Carbon	0.67	1.5	mg/L	1.0
Total Organic Carbon	0.64	0.9	mg/L	1.0
Total Organic Carbon	0.68	0.6	mg/L	1.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30.0
Total Dissolved Solids	---	1100	mg/L	10.0
Water Elevation	---	---	ft	--

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

MW-5 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachoroethene	ND	<1	ug/L	5.0
Tolukebe	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,4-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

MW-5 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Chromium	ND	<0.010	mg/L	0.010
Lead	ND	<0.002	mg/L	0.0050
Mercury	---	<0.0002	mg/L	0.00020

* Data from Analytical Technologies, Inc.

MW-5 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	Date: 02 APR 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Arsenic	ND	<0.005	mg/L	0.010
Barium	0.12	0.017	mg/L	0.010
Cadmium	ND	<0.005	mg/L	0.0050
Calcium	1.9	1.7	mg/L	0.20
Magnesium	0.20	0.2	mg/L	0.20
Manganese	ND	<0.010	mg/L	0.010
Potassium	ND	<1.0	mg/L	5.00
Selenium	ND	0.005	mg/L	0.0050
Silver	ND	<0.010	mg/L	0.010
Sodium	255	270	mg/L	5.0

* Data from Analytical Technologies, Inc.

MW-5 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	Date: 02 OCT 90 Result	06 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	314	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	32	mg/L	5.0
Chloride	---	67	mg/L	3.0
pH	8.63	8.87	units	--
pH	8.63	8.97	units	--
pH	8.63	8.95	units	--
pH	8.62	8.94	units	--
Phenolics	---	<0.02	mg/L	0.010
Sulfate	---	160	mg/L	5.0
Specific Conductance at 25 deg.C	1170	1100	umhos/cm	1.0
Specific Conductance at 25 deg.C	1160	1160	umhos/cm	1.0
Specific Conductance at 25 deg.C	1160	1140	umhos/cm	1.0
Specific Conductance at 25 deg.C	1150	1130	umhos/cm	1.0
Total Organic Carbon	0.56	1.0	mg/L	1.0
Total Organic Carbon	0.58	0.8	mg/L	1.0
Total Organic Carbon	0.58	1.6	mg/L	1.0
Total Organic Carbon	0.59	0.7	mg/L	1.0
Total Organic Halogen as Cl	61.4	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	48.6	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	49.6	<0.008 (1)	ug/L	30.0
Total Organic Halogen as Cl	58.9	<0.008 (1)	ug/L	30.0
Total Dissolved Solids	---	700	mg/L	10.0
Water Elevation	---	---	ft	--

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

SMW-1 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,4-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

SMW-1 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Parameter	Date: 27 MAR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	182	185	mg/L	0.40
Magnesium	56.5	50.6	mg/L	0.40
Potassium	ND	1.9	mg/L	10.0
Sodium	1250	1390	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-1 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.030	0.075	mg/L	0.010
Lead	ND	0.007	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-1 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	620	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	<1	mg/L	5.0
Chloride	---	1130	mg/L	3.0
pH	7.33	7.52	units	---
pH	7.34	7.69	units	---
pH	7.34	7.54	units	---
pH	7.33	7.55	units	---
Average pH	---		units	---
Sulfate	---	1300	mg/L	5.0
Specific Conductance at 25 deg.C	5810	6320	umhos/cm	1.0
Specific Conductance at 25 deg.C	5820	6170	umhos/cm	1.0
Specific Conductance at 25 deg.C	5830	6180	umhos/cm	1.0
Specific Conductance at 25 deg.C	5810	6240	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	1.0
Total Organic Carbon	10.1	14.0	mg/L	0.50
Total Organic Carbon	10.2	12.8	mg/L	0.50
Total Organic Carbon	10.2	15.8	mg/L	0.50
Total Organic Carbon	10.1	11.4	mg/L	0.50
Total Organic Halogen as Cl	47.9	0.032 (1)	ug/L	30
Total Organic Halogen as Cl	41.5	0.039 (1)	ug/L	30
Total Organic Halogen as Cl	52.5	0.053 (1)	ug/L	30
Total Organic Halogen as Cl	50.9	0.037 (1)	ug/L	30
Total Dissolved Solids	---	4700	mg/L	10
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI

SMW-2 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,4-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

SMW-2 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Parameter	03 APR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	147	132	mg/L	0.40
Magnesium	44.3	37.8	mg/L	0.40
Potassium	ND	<1.0	mg/L	10.0
Sodium	1630	1620	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-2 Giant Refining Gallup, New Mexico

Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.19	0.245	mg/L	0.010
Lead	0.034	0.010	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-2 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	578	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	<1	mg/L	5.0
Chloride	---	1240	mg/L	3.0
pH	7.47	7.7	units	---
pH	7.46	7.65	units	---
pH	7.46	7.68	units	---
pH	7.47	7.69	units	---
Average pH	---	7.66	units	---
Sulfate	---	1600	mg/L	5.0
Specific Conductance at 25 deg.C	6600	6940	umhos/cm	1.0
Specific Conductance at 25 deg.C	6600	7030	umhos/cm	1.0
Specific Conductance at 25 deg.C	6610	7100	umhos/cm	1.0
Specific Conductance at 25 deg.C	6620	7100	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	1.0
Total Organic Carbon	8.0	14.3	mg/L	0.50
Total Organic Carbon	7.9	11.6	mg/L	0.50
Total Organic Carbon	8.3	15.2	mg/L	0.50
Total Organic Carbon	8.0	10.2	mg/L	0.50
Total Organic Halogen as Cl	ND	0.051 (1)	ug/L	30
Total Organic Halogen as Cl	ND	0.061 (1)	ug/L	30
Total Organic Halogen as Cl	ND	0.051 (1)	ug/L	30
Total Organic Halogen as Cl	65.7	0.037 (1)	ug/L	30
Total Dissolved Solids	---	5000	mg/L	10
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

SMW-3 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,3-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

SMW-3 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Parameter	03 APR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	59.0	50.4	mg/L	0.40
Magnesium	16.2	14.7	mg/L	0.40
Potassium	ND	1.3	mg/L	10.0
Sodium	739	815	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-3 Giant Refining Gallup, New Mexico

Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.034	0.038	mg/L	0.010
Lead	0.021	0.010	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-3 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	664	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	<1	mg/L	5.0
Chloride	---	59	mg/L	3.0
pH	7.96	7.94	units	---
pH	7.94	8.09	units	---
pH	7.96	8.04	units	---
pH	7.95	7.92	units	---
Average pH	---	---	units	---
Sulfate	---	1200	mg/L	5.0
Specific Conductance at 25 deg.C	3220	3400	umhos/cm	1.0
Specific Conductance at 25 deg.C	3230	3410	umhos/cm	1.0
Specific Conductance at 25 deg.C	3220	3330	umhos/cm	1.0
Specific Conductance at 25 deg.C	3220	3590	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	1.0
Total Organic Carbon	2.7	3.0	mg/L	0.50
Total Organic Carbon	2.8	5.1	mg/L	0.50
Total Organic Carbon	2.9	2.5	mg/L	0.50
Total Organic Carbon	2.6	3.3	mg/L	0.50
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	0.015 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Dissolved Solids	---	5200	mg/L	10
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

SMW-4 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,4-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

SMW-4 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	27 MAR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	4.7	4.5	mg/L	0.40
Magnesium	1.2	1.1	mg/L	0.40
Potassium	ND	1.3	mg/L	10.0
Sodium	296	306	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-4 Giant Refining Gallup, New Mexico

Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.019	0.032	mg/L	0.010
Lead	0.015	0.008	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-4 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	418	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	24	mg/L	5.0
Chloride	---	58	mg/L	3.0
pH	8.39	8.54	units	---
pH	8.38	8.39	units	---
pH	8.39	8.38	units	---
pH	8.39	8.37	units	---
Average pH	---	---	units	5.0
Sulfate	---	170	mg/L	
Specific Conductance at 25 deg.C	1050	1210	umhos/cm	1.0
Specific Conductance at 25 deg.C	1050	1210	umhos/cm	1.0
Specific Conductance at 25 deg.C	1050	1230	umhos/cm	1.0
Specific Conductance at 25 deg.C	1050	1240	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	0.50
Total Organic Carbon	0.76	2.6	mg/L	0.50
Total Organic Carbon	0.82	2.2	mg/L	0.50
Total Organic Carbon	0.73	1.6	mg/L	0.50
Total Organic Carbon	0.75	1.7	mg/L	
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Dissolved Solids	---	860	mg/L	10
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

SMW-5 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	<10	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene		<1		
(cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-				
trifluoroethane	ND	---	ug/L	10
1,2-Dibromoethane (EDB)	ND	---	ug/L	10
1,2-Dichlorobenzene	ND	---	ug/L	5.0
1,3-Dichlorobenzene	ND	---	ug/L	5.0

* Data from Analytical Technologies, Inc.

SMW-5 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	03 APR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	3.9	3.3	mg/L	0.40
Magnesium	0.82	0.8	mg/L	0.40
Potassium	5.6	<1.0	mg/L	10.0
Sodium	254	281	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-5 Giant Refining Gallup, New Mexico

Metals
Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.037	0.042	mg/L	0.010
Lead	0.012	<0.002	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-5 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	378	mg/L	5.0
Alkalinity, Carb. as CaCO3 at pH 8.3	---	20	mg/L	5.0
Chloride	---	65	mg/L	3.0
pH	8.66	8.56	units	---
pH	8.65	8.54	units	---
pH	8.65	8.51	units	---
pH	8.66	8.55	units	---
Average pH	---	---	units	---
Sulfate	---	150	mg/L	5.0
Specific Conductance at 25 deg.C	1000	1160	umhos/cm	1.0
Specific Conductance at 25 deg.C	1010	1150	umhos/cm	1.0
Specific Conductance at 25 deg.C	1000	1120	umhos/cm	1.0
Specific Conductance at 25 deg.C	1010	1150	umhos/cm	1.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	1.0
Total Organic Carbon	0.77	2.3	mg/L	0.50
Total Organic Carbon	0.76	3.2	mg/L	0.50
Total Organic Carbon	0.70	1.3	mg/L	0.50
Total Organic Carbon	0.77	1.5	mg/L	0.50
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	30
Total Dissolved Solids	---	1500	mg/L	10
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

SMW-6 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chloromethane	ND	<10	ug/L	10
Bromomethane	ND	<10	ug/L	10
Vinyl chloride	ND	<1	ug/L	10
Chloroethane	ND	<1	ug/L	10
Methylene chloride	ND	<5	ug/L	5.0
Acetone	ND	15	ug/L	10
Carbon disulfide	ND	<1	ug/L	5.0
1,1-Dichloroethene	ND	<1	ug/L	5.0
1,1-Dichloroethane	ND	<1	ug/L	5.0
1,2-Dichloroethene (cis/trans)	ND	<1	ug/L	5.0
Chloroform	ND	<1	ug/L	5.0
1,2-Dichloroethane	ND	<1	ug/L	5.0
2-Butanone	ND	<2	ug/L	5.0
1,1,1-Trichloroethane	ND	<1	ug/L	10
Carbon tetrachloride	ND	<1	ug/L	5.0
Vinyl acetate	ND	<10	ug/L	5.0
Bromodichloromethane	ND	<1	ug/L	10
trans-1,3-Dichloropropene	ND	<1	ug/L	5.0
Trichloroethene	ND	<1	ug/L	5.0
Chlorodibromomethane	ND	<1	ug/L	5.0
1,1,2-Trichloroethane	ND	<1	ug/L	5.0
Benzene	ND	<1	ug/L	5.0
cis-1,3-Dichloropropene	ND	<1	ug/L	5.0
2-Chloroethyl vinyl ether	ND	<10	ug/L	10
Bromoform	ND	<5	ug/L	5.0
4-Methyl-2-pentanone	ND	<10	ug/L	10
2-Hexanone	ND	<10	ug/L	10
1,1,2,2-Tetrachloroethane	ND	<1	ug/L	5.0
Tetrachloroethene	ND	<1	ug/L	5.0
Toluene	ND	<1	ug/L	5.0
Chlorobenzene	ND	<1	ug/L	5.0
Ethylbenzene	ND	<1	ug/L	5.0
Stryene	ND	<1	ug/L	5.0
Xylenes (total)	ND	<1	ug/L	5.0
1,1,2 Trichloro-1,2,2-trifluoroethane	ND	---	ug/L	
1,2-Dibromoethane (EDB)	ND	---	ug/L	
1,2-Dichlorobenzene	ND	---	ug/L	
1,4-Dichlorobenzene	ND	---	ug/L	

* Data from Analytical Technologies, Inc.

SMW-6 Giant Refinery Gallup, New Mexico

Metals
Dissolved Metals

Parameter	27 MAR 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Calcium	8.3	6.6	mg/L	0.40
Magnesium	2.5	1.9	mg/L	0.40
Potassium	ND	3.6	mg/L	10.0
Sodium	379	376	mg/L	10.0

* Data from Analytical Technologies, Inc.

SMW-6 Giant Refining Gallup, New Mexico

Total Metals

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Chromium	0.11	<0.010	mg/L	0.010
Lead	0.026	<0.002	mg/L	0.0050

* Data from Analytical Technologies, Inc.

SMW-6 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	05 MAR 91 Result*	Units	Reporting Limit
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	604	mg/L	10 10
Alkalinity, Carb. as CaCO3 at pH 8.3	---	8	mg/L	10 10
Chloride	---	82	mg/L	5.0
pH	7.86	8.41	units	10
pH	7.86	8.20	units	5.0
pH	7.87	8.20	units	5.0
pH	7.86	8.17	units	5.0
Average pH	---	---	units	
Sulfate	---	200	mg/L	5.0
Specific Conductance at 25 deg.C	1390	1520	umhos/cm	5.0 5.0
Specific Conductance at 25 deg.C	1390	1540	umhos/cm	5.0 10
Specific Conductance at 25 deg.C	1400	1520	umhos/cm	5.0 5.0
Specific Conductance at 25 deg.C	1400	1490	umhos/cm	10 5.0
Average Specific Conductance at 25 deg.C	---		umhos/cm	5.0 5.0
Total Organic Carbon	0.92	2.0	mg/L	5.0
Total Organic Carbon	0.96	1.2	mg/L	5.0
Total Organic Carbon	0.97	1.2	mg/L	5.0
Total Organic Carbon	0.70	1.3	mg/L	10
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	5.0 10
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	10 5.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	5.0 5.0
Total Organic Halogen as Cl	ND	<0.008 (1)	ug/L	5.0 5.0
Total Dissolved Solids	---	1100	mg/L	5.0 5.0
Water Elevation	---	---	ft	

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

OW-11 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	13 SEP 90 Result	06 MAR 91 Result*	Units
1,1-Dichloroethene	ND	<1	ug/L
2-Butanone	ND	<2	ug/L
1,1,1-Trichloroethane	ND	<1	ug/L
Benzene	ND	<1	ug/L
Tetrachloroethene	ND	<1	ug/L
Toluene	ND	<1	ug/L
Ethylbenzene	ND	<1	ug/L
Xylenes (total)	ND	<1	ug/L
Chloromethane	---	<10	ug/L
Bromomethane	---	<10	ug/L
Vinyl Chloride	---	<1	ug/L
Chloroethane	---	<1	ug/L
Methylene Chloride	---	<5	ug/L
Carbon Disulfide	---	<1	ug/L
1,1-Dichloroethane	---	<1	ug/L
1,2-Dichloroethene (Total)	---	<1	ug/L
Chloroform	---	<1	ug/L
1,2-Dichloroethane	---	<1	ug/L
Carbon Tetrachloride	---	<1	ug/L
Vinyl Acetate	---	<10	ug/L
Bromodichloromethane	---	<1	ug/L
1,1,2,2-Tetrachloroethane	---	<1	ug/L
1,2-Dichloropropane	---	<1	ug/L
Trans-1,3-Dichloropropene	---	<1	ug/L
Trichloroethene	---	<1	ug/L
Dibromochloromethane	---	<1	ug/L
1,1,2-Trichloroethane	---	<1	ug/L
Cis-1,3-Dichloropropene	---	<1	ug/L
2-Chloroethylvinylether	---	<10	ug/L
Bromoform	---	<5	ug/L
2-Hexanone (MBK)	---	<10	ug/L
4-Methyl-2-Pentanone (MIBK)	---	<10	ug/L
Chlorobenzene	---	<1	ug/L
Styrene	---	<1	ug/L

* Data from Analytical Technologies, Inc.

OW-11 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Parameter	13 SEP 90 Result	06 MAR 91 Result*	Units
Arsenic	ND	<0.005	mg/L
Barium	0.018	0.023	mg/L
Cadmium	ND	<0.005	mg/L
Calcium	5.8	5.0	mg/L
Copper	ND	---	mg/L
Manganese	ND	<0.010	mg/L
Nickel	ND	---	mg/L
Selenium	0.020	0.036	mg/L
Silver	ND	0.028	mg/L
Sodium	459	426	mg/L
Zinc	ND	---	mg/L
Potassium	---	1.4	

* Data from Analytical Technologies, Inc.

OW-11 Giant Refining Gallup, New Mexico

Total Metals
Dissolved Metals

Parameter	13 SEP 90 Result	06 MAR 91 Result*	Units
Chromium	ND	<0.010	mg/L
Lead	0.011	0.003	mg/L
Mercury	ND	<0.0002	mg/L

* Data from Analytical Technologies, Inc.

OW-11 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	06 MAR 91 Result*	Units
Alkalinity, Bicarb. as CaCO3 at pH 4.5	424	456	mg/L
Alkalinity, Carb. as CaCO3 at pH 8.3	14.5	<1	mg/L
Chloride	118	140	mg/L
pH	7.98	8.30	units
pH	7.99	8.18	units
pH	7.99	8.14	units
pH	7.98	8.07	units
Phenolics	0.022	<0.02	mg/L
Sulfate	351	200	mg/L
Specific Conductance at 25 deg.C	1710	1760	umhos/cm
Specific Conductance at 25 deg.C	1700	1760	umhos/cm
Specific Conductance at 25 deg.C	1700	1700	umhos/cm
Specific Conductance at 25 deg.C	1710	1720	umhos/cm
Total Organic Carbon	4.4	5.9	mg/L
Total Organic Carbon	4.3	5.1	mg/L
Total Organic Carbon	4.3	5.7	mg/L
Total Organic Carbon	4.4	5.5	mg/L
Total Organic Halogen as Cl	ND	0.013 (1)	ug/L
Total Organic Halogen as Cl	ND	0.015 (1)	ug/L
Total Organic Halogen as Cl	ND	0.011 (1)	ug/L
Total Organic Halogen as Cl	ND	0.010 (1)	ug/L
Total Dissolved Solids	1220	1100	mg/L
Water Elevation	---	---	ft

* Data from Analytical Technologies, Inc.
(1) Total Organic Halide as reported by ATI.

OW-1 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	03 APR 90 Result	07 MAR 91 Result*	Units
Benzene	ND	<0.5	ug/L
Toluene	ND	<0.5	ug/L
Ethylbenzene	ND	<0.5	ug/L
Xylenes (total)	ND	<0.5	ug/L

* Data from Analytical Technologies, Inc.

OW-1 Giant Refining Co. Gallup, NM

Metals
Dissolved Metals

Parameter	03 APR 90 Result	07 MAR 91 Result*	Units
Calcium	2.4	2.1	mg/L
Magnesium	0.33	0.3	mg/L
Potassium	ND	<1.0	mg/L
Sodium	297	326	mg/L

* Data from Analytical Technologies, Inc.

OW-1 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	07 MAR 91 Result*	Units
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	376	mg/L
Alkalinity, Carb. as CaCO3 at pH 8.3	---	12	mg/L
Chloride	---	41	mg/L
pH	8.36	8.47	units
pH	8.37	---	units
pH	8.37	---	units
pH	8.36	---	units
Sulfate	---	220	mg/L
Specific Conductance at 25 deg.C	1180	1290	umhos/cm
Specific Conductance at 25 deg.C	1170	---	umhos/cm
Specific Conductance at 25 deg.C	1170	---	umhos/cm
Specific Conductance at 25 deg.C	1180	---	umhos/cm
Total Organic Carbon	1.4	---	mg/L
Total Organic Carbon	1.4	---	mg/L
Total Organic Carbon	1.4	---	mg/L
Total Organic Carbon	1.2	---	mg/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Dissolved Solids	---	830	mg/L
Water Elevation	---	---	ft
Hydroxide	---	<1	mg/L
Total Alkalinity	---	388	mg/L

* Data from Analytical Technologies, Inc.

OW-2 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	03 APR 90 Result	07 MAR 91 Result*	Units
Benzene	ND	<.5	ug/L
Toluene	ND	<.5	ug/L
Ethylbenzene	ND	<.5	ug/L
Xylenes (total)	ND	<.5	ug/L

* Data from Analytical Technologies, Inc.

OW-2 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

PARAMETER	03 APR 90 Result	07 MAR 91 Result*	Units
Calcium	8.5	10.5	mg/L
Magnesium	3.0	4.8	mg/L
Potassium	ND	1.9	mg/L
Sodium	298	338	mg/L

* Data from Analytical Technologies, Inc.

OW-2 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	07 MAR 91 Result*	Units
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	656	mg/L
Alkalinity, Carb. as CaCO3 at pH 8.3	---	<1	mg/L
Chloride	---	45	mg/L
pH	7.63	7.97	units
pH	7.63	---	units
pH	7.62	---	units
pH	7.63	---	units
Sulfate	---	---	mg/L
Specific Conductance at 25 deg.C	1170	1220	umhos/cm
Specific Conductance at 25 deg.C	1160	---	umhos/cm
Specific Conductance at 25 deg.C	1170	---	umhos/cm
Specific Conductance at 25 deg.C	1170	---	umhos/cm
Total Organic Carbon	3.4	---	mg/L
Total Organic Carbon	4.2	---	mg/L
Total Organic Carbon	3.6	---	mg/L
Total Organic Carbon	3.4	---	mg/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Organic Halogen as Cl	ND	---	ug/L
Total Dissolved Solids	---	910	mg/L
Water Elevation	---	---	ft
TOTAL ALKALINITY	---	656	mg/L
SULFATE	---	10	mg/L

* Data from Analytical Technologies, Inc.

OW-3 Giant Refining Gallup, New Mexico

TCL Volatile Organics
Method 8240

Parameter	03 APR 90 Result	07 MAR 91 Result*	Units
Benzene	ND	<.5	ug/L
Toluene	ND	<.5	ug/L
Ethylbenzene	ND	<.5	ug/L
Xylenes (total)	ND	<.5	ug/L

* Data from Analytical Technologies, Inc.

OW-3 Giant Refining Gallup, New Mexico

Metals
Dissolved Metals

Parameter	03 APR 90 Result	07 MAR 91 Result*	Units
Calcium	9.4	11.0	mg/L
Magnesium	3.1	4.4	mg/L
Potassium	ND	1.1	mg/L
Sodium	292	332	mg/L

* Data from Analytical Technologies, Inc.

OW-3 Giant Refining Gallup, New Mexico

General Inorganics

Parameter	13 SEP 90 Result	07 MAR 91 Result*	Units
Alkalinity, Bicarb. as CaCO3 at pH 4.5	---	624	mg/L
Alkalinity, Carb. as CaCO3 at pH 8.3	---	<1	mg/L
Chloride	---	41	mg/L
pH	7.56	8.06	units
pH	7.57	---	units
pH	7.57	---	units
pH	7.58	---	units
Sulfate	---	---	mg/L
Specific Conductance at 25 deg.C	1030	1280	umhos/cm
Specific Conductance at 25 deg.C	1040	---	umhos/cm
Specific Conductance at 25 deg.C	1040	---	umhos/cm
Specific Conductance at 25 deg.C	1030	---	umhos/cm
Total Organic Carbon	1.9	---	mg/L
Total Organic Carbon	2.4	---	mg/L
Total Organic Carbon	2.2	---	mg/L
Total Organic Carbon	2.1	---	mg/L
Total Organic Halogen as Cl	---	---	ug/L
Total Organic Halogen as Cl	---	---	ug/L
Total Organic Halogen as Cl	---	---	ug/L
Total Organic Halogen as Cl	---	---	ug/L
Total Dissolved Solids	---	840	mg/L
Water Elevation	---	---	ft
Total Alkalinity	---	624	
Sulfate	---	17	

* Data from Analytical Technologies, Inc.

AnalyticalTechnologies, Inc. 2113 S. 48th Street Suite 107 Tempe, AZ 85282 (602) 438-1530

ATI I.D. 102836

April 4, 1991

Giant Refining Company
R.R.3, P.O. Box 7
Gallup, NM 87301

Project Name/Number: None given

Attention: Claud Rosendale

On 02/28/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TOC analyses were performed by ATI, San Diego. BOD analyses were performed by Aquatic Consulting and Testing.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Analytical Technologies, Inc.

CLIENT : GIANT REFINING CO. DATE RECEIVED : 02/28/91
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 04/03/91

ATI I.D. : 102836

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	API EFFLUENT	AQUEOUS	02/27/91
02	API EFFLUENT	AQUEOUS	02/27/91
03	API EFFLUENT	AQUEOUS	02/27/91
04	API EFFLUENT	AQUEOUS	02/27/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	4

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 102836

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 02/28/91
REPORT DATE : 04/03/91

PARAMETER	UNITS	01	02	03	04
BIOLOGICAL OXYGEN DEMAND	MG/L	-	-	-	598
CHEMICAL OXYGEN DEMAND	MG/L	-	-	1000	-
TOTAL DISSOLVED SOLIDS	MG/L	4500	-	-	-
TOTAL ORGANIC CARBON	MG/L	-	125	-	-

Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 102836

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
BIOCHEMICAL OXYGEN DEM	MG/L	10283709	154	154	0	236	100	82
CHEMICAL OXYGEN DEMAND	MG/L	10283901	520	550	6	820	300	100
TOTAL DISSOLVED SOLIDS	MG/L	10352301	2500	2500	0	NA	NA	NA
TOTAL ORGANIC CARBON	MG/L	10499902	0.74	0.74	0	9.60	10.0	89

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

TABLE 1 - GROUNDWATER SAMPLING SCHEDULE
ANNUAL PARAMETERS (MARCH OR APRIL)

WELL #/PARAM	pH	CONDUCT	TOC*	TOX*	TDS	ALKAL. BICARB.	ALKAL. CARB.	CHLORIDE	SULFATE	PHENOL	TCL-VOL ORG(8240)	VOA-BTEX 8020	TOTAL METALS Cr	Pb	Hg	DISSOLVED METALS As	Ba	Cd	Ca	Mg	Mn	K	Ag	Na
MW-1	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X
OW-11	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X
OW-1	X	X			X	X	X	X	X			X							X	X		X		X
OW-2	X	X			X	X	X	X	X			X							X	X		X		X
OW-3	X	X			X	X	X	X	X			X							X	X		X		X
SMW-1	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X
SMW-2	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X
SMW-3	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X
SMW-4	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X
SMW-5	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X
SMW-6	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X		X

SEMI-ANNUAL PARAMETERS (SEPT. OR OCT.)

	pH*	COND*	TOC*	TOX*	TOTAL METALS Cr	Pb	TCL-VOL ORG(8240)
MW-1	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X
OW-11	X	X	X	X	X	X	X
SMW-1	X	X	X	X	X	X	X
SMW-2	X	X	X	X	X	X	X
SMW-3	X	X	X	X	X	X	X
SMW-4	X	X	X	X	X	X	X
SMW-5	X	X	X	X	X	X	X
SMW-6	X	X	X	X	X	X	X

* 1 REPLICATES
+ 2 REPLICATES

Waste Waters

API Effluent
1. BOD
2. COD
3. TOC
4. TDS

Aerated Lagoon Effluent
1. pH
2. BOD
3. COD
4. TOC
5. TDS
6. Sulfide (total)
7. Metals - (As, Cd, Cr, Pb, Hg, Ni, Se)
8. Oil + Grease
9. 8240 (Attached)
10. 8270 (Attached)

Analytical Technologies, Inc.

Analytical**Technologies,**Inc.
Phoenix, Arizona

Chain of Custody

DATE 2-27-91 PAGE 2 OF 2

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt. 3 Box 7
Gallup, NM 87301

BILL TO: ~~Same~~ Claud Rosendale
COMPANY: Same
ADDRESS:

Claud Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
API Effluent 1 Liter plastic	2-27-91	8:10 AM	Waste Water	1
1 250ml Spec.				2
1 250ml plastic				3
1 L. Plastic				4

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	TDS	TOC	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	601	8010	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP	NUMBER OF CONTAINERS
									X													1
										X												1
												X										1
													X									1

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	4
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	N
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed. Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	102836

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Lynn Shelton Time: 9:45 AM	Signature: Time:	Signature: Time:
Printed Name: LYNN SHELTON Date: 2-27-91	Printed Name: Date	Printed Name: Date
Company: Giant Refining Co.	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 1:30
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 2/28/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 **DISTRIBUTION:** White, Canary - ANALYTICAL TECHNOLOGIES, INC.• Pink - ORIGINATOR

Analytical Technologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 102837

April 22, 1991

Giant Refining Company
R.R.3, P.O. Box 7
Gallup, NM 87301

Project Name/Number: None given

Attention: Claud Rosendale

On 02/28/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TOC analyses were performed by ATI, San Diego. BOD analyses were performed by Aquatic Consulting and Testing. Sulfide analyses were performed by Westech Laboratories.

If you have any questions or comments, please do not hesitate to contact us at (602)438-1530.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

RVW:clf
Enclosure

Analytical Technologies, Inc.

CLIENT : GIANT REFINING CO. DATE RECEIVED : 02/28/91
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 04/03/91
ATI I.D. : 102837

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
02	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
03	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
04	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
05	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
06	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
07	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
08	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91
09	AERATED LAGOON EFFLUENT	AQUEOUS	02/27/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	9

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 102837

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 02/28/91
REPORT DATE : 04/03/91

PARAMETER	UNITS	04	05	06	07	08
CHEMICAL OXYGEN DEMAND	MG/L	-	-	-	-	480
OIL AND GREASE, GRAVIMETRIC	MG/L	-	38	-	-	-
PH	UNITS	-	-	7.8	-	-
SULFIDE, TOTAL	MG/L	<0.10	-	-	-	-
TOTAL DISSOLVED SOLIDS	MG/L	-	-	5200	-	-
TOTAL ORGANIC CARBON	MG/L	-	-	-	33.3	-

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 102837

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 02/28/91
REPORT DATE : 04/03/91

PARAMETER	UNITS	09
BIOLOGICAL OXYGEN DEMAND	MG/L	154

Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 102837

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
BIOCHEMICAL OXYGEN DEM	MG/L	10283709	154	154	0	236	100	82
CHEMICAL OXYGEN DEMAND	MG/L	10283901	520	550	6	820	300	100
OIL AND GREASE, GRAVIM	MG/L	10399910	<2	<2	NA	19	20	95
PH	UNITS	10281701	8.1	8.1	0	NA	NA	NA
SULFIDE, TOTAL	MG/L	10399902	<0.10	<0.10	NA	NA	NA	NA
TOTAL DISSOLVED SOLIDS	MG/L	10352301	2500	2500	0	NA	NA	NA
TOTAL ORGANIC CARBON	MG/L	10499902	0.74	0.74	0	9.60	10.0	89

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 102837

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 02/28/91
REPORT DATE : 04/03/91

PARAMETER	UNITS	03
ARSENIC	MG/L	0.036
CADMIUM	MG/L	<0.005
CHROMIUM	MG/L	<0.010
MERCURY	MG/L	0.0004
NICKEL	MG/L	0.038
LEAD	MG/L	0.010
SELENIUM	MG/L	0.011

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 102837

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
ARSENIC	MG/L	10284004	<0.005	<0.005	NA	0.043	0.050	86
CADMIUM	MG/L	10282901	<0.005	<0.005	NA	0.099	0.100	99
CHROMIUM	MG/L	10282901	<0.010	<0.010	NA	0.981	1.00	98
MERCURY	MG/L	10367601	<0.0002	<0.0002	NA	0.0045	0.0050	90
NICKEL	MG/L	10282901	<0.020	<0.020	NA	0.109	0.100	109
LEAD	MG/L	10282901	<0.002	<0.002	NA	0.044	0.050	88
SELENIUM	MG/L	10282901	<0.005	<0.005	NA	MSA	CC=	.999

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10283702

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 02/27/91
PROJECT #	: (NONE)	DATE RECEIVED	: 02/28/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: AERATED LAGOON EFFLUENT	DATE ANALYZED	: 03/08/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 5

COMPOUNDS	RESULTS
CHLOROMETHANE	<50
BROMOMETHANE	<50
VINYL CHLORIDE	<5
CHLOROETHANE	<5
METHYLENE CHLORIDE	<25
ACETONE	60
CARBON DISULFIDE	<5
1,1-DICHLOROETHENE	<5
1,1-DICHLOROETHANE	<5
1,2-DICHLOROETHENE (TOTAL)	<5
CHLOROFORM	<5
1,2-DICHLOROETHANE	<5
2-BUTANONE (MEK)	<10
1,1,1-TRICHLOROETHANE	<5
CARBON TETRACHLORIDE	<5
VINYL ACETATE	<50
BROMODICHLOROMETHANE	<5
1,1,2,2-TETRACHLOROETHANE	<5
1,2-DICHLOROPROPANE	<5
TRANS-1,3-DICHLOROPROPENE	<5
TRICHLOROETHENE	<5
DIBROMOCHLOROMETHANE	<5
1,1,2-TRICHLOROETHANE	<5
BENZENE	<5
CIS-1,3-DICHLOROPROPENE	<5
2-CHLOROETHYLVINYLETHER	<50
BROMOFORM	<25
2-HEXANONE (MBK)	<50
4-METHYL-2-PENTANONE (MIBK)	<50
TETRACHLOROETHENE	<5
TOLUENE	<5
CHLOROBENZENE	<5
ETHYLBENZENE	<5
STYRENE	<5
TOTAL XYLENES	<5

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	80
BROMOFLUOROBENZENE (%)	92
TOLUENE-D8 (%)	98

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10283702

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<10
1,4-DIOXANE	<500

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	ATI I.D.	: 102837
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/08/91
PROJECT NAME	: (NONE)	DATE ANALYZED	: 03/08/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
CHLOROMETHANE	12
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	8
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	93
BROMOFLUOROBENZENE (%)	87
TOLUENE-D8 (%)	103

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO. ATI I.D : 102837

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2
1,4-DIOXANE	<100

Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 102837

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 10399921

DATE ANALYZED : 03/08/91
SAMPLE MATRIX :
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1	50	48	96	48	96	0
TRICHLOROETHENE	<1	50	47	94	43	86	9
CHLOROBENZENE	<1	50	50	100	49	98	2
TOLUENE	<1	50	48	96	48	96	0
BENZENE	<1	50	46	92	47	94	2

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10283701

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 02/27/91
PROJECT #	: (NONE)	DATE RECEIVED	: 02/28/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: 03/04/91
CLIENT I.D.	: AERATED LAGOON EFFLUENT	DATE ANALYZED	: 03/13/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 10

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<100
PHENOL	<100
ANILINE	<100
BIS(2-CHLOROETHYL)ETHER	<100
2-CHLOROPHENOL	<100
1,3-DICHLOROBENZENE	<100
1,4-DICHLOROBENZENE	<100
BENZYL ALCOHOL	<100
1,2-DICHLOROBENZENE	<100
2-METHYLPHENOL	<100
BIS(2-CHLOROISOPROPYL)ETHER	<100
4-METHYLPHENOL	<100
N-NITROSO-DI-N-PROPYLAMINE	<100
HEXACHLOROETHANE	<100
NITROBENZENE	<100
ISOPHORONE	<100
2-NITROPHENOL	<100
2,4-DIMETHYLPHENOL	<100
BENZOIC ACID	<500
BIS(2-CHLOROETHOXY)METHANE	<100
2,4-DICHLOROPHENOL	<100
1,2,4-TRICHLOROBENZENE	<100
NAPHTHALENE	<100
4-CHLOROANILINE	<100
HEXACHLOROBUTADIENE	<100
4-CHLORO-3-METHYLPHENOL	<100
2-METHYLNAPHTHALENE	<100
HEXACHLOROCYCLOPENTADIENE	<100
2,4,6-TRICHLOROPHENOL	<100
2,4,5-TRICHLOROPHENOL	<500
2-CHLORONAPHTHALENE	<100
2-NITROANILINE	<500
DIMETHYLPHTHALATE	<100
ACENAPHTHYLENE	<100
3-NITROANINLINE	<500
ACENAPHTHENE	<100
2,4-DINITROPHENOL	<500
4-NITROPHENOL	<500
DIBENZOFURAN	<100
2,4-DINITROTOLUENE	<100
2,6-DINITROTOLUENE	<100

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Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10283701

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

COMPOUNDS	RESULTS
DIETHYLPHTHALATE	<100
4-CHLOROPHENYL-PHENYLETHER	<100
FLUORENE	<100
4-NITROANILINE	<500
4,6-DINITRO-2-METHYLPHENOL	<500
N-NITROSODIPHENYLAMINE	<100
4-BROMOPHENYL-PHENYLETHER	<100
HEXACHLOROBENZENE	<100
PENTACHLOROPHENOL	<500
PHENANTHRENE	<100
ANTHRACENE	<100
DI-N-BUTYLPHTHALATE	<100
FLUORANTHENE	<100
BENZIDINE	<1000
PYRENE	<100
BUTYLBENZYLPHTHALATE	<100
3,3'-DICHLOROBENZIDINE	<200
BENZO(a)ANTHRACENE	<100
BIS(2-ETHYLHEXYL)PHTHALATE	<100
CHRYSENE	100
DI-N-OCTYLPHTHALATE	<100
BENZO(b)FLUORANTHENE	<100
BENZO(k)FLUORANTHENE	<100
BENZO(a)PYRENE	<100
INDENO(1,2,3-cd)PYRENE	<100
DIBENZO(a,h)ANTHRACENE	<100
BENZO(g,h,i)PERYLENE	<100

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5 (%)	72
2-FLUOROBIPHENYL (%)	72
TERPHENYL (%)	140
PHENOL-D6 (%)	66
2-FLUOROPHENOL (%)	74
2,4,6-TRIBROMOPHENOL (%)	109

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

CLIENT	: GIANT REFINING CO.	ATI I.D.	: 102837
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/04/91
PROJECT NAME	: (NONE)	DATE ANALYZED	: 03/13/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
N-NITROSODIMETHYLAMINE	<10
PHENOL	<10
ANILINE	<10
BIS(2-CHLOROETHYL)ETHER	<10
2-CHLOROPHENOL	<10
1,3-DICHLOROBENZENE	<10
1,4-DICHLOROBENZENE	<10
BENZYL ALCOHOL	<10
1,2-DICHLOROBENZENE	<10
2-METHYLPHENOL	<10
BIS(2-CHLOROISOPROPYL)ETHER	<10
4-METHYLPHENOL	<10
N-NITROSO-DI-N-PROPYLAMINE	<10
HEXACHLOROETHANE	<10
NITROBENZENE	<10
ISOPHORONE	<10
2-NITROPHENOL	<10
2,4-DIMETHYLPHENOL	<10
BENZOIC ACID	<50
BIS(2-CHLOROETHOXY)METHANE	<10
2,4-DICHLOROPHENOL	<10
1,2,4-TRICHLOROBENZENE	<10
NAPHTHALENE	<10
4-CHLOROANILINE	<10
HEXACHLOROBUTADIENE	<10
4-CHLORO-3-METHYLPHENOL	<10
2-METHYLNAPHTHALENE	<10
HEXACHLOROCYCLOPENTADIENE	<10
2,4,6-TRICHLOROPHENOL	<10
2,4,5-TRICHLOROPHENOL	<50
2-CHLORONAPHTHALENE	<10
2-NITROANILINE	<50
DIMETHYLPHTHALATE	<10
ACENAPHTHYLENE	<10
3-NITROANINLINE	<50
ACENAPHTHENE	<10
2,4-DINITROPHENOL	<50
4-NITROPHENOL	<50
DIBENZOFURAN	<10
2,4-DINITROTOLUENE	<10
2,6-DINITROTOLUENE	<10
DIETHYLPHTHALATE	<10
4-CHLOROPHENYL-PHENYLETHER	<10

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Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

ATI I.D. : 102837

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

COMPOUNDS	RESULTS
FLUORENE	<10
4-NITROANILINE	<50
4,6-DINITRO-2-METHYLPHENOL	<50
N-NITROSODIPHENYLAMINE	<10
4-BROMOPHENYL-PHENYLETHER	<10
HEXACHLOROBENZENE	<10
PENTACHLOROPHENOL	<50
PHENANTHRENE	<10
ANTHRACENE	<10
DI-N-BUTYLPHTHALATE	<10
FLUORANTHENE	<10
BENZIDINE	<100
PYRENE	<10
BUTYLBENZYLPHTHALATE	<10
3,3'-DICHLOROBENZIDINE	<20
BENZO(a)ANTHRACENE	<10
BIS(2-ETHYLHEXYL)PHTHALATE	<10
CHRYSENE	<10
DI-N-OCTYLPHTHALATE	<10
BENZO(b)FLUORANTHENE	<10
BENZO(k)FLUORANTHENE	<10
BENZO(a)PYRENE	<10
INDENO(1,2,3-cd)PYRENE	<10
DIBENZO(a,h)ANTHRACENE	<10
BENZO(g,h,i)PERYLENE	<10

SURROGATE PERCENT RECOVERIES

NITROBENZENE-D5 (%)	82
2-FLUOROBIPHENYL (%)	79
TERPHENYL (%)	137
PHENOL-D6 (%)	81
2-FLUOROPHENOL (%)	91
2,4,6-TRIBROMOPHENOL (%)	96

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

ATI I.D. : 10283701

COMPOUNDS	RESULTS
TOTAL ORGANIC ACIDS	500
TOTAL EXTRACTABLE HYDROCARBONS C13-C24	10000
7,12-DIMETHYLBENZ(a)ANTHRACENE	<100
1-METHYLNAPHTHALENE	<100
3/4-METHYLPHENOL	<100
PYRIDINE	<200
QUINOLINE	<500
BENZENETHIOL	ND *
INDENE	ND *

*ND INDICATES THE COMPOUND WAS NOT DETECTED WITH AN ESTIMATED DETECTION LIMIT OF 100 UG/L.

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

CLIENT : GIANT REFINING CO. ATI I.D : 102837

COMPOUNDS	RESULTS
7,12-DIMETHYLBENZ(a)ANTHRACENE	<10
1-METHYLNAPHTHALENE	<10
3/4-METHYLPHENOL	<10
PYRIDINE	<20
QUINOLINE	<50
BENZENETHIOL	ND *
INDENE	ND *

*ND INDICATES THE COMPOUND WAS NOT DETECTED WITH AN ESTIMATED DETECTION LIMIT OF 10 UG/L.

Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 102837

TEST : SEMI-VOLATILE ORGANICS (EPA 8270)

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 10399921

DATE ANALYZED : 03/13/91
SAMPLE MATRIX :
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,2,4-TRICHLOROBENZENE	<10	70	59	84	63	90	7
ACENAPHTHENE	<10	50	56	112	58	116	4
2,4-DINITROTOLUENE	<10	50	56	112	59	118	5
PYRENE	<10	50	60	120	69	138	14
N-NITROSO-DI-N-PROPYL AMINE	<10	50	51	102	58	116	13
1,4-DICHLOROBENZENE	<10	50	37	74	43	86	15
PENTACHLOROPHENOL	<50	100	110	110	118	118	7
PHENOL	<10	100	62	62	76	76	20
2-CHLOROPHENOL	<10	100	72	72	86	86	18
4-CHLORO-3-METHYLPHENOL	<10	100	70	70	87	87	22
4-NITROPHENOL	<50	100	77	77	91	91	17

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 2-27-91 PAGE 1 OF 2

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt. 3 Box 7
Gallup, NM. 87301

BILL TO: Clark Rosendale
COMPANY: Giant
ADDRESS:

SAMPLERS: (Signature)

( ) PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
Aerated Lagoon 2x1L Glass	2-27-91	8:25 AM	Waste Water	1
Effluent 2x40ml VOA				2
1x1L. Plastic				3
1x250ml. Plastic				4
1x500ml. Amber Glass				5
1x1L. Plastic				6
1x250ml. Amber				7
1x250ml. Plastic				8
1x1L. Plastic				9

Petroleum Hydrocarbons (418.1) | (MOD 8015) Gas/Diesel | Diesel/Gasoline/BTXE (MOD 8015/8020) | BTXE (8020) | Chlorinated Hydrocarbons (601/8010) | Aromatic Hydrocarbons (602/8020) | MTBE | Pesticides/PCB (608/8080) | Herbicides (615/8150) | Base/Neutral/Acid Compounds GC/MS (625/8270) | Volatile Organics GC/MS (624/8240) | TDS, PH | TOC | SDWA Primary Standards 601 | SDWA Secondary Standards 602 | SDWA Volatiles (502.1/503.1) | The 19 Priority Pollutant Metals Listed | The 8 EP Tox Metals by EP Tox Prep. (1310) | The 8 EP Tox Metals by Total Digestion | The 8 EP Tox Metals by TCLP | Sulfide | Oil & Grease | NUMBER OF CONTAINERS

										X													2
						X				X	X												2
																	X						1
																				X			1
																					X		1
										X	X	X											1
											X	X											1
														X									1
															X								1

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	11
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	N
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed. Ex.	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	102837

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments: Trip Blank was broken on delivery
(X) *See Attached for detailed analysis and parameters for G.C. Scans.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Lynn Shelton Time: 9:45AM	Signature: Time:	Signature: Time:
Printed Name: LYNN Shelton Date: 2-27-91	Printed Name: Date	Printed Name: Date
Company: Giant Refining Co.	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 1:45
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 2/28/91
Company:	Company:	Analytical Technologies, Inc.

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TABLE 1 - GROUNDWATER SAMPLING SCHEDULE
ANNUAL PARAMETERS (MARCH OR APRIL)

ELL #/PARAM	pH	CONDUCT	TOC*	TOX*	TDS	ALKAL. BICARB.	ALKAL. CARB.	CHLORIDE	SULFATE	PHENOL	TCL-VOL ORG(8240)	VOA-BTEX 8020	TOTAL METALS Cr	Pb	Hg	DISSOLVED METALS As	Ba	Cd	Ca	Mg	Mn	K	Se	Ag	Na
W-1	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-2	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-4	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-5	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-11	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-1	X	X			X	X	X	X	X			X							X	X		X			X
W-2	X	X			X	X	X	X	X			X							X	X		X			X
W-3	X	X			X	X	X	X	X			X							X	X		X			X
MW-1	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-2	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-3	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-4	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-5	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-6	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X

SEMI-ANNUAL PARAMETERS (SEPT. OR OCT.)

	pH*	COND*	TOC*	TOX*	TOTAL METALS Cr	Pb	TCL-VOL ORG(8240)
MW-1	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X
OW-11	X	X	X	X	X	X	X
SMW-1	X	X	X	X	X	X	X
SMW-2	X	X	X	X	X	X	X
SMW-3	X	X	X	X	X	X	X
SMW-4	X	X	X	X	X	X	X
SMW-5	X	X	X	X	X	X	X
SMW-6	X	X	X	X	X	X	X

* 4 REPLICATES
+ 2 REPLICATES

Waste Waters

API Effluent
1. BOD
2. COD
3. TOC
4. TDS

Aerated Lagoon Effluent
1. pH
2. BOD
3. COD
4. TOC
5. TDS
6. Sulfide (total)
7. Metals - (As, Cd, Cr, Pb, Hg, Ni, Se)
8. Oil + Grease
9. 8240 (Attached)
10. 8270 (Attached)

Waste Water (N.C. 3644)

Semivolatile Organics
Refinery List
Method 8270

Parameter	Units	Reporting Limit
Anthracene	ug/L	20
Benzenethiol	ug/L	--
Benzo(a)anthracene	ug/L	20
Benzo(b)fluoranthene	ug/L	20
Benzo(k)fluoranthene	ug/L	20
Benzo(a)pyrene	ug/L	20
Butyl benzyl phthalate	ug/L	20
Chrysene	ug/L	20
Dibenz(a,h)anthracene	ug/L	20
Di-n-butyl phthalate	ug/L	20
1,2-Dichlorobenzene	ug/L	20
1,3-Dichlorobenzene	ug/L	20
1,4-Dichlorobenzene	ug/L	20
Diethyl phthalate	ug/L	20
7,12-Dimethylbenz(a)-anthracene	ug/L	20
2,4-Dimethylphenol	ug/L	20
Dimethyl phthalate	ug/L	20
2,4-Dinitrophenol	ug/L	100
Di-n-octyl phthalate	ug/L	20
bis(2-Ethylhexyl) phthalate	ug/L	20
Fluoranthene	ug/L	20
Indene	ug/L	20
1-Methylnaphthalene	ug/L	20
2-Methylphenol	ug/L	20
3/4-Methylphenol	ug/L	20
Naphthalene	ug/L	20
4-Nitrophenol	ug/L	100
Phenanthrene	ug/L	20
Phenol	ug/L	20
Pyrene	ug/L	20
Pyridine	ug/L	40
Quinoline	ug/L	100

Aromatic Volatile Organics
8240

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
2-Butanone (MEK)	72	ug/L	10
Carbon disulfide	8.7	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichloroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	500
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Xylenes (total)	11	ug/L	5.0

Rocky Mountain
Analytical Laboratory

ANALYTICAL RESULTS

FOR

GIANT REFINING

ENSECO-RMAL NO. 011196

OCTOBER 10, 1990

Enseco

Reviewed by:

Julie Essey

Sue Dalla

Enseco Incorporated
4955 Yarrow Street
Arvada, Colorado 80002
303/421-6611 Fax: 303/431-7171

Introduction

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

- Sample Description Information
- Analytical Test Requests
- Analytical Results
- Quality Control Report

All analyses at Enseco are performed so that the maximum concentration of sample consistent with the method is analyzed. Dilutions are at times required to achieve linearity of the specific parameter or to reduce matrix interferences. In this event, reporting limits are adjusted proportionately.

Sample 011196-0003 by Method 8270 was diluted due to concentrations of non-target compounds.

The preparation holding time for semivolatiles was exceeded for RMAL sample 011196-0003. The initial extraction was performed within holding times; however, after assessing the original results, a reextraction was performed outside of holding times in order to improve the quality of the data.

The holding time for TDS was exceeded for RMAL sample 011196-0002. This sample was originally analyzed within holding times but was reanalyzed because the TDS/conductivity ratio was outside of lab limits.

The holding time for BOD was exceeded for RMAL sample 011196-0003. This sample was overdiluted for the initial analysis.

Sample Description Information

The Sample Description Information lists all of the samples received in this project together with the internal laboratory identification number assigned for each sample. Each project received at Enseco - RMAL is assigned

a unique six digit number. Samples within the project are numbered sequentially. The laboratory identification number is a combination of the six digit project code and the sample sequence number.

Also given in the Sample Description Information is the Sample Type (matrix), Date of Sampling (if known) and Date of Receipt at the laboratory.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Analytical Test Requests

The Analytical Test Requests lists the analyses that were performed on each sample. The Custom Test column indicates where tests have been modified to conform to the specific requirements of this project.

Enseco
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SAMPLE DESCRIPTION INFORMATION
for
Giant Refining

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
011196-0001-SA	TRIP BLANK	AQUEOUS			07 SEP 90
011196-0002-SA	API Effluent	AQUEOUS	06 SEP 90	10:40	07 SEP 90
011196-0003-SA	Aerated Lagoon Effluent	AQUEOUS	06 SEP 90	10:30	07 SEP 90

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ANALYTICAL TEST REQUESTS
for
Giant Refining

Lab ID: 011196	Group Code	Analysis Description	Custom Test?
0001	A	Aromatic Volatile Organics	N
0002	B	Total Organic Carbon (TOC)	N
		Total Dissolved Solids (TDS)	N
		Biochemical Oxygen Demand (BOD)	N
		Chemical Oxygen Demand (COD)	N
0003	C	Biochemical Oxygen Demand (BOD)	Y
		Chemical Oxygen Demand (COD)	N
		Total Organic Carbon (TOC)	N
		Total Dissolved Solids (TDS)	N
		Oil & Grease, Gravimetric	N
		Sulfide, Total	N
		Volatile Organics Refinery List	N
		Screen - Volatile Organics	N
		Semivolatile Organics Refinery List	Y
		Prep - Semivolatile Organics by GC/MS	N
		pH	N
		ICP Metals (Total)	Y
		Prep - Total Metals, ICP	N
		Arsenic, Furnace AA (Total)	N
		Prep - Total Metals, Furnace AA	N
		Lead, Furnace AA (Total)	N
		Selenium, Furnace AA (Total)	N
		Mercury, Cold Vapor AA (Total)	N
		Prep - Mercury, Cold Vapor AA (Total)	N
		Oil & Grease, IR	N

Analytical Results

The analytical results for this project are presented in the following data tables. Each data table includes sample identification information, and when available and appropriate, dates sampled, received, authorized, prepared and analyzed. The authorization data is the date when the project was defined by the client such that laboratory work could begin.

Data sheets contain a listing of the parameters measured in each test, the analytical results and the Enseco reporting limit. Reporting limits are adjusted to reflect dilution of the sample, when appropriate. Solid and waste samples are reported on an "as received" basis, i.e. no correction is made for moisture content.

Enseco-RMAL is no longer routinely blank-correcting analytical data. Uncorrected analytical results are reported, along with associated blank results, for all organic and metals analyses. Analytical results and blank results are reported for conventional inorganic parameters as specified in the method. This policy is described in detail in the Enseco Incorporated Quality Assurance Program Plan for Environmental Chemical Monitoring, Revision 3.3, May, 1989.

The results from the Standard Enseco QA/QC Program, which generates data which are independent of matrix effects, is provided subsequently.

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A Corning Company

Volatile Organics
Refinery List
Method 8240

Client Name: Giant Refining
Client ID: Aerated Lagoon Effluent
Lab ID: 011196-0003-SA
Matrix: AQUEOUS Sampled: 06 SEP 90 Received: 07 SEP 90
Authorized: 07 SEP 90 Prepared: 10 SEP 90 Analyzed: 16 SEP 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
2-Butanone (MEK)	72	ug/L	10
Carbon disulfide	8.7	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichloroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	500
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Xylenes (total)	11	ug/L	5.0
Surrogate	**Recovery**		
Toluene-d8	100	%	--
4-Bromofluorobenzene	106	%	--
1,2-Dichloroethane-d4	97	%	--

ND = Not detected
NA = Not applicable

Reported By: Michael Blades Approved By: Jeff Lowry

Enseco
A Corning Company

Semivolatile Organics
Refinery List
Method 8270

Client Name: Giant Refining
Client ID: Aerated Lagoon Effluent
Lab ID: 011196-0003-SA
Matrix: AQUEOUS Sampled: 06 SEP 90 Received: 07 SEP 90
Authorized: 07 SEP 90 Prepared: 21 SEP 90 Analyzed: 01 OCT 90

Parameter	Result	Units	Reporting Limit
Anthracene	ND	ug/L	20
Benzenethiol	ND	ug/L	--
Benzo(a)anthracene	ND	ug/L	20
Benzo(b)fluoranthene	ND	ug/L	20
Benzo(k)fluoranthene	ND	ug/L	20
Benzo(a)pyrene	ND	ug/L	20
Butyl benzyl phthalate	ND	ug/L	20
Chrysene	ND	ug/L	20
Dibenz(a,h)anthracene	ND	ug/L	20
Di-n-butyl phthalate	ND	ug/L	20
1,2-Dichlorobenzene	ND	ug/L	20
1,3-Dichlorobenzene	ND	ug/L	20
1,4-Dichlorobenzene	ND	ug/L	20
Diethyl phthalate	ND	ug/L	20
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	20
2,4-Dimethylphenol	84	ug/L	20
Dimethyl phthalate	ND	ug/L	20
2,4-Dinitrophenol	ND	ug/L	100
Di-n-octyl phthalate	ND	ug/L	20
bis(2-Ethylhexyl) phthalate	ND	ug/L	20
Fluoranthene	ND	ug/L	20
Indene	ND	ug/L	20
1-Methylnaphthalene	ND	ug/L	20
2-Methylphenol	ND	ug/L	20
3/4-Methylphenol	ND	ug/L	20
Naphthalene	ND	ug/L	20
4-Nitrophenol	ND	ug/L	100
Phenanthrene	ND	ug/L	20
Phenol	63	ug/L	20
Pyrene	ND	ug/L	20
Pyridine	ND	ug/L	40
Quinoline	ND	ug/L	100

Surrogate	Recovery		
Nitrobenzene-d5	61	%	--
2-Fluorobiphenyl	46	%	--
Terphenyl-d14	31	%	--
Phenol-d5	78	%	--

(continued on following page)

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

Enseco
A Corning Company

Semivolatile Organics
Refinery List
Method 8270

Client Name: Giant Refining
Client ID: Aerated Lagoon Effluent
Lab ID: 011196-0003-SA
Matrix: AQUEOUS Sampled: 06 SEP 90 Received: 07 SEP 90
Authorized: 07 SEP 90 Prepared: 21 SEP 90 Analyzed: 01 OCT 90

Surrogate	Recovery		
2-Fluorophenol	68	%	--
2,4,6-Tribromophenol	68	%	--

ND = Not detected
NA = Not applicable

Reported By: Steve Siegel Approved By: Jeff Lowry

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Aromatic Volatile Organics

Method 8020

Client Name: Giant Refining
Client ID: TRIP BLANK
Lab ID: 011196-0001-SA
Matrix: AQUEOUS
Authorized: 07 SEP 90

Sampled: Unknown
Prepared: NA

Received: 07 SEP 90
Analyzed: 10 SEP 90

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

ND = Not detected
NA = Not applicable

Reported By: Garth Atkins

Approved By: Jeff Lowry

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Metals

Total Metals

Client Name: Giant Refining
Client ID: Aerated Lagoon Effluent
Lab ID: 011196-0003-SA
Matrix: AQUEOUS Sampled: 06 SEP 90 Received: 07 SEP 90
Authorized: 07 SEP 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Arsenic	ND	mg/L	0.0050	7060	03 OCT 90	04 OCT 90
Cadmium	ND	mg/L	0.010	6010	03 OCT 90	05 OCT 90
Chromium	ND	mg/L	0.020	6010	03 OCT 90	05 OCT 90
Lead	0.026	mg/L	0.025	7421	03 OCT 90	04 OCT 90
Mercury	0.0010	mg/L	0.00020	7470	02 OCT 90	03 OCT 90
Nickel	ND	mg/L	0.080	6010	03 OCT 90	05 OCT 90
Selenium	ND	mg/L	0.025	7740	03 OCT 90	04 OCT 90

ND = Not detected
NA = Not applicable

Reported By: Mark Brundege Approved By: Mary Grehl

Enseco
A Corning Company

General Inorganics

Client Name: Giant Refining
Client ID: API Effluent
Lab ID: 011196-0002-SA
Matrix: AQUEOUS
Authorized: 07 SEP 90

Sampled: 06 SEP 90
Prepared: See Below

Received: 07 SEP 90
Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Biochemical Oxygen Demand	460	mg/L	2.0	405.1	NA	07 SEP 90
Chemical Oxygen Demand (Regular)	1260	mg/L	50.0	410.4	NA	18 SEP 90
Total Organic Carbon	226	mg/L	2.5	9060	NA	17 SEP 90
Total Dissolved Solids	3570	mg/L	50.0	160.1	NA	15 SEP 90

ND = Not detected
NA = Not applicable

Reported By: Eileen Burke

Approved By: Mary Grehl

Enseco
A Corning Company

General Inorganics

Client Name: Giant Refining
Client ID: Aerated Lagoon Effluent
Lab ID: 011196-0003-SA
Matrix: AQUEOUS Sampled: 06 SEP 90 Received: 07 SEP 90
Authorized: 07 SEP 90 Prepared: See Below Analyzed: See Below

Parameter	Result	Units	Reporting Limit	Analytical Method	Prepared Date	Analyzed Date
Biochemical Oxygen Demand	83.4	mg/L	2.0	405.1	NA	14 SEP 90
Chemical Oxygen Demand (Regular)	537	mg/L	25.0	410.4	NA	27 SEP 90
Oil and Grease	59.1	mg/L	2.5	413.2	NA	10 SEP 90
pH	8.4	units	--	9040	NA	07 SEP 90
Sulfide, Total	0.79	mg/L	0.050	9030M	NA	12 SEP 90
Total Organic Carbon	71.5	mg/L	1.0	9060	NA	18 SEP 90
Total Dissolved Solids	4900	mg/L	50.0	160.1	NA	10 SEP 90

ND = Not detected
NA = Not applicable

Reported By: Tammy Bailey Approved By: Mary Grehl

Quality Control Results

The Enseco laboratories operate under a vigorous QA/QC program designed to ensure the generation of scientifically valid, legally defensible data by monitoring every aspect of laboratory operations. Routine QA/QC procedures include the use of approved methodologies, independent verification of analytical standards, use of duplicate Laboratory Control Samples to assess the precision and accuracy of the methodology on a routine basis, and a rigorous system of data review.

In addition, the Enseco laboratories maintain a comprehensive set of certifications from both state and federal governmental agencies which require frequent analyses of blind audit samples. Enseco - Rocky Mountain Analytical Laboratory is certified by the EPA under the EPA/CLP program for both Organic and Inorganic analyses, under the USATHAMA (U.S. Army) program, by the Army Corps of Engineers, and the states of Colorado, New Jersey, New York, Utah, and Florida, among others.

The standard laboratory QC package is designed to:

1) establish a strong, cost-effective QC program that ensures the generation of scientifically valid, legally defensible data

2) assess the laboratory's performance of the analytical method using control limits generated with a well-defined matrix

3) establish clear-cut guidelines for acceptability of analytical data so that QC decisions can be made immediately at the bench, and

4) provide a standard set of reportables which assures the client of the quality of his data.

The Enseco QC program is based upon monitoring the precision and accuracy of an analytical method by analyzing a set of Duplicate Control Samples (DCS) at frequent, well-defined intervals. Each DCS is a well-characterized matrix which is spiked with target compounds at 5-100 times the reporting limit, depending upon the methodology being monitored. The purpose of the DCS is not to duplicate the sample matrix, but rather to provide an interference-free, homogeneous matrix from which to gather data to establish control limits. These limits are used to determine whether data generated by the laboratory on any given day is in control.

Control limits for accuracy (percent recovery) are based on the average, historical percent recovery +/- 3 standard deviation units. Control limits for precision (relative percent difference) range from 0 (identical duplicate DCS results) to the average, historical relative percent difference + 3 standard deviation units. These control limits are fairly narrow based on the consistency of the matrix being monitored and are updated on a quarterly basis.

For each batch of samples analyzed, an additional control measure is taken in the form of a Single Control Sample (SCS). The SCS consists of a control matrix that is spiked with either representative target compounds or surrogate compounds appropriate to the method being used. An SCS is prepared for each sample lot for which the DCS pair are not analyzed.

Accuracy for DCS and SCS is measured by Percent Recovery.

$$\% \text{ Recovery} = \frac{\text{Measured Concentration}}{\text{Actual Concentration}} \times 100$$

Precision for DCS is measured by Relative Percent Difference (RPD).

$$\text{RPD} = \frac{\left| \text{Measured Concentration DCS1} - \text{Measured Concentration DCS2} \right|}{(\text{Measured Concentration DCS1} + \text{Measured Concentration DCS2})/2} \times 100$$

All samples analyzed concurrently by the same test are assigned the same QC lot number. Projects which contain numerous samples, analyzed over several days, may have multiple QC lot numbers associated with each test. The QC information which follows includes a listing of the QC lot numbers associated with each of the samples reported, DCS and SCS (where applicable) recoveries from the QC lots associated with the samples, and control limits for these lots. The QC data is reported by test code, in the order that the tests are reported in the analytical results section of this report.

Enseco
A Corning Company

QC LOT ASSIGNMENT REPORT
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011196-0003-SA	AQUEOUS	624-A	12 SEP 90-H	16 SEP 90-H

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DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 624-A Matrix: AQUEOUS QC Lot: 12 SEP 90-H Concentration Units: ug/L								
1,1-Dichloroethene	50	43.0	44.7	43.8	88	61-145	3.9	14
Trichloroethene	50	47.7	48.7	48.2	96	71-120	2.1	14
Benzene	50	50.3	53.5	51.9	104	76-127	6.2	11
Toluene	50	56.7	57.9	57.3	115	76-125	2.1	13
Chlorobenzene	50	52.7	54.2	53.4	107	75-130	2.8	13

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC/MS

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) SCS	Accuracy(%) Limits
Category: 624-A				
Matrix: AQUEOUS				
QC Lot: 12 SEP 90-H QC Run: 16 SEP 90-H				
Concentration Units: ug/L				
1,2-Dichloroethane-d4	50.0	49.9	100	76-114
4-Bromofluorobenzene	50.0	50.5	101	86-115
Toluene-d8	50.0	50.9	102	88-110

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

METHOD BLANK REPORT
Volatile Organics by GC/MS

Test: 8240CP-REF-AP
Matrix: AQUEOUS
QC Lot: 12 SEP 90-H QC Run: 16 SEP 90-H

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	5.0
2-Butanone (MEK)	ND	ug/L	10
Carbon disulfide	ND	ug/L	5.0
Chlorobenzene	ND	ug/L	5.0
Chloroform	ND	ug/L	5.0
1,2-Dibromoethane (EDB)	ND	ug/L	10
1,2-Dichloroethane	ND	ug/L	5.0
1,4-Dioxane	ND	ug/L	500
Ethylbenzene	ND	ug/L	5.0
Styrene	ND	ug/L	5.0
Toluene	ND	ug/L	5.0
Xylenes (total)	ND	ug/L	5.0

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A Corning Company

QC LOT ASSIGNMENT REPORT
Semivolatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011196-0003-SA	AQUEOUS	625-A	21 SEP 90-A	21 SEP 90-A

Enseco
A Corning Company

DUPLICATE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 625-A Matrix: AQUEOUS QC Lot: 21 SEP 90-A Concentration Units: ug/L								
Phenol	100	79.6	84.0	81.8	82	12- 89	5.4	42
2-Chlorophenol	100	77.3	80.3	78.8	79	27-123	3.8	40
1,4-Dichlorobenzene	50	36.5	35.6	36.0	72	36- 97	2.5	28
N-Nitroso-di-n-propylamine	50	41.5	43.2	42.4	85	41-116	4.0	38
1,2,4-Trichlorobenzene	50	37.1	35.8	36.4	73	39- 98	3.6	28
4-Chloro-3-methylphenol	100	78.2	77.9	78.0	78	23- 97	0.4	42
Acenaphthene	50	37.0	37.4	37.2	74	46-118	1.1	31
4-Nitrophenol	100	70.9	68.4	69.6	70	10- 80	3.6	50
2,4-Dinitrotoluene	50	37.9	39.1	38.5	77	24- 96	3.1	38
Pentachlorophenol	100	38.4	24.2	31.3	31	9-103	45	50
Pyrene	50	44.6	45.7	45.2	90	26-127	2.4	31

Calculations are performed before rounding to avoid round-off errors in calculated results.

Enseco
A Corning Company

SINGLE CONTROL SAMPLE REPORT
Semivolatile Organics by GC/MS

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 625-A				
Matrix: AQUEOUS				
QC Lot: 21 SEP 90-A QC Run: 21 SEP 90-A				
Concentration Units: ug/L				
Nitrobenzene-d5	100	78.0	78	35-114
2-Fluorobiphenyl	100	68.6	69	43-116
Terphenyl-d14	100	67.6	68	33-141
2-Fluorophenol	200	124	62	21-100
Phenol-d5	200	103	52	10- 94
2,4,6-Tribromophenol	200	108	54	10-123

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Semivolatile Organics by GC/MS

Test: 8270CP-REF-A
Matrix: AQUEOUS
QC Lot: 21 SEP 90-A QC Run: 21 SEP 90-A

Analyte	Result	Units	Reporting Limit
Anthracene	ND	ug/L	10
Benzenethiol	ND	ug/L	--
Benzo(a)anthracene	ND	ug/L	10
Benzo(b)fluoranthene	ND	ug/L	10
Benzo(k)fluoranthene	ND	ug/L	10
Benzo(a)pyrene	ND	ug/L	10
Butyl benzyl phthalate	ND	ug/L	10
Chrysene	ND	ug/L	10
Dibenz(a,h)anthracene	ND	ug/L	10
Di-n-butyl phthalate	ND	ug/L	10
1,2-Dichlorobenzene	ND	ug/L	10
1,3-Dichlorobenzene	ND	ug/L	10
1,4-Dichlorobenzene	ND	ug/L	10
Diethyl phthalate	ND	ug/L	10
7,12-Dimethylbenz(a)-anthracene	ND	ug/L	10
2,4-Dimethylphenol	ND	ug/L	10
Dimethyl phthalate	ND	ug/L	10
2,4-Dinitrophenol	ND	ug/L	50
Di-n-octyl phthalate	ND	ug/L	10
bis(2-Ethylhexyl) phthalate	ND	ug/L	10
Fluoranthene	ND	ug/L	10
Indene	ND	ug/L	10
1-Methylnaphthalene	ND	ug/L	10
2-Methylphenol	ND	ug/L	10
3/4-Methylphenol	ND	ug/L	10
Naphthalene	ND	ug/L	10
4-Nitrophenol	ND	ug/L	50
Phenanthrene	ND	ug/L	10
Phenol	ND	ug/L	10
Pyrene	ND	ug/L	10
Pyridine	ND	ug/L	20
Quinoline	ND	ug/L	50

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QC LOT ASSIGNMENT REPORT
Volatile Organics by GC

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011196-0001-SA	AQUEOUS	602-A	09 SEP 90-A	09 SEP 90-A

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DUPLICATE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: 602-A Matrix: AQUEOUS QC Lot: 09 SEP 90-A Concentration Units: ug/L								
Benzene	5.0	4.18	4.44	4.31	86	80-120	6.0	15
Toluene	5.0	4.12	4.33	4.23	85	80-120	5.0	15
Ethylbenzene	5.0	4.15	4.35	4.25	85	80-120	4.7	15
Xylenes (total)	5.0	4.40	4.76	4.58	92	80-120	7.9	15
1,3-Dichlorobenzene	5.0	4.60	4.75	4.68	94	80-120	3.2	15

Calculations are performed before rounding to avoid round-off errors in calculated results.

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SINGLE CONTROL SAMPLE REPORT
Volatile Organics by GC

Analyte	Concentration Spiked	Measured	Accuracy(%) SCS	Limits
Category: 602-A				
Matrix: AQUEOUS				
QC Lot: 09 SEP 90-A QC Run: 09 SEP 90-A				
Concentration Units: ug/L				
a,a,a-Trifluorotoluene	30.0	30.7	102	20-160

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Volatile Organics by GC

Test: 602-AP
Matrix: AQUEOUS
QC Lot: 09 SEP 90-A QC Run: 09 SEP 90-A

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Chlorobenzene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	0.50
1,4-Dichlorobenzene	ND	ug/L	0.50
1,2-Dichlorobenzene	ND	ug/L	0.50

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QC LOT ASSIGNMENT REPORT
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011196-0003-SA	AQUEOUS	ICP-AT	03 OCT 90-A	03 OCT 90-A
011196-0003-SA	AQUEOUS	AS-FAA-AT	03 OCT 90-C	03 OCT 90-C
011196-0003-SA	AQUEOUS	PB-FAA-AT	03 OCT 90-C	03 OCT 90-C
011196-0003-SA	AQUEOUS	SE-FAA-AT	03 OCT 90-C	03 OCT 90-C
011196-0003-SA	AQUEOUS	HG-CVAA-AT	02 OCT 90-A	02 OCT 90-A

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A Corning Company

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: ICP-AT Matrix: AQUEOUS QC Lot: 03 OCT 90-A Concentration Units: mg/L								
Aluminum	2.0	1.86	1.88	1.87	94	75-125	1.0	20
Antimony	0.5	0.464	0.471	0.467	93	75-125	1.5	20
Arsenic	0.5	0.461	0.467	0.464	93	75-125	1.2	20
Barium	2.0	1.84	1.86	1.85	92	75-125	0.8	20
Beryllium	0.05	0.0460	0.0458	0.0459	92	75-125	0.3	20
Cadmium	0.05	0.0401	0.0461	0.0431	86	75-125	14	20
Calcium	100	92.3	90.6	91.4	91	75-125	1.9	20
Chromium	0.2	0.192	0.189	0.191	95	75-125	1.2	20
Cobalt	0.5	0.451	0.449	0.450	90	75-125	0.6	20
Copper	0.25	0.235	0.235	0.235	94	75-125	0.4	20
Iron	1.0	0.960	1.00	0.981	98	75-125	4.2	20
Lead	0.5	0.452	0.454	0.453	91	75-125	0.4	20
Magnesium	50	45.6	44.8	45.2	90	75-125	1.8	20
Manganese	0.5	0.456	0.457	0.456	91	75-125	0.2	20
Nickel	0.5	0.464	0.462	0.463	93	75-125	0.4	20
Potassium	50	41.9	41.2	41.6	83	75-125	1.7	20
Silver	0.05	0.0477	0.0488	0.0483	97	75-125	2.4	20
Sodium	100	87.9	86.0	86.9	87	75-125	2.2	20
Vanadium	0.5	0.479	0.482	0.480	96	75-125	0.6	20
Zinc	0.5	0.451	0.456	0.453	91	75-125	1.2	20
Category: AS-FAA-AT Matrix: AQUEOUS QC Lot: 03 OCT 90-C Concentration Units: mg/L								
Arsenic	0.04	0.0410	0.0420	0.0415	104	75-125	2.4	20
Category: PB-FAA-AT Matrix: AQUEOUS QC Lot: 03 OCT 90-C Concentration Units: mg/L								
Lead	0.02	0.0221	0.0254	0.0238	119	75-125	14	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Metals Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: SE-FAA-AT Matrix: AQUEOUS QC Lot: 03 OCT 90-C Concentration Units: mg/L								
Selenium	0.01	0.0115	0.0119	0.0117	117	75-125	3.4	20
Category: HG-CVAA-AT Matrix: AQUEOUS QC Lot: 02 OCT 90-A Concentration Units: mg/L								
Mercury	0.0010	0.00103	0.00103	0.00103	103	75-125	0.0	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

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METHOD BLANK REPORT
Metals Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: ICP-AT			
Matrix: AQUEOUS			
QC Lot: 03 OCT 90-A QC Run: 03 OCT 90-A			
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Nickel	ND	mg/L	0.040
Test: AS-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 03 OCT 90-C QC Run: 03 OCT 90-C			
Arsenic	ND	mg/L	0.0050
Test: PB-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 03 OCT 90-C QC Run: 03 OCT 90-C			
Lead	ND	mg/L	0.0050
Test: SE-FAA-AT			
Matrix: AQUEOUS			
QC Lot: 03 OCT 90-C QC Run: 03 OCT 90-C			
Selenium	ND	mg/L	0.0050
Test: HG-CVAA-AT			
Matrix: AQUEOUS			
QC Lot: 02 OCT 90-A QC Run: 02 OCT 90-A			
Mercury	ND	mg/L	0.00020

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QC LOT ASSIGNMENT REPORT
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK)
011196-0002-SA	AQUEOUS	COD-A	18 SEP 90-A	-
011196-0002-SA	AQUEOUS	BOD-A	07 SEP 90-A	-
011196-0002-SA	AQUEOUS	TDS-A	15 SEP 90-A	15 SEP 90-A
011196-0002-SA	AQUEOUS	TOC-A	17 SEP 90-A	-
011196-0003-SA	AQUEOUS	BOD-A	14 SEP 90-A	-
011196-0003-SA	AQUEOUS	COD-A	27 SEP 90-A	-
011196-0003-SA	AQUEOUS	TOC-A	18 SEP 90-A	-
011196-0003-SA	AQUEOUS	TDS-A	10 SEP 90-C	10 SEP 90-C
011196-0003-SA	AQUEOUS	S-A	12 SEP 90-A	-
011196-0003-SA	AQUEOUS	PH-A	07 SEP 90-B	-
011196-0003-SA	AQUEOUS	O&G-IR-A	10 SEP 90-W	10 SEP 90-W

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: COD-A Matrix: AQUEOUS QC Lot: 18 SEP 90-A Concentration Units: mg/L								
Chemical Oxygen Demand (Regular)	65	57.7	58.6	58.2	89	76-124	1.5	20
Category: BOD-A Matrix: AQUEOUS QC Lot: 07 SEP 90-A Concentration Units: mg/L								
Biochemical Oxygen Demand	200	200	199	200	100	80-120	0.5	20
Category: TDS-A Matrix: AQUEOUS QC Lot: 15 SEP 90-A Concentration Units: mg/L								
Total Dissolved Solids	834	777	741	759	91	90-110	4.7	10
Category: TOC-A Matrix: AQUEOUS QC Lot: 17 SEP 90-A Concentration Units: mg/L								
Total Organic Carbon	25	25.3	25.3	25.3	101	91-109	0.0	20
Category: BOD-A Matrix: AQUEOUS QC Lot: 14 SEP 90-A Concentration Units: mg/L								
Biochemical Oxygen Demand	200	195	172	184	92	80-120	13	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Average(%) Limits	Precision (RPD) DCS	Precision (RPD) Limit
Category: COD-A Matrix: AQUEOUS QC Lot: 27 SEP 90-A Concentration Units: mg/L								
Chemical Oxygen Demand (Regular)	104	102	97.1	99.6	96	76-124	4.9	20
Category: TOC-A Matrix: AQUEOUS QC Lot: 18 SEP 90-A Concentration Units: mg/L								
Total Organic Carbon	25	25.8	25.8	25.8	103	91-109	0.3	20
Category: TDS-A Matrix: AQUEOUS QC Lot: 10 SEP 90-C Concentration Units: mg/L								
Total Dissolved Solids	834	765	783	774	93	90-110	2.3	10
Category: S-A Matrix: AQUEOUS QC Lot: 12 SEP 90-A Concentration Units: mg/L								
Sulfide, Total	0.442	0.441	0.451	0.446	101	80-120	2.2	20
Category: PH-A Matrix: AQUEOUS QC Lot: 07 SEP 90-B Concentration Units: units								
pH	9.1	9.00	9.00	9.00	99	98-102	0.0	5

Calculations are performed before rounding to avoid round-off errors in calculated results.

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DUPLICATE CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation (cont.)

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	Measured AVG	Accuracy Average(%) DCS	Accuracy Limits	Precision (RPD) DCS	Precision Limit
Category: O&G-IR-A Matrix: AQUEOUS QC Lot: 10 SEP 90-W Concentration Units: mg/L								
Oil and Grease	20	17.5	18.0	17.8	89	75-125	2.8	20

Calculations are performed before rounding to avoid round-off errors in calculated results.

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation

Analyte	Result	Units	Reporting Limit
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 15 SEP 90-A QC Run: 15 SEP 90-A			
Total Dissolved Solids	ND	mg/L	10.0
Test: TDS-BAL-A Matrix: AQUEOUS QC Lot: 10 SEP 90-C QC Run: 10 SEP 90-C			
Total Dissolved Solids	ND	mg/L	10.0
Test: O&G-IR-A Matrix: AQUEOUS QC Lot: 10 SEP 90-W QC Run: 10 SEP 90-W			
Oil and Grease	ND	mg/L	0.050

Analytical Technologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 103573

April 18, 1991

Giant Refining Company
Route 3, P.O. Box 7
Gallup, NM 87301

Project Name/Number: None Given

Attention: Claud Rosendale

On 03/06/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TOC, TOX analyses were performed by ATI, San Diego. Additional sample for client ID SMW-3 was received on 03/07/91. Total metals results are reported under ATI ID numbers 103573-01,- 06, -11, -16, -21, -26, and -31. Dissolved metals results are reported under ATI ID number -02, -07, -12, -17, -22, and -27.

If you have any questions or comments, please do not hesitate to contact us at (602)496-4400.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

Lorraine Davis
QA Coordinator

RVW:clf
Enclosure

Analytical Technologies, Inc.

CLIENT : GIANT REFINING CO. DATE RECEIVED : 03/06/91
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 04/18/91

ATI I.D. : 103573

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	SMW-1	AQUEOUS	03/05/91
02	SMW-1	AQUEOUS	03/05/91
03	SMW-1	AQUEOUS	03/05/91
04	SMW-1	AQUEOUS	03/05/91
05	SMW-1	AQUEOUS	03/05/91
06	SMW-2	AQUEOUS	03/05/91
07	SMW-2	AQUEOUS	03/05/91
08	SMW-2	AQUEOUS	03/05/91
09	SMW-2	AQUEOUS	03/05/91
10	SMW-2	AQUEOUS	03/05/91
11	SMW-3	AQUEOUS	03/05/91
12	SMW-3	AQUEOUS	03/05/91
13	SMW-3	AQUEOUS	03/05/91
14	SMW-3	AQUEOUS	03/05/91
15	SMW-3	AQUEOUS	03/06/91
16	SMW-4	AQUEOUS	03/05/91
17	SMW-4	AQUEOUS	03/05/91
18	SMW-4	AQUEOUS	03/05/91
19	SMW-4	AQUEOUS	03/05/91
20	SMW-4	AQUEOUS	03/05/91
21	SMW-5	AQUEOUS	03/05/91
22	SMW-5	AQUEOUS	03/05/91
23	SMW-5	AQUEOUS	03/05/91
24	SMW-5	AQUEOUS	03/05/91
25	SMW-5	AQUEOUS	03/05/91
26	SMW-6	AQUEOUS	03/05/91
27	SMW-6	AQUEOUS	03/05/91
28	SMW-6	AQUEOUS	03/05/91
29	SMW-6	AQUEOUS	03/05/91
30	SMW-6	AQUEOUS	03/05/91
31	SMW EQUIP WASH	AQUEOUS	03/05/91
32	SMW EQUIP WASH	AQUEOUS	03/05/91
33	SMW EQUIP WASH	AQUEOUS	03/05/91
34	SMW EQUIP WASH	AQUEOUS	03/05/91
35	TRIP BLANK	AQUEOUS	03/05/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	35

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	01	03	04	05	06
CARBONATE (CACO3)	MG/L	<1	-	-	-	<1
BICARBONATE (CACO3)	MG/L	620	-	-	-	578
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	620	-	-	-	578
CHLORIDE	MG/L	1130	-	-	-	1240
CONDUCTIVITY, (UMHOS/CM)		6320	6170	6180	6240	6940
PH	UNITS	7.52	7.69	7.54	7.55	7.65
SULFATE	MG/L	1300	-	-	-	1600
TOTAL DISSOLVED SOLIDS	MG/L	4700	-	-	-	5000
TOTAL ORGANIC CARBON	MG/L	14.0	12.8	15.8	11.4	14.3
TOTAL ORGANIC HALIDE	MG/L	0.032	0.039	0.053	0.037	0.051

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	08	09	10	11	13
CARBONATE (CACO3)	MG/L	-	-	-	<1	-
BICARBONATE (CACO3)	MG/L	-	-	-	664	-
HYDROXIDE (CACO3)	MG/L	-	-	-	<1	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	-	664	-
CHLORIDE	MG/L	-	-	-	59	-
CONDUCTIVITY, (UMHOS/CM)		7030	7100	7100	3400	3410
PH	UNITS	7.68	7.69	7.66	7.94	8.09
SULFATE	MG/L	-	-	-	1200	-
TOTAL DISSOLVED SOLIDS	MG/L	-	-	-	5200	-
TOTAL ORGANIC CARBON	MG/L	11.6	15.2	10.2	3.0	5.1
TOTAL ORGANIC HALIDE	MG/L	0.061	0.051	0.037	<0.008	0.015

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	14	15	16	18	19
CARBONATE (CACO3)	MG/L	-	-	24	-	-
BICARBONATE (CACO3)	MG/L	-	-	418	-	-
HYDROXIDE (CACO3)	MG/L	-	-	<1	-	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	442	-	-
CHLORIDE	MG/L	-	-	58	-	-
CONDUCTIVITY, (UMHOS/CM)		3330	3590	1210	1210	1230
PH	UNITS	8.04	7.92	8.54	8.39	8.38
SULFATE	MG/L	-	-	170	-	-
TOTAL DISSOLVED SOLIDS	MG/L	-	-	860	-	-
TOTAL ORGANIC CARBON	MG/L	2.5	3.3	2.6	2.2	1.6
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	20	21	23	24	25
CARBONATE (CACO3)	MG/L	-	20	-	-	-
BICARBONATE (CACO3)	MG/L	-	378	-	-	-
HYDROXIDE (CACO3)	MG/L	-	<1	-	-	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	398	-	-	-
CHLORIDE	MG/L	-	65	-	-	-
CONDUCTIVITY, (UMHOS/CM)		1240	1160	1150	1120	1150
PH	UNITS	8.37	8.56	8.54	8.51	8.55
SULFATE	MG/L	-	150	-	-	-
TOTAL DISSOLVED SOLIDS	MG/L	-	1500	-	-	-
TOTAL ORGANIC CARBON	MG/L	1.7	2.3	3.2	1.3	1.5
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	26	28	29	30	31
CARBONATE (CACO3)	MG/L	8	-	-	-	<1
BICARBONATE (CACO3)	MG/L	604	-	-	-	2
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	612	-	-	-	2
CHLORIDE	MG/L	82	-	-	-	<0.5
CONDUCTIVITY, (UMHOS/CM)		1520	1540	1520	1490	1.42
PH	UNITS	8.41	8.20	8.20	8.17	5.71
SULFATE	MG/L	200	-	-	-	<0.3
TOTAL DISSOLVED SOLIDS	MG/L	1100	-	-	-	10
TOTAL ORGANIC CARBON	MG/L	2.0	1.2	1.2	1.3	1.3
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	32	33	34
CONDUCTIVITY, (UMHOS/CM)		1.28	1.23	1.08
PH	UNITS	6.05	5.92	5.76
TOTAL ORGANIC CARBON	MG/L	0.9	0.6	<0.5
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 103573

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE	MG/L	10371505	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		17	17	0	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		17	17	0	NA	NA	NA
CARBONATE	MG/L	10357602	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		150	154	3	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		150	154	3	NA	NA	NA
CHLORIDE	MG/L	10357602	150	150	0	280	125	104
CONDUCTIVITY(UMHOS/CM)		10357313	3410	3410	0	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10357326	1520	1530	0.7	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10360203	90.7	89.5	1	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10357334	1.08	1.10	2	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10368901	2180	2160	0.9	NA	NA	NA
PH	UNITS	10357306	7.7	7.7	0	NA	NA	NA
PH	UNITS	10499905	8.4	8.4	0	NA	NA	NA
PH	UNITS	10357602	8.0	8.0	0	NA	NA	NA
PH	UNITS	10357333	5.9	5.9	0	NA	NA	NA
SULFATE	MG/L	10352901	170	170	0	340	170	100
SULFATE	MG/L	10357602	87	87	0	180	93	100
TOTAL DISSOLVED SOLIDS	MG/L	10357321	1500	1500	0	NA	NA	NA
TOTAL DISSOLVED SOLIDS	MG/L	10357331	10	10	0	NA	NA	NA
TOTAL ORGANIC CARBON	MG/L	10357314	2.5	3.0	18	26.2	20.0	119
TOTAL ORGANIC CARBON	MG/L	10499914	0.8	0.6	29	23.2	20.0	112
TOTAL ORGANIC CARBON	MG/L	10357328	1.2	1.2	0	22.5	20.0	107
TOTAL ORGANIC HALIDE	MG/L	10357316	<0.008	<0.008	NA	0.19	0.20	95
TOTAL ORGANIC HALIDE	MG/L	10357326	<0.008	<0.008	NA	0.19	0.20	95
TOTAL ORGANIC HALIDE	MG/L	10359806	<0.008	<0.008	NA	0.17	0.20	85

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	01	02	06	07	11
CALCIUM	MG/L	-	185	-	132	-
CHROMIUM	MG/L	0.075	-	0.245	-	0.038
POTASSIUM	MG/L	-	1.9	-	<1.0	-
MAGNESIUM	MG/L	-	50.6	-	37.8	-
SODIUM	MG/L	-	1390	-	1620	-
LEAD	MG/L	0.007	-	0.010	-	0.010

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	12	16	17	21	22
CALCIUM	MG/L	50.4	-	4.5	-	3.3
CHROMIUM	MG/L	-	0.032	-	0.042	-
POTASSIUM	MG/L	1.3	-	1.3	-	<1.0
MAGNESIUM	MG/L	14.7	-	1.1	-	0.8
SODIUM	MG/L	815	-	306	-	281
LEAD	MG/L	-	0.008	-	<0.002	-

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 103573

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/06/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	26	27	31
CALCIUM	MG/L	-	6.6	-
CHROMIUM	MG/L	0.038	-	<0.010
POTASSIUM	MG/L	-	3.6	-
MAGNESIUM	MG/L	-	1.9	-
SODIUM	MG/L	-	376	-
LEAD	MG/L	0.010	-	<0.002

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 103573

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CALCIUM	MG/L	10357602	80.9	80.8	0.1	133	50.0	104
CHROMIUM	MG/L	10357001	0.020	0.020	0	0.932	1.00	91
POTASSIUM	MG/L	10357602	3.6	3.5	3	56.4	50.0	106
MAGNESIUM	MG/L	10357602	48.5	48.3	0.4	74.2	25.0	103
SODIUM	MG/L	10357602	44.3	44.2	0.2	93.8	50.0	99
LEAD	MG/L	10357321	<0.002	<0.002	NA	0.039	0.050	78
LEAD	MG/L	10357331	<0.002	<0.002	NA	0.056	0.050	112

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357301

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-1	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	95
BROMOFLUOROBENZENE (%)	116
TOLUENE-D8 (%)	101

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357301

COMPOUNDS	RESULTS
SULFONATED HYDROCARBON C6	400
UNKNOWN DIOL	700
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357306

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-2	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	98
BROMOFLUOROBENZENE (%)	116
TOLUENE-D8 (%)	93

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357306

COMPOUNDS	RESULTS
SULFONATED HYDROCARBON C6	400
UNKNOWN DIOL	600
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357311

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-3	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	94
BROMOFLUOROBENZENE (%)	88
TOLUENE-D8 (%)	113

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357311

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357316

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-4	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	88
BROMOFLUOROBENZENE (%)	117
TOLUENE-D8 (%)	97

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357316

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357321

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-5	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	88
BROMOFLUOROBENZENE (%)	117
TOLUENE-D8 (%)	103

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357321

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357326

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW-6	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	15
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	94
BROMOFLUOROBENZENE (%)	116
TOLUENE-D8 (%)	101

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357326

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357331

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: SMW EQUIP WASH	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	14
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	99
BROMOFLUOROBENZENE (%)	115
TOLUENE-D8 (%)	103

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357331

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10357335

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/05/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/06/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 03/11/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	95
BROMOFLUOROBENZENE (%)	105
TOLUENE-D8 (%)	99

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10357335

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	ATI I.D.	: 103573
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/11/91
PROJECT NAME	: (NONE)	DATE ANALYZED	: 03/11/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	99
BROMOFLUOROBENZENE (%)	107
TOLUENE-D8 (%)	103

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO. ATI I.D : 103573

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 103573

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 10399901

DATE ANALYZED : 03/11/91
SAMPLE MATRIX :
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1	50	52	104	51	102	2
TRICHLOROETHENE	<1	50	53	106	47	94	12
CHLOROBENZENE	<1	50	52	104	51	102	2
TOLUENE	<1	50	56	112	56	112	0
BENZENE	<1	50	55	110	49	98	12

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 PAGE 1 OF 2

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co
ADDRESS: Rt. 3 Box 7
Gallup, N.M. 87301

BILL TO: Cland Ramsdale
COMPANY:
ADDRESS: Same

Cland Ramsdale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
SMW-1 250ml Amber Sulfuric	3-5	0820	Water		4
250ml Amber Sulfuric					4
250ml Plastic					4
1 L. Plastic					1
1 L Plastic					1
1 L. Plastic					1
40ml VOA					2

ANALYSIS REQUEST

- Petroleum Hydrocarbons (418.1)
- (MOD 8015) Gas/Diesel
- Diesel/Gasoline/BTXE (MOD 8015/8020)
- BTXE (8020)
- Chlorinated Hydrocarbons (601/8010)
- Aromatic Hydrocarbons (602/8020)
- MTBE
- Pesticides/PCB (608/8080)
- Herbicides (615/8150)
- ~~TCLP~~
- Base/Neutral/Acid Compounds GC/MS (625/8270)
- Volatile Organics GC/MS (624/8240) — X (VOA)
- TOC - 4 replicates — X
- TOX - 4 replicates — X
- pH, Cond. - 4 replicates — X
- SDWA Primary Standards
- SDWA Secondary Standards
- SDWA Volatiles (502.1/503.1)
- TDS Alk, Cl, SO4 — X
- ~~The 13 Priority Pollutant~~ Total Metals — X
- ~~The 8 EP Tox Metals~~ by EP Tox Prep. (1310)
- ~~The 8 EP Tox Metals by Total Digestion~~
- ~~The 8 CAM~~ Metals ~~TCLP~~ Dissolved — X

PROJECT INFORMATION	
PROJECT NO.:	—
PROJECT NAME:	—
P.O. NO.:	01413
VIA:	Fed Ex
TAT:	☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS

SAMPLE RECEIPT	
TOTAL NO. OF CONTAINERS	17
CHAIN OF CUSTODY SEALS	Y
INTACT?	Y
RECEIVED GOOD COND./COLD	Y
LAB NUMBER	103573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments: See attached for specific parameter detail

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Cland Ramsdale Time: 2:15pm	Signature: Time:	Signature: Time:
Printed Name: C. Ramsdale Date: 3-5-91	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc. 3/6/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical**Technologies,**Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 PAGE 2 OF 7

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup, NM 87301

BILL TO: Cloud Rosendale
COMPANY:
ADDRESS: Same

Cloud Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE		Pesticides/PCB (608/8080)	Herbicides (615/8150)		Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TOC-4 replicates	TOX-4 replicates	all listed - 4 replicates each	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS, Alk, Cl-, SO4	The 13 Priority Pollutant Metals Tota l	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	~~The 8 EP Tox Metals by~~ Dissolved			NUMBER OF CONTAINERS
SMW-2 250ml Amber Sulfuric	3-5	0930	Water															X													4
250ml Amber Sulfuric																			X												4
250ml Plastic																				X											4
1 L. Plastic																							X								1
1 L. Plastic																								X			~~X~~				1
1 L. Plastic																											X				1
40ml VOA																X															2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:		TOTAL NO. OF CONTAINERS	17
PROJECT NAME:		CHAIN OF CUSTODY SEALS	X
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	10353

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail,

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: C Rosendale Time: 3:15	Signature: Time:	Signature: Time:
Printed Name: C Rosendale Date: 3-5	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc. 3/6/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical**Technologies,**Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 PAGE 3 OF 7

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup, NM 87301

BILL TO: Client Roswell
COMPANY: Same
ADDRESS:

Ronald Kasendorf — SAMPLERS: (Signature)
505 722 0217 — PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
SMW-3 250ml Amber	3-5-91	10:30	water	
250ml Amber				
250ml plastic				
1 L Plastic				
1 L Plastic				
1 L Plastic				
40ml VOA				

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TOC - 4 replicates	TOX - 4 replicates	PH, Cond, Titrations 2nd	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS, Alk, Cl, SO4	Total Recoverable Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP	Dissolved	NUMBER OF CONTAINERS
										X	X	X	X				X	X			X		4
												X											4
													X										3
																	X						1
																		X					1
																					X		1
										X													2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	15
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	N
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail, TOX, PH, Cond. + Inorganics Later

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 2:15	Signature: Time:	Signature: Time:
Printed Name: Date: 5/91	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc. 5/6/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3/91 PAGE 4 OF 7

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup, NM 87301

BILL TO: Cloud Roanoke
COMPANY:
ADDRESS: Same

[signature] (505)722-0217
SAMPLERS: (Signature) PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
SMW-4 250ml Amber Sulfuric	3-5-91	11:15	Water		4
250ml Amber Sulfuric					4
250ml Plastic					4
1 L Plastic					1
1 L Plastic					1
1 L Plastic					1
40ml VOA					2

ANALYSIS REQUEST

- Petroleum Hydrocarbons (418.1)
- (MOD 8015) Gas/Diesel
- Diesel/Gasoline/BTXE (MOD 8015/8020)
- BTXE (8020)
- Chlorinated Hydrocarbons (601/8010)
- Aromatic Hydrocarbons (602/8020)
- MTBE
- Pesticides/PCB (608/8080)
- Herbicides (615/8150)
- Base/Neutral/Acid Compounds GC/MS (625/8270)
- Volatile Organics GC/MS (624/8240)
- TCL - 4 replicates
- TOX - 4 replicates
- all Cont. - 4 replicates each
- SDWA Primary Standards
- SDWA Secondary Standards
- SDWA Volatiles (502.1/503.1)
- TDS, Alk, Cl, SO4
- The 8 RCRA Priority Pollutant Metals TCLP
- ~~The 8 EP Tox Metals by EP Tox (1310)~~
- The 8 EP Tox Metals by Total Digestion
- ~~The 8 EP Tox Metals by TCLP~~ 17, Soluble

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	17
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	Y
P.O. NO.:	C1413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	03573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: [signature] Time: 2:15	Signature: Time:	Signature: Time:
Printed Name: [signature] Date: 3-5-91	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: [signature] Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: [signature] Date:
Company:	Company:	Analytical Technologies, Inc. 3/6/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. Pink - ORIGINATOR

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 PAGE 5 OF 7

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup NM 87301

BILL TO: Chad Kendall
COMPANY:
ADDRESS: Same

Chad Kendall — SAMPLERS: (Signature)
505 722-0217 — PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
SMW-5 250ml Amber Septum	3-5-91	12:45	Water		4
250ml Amber	"				4
250ml Plastic	"				4
1L Plastic	"				1
1L Plastic	"				1
1L Plastic	"				1
40ml VOA	"				2

Petroleum Hydrocarbons (418.1) — X
(MOD 8015) Gas/Diesel — X
Diesel/Gasoline/BTXE (MOD 8015/8020) — X
BTXE (8020) — X
Chlorinated Hydrocarbons (601/8010) — X
Aromatic Hydrocarbons (602/8020) — X
MTBE — X
Pesticides/PCB (608/8080) — X
Herbicides (615/8150) — X
Base/Neutral/Acid Compounds GC/MS (625/8270) — X
Volatile Organics GC/MS (624/8240) — X
TOC - 4 reglia 2.5
TPH - 4 reglia 2.5
pH Cond - Greglia as each
SDWA Primary Standards — X
SDWA Secondary Standards — X
SDWA Volatiles (502.1/503.1) — X
TDS, Alk, Cl, SO4 — X
Total Primary Pollutant Metals — X
The 8 EP Tox Metals by EP Tox Prep. (1310) — X
The 8 EP Tox Metals by Total Digestion — X
The 8 EP Tox Metals by TCLP — X
Turn around 2 wks

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	7
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	N
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments: See Attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Chad Time: 2:15	Signature: Time:	Signature: Time:
Printed Name: C Kendall Date 3-5-91	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 1105
Printed Name: Date:	Printed Name: Date:	Printed Name: Date: 3/6/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 / PAGE 6 OF 7

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt. 3 Box 7
Gallup, N.M. 87301

BILL TO: Clark Rosendale
COMPANY:
ADDRESS: Same

Clark Rosendale
SAMPLERS: (Signature)

505 722-0217
PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
SMW-6 250ml Amber Preserved	3-5	1:00	Water	
250ml Amber Preserved	"	"	"	
250ml Plastic	"	"	"	
1 L. Plastic	"	"	"	
1 L. Plastic	"	"	"	
1 L. Plastic	"	"	"	
40ml VOA	"	"	"	

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TOC - 4 replicates	TOX - 4 replicates	Alkalinity, Chloride, Fluoride, pH	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS, Alk, Cl, SO4	The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP	Dissolved		NUMBER OF CONTAINERS
										X	X													4
												X												4
													X											4
																X								1
																	X							1
																					X			1
										X														2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.: —		TOTAL NO. OF CONTAINERS	17
PROJECT NAME: —		CHAIN OF CUSTODY SEALS	Y
P.O. NO.: 01413		INTACT?	Y
VIA: Fed Ex		RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 2:15	Signature: Time:	Signature: Time:
Printed Name: Date 6-3-5	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc. 3/6/91

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-5-91 PAGE 1 OF 1

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co
ADDRESS: #3 Fir St
Gallup NM 87301

BILL TO: Carl Rosendale
COMPANY:
ADDRESS: Same

Carl Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
SMK Equipment Wash	3-5	0920	Water		4
					4
					4
					1
					1
					1
					2
TRIP BLANKS					2

Petroleum Hydrocarbons (418.1); (MOD 8015) Gas/Diesel; Diesel/Gasoline/BTXE (MOD 8015/8020); BTXE (8020); Chlorinated Hydrocarbons (601/8010); Aromatic Hydrocarbons (602/8020); MTBE; Pesticides/PCB (608/8080); Herbicides (615/8150); Base/Neutral/Acid Compounds GC/MS (625/8270); Volatile Organics GC/MS (624/8240); TCC; TOX; Oil & Grease; SDWA Primary Standards; SDWA Secondary Standards; SDWA Volatiles (502.1/503.1); TDS, Alkalinity, Sulfate; The 40 Priority Pollutant Metals; The 8 EP Tox Metals by EP Tox Prep. (1310); The 8 EP Tox Metals by Total Digestion; The 8 EP Tox Metals by SPLP Digestion

PROJECT INFORMATION	SAMPLE RECEIPT	
PROJECT NO.:	TOTAL NO. OF CONTAINERS	15
PROJECT NAME:	CHAIN OF CUSTODY SEALS	N
P.O. NO.: 01413	INTACT?	Y
VIA: Fed Ex.	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS	LAB NUMBER	103573

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 2:15	Signature: Time:	Signature: Time:
Printed Name: Date 3-5	Printed Name: Date	Printed Name: Date
Company: Giant	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 1115
Printed Name: Date:	Printed Name: Date:	Printed Name: Date:
Company:	Company:	Analytical Technologies, Inc. 3/6/91

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001

DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

AnalyticalTechnologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-6 PAGE 1 OF 1

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant
ADDRESS: Rt 3 Box 7
Gallup

BILL TO:
COMPANY: Same
ADDRESS:

SAMPLERS: (Signature)
( ) - PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
SMW3	3-6	12:45	Water	15	1
				15	1
				11	1

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	
(MOD 8015) Gas/Diesel	
Diesel/Gasoline/BTXE (MOD 8015/8020)	
BTXE (8020)	
Chlorinated Hydrocarbons (601/8010)	
Aromatic Hydrocarbons (602/8020)	
MTBE	
Pesticides/PCB (608/8080)	
Herbicides (615/8150)	
Base/Neutral/Acid Compounds GC/MS (625/8270)	
Volatile Organics GC/MS (624/8240)	X
TPH	X
TPH Diesel only	X
SDWA Primary Standards	
SDWA Secondary Standards	
SDWA Volatiles (502.1/503.1)	
The 13 Priority Pollutant Metals	
The 8 EP Tox Metals by EP Tox Prep. (1310)	
The 8 EP Tox Metals by Total Digestion	
The 8 EP Tox Metals by TCLP	

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:		TOTAL NO. OF CONTAINERS	3
PROJECT NAME:		CHAIN OF CUSTODY SEALS	Y
P.O. NO.:		INTACT?	Y
VIA:		RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	03573

SAMPLE DISPOSAL INSTRUCTIONS
☐ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 12:45	Signature: Time:	Signature: Time:
Printed Name: Date: 3-6-91	Printed Name: Date	Printed Name: Date
Company:	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 10:50
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 3/7/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

TABLE 1 - GROUNDWATER SAMPLING SCHEDULE
ANNUAL PARAMETERS (MARCH OR APRIL)

WELL #/PARAM	pH	CONDUCT	TOC*	TOX*	TDS	ALKAL. BICARB.	ALKAL. CARB.	CHLORIDE	SULFATE	PHENOL	TCL-VOL ORG(8240)	VOA-BTEX 8020	TOTAL METALS Cr	Pb	Hg	DISSOLVED METALS As	Ba	Cd	Ca	Mg	Mn	I	Se	Ag	Na
MW-1	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
OW-11	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
OW-1	X	X			X	X	X	X	X			X							X	X		X			X
OW-2	X	X			X	X	X	X	X			X							X	X		X			X
OW-3	X	X			X	X	X	X	X			X							X	X		X			X
SMW-1	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
SMW-2	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
SMW-3	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
SMW-4	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
SMW-5	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
SMW-6	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X

SEMI-ANNUAL PARAMETERS (SEPT. OR OCT.)

	pH*	COND*	TOC*	TOX*	TOTAL METALS Cr	Pb	TCL-VOL ORG(8240)
MW-1	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X
OW-11	X	X	X	X	X	X	X
SMW-1	X	X	X	X	X	X	X
SMW-2	X	X	X	X	X	X	X
SMW-3	X	X	X	X	X	X	X
SMW-4	X	X	X	X	X	X	X
SMW-5	X	X	X	X	X	X	X
SMW-6	X	X	X	X	X	X	X

* 4 REPLICATES
+ 2 REPLICATES

Waste Waters

API Effluent
1. BOD
2. COD
3. TOC
4. TDS

Aerated Lagoon Effluent
1. pH
2. BOD
3. COD
4. TOC
5. TDS
6. Sulfide (total)
7. Metals - (As, Cd, Cr, Pb, Hg, Ni, Se)
8. Oil + Grease
9. 8240 (Attached)
10. 8270 (Attached)

TABLE-4

RECOMMENDED ANALYTICAL METHODS

Parameter	Method
pH (Liquid)	221, 9040
Specific Conductance	120.1
Total Organic Carbon (TOC) 4 replicates	505, 9060
Total Organic Halogen (TOX) 4 replicates	9020
Total Dissolved Solids (TDS)	160.1
Alkalinity as Bicarbonate	310.1
Alkalinity as Carbonate	310.1
Chloride	300.0
Sulfate	300.0
Phenol	420.1, 9065
Metals	-
Arsenic	303E, 206.2,7060
Barium	303A, 200.7, 6010
Cadmium	200.7, 6010
Calcium D	200.7, 6010
Chromium T	303A, 200.7, 6010
Lead T	303A, 239.2, 7421
Magnesium D	200.7, 6010
Manganese	200.7, 6010
Mercury	245.1, 7470
Potassium D	200.7, 6010
Selenium	270.2, 7740
Silver	200.7, 6010
Sodium D	200.7, 6010
Oil & Grease	413.1, 9071
pH (Solid)	9045
Carbon	9060
Nitrogen	353.2
Phosphorus	365.3
Total Solids (Solids)	160.3
VOA (BTEX) (Liquid & Solid)	8020
Benzene	-
Toluene	-
Ethyl benzene	-
Xylene (m, o & p)	-
TCL Volatile Organics (Liquids)	8240
Chloromethane	-
Bromomethane	-
Vinyl chloride	-
Chloroethane	-
Methylene chloride	-
Acetone	-
Carbon disulfide	-
1,1 - Dichloroethene	-
1,1 - Dichloroethane	-
1,2 - Dichloroethene (cis/trans)	-

Chloroform	-	
1,2-Dichloroethane	-	
2-Butanone	-	
1,1,1-Trichloroethane	-	
Carbon tetrachloride	-	
Vinyl acetate	-	
Bromodichloromethane	-	
1,2 - Dichloropropane	-	
trans-1,3-Dichloropropene	-	
Trichloroethene	-	
Chlorodibromomethane	-	
1,1,2-Trichloroethane	-	
Benzene	-	
cis-1,3-Dichloropropene	-	
2-Chloroethyl vinyl ether	-	
Bromoform	-	
4-Methyl-2-pentanone	-	
2-Hexanone	-	
1,1,2,2,-Tetrachloroethane	-	
Tetrachloroethene	-	
Toluene	-	
Chlorobenzene	-	
Ethyl benzene	-	
Styrene	-	
Xylenes (total)	-	
1,1,2 Trichloro-1,2,2-trifluorethane	-	
1,2-Dibromomethane	-	
1,2-Dichlorobenzene	-	
1,3-Dichlorobenzene	-	
1,4-Dichlorobenzene	-	
Refinery Hazardous Const. Semivolatiles (Solids)		8270
Benzo(a)pyrene	-	
Chrysene	-	
1-Methylnaphthalene	-	
Phenanthrene	-	
Pyrene	-	
o-Cresol	-	
m & p Cresol	-	

Analytical Technologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 103598

April 18, 1991

Giant Refining Company
Route 3, P.O. Box 7
Gallup, NM 87301

Project Name/Number: None Given

Attention: Claud Rosendale

On 03/07/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TOC, TOX analyses were performed by ATI, San Diego. Samples 103598-01 and -02, 103598-06 and -07, as well as 103598-11 and -12 are replicates for EPA Method 8240. Total metals results are reported under ATI ID number -01, -06, -11, and -16. Dissolved metals results are reported under ATI ID numbers -02, -07, -12, and -17.

If you have any questions or comments, please do not hesitate to contact us at (602)496-4400.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

Lorraine Davis
QA Coordinator

RVW:dkm
Enclosure

Analytical Technologies, Inc.

CLIENT : GIANT REFINING CO. DATE RECEIVED : 03/07/91
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 04/10/91
ATI I.D. : 103598

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-1/MW-1-2	AQUEOUS	03/06/91
02	MW-1/MW-1-1	AQUEOUS	03/06/91
03	MW-1	AQUEOUS	03/06/91
04	MW-1	AQUEOUS	03/06/91
05	MW-1	AQUEOUS	03/06/91
06	MW-4/MW-4-2	AQUEOUS	03/06/91
07	MW-4/MW-4-1	AQUEOUS	03/06/91
08	MW-4	AQUEOUS	03/06/91
09	MW-4	AQUEOUS	03/06/91
10	MW-4	AQUEOUS	03/06/91
11	OW-11/OW-11-1	AQUEOUS	03/06/91
12	OW-11/OW-11-2	AQUEOUS	03/06/91
13	OW-11	AQUEOUS	03/06/91
14	OW-11	AQUEOUS	03/06/91
15	OW-11	AQUEOUS	03/06/91
16	EQUIPMENT WASH/EQUIP WASH-2	AQUEOUS	03/06/91
17	EQUIPMENT WASH	AQUEOUS	03/06/91
18	EQUIPMENT WASH	AQUEOUS	03/06/91
19	EQUIPMENT WASH	AQUEOUS	03/06/91
20	TRIP BLANK	AQUEOUS	03/06/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	20

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103598

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/07/91
REPORT DATE : 04/10/91

PARAMETER	UNITS	01	03	04	05	06
CARBONATE (CACO3)	MG/L	48	-	-	-	28
BICARBONATE (CACO3)	MG/L	304	-	-	-	428
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	352	-	-	-	456
CHLORIDE	MG/L	51	-	-	-	19
CONDUCTIVITY, (UMHOS/CM)		1080	1110	1090	1110	1150
PH	UNITS	8.92	8.92	8.94	8.94	8.65
PHENOLICS, TOTAL	MG/L	<0.02	-	-	-	<0.02
SULFATE	MG/L	160	-	-	-	150
TOTAL DISSOLVED SOLIDS	MG/L	710	-	-	-	740
TOTAL ORGANIC CARBON	MG/L	1.9	0.8	0.6	0.7	0.5
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103598

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/07/91
REPORT DATE : 04/10/91

PARAMETER	UNITS	08	09	10	11	13
CARBONATE (CACO3)	MG/L	-	-	-	<1	-
BICARBONATE (CACO3)	MG/L	-	-	-	456	-
HYDROXIDE (CACO3)	MG/L	-	-	-	<1	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	-	456	-
CHLORIDE	MG/L	-	-	-	140	-
CONDUCTIVITY, (UMHOS/CM)		1130	1150	1100	1760	1760
PH	UNITS	8.69	8.69	8.69	8.3	8.18
PHENOLICS, TOTAL	MG/L	-	-	-	<0.02	-
SULFATE	MG/L	-	-	-	200	-
TOTAL DISSOLVED SOLIDS	MG/L	-	-	-	1100	-
TOTAL ORGANIC CARBON	MG/L	1.5	0.9	0.6	5.9	5.1
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	0.013	0.015

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103598

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/07/91
REPORT DATE : 04/10/91

PARAMETER	UNITS	14	15	16	18	19
CARBONATE (CACO3)	MG/L	-	-	<1	-	-
BICARBONATE (CACO3)	MG/L	-	-	5	-	-
HYDROXIDE (CACO3)	MG/L	-	-	<1	-	-
TOTAL ALKALINITY (AS CACO3)	MG/L	-	-	5	-	-
CHLORIDE	MG/L	-	-	<0.5	-	-
CONDUCTIVITY, (UMHOS/CM)		1700	1720	1.49	1.63	1.51
PH	UNITS	8.14	8.07	5.66	5.92	5.65
PHENOLICS, TOTAL	MG/L	-	-	<0.02	-	-
SULFATE	MG/L	-	-	<0.3	-	-
TOTAL DISSOLVED SOLIDS	MG/L	-	-	10	-	-
TOTAL ORGANIC CARBON	MG/L	5.7	5.5	0.5	0.5	<0.5
TOTAL ORGANIC HALIDE	MG/L	0.011	0.010	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 103598

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
CARBONATE	MG/L	10371505	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		17	17	0	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		17	17	0	NA	NA	NA
CARBONATE	MG/L	10357602	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		150	154	3	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		150	154	3	NA	NA	NA
CARBONATE	MG/L	10365005	<1	<1	NA	NA	NA	NA
BICARBONATE	MG/L		2	2	0	NA	NA	NA
HYDROXIDE	MG/L		<1	<1	NA	NA	NA	NA
TOTAL ALKALINITY	MG/L		2	2	0	NA	NA	NA
CHLORIDE	MG/L	10359816	<0.5	<0.5	NA	10.9	10.0	109
CONDUCTIVITY(UMHOS/CM)		10359813	1760	1750	0.6	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10359819	1.51	1.51	0	NA	NA	NA
CONDUCTIVITY(UMHOS/CM)		10368901	2180	2160	0.9	NA	NA	NA
PH	UNITS	10359816	5.7	5.7	0	NA	NA	NA
PH	UNITS	10357602	8.0	8.0	0	NA	NA	NA
PH	UNITS	10365005	5.1	5.1	0	NA	NA	NA
PH	UNITS	10357306	7.7	7.7	0	NA	NA	NA
PH	UNITS	10499905	8.4	8.4	0	NA	NA	NA
PHENOLICS, TOTAL	MG/L	10359816	<0.02	<0.02	NA	0.26	0.25	104
SULFATE	MG/L	10358401	31	32	3	63	31	103
SULFATE	MG/L	10361901	140	140	0	270	140	93
TOTAL DISSOLVED SOLIDS	MG/L	10357602	550	570	4	NA	NA	NA
TOTAL ORGANIC CARBON	MG/L	10359803	0.8	0.6	29	23.2	20.0	112
TOTAL ORGANIC CARBON	MG/L	10359811	5.9	5.1	15	26.6	20.0	104
TOTAL ORGANIC CARBON	MG/L	10499913	0.8	0.8	0	21.7	20.0	105
TOTAL ORGANIC HALIDE	MG/L	10359806	<0.008	<0.008	NA	0.17	0.20	85
TOTAL ORGANIC HALIDE	MG/L	10366006	<0.008	<0.008	NA	0.21	0.20	105

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 103598

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/07/91
REPORT DATE : 04/10/91

PARAMETER	UNITS	01	02	06	07	11
SILVER	MG/L	-	<0.010	-	0.016	-
ARSENIC	MG/L	-	<0.005	-	<0.005	-
BARIUM	MG/L	-	<0.010	-	0.019	-
CALCIUM	MG/L	-	1.9	-	2.0	-
CADMIUM	MG/L	-	<0.005	-	<0.005	-
CHROMIUM	MG/L	<0.010	-	<0.010	-	<0.010
MERCURY	MG/L	<0.0002	-	<0.0002	-	<0.0002
POTASSIUM	MG/L	-	<1.0	-	<1.0	-
MAGNESIUM	MG/L	-	0.3	-	0.3	-
MANGANESE	MG/L	-	<0.010	-	0.010	-
SODIUM	MG/L	-	267	-	292	-
LEAD	MG/L	0.010	-	0.005	-	0.003
SELENIUM	MG/L	-	<0.005	-	<0.005	-

Analytical Technologies, Inc.

METALS RESULTS

ATI I.D. : 103598

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/07/91
REPORT DATE : 04/10/91

PARAMETER	UNITS	12	16	17
SILVER	MG/L	0.028	-	<0.010
ARSENIC	MG/L	<0.005	-	<0.005
BARIUM	MG/L	0.023	-	<0.010
CALCIUM	MG/L	5.0	-	<0.1
CADMIUM	MG/L	<0.005	-	<0.005
CHROMIUM	MG/L	-	<0.010	-
MERCURY	MG/L	-	<0.0002	-
POTASSIUM	MG/L	1.4	-	<1.0
MAGNESIUM	MG/L	0.5	-	<0.1
MANGANESE	MG/L	<0.010	-	<0.010
SODIUM	MG/L	426	-	<0.1
LEAD	MG/L	-	<0.002	-
SELENIUM	MG/L	0.036	-	<0.005

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE) ATI I.D. : 103598

PARAMETER	UNITS	ATI I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED SAMPLE	SPIKE CONC	% REC
SILVER	MG/L	10359802	<0.010	<0.010	NA	0.095	0.100	95
ARSENIC	MG/L	10357001	<0.005	<0.005	NA	0.044	0.050	88
ARSENIC	MG/L	10359906	<0.005	<0.005	NA	0.053	0.050	106
BARIUM	MG/L	10359802	<0.010	<0.010	NA	0.110	0.100	110
CALCIUM	MG/L	10358301	204	203	0.5	260	50.0	112
CADMIUM	MG/L	10360801	<0.005	<0.005	NA	0.102	0.100	102
CHROMIUM	MG/L	10359816	<0.010	<0.010	NA	0.934	1.00	93
MERCURY	MG/L	10355601	<0.0002	<0.0002	NA	0.0047	0.0050	94
POTASSIUM	MG/L	10358301	8.7	8.7	0	60.5	50.0	104
MAGNESIUM	MG/L	10358301	191	190	0.5	413	200	111
MANGANESE	MG/L	10359802	<0.010	<0.010	NA	0.111	0.100	111
SODIUM	MG/L	10358301	223	220	1	275	50.0	104
LEAD	MG/L	10359806	0.005	0.003	50	0.048	0.050	86
SELENIUM	MG/L	10359802	<0.005	<0.005	NA	0.038	0.050	76

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative Percent Difference)} = \frac{(\text{Sample Result} - \text{Duplicate Result})}{\text{Average Result}} \times 100$$

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359801

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1/MW-1-2	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	100
BROMOFLUOROBENZENE (%)	108
TOLUENE-D8 (%)	91

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359801

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359802

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-1/MW-1-1	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	89
BROMOFLUOROBENZENE (%)	96
TOLUENE-D8 (%)	104

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359802

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359806

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4/MW-4-2	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	88
BROMOFLUOROBENZENE (%)	107
TOLUENE-D8 (%)	93

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359806

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359807

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: MW-4/MW-4-1	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1
SURROGATE PERCENT RECOVERIES	
1,2-DICHLOROETHANE-D4 (%)	90
BROMOFLUOROBENZENE (%)	99
TOLUENE-D8 (%)	92

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359807

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359811

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: OW-11/OW-11-1	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	96
BROMOFLUOROBENZENE (%)	97
TOLUENE-D8 (%)	93

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359811

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359812

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: OW-11/OW-11-2	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	85
BROMOFLUOROBENZENE (%)	95
TOLUENE-D8 (%)	93

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359812

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359816

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: EQUIPMENT WASH/EQUIP WASH-2	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	89
BROMOFLUOROBENZENE (%)	101
TOLUENE-D8 (%)	98

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359816

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

ATI I.D. : 10359820

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	DATE SAMPLED	: 03/06/91
PROJECT #	: (NONE)	DATE RECEIVED	: 03/07/91
PROJECT NAME	: (NONE)	DATE EXTRACTED	: N/A
CLIENT I.D.	: TRIP BLANK	DATE ANALYZED	: 03/14/91
SAMPLE MATRIX	: AQUEOUS	UNITS	: UG/L
		DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	90
BROMOFLUOROBENZENE (%)	80
TOLUENE-D8 (%)	104

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

ATI I.D. : 10359820

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT	: GIANT REFINING CO.	ATI I.D.	: 103598
PROJECT #	: (NONE)	DATE EXTRACTED	: 03/14/91
PROJECT NAME	: (NONE)	DATE ANALYZED	: 03/14/91
CLIENT I.D.	: REAGENT BLANK	UNITS	: UG/L
		DILUTION FACTOR	: N/A

COMPOUNDS	RESULTS
CHLOROMETHANE	<10
BROMOMETHANE	<10
VINYL CHLORIDE	<1
CHLOROETHANE	<1
METHYLENE CHLORIDE	<5
ACETONE	<10
CARBON DISULFIDE	<1
1,1-DICHLOROETHENE	<1
1,1-DICHLOROETHANE	<1
1,2-DICHLOROETHENE (TOTAL)	<1
CHLOROFORM	<1
1,2-DICHLOROETHANE	<1
2-BUTANONE (MEK)	<2
1,1,1-TRICHLOROETHANE	<1
CARBON TETRACHLORIDE	<1
VINYL ACETATE	<10
BROMODICHLOROMETHANE	<1
1,1,2,2-TETRACHLOROETHANE	<1
1,2-DICHLOROPROPANE	<1
TRANS-1,3-DICHLOROPROPENE	<1
TRICHLOROETHENE	<1
DIBROMOCHLOROMETHANE	<1
1,1,2-TRICHLOROETHANE	<1
BENZENE	<1
CIS-1,3-DICHLOROPROPENE	<1
2-CHLOROETHYLVINYLETHER	<10
BROMOFORM	<5
2-HEXANONE (MBK)	<10
4-METHYL-2-PENTANONE (MIBK)	<10
TETRACHLOROETHENE	<1
TOLUENE	<1
CHLOROBENZENE	<1
ETHYLBENZENE	<1
STYRENE	<1
TOTAL XYLENES	<1

SURROGATE PERCENT RECOVERIES

1,2-DICHLOROETHANE-D4 (%)	93
BROMOFLUOROBENZENE (%)	105
TOLUENE-D8 (%)	100

Analytical Technologies, Inc.

GCMS - RESULTS

REAGENT BLANK

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO. ATI I.D : 103598

COMPOUNDS	RESULTS
1,2-DIBROMOMETHANE	<2

Analytical Technologies, Inc.

QUALITY CONTROL DATA

ATI I.D. : 103598

TEST : VOLATILE ORGANICS (EPA 8240)

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)
REF I.D. : 10399923

DATE ANALYZED : 03/14/91
SAMPLE MATRIX :
UNITS : UG/L

COMPOUNDS	SAMPLE RESULT	CONC. SPIKED	SPIKED SAMPLE	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
1,1-DICHLOROETHENE	<1	50	49	98	49	98	0
TRICHLOROETHENE	<1	50	51	102	49	98	4
CHLOROBENZENE	<1	50	51	102	50	100	2
TOLUENE	<1	50	46	92	47	94	2
BENZENE	<1	50	51	102	49	98	4

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{(\text{Spiked Sample Result} - \text{Duplicate Spike Sample Result})}{\text{Average of Spiked Sample}} \times 100$$

AnalyticalTechnologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE _____ PAGE 1 OF 2

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup, NM 87301

BILL TO: Clark Rosendale
COMPANY: Giant
ADDRESS:

Clark Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
MW-1 250ml			Water		4
250ml					4
250ml					4
1 L.					1
1 L.					1
1 L.					1
1 L.					1
-1 (40ml)					2
-2 (40ml)					2

Petroleum Hydrocarbons (418.1) — X
(MOD 8015) Gas/Diesel
Diesel/Gasoline/BTXE (MOD 8015/8020)
BTXE (8020)
Chlorinated Hydrocarbons (601/8010)
Aromatic Hydrocarbons (602/8020)
MTBE
Pesticides/PCB (608/8080)
Herbicides (615/8150)
Base/Neutral/Acid Compounds GC/MS (625/8270)
Volatile Organics GC/MS (624/8240) — X
TOX - 4 replicates — X
TOC - 4 replicates — X
Oil, Grease - 4 replicates — X
SDWA Primary Standards
SDWA Secondary Standards
SDWA Volatiles (502.1/503.1)
TDS, Alk, Cl, SO4 — X
The 13 Priority Pollutant Metals — X
The 8 EP Tox Metals by EP Tox Prep. (1310)
The 8 EP Tox Metals by Total Digestion
~~The 8 EP Tox Metals by~~ Dissolved — X
Phenol — X

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	20
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	Y
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex.	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103598

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time: 12:30	Signature: Time:	Signature: Time:
Printed Name: Date	Printed Name: Date	Printed Name: Date
Company: Giant Refining	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Time: 11:00
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 3/7/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical**Technologies,**Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-6-91 PAGE 3 OF 3

PROJECT MANAGER: Elizabeth Moffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt. 3 Box 7
Gallup, NM 87301

BILL TO: Cland Rosendale
COMPANY:
ADDRESS: Same

Cland Rosendale (505)777-0217
SAMPLERS: (Signature) PHONE NUMBER

ANALYSIS REQUEST

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE	Pesticides/PCB (608/8080)	Herbicides (615/8150)	Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TOC - 4 replicates	TOX - 4 replicates	full Cond. - all replicates each	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS, Alk, Cl - 40ml	The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals, by TCLP	Diss. Cond.	Phenol	NUMBER OF CONTAINERS
MW-4 250ml			Water													X													4
250ml																	X												4
250ml																		X											4
1L																					X								1
1L																						X							1
1L																									X				1
1L																										X			1
40ml															X														2
40ml															X														2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	20
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	Y
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex.	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103598

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments: See attached for specific parameter details.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Cland Time: 12:30	Signature: Time:	Signature: Time:
Printed Name: C Rosendale Date: 3-6-91	Printed Name: Date	Printed Name: Date
Company: Giant Refining	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 4:10
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 3/7/91
Company:	Company:	Analytical Technologies, Inc.

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-6 PAGE 5 OF 12

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup, N.M. 87301

BILL TO: Cloud Rosendale
COMPANY:
ADDRESS: Same

Cloud Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID	NUMBER OF CONTAINERS
OW-11 250 ml			Water		4
250 ml					4
250 ml					4
1 L					1
1 L					1
1 L					1
1 L					1
-1 (40 ml)					2
-2 40 ml					2

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)		(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE		Pesticides/PCB (608/8080)	Herbicides (615/8150)		Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TOC - 4 replicates	TOX - 4 replicates	pH and - 4 replicates each	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS AK C1 SO4	The 13 Priority Pollutant Metals Tetra	The 8 EP Tox Metals (EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP	Ca 550/Hard	Chloro		
													X													
														X												
															X											
																			X							
																				X						
																					X					
																									X	
													X													
													X													

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	20
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	Y
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103598

SAMPLE DISPOSAL INSTRUCTIONS
☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Cloud Rosendale Time: 17:30	Signature: Time:	Signature: Time:
Printed Name: C. Rosendale Date: 03-6	Printed Name: Date	Printed Name: Date
Company: Giant Refining	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 11:15
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 3/7/9
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC. • Pink - ORIGINATOR

Analytical Technologies, Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-6 PAGE 6 OF 8

PROJECT MANAGER: Elizabeth Proffitt

COMPANY: Giant Refining Co
ADDRESS: Rt 3 Box 7
Gallup NM 87301

BILL TO: Cloud Rosendale
COMPANY:
ADDRESS:

SAMPLERS: (Signature)

505 722-0217
PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
Equipment Wash			Water	

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)	(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE		Pesticides/PCB (608/8080)	Herbicides (615/8150)		Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)	TIC - Hydrocarbons	TOX - Hydrocarbons	Oil and Grease	SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)	TDS AIK Cl SO4	The 13 Priority Pollutant Metals Total	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP	Dissolved		NUMBER OF CONTAINERS
													X												4
														X											9
															X										4
																		X							1
																			X						1
																						X			1
																							X		1
												X													2

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	20
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	Y
P.O. NO.:	01413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103598

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:
See attached for specific parameter detail.

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Time:	Signature: Time:	Signature: Time:
Printed Name: Date	Printed Name: Date	Printed Name: Date
Company: Giant Refining	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 11:00
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date:
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001

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Analytical**Technologies,** Inc.
Phoenix, Arizona

Chain of Custody

DATE 3-6 PAGE 8 OF 8

PROJECT MANAGER: Elizabeth Bisaffatt

COMPANY: Giant Refining Co.
ADDRESS: Rt 3 Box 7
Gallup N.M. 87301

BILL TO: Claud Rosendale
COMPANY:
ADDRESS: Same

Claud Rosendale — SAMPLERS: (Signature)
(505) 722-0217 — PHONE NUMBER

SAMPLE ID	DATE	TIME	MATRIX	LAB ID
Trip Blank (MW)			Water	

ANALYSIS REQUEST

Petroleum Hydrocarbons (418.1)		(MOD 8015) Gas/Diesel	Diesel/Gasoline/BTXE (MOD 8015/8020)	BTXE (8020)	Chlorinated Hydrocarbons (601/8010)	Aromatic Hydrocarbons (602/8020)	MTBE		Pesticides/PCB (608/8080)	Herbicides (615/8150)			Base/Neutral/Acid Compounds GC/MS (625/8270)	Volatile Organics GC/MS (624/8240)				SDWA Primary Standards	SDWA Secondary Standards	SDWA Volatiles (502.1/503.1)		The 13 Priority Pollutant Metals	The 8 EP Tox Metals by EP Tox Prep. (1310)	The 8 EP Tox Metals by Total Digestion	The 8 EP Tox Metals by TCLP			NUMBER OF CONTAINERS

PROJECT INFORMATION		SAMPLE RECEIPT	
PROJECT NO.:	—	TOTAL NO. OF CONTAINERS	2
PROJECT NAME:	—	CHAIN OF CUSTODY SEALS	N
P.O. NO.:	04413	INTACT?	Y
VIA:	Fed Ex	RECEIVED GOOD COND./COLD	Y
TAT: ☐ 24HR ☐ 48 HRS ☐ 1 WK ☐ 2 WKS		LAB NUMBER	103598

SAMPLE DISPOSAL INSTRUCTIONS

☒ ATI Disposal ☐ Return ☐ Pickup (will call)

Comments:

RELINQUISHED BY: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature: Claud Rosendale Time: 12:30	Signature: Time:	Signature: Time:
Printed Name: C. Rosendale Date: 3-6	Printed Name: Date	Printed Name: Date
Company: Claud Rosendale	Company:	Company:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY: (LAB) 3.**
Signature: Time:	Signature: Time:	Signature: Linda Eshelman Time: 11:00
Printed Name: Date:	Printed Name: Date:	Printed Name: Linda Eshelman Date: 3/7/91
Company:	Company:	Analytical Technologies, Inc.

ATI Labs: San Diego (619)458-9141 • Phoenix (602)438-1530 • Seattle (206)228-8335 • Pensacola (904)474-1001 DISTRIBUTION: White, Canary - ANALYTICAL TECHNOLOGIES, INC.• Pink - ORIGINATOR

TABLE 1 - GROUNDWATER SAMPLING SCHEDULE
ANNUAL PARAMETERS (MARCH OR APRIL)

ELL #/PARAM	pH	CONDUCT	TOC*	TOX*	TDS	ALKAL. BICARB.	ALKAL. CARB.	CHLORIDE	SULFATE	PHENOL	TCL-VOL ORG(8240)	VOA-BTEX 8020	TOTAL METALS Cr	Pb	Hg	DISSOLVED METALS As	Ba	Cd	Ca	Mg	Mn	K	Se	Ag	Na
W-1	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-2	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-4	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-5	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-11	X	X	X	X	X	X	X	X	X	X	X+		X	X	X	X	X	X	X	X	X	X	X	X	X
W-1	X	X			X	X	X	X	X			X							X	X		X			X
W-2	X	X			X	X	X	X	X			X							X	X		X			X
W-3	X	X			X	X	X	X	X			X							X	X		X			X
MW-1	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-2	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-3	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-4	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-5	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X
MW-6	X	X	X	X	X	X	X	X	X		X		X	X					X	X		X			X

SEMI-ANNUAL PARAMETERS (SEPT. OR OCT.)

	pH*	COND*	TOC*	TOX*	TOTAL METALS Cr	Pb	TCL-VOL ORG(8240)
W-1	X	X	X	X	X	X	X
W-2	X	X	X	X	X	X	X
W-4	X	X	X	X	X	X	X
W-5	X	X	X	X	X	X	X
W-11	X	X	X	X	X	X	X
MW-1	X	X	X	X	X	X	X
MW-2	X	X	X	X	X	X	X
MW-3	X	X	X	X	X	X	X
MW-4	X	X	X	X	X	X	X
MW-5	X	X	X	X	X	X	X
MW-6	X	X	X	X	X	X	X

* 4 REPLICATES
+ 2 REPLICATES

Waste Waters

API Effluent
1. BOD
2. COD
3. TOC
4. TDS

Aerated Lagoon Effluent
1. pH
2. BOD
3. COD
4. TOC
5. TDS
6. Sulfide (total)
7. Metals - (As, Cd, Cr, Pb, Hg, Ni, Se)
8. Oil + Grease
9. 8240 (Attached)
10. 8270 (Attached)

TABLE-4

RECOMMENDED ANALYTICAL METHODS

Parameter	Method
pH (Liquid)	221, 9040
Specific Conductance	120.1
Total Organic Carbon (TOC) 4 replicates	505, 9060
Total Organic Halogen (TOX) 4 replicates	9020
Total Dissolved Solids (TDS)	160.1
Alkalinity as Bicarbonate	310.1
Alkalinity as Carbonate	310.1
Chloride	300.0
Sulfate	300.0
Phenol	420.1, 9065
Metals	-
Arsenic	303E, 206.2,7060
Barium	303A, 200.7, 6010
Cadmium	200.7, 6010
Calcium	200.7, 6010
Chromium T	303A, 200.7, 6010
Lead T	303A, 239.2, 7421
Magnesium	200.7, 6010
Manganese	200.7, 6010
Mercury T	245.1, 7470
Potassium	200.7, 6010
Selenium	270.2, 7740
Silver	200.7, 6010
Sodium	200.7, 6010
Oil & Grease	413.1, 9071
pH (Solid)	9045
Carbon	9060
Nitrogen	353.2
Phosphorus	365.3
Total Solids (Solids)	160.3
VOA (BTEX) (Liquid & Solid)	8020
Benzene	-
Toluene	-
Ethyl benzene	-
Xylene (m, o & p)	-
TCL Volatile Organics (Liquids)	8240 2 replicates for mw-1, mw-4, mw-11
Chloromethane	-
Bromomethane	-
Vinyl chloride	-
Chloroethane	-
Methylene chloride	-
Acetone	-
Carbon disulfide	-
1,1 - Dichloroethene	-
1,1 - Dichloroethane	-
1,2 - Dichloroethene (cis/trans)	-

Chloroform	-	
1,2-Dichloroethane	-	
2-Butanone	-	
1,1,1-Trichloroethane	-	
Carbon tetrachloride	-	
Vinyl acetate	-	
Bromodichloromethane	-	
1,2 - Dichloropropane	-	
trans-1,3-Dichloropropene	-	
Trichloroethene	-	
Chlorodibromomethane	-	
1,1,2-Trichloroethane	-	
Benzene	-	
cis-1,3-Dichloropropene	-	
2-Chloroethyl vinyl ether	-	
Bromoform	-	
4-Methyl-2-pentanone	-	
2-Hexanone	-	
1,1,2,2,-Tetrachloroethane	-	
Tetrachloroethene	-	
Toluene	-	
Chlorobenzene	-	
Ethyl benzene	-	
Styrene	-	
Xylenes (total)	-	
1,1,2 Trichloro-1,2,2-trifluorethane	-	
1,2-Dibromomethane	-	
1,2-Dichlorobenzene	-	
1,3-Dichlorobenzene	-	
1,4-Dichlorobenzene	-	
Refinery Hazardous Const. Semivolatiles (Solids)	8270	
Benzo(a)pyrene	-	
Chrysene	-	
1-Methylnaphthalene	-	
Phenanthrene	-	
Pyrene	-	
o-Cresol	-	
m & p Cresol	-	

Analytical Technologies, Inc. 9830 S. 51st Street Suite B-113 Phoenix, AZ 85044 (602) 496-4400

ATI I.D. 103660

April 18, 1991

Giant Refining
Route 3, P.O. Box 7
Gallup, NM 87301

Project Name/Number: None given

Attention: Claud Rosendale

On 03/09/91, Analytical Technologies, Inc. received a request to analyze aqueous sample(s). The sample(s) were analyzed with EPA methodology or equivalent methods. The results of these analyses and the quality control data, which follow each set of analyses, are enclosed.

TOX, TOC analyses were performed by ATI, San Diego. Samples 103660-01 and -02 as well as samples 103660-06 and -07 are replicates for EPA Method 8240. Total metals results are reported under ATI ID numbers -01 and -06. The dissolved metals are reported under ATI ID number -02 and -07.

If you have any questions or comments, please do not hesitate to contact us at (602)496-4400.

Elizabeth Proffitt
Senior Project Manager

Robert V. Woods
Laboratory Manager

Lorraine Davis
QA Coordinator

RVW:clf
Enclosure

Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

Analytical Technologies, Inc.

CLIENT : GIANT REFINING CO. DATE RECEIVED : 03/09/91
PROJECT # : (NONE)
PROJECT NAME : (NONE) REPORT DATE : 04/18/91
ATI I.D. : 103660

ATI #	CLIENT DESCRIPTION	MATRIX	DATE COLLECTED
01	MW-5/MW-5-1	AQUEOUS	03/08/91
02	MW-5/MW-5-2	AQUEOUS	03/08/91
03	MW-5	AQUEOUS	03/08/91
04	MW-5	AQUEOUS	03/08/91
05	MW-5	AQUEOUS	03/08/91
06	MW-2/MW-2-2	AQUEOUS	03/08/91
07	MW-2/MW-2-1	AQUEOUS	03/08/91
08	MW-2	AQUEOUS	03/08/91
09	MW-2	AQUEOUS	03/08/91
10	MW-2	AQUEOUS	03/08/91

----- TOTALS -----

MATRIX	# SAMPLES
AQUEOUS	10

ATI STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103660

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/09/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	01	03	04	05	06
CARBONATE (CACO3)	MG/L	32	-	-	-	48
BICARBONATE (CACO3)	MG/L	314	-	-	-	304
HYDROXIDE (CACO3)	MG/L	<1	-	-	-	<1
TOTAL ALKALINITY (AS CACO3)	MG/L	346	-	-	-	352
CHLORIDE	MG/L	67	-	-	-	59
CONDUCTIVITY, (UMHOS/CM)		1100	1160	1140	1130	1120
PH	UNITS	8.87	8.97	8.95	8.94	8.83
PHENOLICS, TOTAL	MG/L	<0.02	-	-	-	<0.02
SULFATE	MG/L	160	-	-	-	160
TOTAL DISSOLVED SOLIDS	MG/L	700	-	-	-	690
TOTAL ORGANIC CARBON	MG/L	1.0	0.8	1.6	0.7	0.8
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008	<0.008	<0.008

Analytical Technologies, Inc.

GENERAL CHEMISTRY RESULTS

ATI I.D. : 103660

CLIENT : GIANT REFINING CO.
PROJECT # : (NONE)
PROJECT NAME : (NONE)

DATE RECEIVED : 03/09/91
REPORT DATE : 04/18/91

PARAMETER	UNITS	08	09	10
CONDUCTIVITY, (UMHOS/CM)		1100	1130	1130
PH	UNITS	8.96	8.95	8.95
TOTAL ORGANIC CARBON	MG/L	<0.5	1.6	0.8
TOTAL ORGANIC HALIDE	MG/L	<0.008	<0.008	<0.008

<OCD File Copy.>

GIANT REFINING CO.

CINIZA REFINERY

COMPREHENSIVE FACILITY INVESTIGATION WORK PLAN

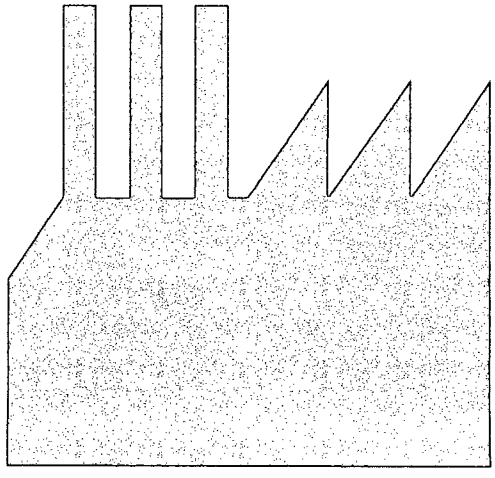
SUBMITTED JUNE 30, 1997

RECEIVED
JUL 1 1997
Environmental Bureau
Oil Conservation Division

TO

ENERGY, MINERALS, AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION



GIANT REFINING CO.

Route 3, Box 7
Gallup, New Mexico
87301

505
722-3833

June 27, 1997

Mr. Roger Anderson
Environmental Bureau Chief
Oil Conservation District
2040 S. Pacheco
Santa Fe, New Mexico 87505

RE: Modification of Discharge Plan GW-32; Comprehensive Facility Investigation Work Plan

Dear. Mr. Anderson:

Enclosed is Ciniza Refinery's Comprehensive Facility Investigation Work Plan as required by your February 28, 1997 letter. The plan was prepared using the Stage 1 WQCC Abatement Regulations (20 NMAC 6.2.4106) and is designed to consolidate previous investigations and remedial activity into one coherent plan for the facility as a whole.

In the course of preparing this plan, it has become apparent that a number of the existing wells on site pose a significant risk of contamination to the Sonsela aquifer. We and our consultants feel it is urgent to plug and close these wells as soon as possible in order to minimize any further risk. Specific details on these wells are included both in the body of the plan and in Appendix A.

Following your review and approval, we anticipate that approximately 120 days will be needed to complete the activities identified in this plan. It is possible we could finish by mid-November, 1997. Once authorization from your office is received, we will begin the task of plugging and closing the at-risk wells.

If you have questions or comments regarding this correspondence, please contact me at (505) 722-0227.

Sincerely,

Dorinda Mancini
Environmental Manager, Ciniza Refinery

cc: Denny Foust, NMOCD - Farmington
Mr. Stuart Dinwiddie, NMED, HRMB
Dave Pavlich, HSE Manager, Giant Refining

Stage1 cover letter.doc

Comprehensive Facility Investigation Work Plan (Stage 1 Abatement Plan)

For

The Giant Refining Company Ciniza Refinery
McKinley County, New Mexico

June 30, 1997

Prepared by:

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Plan Overview

Giant Refining Company (Giant) owns and operates a petroleum refinery (Ciniza) in McKinley County, New Mexico. The New Mexico Oil Conservation Division (OCD) administers water quality protection programs for this industry segment and regulates groundwater discharges from the Ciniza Refinery via Discharge Plan GW-032.

Giant has recently discovered shallow soil and groundwater contamination near its tank farm and loading areas. As a result, OCD has requested that Giant prepare a comprehensive facility investigation plan to define areas of contamination and develop the information needed to design abatement remedies.

This plan has been developed in compliance with WQCC Regulation 20 NMAC 6.2.4106, Stage 1 Abatement Plan requirements.

Facility History and Operations

The Ciniza Refinery was constructed in 1957 by the El Paso Natural Gas Company. In 1964, it was sold to the Shell Oil Company and then again in 1982 it was sold to the present owner, Giant Industries, Inc. In the mid 1980's, Giant expanded the refinery to accommodate EPA mandates for producing cleaner burning fuels and also constructed a new travel center adjacent to Interstate 40.

The refinery receives crude oil via pipeline and produces fuel products which are shipped out by tank truck, railcar, and a pipeline connection to the Giant Travel Center. Various hydrocarbon liquids are stored on-site in tanks and distributed throughout the refinery via an extensive piping system.

The most likely cause of an adverse environmental impact to groundwater is a release of hydrocarbons onto the ground. Migration of spilled material can potentially contaminate vadose zone soil, shallow groundwater in soil layer above the Chinle Formation, or, under worst case conditions, the Sonsela Aquifer.

In 1986, OCD approved and issued Discharge Plan GW-032 for the Giant Ciniza Refinery. This plan prescribes specific requirements for monitoring groundwater quality and detecting potential contamination.

Site Geology and Hydrogeology

The Ciniza Refinery is located on a layered geologic formation which slopes gently to the northwest. Surface soils consist of varied fluvial and alluvial deposits, clay, silt, sand, and imported fill. Below is the Chinle Formation which consists of very low permeability clays and shales, and effectively serves as a aquiclude. Inter-bedded within the Chinle is the Sonsela sandstone layer, which represents the uppermost potential aquifer in the region.

Groundwater flow in the Sonsela Aquifer follows the slope of the formation and is generally north by northwest. See Drawing No. 1.

Shallow groundwater flows along the upper contour of the Chinle Formation. The prevailing flow direction is to the north; however, a subsurface ridge has been discovered and is thought to deflect some flow in a northeasterly direction in the vicinity of the refinery tank farm. See Drawing No. 2.

Groundwater Monitoring and Protection

As per Discharge Plan GW-032, Giant performs regular groundwater sampling and analysis to monitor water quality and detect potential contamination. This monitoring program has two main components as follows.

- Shallow monitoring wells are installed in the soil layer above of the Chinle Formation and used to provide early detection of contamination.

- Deep monitoring wells are installed in the Sonsela sandstone layer and used to detect contamination in this uppermost potential water supply aquifer. This is the point of compliance for OCD Discharge Plan GW-032.

In addition to the above, Giant also performs regular groundwater sampling and analysis at wells installed as part of a RCRA Program administered by the New Mexico Environment Department (NMED). In general, these monitoring wells are associated with a former RCRA Land Treatment Unit.

Both the OCD and NMED programs mandate State notification in the event that groundwater monitoring reveals potential contamination.

Previous Soil and Groundwater Investigations

In 1987, the EPA conducted a RCRA facility assessment at the Ciniza Refinery. This investigation identified 13 areas of suspected environmental contamination. As a result, Giant has conducted detailed investigations at each of these sites. The current status is as follows.

- A no further action (NFA) determination has been approved for the Aeration Lagoon, Evaporation Ponds, Empty Container Storage Area, and Drainage Ditch sites.

- A voluntary Corrective Action Plan (CAP) has been approved and is being implemented at the Landfill Areas. A clay cap will be installed later this year.

- A voluntary CAP is being implemented at the Railroad Rack Lagoon. Petroleum contaminated surface soils will be treated in-situ using bioremediation methods.

- A supplementary investigation at the Tank Farm Area has revealed the presence of hydrocarbons in soil and groundwater adjacent to Tank 569. A recovery well has been installed and is currently being used in a pump & treat remediation system.

- Other areas have been recommended for no further action and are currently being monitored.

In 1989, a hydrocarbon layer was discovered in Observation Well 17 (OW-17), which is located in the Tank Farm Area east of Tank 345. This site is currently undergoing investigation.

Refinery Contamination Sites

Groundwater monitoring data and investigative soil analyses have revealed hydrocarbon contamination at four locations within the refinery. These areas are located in the vicinity of storage tanks and loading areas as described below.

- Groundwater Impact Area #1 is located in the vicinity of Tank 569 on the eastern side of the tank farm. Inspection records indicate that a leaking seam in an adjacent tank was repaired in 1995 and this leak source is now thought to be corrected. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. A recovery well has been installed and a pump & treat remediation is currently in operation.

- Groundwater Impact Area #2 is located in the vicinity of Tank 345 on the northwestern side of the tank farm. Inspection records indicate that a leaking seam in an adjacent tank was repaired in 1996 and this leak source is now thought to be corrected. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. A pump & treat remediation system is recommended for this area.

- Groundwater Impact Area #3 is also located in the vicinity of Tank 345 on the northwestern side of the tank farm. The source of this contamination is thought to be prior spill events. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. Due to the low level of detection and ongoing biodegradation of the hydrocarbons, this area is remediating by natural attenuation.

- Groundwater Impact Area #4 is located in the vicinity of truck loading rack at the southeastern corner of the refinery. The source of this contamination is a hydrocarbon spill that occurred in the early 1980's. Investigative soil borings have been performed and the plume has been delineated as shown on Drawing No. 3. Due to the low level of detection and ongoing biodegradation of the hydrocarbons, this area is remediating by natural attenuation.

- Soil Impact Area #1 is located at the railcar loading rack at the north-eastern corner of the refinery. The source of this contamination is past loading related spills. Investigative soil sampling has been performed and the soil impact area has been delineated as shown on Drawing No. 3.

- Soil Impact Area #2 is located north of the tank farm at the northeastern corner of the refinery. The source of this contamination is runoff from the railcar loading rack. Investigative soil sampling has been performed and the soil impact area has been delineated as shown on Drawing No. 3.

Investigative and Abatement Work Plan

Investigation of potential groundwater contamination at the Ciniza Refinery consists of two main components as follows.

- Detecting contamination in the Sonsela Aquifer.

- Detecting, locating, and assessing sources of contamination.

Sonsela Aquifer

As the uppermost potential water supply underlying the refinery, the Sonsela Aquifer must be protected against potential contamination. The shales of the Chinle aquiclude, with a hydraulic conductivity of 10^{-9} centimeters per second, represent a formidable barrier to migration of contaminants. Nevertheless, contaminants released at the surface could potentially migrate through the aquiclude (very slow route) or short-circuit into the aquifer via an existing well which has been screened across the aquitard (potentially a very fast route). For this reason, monitoring wells in the Sonsela Aquifer must be properly installed.

Because many of the original observation wells were installed prior to a detailed understanding of the site's geology, some of these wells are inappropriately located and screened. To correct these deficiencies and eliminate the potential for short-circuiting, the following modifications to GW-032 are proposed.

1. Install a new background monitoring well upgradient of the refinery. The well screen shall be located solely within the Sonsela Aquifer and sealed above. After installation of the new well, plug and close the existing upgradient well (OW-11), which is improperly located and consistently fouled by mud infiltration. See Drawing No. 1 for location.

2. Install a new property boundary well downgradient of the refinery. The well screen shall be located solely within the Sonsela Aquifer and sealed above. After installation of the new well, plug and close the existing downgradient wells (OW-2, 3, 4, & 24), which are improperly installed and consequently can allow short-circuiting of contamination into the Sonsela Aquifer. See Drawing No. 1 for location.

3. Continue the use of OW-1 as a cross-gradient monitoring well on the western property boundary. Boring log data suggest that this well is properly installed; however, this free-flowing well should be capped when not in use for sampling.

4. Begin the use of OW-12 as a plant boundary monitoring well located immediately downgradient of the refinery tank farm. Boring log data suggest that this well is properly installed.

5. Utilize OW-13 as a secondary plant boundary monitoring well located immediately downgradient of the refinery tank farm. This well will only be sampled and analyzed in the event of a contaminant detection in OW-12, and the results then used for confirmatory purposes. Boring log data suggest that this well is properly installed.

6. The four wells referenced in Items 1 through 4 above shall be sampled and analyzed annually for BTEX. Due to its preponderance within the refinery and high mobility, BTEX is the best early warning indicator of contamination in the Sonsela Aquifer.

7. Plug and close OW-7, 9, 10, 16, 17, 20, 25, 26, and 28. These wells are improperly installed and consequently can allow short-circuiting of contamination into the Sonsela Aquifer.

Contamination Sources

Environmental contamination can arise from many sources within the refinery, such as a leaking storage tank or loading related spill. When a release occurs, contaminants first impact surrounding surface soil and may be initially detected via odor, visual staining, or a rainbow sheen on standing water. If a release is of sufficient magnitude and duration, a migration plume will develop and the contaminants will spread out horizontally and vertically from the point of origin. As such, various scenarios may arise as follows.

- The plume can remain small and confined to nearby vadose zone soils. Soil Impact Areas #1 and #2 are examples of this type of release.

- The plume can migrate downward until it encounters the Chinle Formation. It may then flow downgradient along the surface contour of the Chinle or pool in a local depression on the aquiclude. Groundwater Impact Areas #1 through #4 are examples of this type of release.

- The plume can migrate more quickly in some areas via entry into localized sand or gravel layers. This effect can result in differential plume expansion.

- The plume can migrate into the Sonsela Aquifer by short-circuiting through the aquiclude via an improperly installed monitoring well. This effect is resisted by strong artesian head in the aquifer.

Release detection at the Ciniza Refinery is composed of two elements as follows.

- Routine surveillance of process equipment and grounds is used to spot leaks and detect releases. All leaks and spills are immediately reported to the Refinery Environmental Department. Tanks, vessels, and piping are regularly inspected for mechanical integrity and repaired when necessary. When hydrocarbon storage tanks are taken out of service and inspected, any indication of past leakage is immediately reported to the Refinery Environmental Department.

- Shallow monitoring wells are installed at various locations throughout the refinery to detect potential groundwater contamination in the soil layer above the Chinle Formation. Any detection of contamination initiates a release investigation.

Known areas of contamination are associated with storage tank leaks or loading related spills. In each case, investigative soil borings have been performed and the extent of each contaminant plume has been delineated. The status of these areas is as follows.

Groundwater Impact Area #1 is in active remediation at this time using a pump & treat contaminant recovery system. This system should continue operation.

Groundwater Impact Area #2 has been investigated and a pump & treat contaminant recovery system is recommended. The following modifications to GW-032 are proposed.

1. Install a new contaminant recovery well adjacent to and downgradient from Tank 345. This well shall be carefully drilled so as not to penetrate the Sonsela Aquifer and shall be screened in the soil layer above the Chinle Formation at a depth allowing for the recovery of the hydrocarbon layer located under the tank.

2. Install a groundwater recovery pump.

3. Operate the contaminant recovery system to extract the hydrocarbons and groundwater. Recovered material shall be processed through the API separator to reclaim the hydrocarbons.

4. Shallow groundwater monitoring wells OW-29 and OW-30 are located downgradient from the refinery tank farm and shall be sampled and analyzed annually for BTEX.

Groundwater Impact Areas #3 and #4 have been investigated and classified as an old spill sites. Residual hydrocarbons are present at very low levels and declining through natural biodegradation. These sites should continue passive remediation by natural attenuation.

Schedule

If OCD approves this modification by the end of July, it is anticipated that all tasks may be completed by November 1, 1997.

SPECIAL NOTE: Because several of the existing Observation Wells are improperly installed and may allow short-circuiting of contamination into the Sonsela Aquifer, expedited approval to plug and close these wells is warranted.

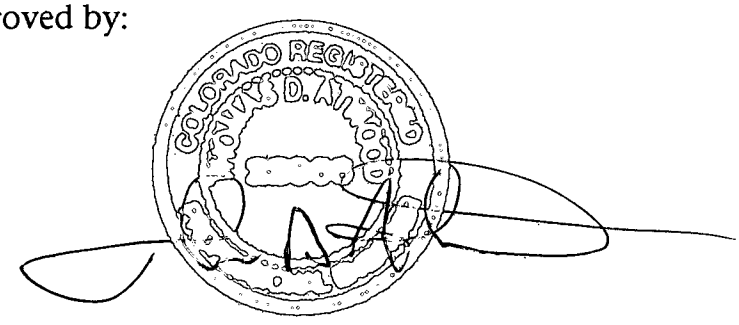
Attachments

A summary of existing monitoring wells and recommended actions is presented in Appendix A.

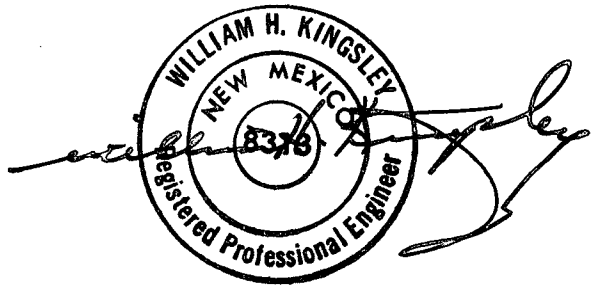
Referenced drawings are presented in Appendix B.

Professional Engineers Certification

This plan has been prepared and approved by:



Thomas D. Atwood, P.E.
Practical Environmental Services, Inc.



William H. Kingsley, P.E.
Precision Engineering, Inc.

APPENDIX

"A"

APPENDIX A

WELL CLOSEOUT RECOMMENDATIONS - CINIZA REFINERY

WELL I.D.	(YES/NO)	RATIONALE
OW-1	NO	Well monitors the Sonsela at the western edge of the property. Well is artesian flowing. Recommend adding pressure cap.
OW-2	**YES**	Well drilled to the Sonsela (143'), backfilled with cuttings, gravel packed and screened from 43'-68'. Potential for communication between upper water bearing zone and Sonsela considered high. Log questionable; location of upper water bearing zone not known.
OW-3	**YES**	Suspect poor logging. Location of water bearing zone not known. Well screened and gravel packed from 36'-67'. Believe water bearing interval is a very thin zone at approximately 67' based on recent data. This zone may add water to otherwise dry sandy zones above.
OW-4	**YES**	Located in the center of the land treatment unit. Logs indicate that the well is screened in the Sonsela and likely is gravel packed across other water bearing units above, creating the potential for cross contamination. Logging questionable.
OW-5	**CLOSED**	This well was closed in 1996 after it was observed screen used in construction of the well was exposed at the ground surface.
OW-7	**YES**	Water producing zone is not known. Screen and gravel pack extends 25'. It is believed that the well produces from zone on Chinle plus sands above - 2 distinct zones. Zones should not be allowed to intermix. Located in a low water area and floods during rainy season.
OW-9	**YES**	This well is located in the Sonsela. Gravel extends into the alluvial material above the sandstone. Potentially cross contamination can occur between Sonsela water and water in the alluvial materials above. The well is also located in a standing water area and is subject to flooding.
OW-10	**YES**	Well appears to be sound but is located in area subject to surface flooding.
OW-11	**YES**	Used as the up gradient well for monitoring water coming into the facility. The location of the well is not truly up gradient of the facility. Recommend replacing this well with a well that is up gradient of the facility. Well is screened below the producing zone. Well was originally drilled to 150+feet, backfilled with cuttings then screened. Water producing zone can be cross contaminated with material below the actual production zone.

Continue

WELL I.D.	(YES/NO)	RATIONALE
OW-12	NO	Apparently well constructed. Well screened in the Sonsela down gradient of the facility. Recommend keep as an intermediate monitoring point.
OW-13	NO	Apparently well constructed. Well screened in the Sonsela down gradient of the facility. Recommend keep as an intermediate monitoring backup well.
OW-14	NO	Well is known to be contaminated. Used to track contaminant migrating on top of the Chinle shale in Area 1 (see plume sheet).
OW-16	**YES**	Sonsela well within the tank farm berms. Well provides a direct pathway to the Sonsela if a tank is compromised.
OW-17(RW-4)	**YES**	This well connects the Sonsela and the zone on top of the Chinle shale directly. The zone on the Chinle shale is contaminated. Cross contamination is imminent if this well is not closed. Sonsela does not appear to be impacted as yet because of its artesian potential. This well should be closed immediately.
OW-18	**CLOSED**	This well was destroyed during construction activities.
OW-20	**YES**	Well drilled into the Sonsela but screened above in a "mudstone" zone. Unknown how the well was backfilled to the screened interval. Suspect cross contamination may occur with water on top of the Chinle Formation. This well has been damaged twice and repaired because of site construction. Well up gradient from tank farm, but, down gradient of the facility. Water producing zone cannot be clearly identified from the logs.
OW-24	**YES**	Well was gravel packed from 28'-61'. The zone lying on top of the Chinle Formation is in direct contact with the sandy stringers above allowing immediate communication between the zones. The potential for cross contamination, should one or the other of the zones become contaminated, is high.
OW-25(RW-3)	**YES**	The well is screened in an upper part of the Sonsela and the zone lying on top of the Chinle shale. The zone on the shale is contaminated and cross contamination will occur. Sonsela appears to not have been impacted, as yet. Sonsela has likely not been impacted because of its artesian properties. Closure of this well should be a priority or cross contamination will occur.
OW-26	**YES**	This well is screened in the Sonsela. It is located within a tank farm berm area. Loss of integrity of the tanks will inject product directly into the Sonsela. Recommend priority closure.
BG4(OW-27)(RW1)	NO	Currently a recovery well in Area 1 plume. Well is screened in the zone on top of the Chinle shale.
B-1(OW-28)(RW-2)	**YES**	Originally converted from a boring to a well because of the discovery of product on the water surface of the zone lying on top of the Chinle shale. No product has been observed in the well since the original discovery. Recommend Closure since this well is inside a tank berm area and can potentially inject product to the top of the Chinle if tank integrity is lost.
OW-29	NO	Screened across the zone on top of the Chinle shale. Currently used to monitor for contaminant constituents for the Area 1 plume.
OW-30	NO	Screened across the zone on top of the Chinle shale. Currently used to monitor for contaminant constituents for the Area 1 plume.

Continue

WELL I.D.	(YES/NO)	RATIONALE
MW-1	NO	Well logged, documented installation in the Sonsela.
MW-2	NO	Well logged, documented installation in the Sonsela.
MW-3	NO	Well logged, documented installation in the Sonsela.
MW-4	NO	Well logged, documented installation in the Sonsela.
MW-5	NO	Well logged, documented installation in the Sonsela.
SMW-1	**YES**	Well is no longer monitored. Connects fluvial sands with zone on top of Chinle shale.
SMW-2	**YES**	Well is no longer monitored. Connects fluvial sands with zone on top of Chinle shale.
SMW-3	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-4	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-5	**YES**	Connects fluvial sands with zone on top of Chinle shale.
SMW-6	**YES**	Produces no water.

APPENDIX

"B"

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Drawing 1 - Flow Direction in the Sonsela Sandstone Bed

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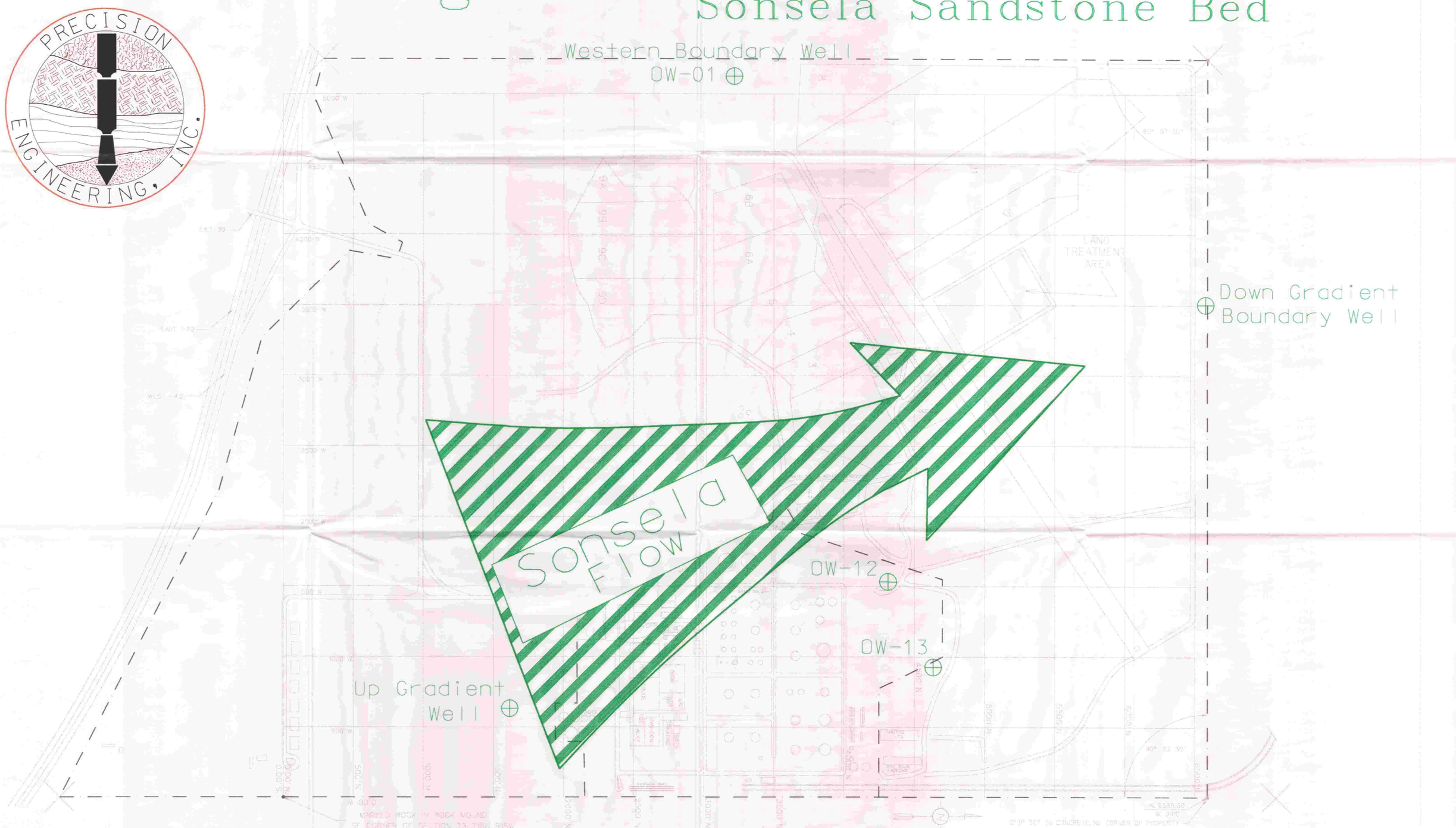

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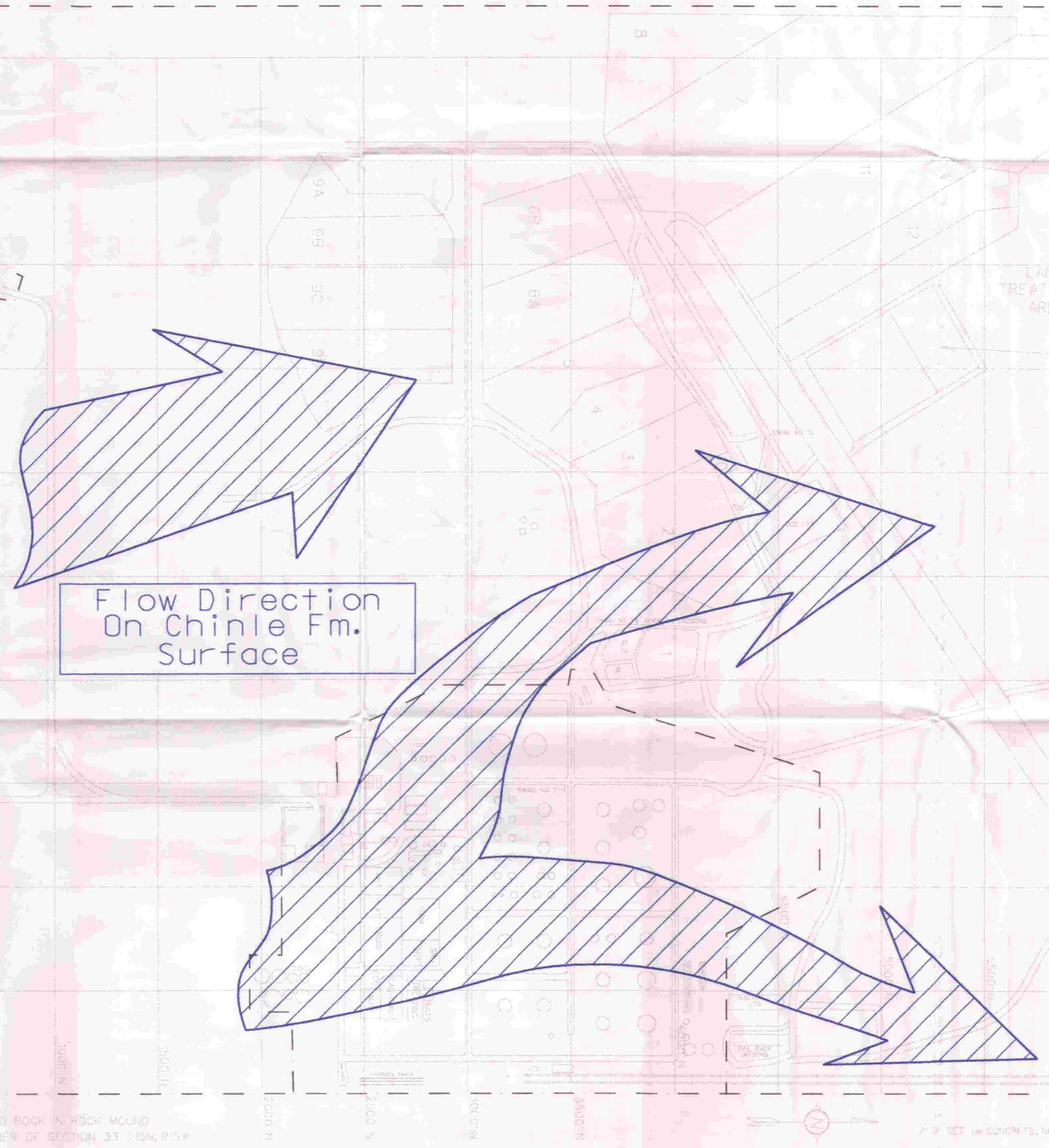
Oil Conservation Division

Drawing 2 - Flow Direction on Top of The Chinle Formation

PRECISION ENGINEERING, INC.



Drawing 3 - Plume Definition

PRECISION ENGINEERING, INC.