GW - 25

REPORTS

YEAR(S):

1996-1984

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

BRUCE KING
GOVERNOR

POST OFFICE BOX 1980
HOBBS, NEW MEXICO 88241-1980
(505) 393-6161

May 11, 1992

Climax Chemical Co.
P.O. Box 430
Hobbs, New Mexico 88240

Attn: John C. Good

Dear Mr. Good:

On April 2, 1992, the New Mexico Oil Conservation Division (OCD) collected a water sample from your monitor well #12-9. The analysis was inconclusive in that all analyzed compounds were undetectable. Enclosed you will find the results of the analysis.

The OCD would like to contact you later to make arrangements to resample in the company of an additional Environmental Bureau employee.

If you have any questions please contact me at 393-6161.

Sincerely,

Jerry Sexton

JERRY SEXTON
District I Supervisor

CEE/sad

Enclosures

cc: Roger Anderson

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Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Soil	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	72501
Delivered by	John Good	**Report Date**	7-29-91
		Date Received	6-27-91

Identification Soil Samples for the 2nd Quarter of 1991, North Sample, Samples 6-26-91 @ 10:25 a.m. by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results	Date Performed	Analyst	Test Method
pH, in Water	7.01	7-2-91	W. Jaycox	SW846,9045

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on	Soil	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	72502
Delivered by	John Good	**Report Date**	7-29-91
		Date Received	6-27-91

Identification Soil Samples for the 2nd Quarter of 1991, East Sample, Samples 6-26-91 @ 10:25 a.m. by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results	Date Performed	Analyst	Test Method
pH, in 0.01M $CaCl_2$	7.52	7-2-91	W. Jaycox	SW846,9045

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on	Soil	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	72503
Delivered by	John Good	**Report Date**	7-29-91
		Date Received	6-27-91

Identification Soil Samples for the 2nd Quarter of 1991, South Sample, Samples 6-26-91 @ 10:25 a.m. by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results	Date Performed	Analyst	Test Method
pH, in 0.01M $CaCl_2$	7.46	7-2-91	W. Jaycox	SW846,9045

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on	Soil	File No.	6147600
Client	Climax Chemical Company	Report No.	72504
Delivered by	John Good	Report Date	7-29-91
		Date Received	6-27-91

Identification Soil Samples for the 2nd Quarter of 1991, West Sample, Samples 6-26-91 @ 10:25 a.m. by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results	Date Performed	Analyst	Test Method
pH, in Water	7.64	7-2-91	W. Jaycox	SW846,9045

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	72493
Delivered by	John Good	**Report Date**	7-29-91
		Date Received	6-27-91

Identification Monitor Wells for the 2nd Quarter of 1991, Well No. 2-3, Sampled 6-26-91 @ 10:10 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results mg/L	Date Performed	Analyst	Method
Sulfate	137	7-3-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	227	7-2-91	W. Jaycox	S.M. 4500-Cl, B
Total Dissolved Solids @ 180° C	1034	7-3-91	W. Jaycox	S.M. 2540-C

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C Date of Analysis 7-1-91 Analyst W. Jaycox Method Std. Meth., 17th Ed., 2510-B	1400	1410	1390	1400
pH Date of Analysis 7-1-91 Analyst W. Jaycox Method Std. Meth., 17th Ed., 4500-H	7.08	7.11	7.10	7.09

*Denotes "less than"

Copies: Climax Chemical
Attn: John Good

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	72493
Delivered by	John Good	**Report Date**	7-29-91
		Date Received	6-27-91

Identification Monitor Wells for the 2nd Quarter of 1991, Well No. 2-3, Sampled 6-26-91 @ 10:10 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.05	0.05	7-9-91	G. Bunch	SW846, 7061
Barium	* 1	1.0	7-5-91	G. Bunch	SW846, 7080
Cadmium	* 0.01	0.01	7-3-91	G. Bunch	SW846, 7130
Chromium	* 0.05	0.05	7-3-91	G. Bunch	SW846, 7191
Lead	* 0.02	0.02	7-1-91	G. Bunch	S.M. 316B
Mercury	* 0.002	0.002	7-9-91	G. Bunch	SW846, 7470
Selenium	* 0.01	0.01	7-10-91	G. Bunch	SW846, 7741
Silver	* 0.05	0.05	7-5-91	G. Bunch	SW846, 7760

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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Ron E. Linder

Report of tests on Water
Client Climax Chemical Company
Delivered by John Good

File No. 6147600
Report No. 72493
Report Date 7-29-91
Date Received 6-27-91

Identification Monitor Wells for the 2nd Quarter of 1991, Well No. 2-3, Sampled 6-26-91 @ 10:10 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 6-28-91
Technique Purge and Trap GC/MS

Method EPA 624
Analyst W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on Water
Client Climax Chemical
Delivered by John Good

File No. 6147600
Report No. 74484
Report Date 11-26-91
Date Received 10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 1-3, Sampled 10-10-91 @ 9:30 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	199	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	269	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C	1550	1560	1550	1560
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 2510-B				
pH	6.94	6.90	6.91	6.94
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 4500-H				

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74484
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 1-3, Sampled 10-10-91 @ 9:30 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	* 0.010	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74484
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 1-3
Sampled 10-10-91 @ 9:30 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624
Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
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Report of tests on Water
Client Climax Chemical
Delivered by John Good

File No.
Report No.
Report Date
Date Received

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 2-3, Sampled 10-10-91 @ 9:45 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Metho
Sulfate	82	10-28-91	W. Jaycox	S.M. 450
Chloride	227	10-25-91	W. Jaycox	S.M. 450

Parameters	Test 1	Test 2	Test 3
Conductivity, micromhos/cm @ 25°C Date of Analysis 10-21-91 Analyst L. Church Method Std. Meth., 17th Ed., 2510-B	1280	1280	1270
pH Date of Analysis 10-21-91 Analyst L. Church Method Std. Meth., 17th Ed., 4500-H	7.13	7.10	7.07

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Report of tests on	Water	**File No.**	61
Client	Climax Chemical	**Report No.**	74
Delivered by	John Good	**Report Date**	11
		Date Received	1C

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 4-3, Sampled 10-10-91 @ 10:55 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	6889	10-28-91	W. Jaycox	S.M. 4500-
Chloride	30848	10-25-91	W. Jaycox	S.M. 4500-

Parameters	Test 1	Test 2	Test 3	
Conductivity, micromhos/cm @ 25°C Date of Analysis 10-21-91 Analyst L. Church Method Std. Meth., 17th Ed., 2510-B	63700	63500	63700	6
pH Date of Analysis 10-21-91 Analyst L. Church Method Std. Meth., 17th Ed., 4500-H	6.34	6.32	6.36	

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Report of tests on Water
Client Climax Chemical
Delivered by John Good

Identification Monitor Wells for the 3rd Quarter of
Sampled 10-10-91 @ 10:05 by John Goo

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed
Sulfate	6666	10-28-91
Chloride	7801	10-25-91

Parameters	Test 1
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	27500
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	6.73

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1703 W

Report of tests on Water
Client Climax Ch
Delivered by John Goo

Identification Monitor Wells
Sampled 10-1

Date of Analysis 10-22-91
Technique Purge and Trap GC/M

Compound
Chloromethane
Bromomethane
Vinyl Chloride
Chloroethane
Methylene Chloride
1,1-Dichloroethene
1,1-Dichloroethane
trans-1,2-Dichloroether
Chloroform
1,2-Dichloroethane
1,1,1-Trichloroethane
Carbon Tetrachloride
Bromodichloromethane
1,2-Dichloropropane
trans-1,3-Dichloroprope
Trichloroethene
Dibromochloromethane
1,1,2-Trichloroethane
Benzene
cis-1,3-Dichloropropen
2-Chloroethylvinylethe
Bromoform
Tetrachloroethene
1,1,2,2-Tetrachloroeth
Toluene
Chlorobenzene
Ethylbenzene
Total Xylenes
Acrolein
Acrylonitrile

*Denotes "less than"

Copies: Climax Chemical Company
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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74487
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 5-3, Sampled 10-10-91 @ 10:05 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	0.042	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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Report of tests on	Water	File No.	6147600
Client	Climax Chemical Company	Report No.	74487
Delivered by	John Good	Report Date	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 5-3, Sampled 10-10-91 @ 10:05 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 — Method EPA 624
Technique Purge and Trap GC/MS — Analyst W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74488
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 10-10, Sampled 10-10-91 @ 10:30 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	3662	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	14538	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C	37400	37500	37500	37400
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 2510-B				
pH	6.70	6.69	6.71	6.74
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 4500-H				

*Denotes "less than"

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74488
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 10-10, Sampled 10-10-91 @ 10:30 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	0.055	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74488
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 10-10, Sampled 10-10-91 @ 10:30 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624
Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

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Attn: John Good

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1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74489
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 12-9, Sampled 10-10-91 @ 10:40 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	9703	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	19147	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	48900	48600	48700	49000
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	6.90	6.88	6.94	6.91

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74489
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 12-9, Sampled 10-10-91 @ 10:40 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	0.080	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74489
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Well No. 12-9, Sampled 10-10-91 @ 10:40 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624
Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74490
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Trip Blank, Sampled 10-10-91 by SwL

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	* 10	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	* 14	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C	1	2	1	1
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 2510-B				
pH	7.74	7.72	7.69	7.71
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 4500-H				

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74490
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Trip Blank, Sampled 10-10-91 by SwL

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	* 10	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	* 14	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	1	2	1	1
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	7.74	7.72	7.69	7.71

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Client	Climax Chemical Company	**Report No.**	74490
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Trip Blank, Sampled 10-10-91 by SwL

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	* 0.010	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Delivered by	John Good	**Report Date**	11-26-91
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Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	* 0.010	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74491
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Field Blank, Sampled 10-10-91 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	* 10	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	* 14	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	4	5	4	3
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	5.79	5.82	5.85	5.80

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical	**Report No.**	74491
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Field Blank, Sampled 10-10-91 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	* 10	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	* 14	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	4	5	4	3
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	5.79	5.82	5.85	5.80

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Report of tests on	Water	File No.	6147600
Client	Climax Chemical Company	Report No.	74491
Delivered by	John Good	Report Date	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Field Blank, Sampled 10-10-91 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	* 0.010	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Report of tests on Water
Client Climax Chemical Company
Delivered by John Good

File No. 6147600
Report No. 74491
Report Date 11-26-91
Date Received 10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Field Blank, Sampled 10-10-91 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	* 0.010	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74492
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	0.042	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74492
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF TOTAL METALS DRINKING WATER SPECIFICATIONS

Parameters	Results mg/L	Regulatory Limit	Date Performed	Analyst	Test Method
Arsenic	* 0.050	0.05	11-18-91	G. Bunch	EPA 206.3
Barium	* 0.20	1.0	11-18-91	G. Bunch	EPA 208.1
Cadmium	0.042	0.01	11-18-91	G. Bunch	EPA 213.1
Chromium	* 0.050	0.05	11-18-91	G. Bunch	EPA 218.1
Lead	* 0.020	0.02	11-22-91	G. Bunch	S.M. 316B
Mercury	* 0.0020	0.002	11-18-91	G. Bunch	EPA 245.1
Selenium	* 0.010	0.01	11-19-91	G. Bunch	EPA 270.3
Silver	* 0.050	0.05	11-18-91	G. Bunch	EPA 272.1

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Client	Climax Chemical	**Report No.**	74492
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	6831	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	7801	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C	25600	25800	25700	25900
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 2510-B				
pH	6.74	6.71	6.72	6.75
Date of Analysis 10-21-91				
Analyst L. Church				
Method Std. Meth., 17th Ed., 4500-H				

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Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF CHEMICAL ANALYSIS

Parameters	Results, mg/L	Date Performed	Analyst	Method
Sulfate	6831	10-28-91	W. Jaycox	S.M. 4500-SO_4, C
Chloride	7801	10-25-91	W. Jaycox	S.M. 4500-Cl, B

Parameters	Test 1	Test 2	Test 3	Test 4
Conductivity, micromhos/cm @ 25°C **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 2510-B	25600	25800	25700	25900
pH **Date of Analysis** 10-21-91 **Analyst** L. Church **Method** Std. Meth., 17th Ed., 4500-H	6.74	6.71	6.72	6.75

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Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624
Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

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Attn: John Good

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Su
Report of te
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Date of Ana
Technique
Compound
Chloromet
Bromometl
Vinyl Ch
Chloroetl
Methylen
1,1-Dich
1,1-Dich
trans-1,
Chlorofo
1,2-Dich
1,1,1-Tr
Carbon T
Bromodicl
1,2-Dich
trans-1,
Trichlor
Dibromocl
1,1,2-Tr
Benzene—
cis-1,3-
2-Chloro
Bromofor
Tetrachl
1,1,2,2-
Toluene—
Chlorobe
Ethylben
Total Xy
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Report of tests on Water
Client Climax Chemical Company
Delivered by John Good

File No.
Report No
Report Dat
Date Rece.

Identification Monitor Wells for the 3rd Quarter of 1991, Blind
Sampled 10-10-91 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91
Technique Purge and Trap GC/MS

Compound	Metho Analys uc
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

AMB
Reviewed by

SOUTHWESTERN LA

The letters and reports shall n

SwL ( )UTHWESTERN LABC ATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74491
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Field Blank, Sampled 10-10-91 by John Good

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624
Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

AMB
Reviewed by

SOUTHWESTERN LABORATORIES

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Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Water	**File No.**	6147600
Client	Climax Chemical Company	**Report No.**	74490
Delivered by	John Good	**Report Date**	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Trip Blank, Sampled 10-10-91 by SwL

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 **Method** EPA 624

Technique Purge and Trap GC/MS **Analyst** W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

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Reviewed by

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Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
1703 West Industrial Avenue • P.O. Box 2150 • Midland, Texas 79702

Report of tests on	Water	File No.	6147600
Client	Climax Chemical Company	Report No.	74490
Delivered by	John Good	Report Date	11-26-91
		Date Received	10-11-91

Identification Monitor Wells for the 3rd Quarter of 1991, Trip Blank, Sampled 10-10-91 by SwL

REPORT OF ORGANICS ANALYSIS

Date of Analysis 10-22-91 — Method EPA 624
Technique Purge and Trap GC/MS — Analyst W. Kucera

Compound	ug/L
Chloromethane	* 10
Bromomethane	* 10
Vinyl Chloride	* 10
Chloroethane	* 10
Methylene Chloride	* 5
1,1-Dichloroethene	* 5
1,1-Dichloroethane	* 5
trans-1,2-Dichloroethene	* 5
Chloroform	* 5
1,2-Dichloroethane	* 5
1,1,1-Trichloroethane	* 5
Carbon Tetrachloride	* 5
Bromodichloromethane	* 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	* 10
Bromoform	* 5
Tetrachloroethene	* 5
1,1,2,2-Tetrachloroethane	* 5
Toluene	* 5
Chlorobenzene	* 5
Ethylbenzene	* 5
Total Xylenes	* 5
Acrolein	* 50
Acrylonitrile	* 50

*Denotes "less than"

Copies: Climax Chemical Company
Attn: John Good

AMB

Reviewed by

SOUTHWESTERN LABORATORIES

SwL SOUTHWESTERN LABORATORIES

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2575 LONE STAR DRIVE * P.O. BOX 224227, DALLAS,TEXAS 75222 * 214/631-2700

OIL CONSER... ON DIVISION
RECEIVED
'92 APR 15 AM 8 43

Client OIL CONSERVATION DIVISION
P.O. BOX 2088,
SANTA FE, NEW MEXICO
87504-2088
Attn: KATHY M. BROWN

Client No. 23178400
Report No. D2-04-062
Report Date 04/09/92 13:26

Project 040119920910

Date Sampled 04/01/92

Sampled By UNKNOWN

Sample Type WATER

Transported by LSO

P.O. # CONTRACT#80-521.07-140

Date Received 04/01/92

Lab No.	Sample Identification
D2-04-062-01	040119920910

SOUTHWESTERN LABORATORIES

Galbia Smith
Reviewed By

Bob Garrett
Bob Garrett, Mgr., EAS

SOUTHWESTERN LABORATORIES

Order # D2-04-062
04/09/92 13:26
Client: OIL CONSERVATION DIVISION

TEST RESULTS BY SAMPLE

Sample: 01A 040119920910 Collected: 04/01/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organics	EPA 624/8240	Enclosure	Date Com		04/07/92	LK

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55
Client: New Mexico Oil Conservation
Date Analyzed: 4/07/92
Instrument ID: 70 1

THE FOLLOWING SAMPLES WERE ANALYZED:

LAB NUMBER	SAMPLE ID	LAB FILE ID
9204062-1	040119920910	>AF870

Loretta Koehler, GC/MS Chemist

William J. Gase, Lab Supervisor, EAS

VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA METHOD 601/602

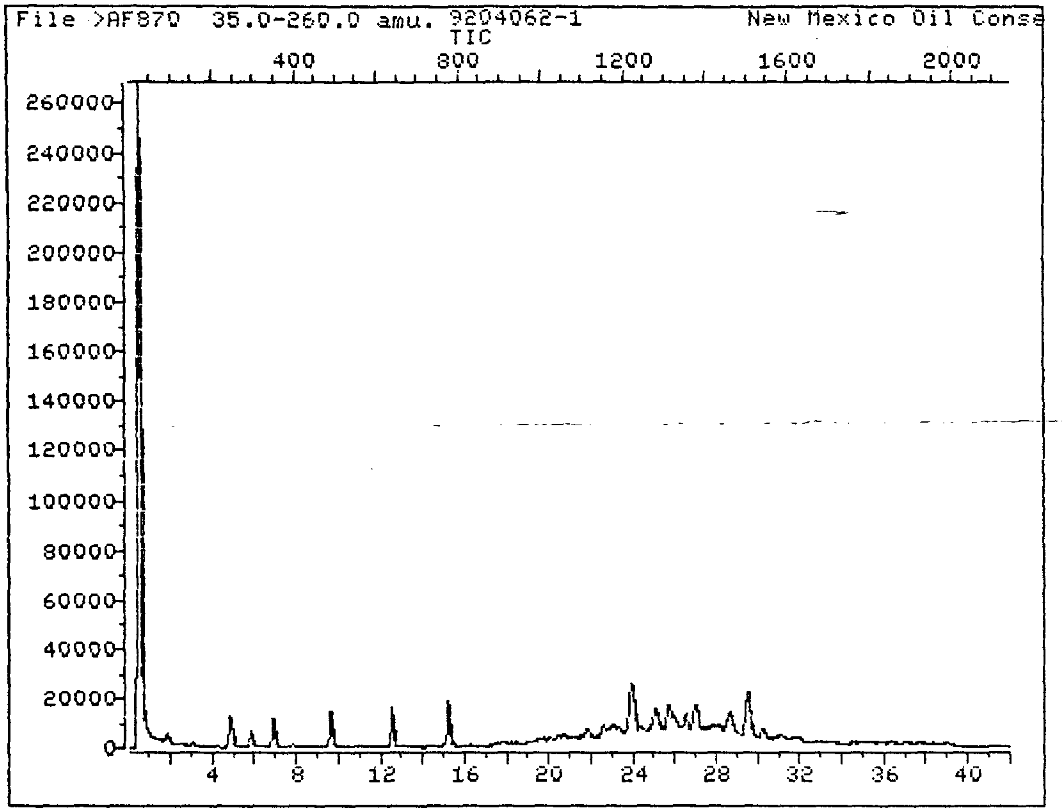
Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55 Dallas
Matrix: (soil/water) WATER
Sample wt/vol: 5 (g/mL) mL
Level: (low/med) LOW
Dilution Factor: 1.0

Lab Number: 9204062-1
Client: Oil Conservation
Sample ID: 040119920910
Lab File ID: >AF870
Date Received: 4/07/92
Date Analyzed: 4/07/92

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	10.	U
74-83-9	Bromomethane	10.	U
75-01-4	Vinyl Chloride	10.	U
75-69-4	Trichlorofluoromethane	10.	U
75-00-3	Chloroethane	10.	U
75-09-2	Methylene Chloride	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
156-60-5	trans-1,2-Dichloroethene	5.	U
67-66-3	Chloroform	5.	U
107-02-2	1,2-Dichloroethane	5.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
108-88-3	Toluene	5.	U
110-75-8	2-Chloroethylvinyl Ether	10.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U
71-43-2	Benzene	5.	U
75-25-2	Bromoform	5.	U
127-18-4	Tetrachloroethene	5.	U
100-41-4	Ethylbenzene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-90-7	Chlorobenzene	5.	U
541-73-1	1,3-Dichlorobenzene	5.	U
106-46-7	1,4-Dichlorobenzene	5.	U
95-50-1	1,2-Dichlorobenzene	5.	U
75-71-8	Dichlorodifluoromethane	10.	U

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
B - The compound was found in the method blank.

TOTAL ION CHROMATOGRAM



Data File: >AF870::D4 Quant Output File: ^AF870::QT
Name: 9204062-1
Misc: New Mexico Oil Conservation 040119920910

Id File: ID_VOA::SC
Title: SWL VOA Standards for 5 Point Calibration Curve MAR '92
Last Calibration: 920303 09:49

Operator ID: RET
Quant Time: 920407 20:13
Injected at: 920407 19:30

SwL

SOUTHWESTERN LABORATORIES

OIL CONSER... ON DIVISION
REC... VED

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

2575 LONE STAR DRIVE * P.O. BOX 224227, DALLAS, TEXAS 75222 * 214/631-2700

92 APR 13 AM 8 44

Client OIL CONSERVATION DIVISION
P.O. BOX 2088,
SANTA FE, NEW MEXICO
87504-2088
Attn: KATHY M. BROWN

Client No. 23178400
Report No. D2-04-062
Report Date 04/09/92 13:26

Project 040119920910

Date Sampled 04/01/92

Sampled By UNKNOWN

Sample Type WATER

Transported by LSO

P.O. # CONTRACT#80-521.07-140

Date Received 04/01/92

Lab No.	Sample Identification
D2-04-062-01	040119920910

SOUTHWESTERN LABORATORIES

Mallia Smith

Reviewed By

Bob Garrett

Bob Garrett, Mgr., EAS

SOUTHWESTERN LABORATORIES

Order # D2-04-062
04/09/92 13:26
Client: OIL CONSERVATION DIVISION

TEST RESULTS BY SAMPLE

Sample: 01A 040119920910 Collected: 04/01/92

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organics	EPA 624/8240	Enclosure	Date Com		04/07/92	LK

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55
Client: New Mexico Oil Conservation
Date Analyzed: 4/07/92
Instrument ID: 70 1

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Sample wt/vol: 5 (g/mL) mL
Level: (low/med) LOW
Dilution Factor: 1.0

Lab Number: 9204062-1
Client: Oil Conservation
Sample ID: 040119920910
Lab File ID: >AF870
Date Received: 4/07/92
Date Analyzed: 4/07/92

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
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75-09-2	Methylene_Chloride	5.	U
75-35-4	1,1-Dichloroethene	5.	U
75-34-3	1,1-Dichloroethane	5.	U
156-60-5	trans-1,2-Dichloroethene	5.	U
67-66-3	Chloroform	5.	U
107-02-2	1,2-Dichloroethane	5.	U
71-55-6	1,1,1-Trichloroethane	5.	U
56-23-5	Carbon Tetrachloride	5.	U
75-27-4	Bromodichloromethane	5.	U
78-87-5	1,2-Dichloropropane	5.	U
108-88-3	Toluene	5.	U
110-75-8	2-Chloroethylvinyl_Ether	10.	U
10061-01-5	cis-1,3-Dichloropropene	5.	U
79-01-6	Trichloroethene	5.	U
124-48-1	Dibromochloromethane	5.	U
79-00-5	1,1,2-Trichloroethane	5.	U
10061-02-6	trans-1,3-Dichloropropene	5.	U
71-43-2	Benzene	5.	U
75-25-2	Bromoform	5.	U
127-18-4	Tetrachloroethene	5.	U
100-41-4	Ethylbenzene	5.	U
79-34-5	1,1,2,2-Tetrachloroethane	5.	U
108-90-7	Chlorobenzene	5.	U
541-73-1	1,3-Dichlorobenzene	5.	U
106-46-7	1,4-Dichlorobenzene	5.	U
95-50-1	1,2-Dichlorobenzene	5.	U
75-71-8	Dichlorodifluoromethane	10.	U

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
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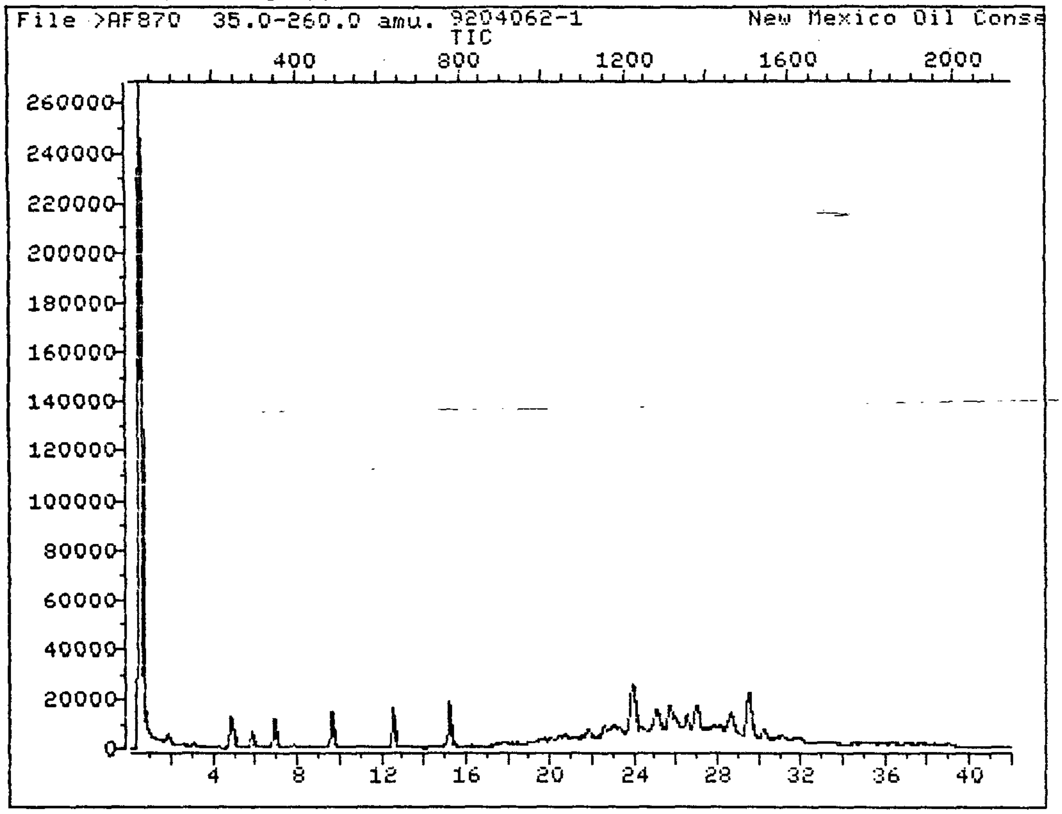
TOTAL ION CHROMATOGRAM



Data File: >AF870::D4   Quant Output File: ^AF870::QT
Name: 9204062-1
Misc: New Mexico Oil Conservation 040119920910

Id File: ID_VOA::SC
Title: SWL VOA Standards for 5 Point Calibration Curve MAR '92
Last Calibration: 920303 09:49

Operator ID: RET
Quant Time: 920407 20:13
Injected at: 920407 19:30

889078

SwL SOUTHWESTERN LABORATORIES
Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
1703 West Industrial • P.O. Box 2150, Midland, Texas 79702 • 915/683-3349

Analysis Request and Chain of Custody Record

Project no.:

Client/Project: NEW MEXICO OIL CONSERVATION DIVISION

Sample Date: 4-1-92

Field Sample No./ Identification	Grab	Comp	Sample Container (Size/Mat'l)	Sample Type (Liquid Sludge, Etc.)	Preservative	ANALYSIS REQUESTED	LAB I.D. NO.
040119920910	✓		40ml/Glass	H_2O	none	Method 601, 602	VOA

Samplers: (Print)	Relinquished by: (Signature) [signature]	Date: 4-1-92 Time: 300 PM	Received by: (Signature)	Date: Time:	COC Seal No. Recvd intact & good condition
Affiliation	Relinquished by: (Signature)	Date: Time:	Received by: (Signature) Debra J. Koch	Date: 4-7-92 Time: 8 AM	
	Relinquished by: (Signature)	Date: Time:	Received by Laboratory: (Signature) [signature]	Date: 4-1-92 Time: 3:00 PM	Intact:
Results by ______ Rush Charges Authorized Yes ____ No ____	REMARKS:		Data Results To: ROGER ANDERSON 1. SANTA FE, NM CHRIS EUSTICE 2. P.O. BOX 1980 HOBBS, NM 88241		Laboratory No. 9204.062

SECTION VI

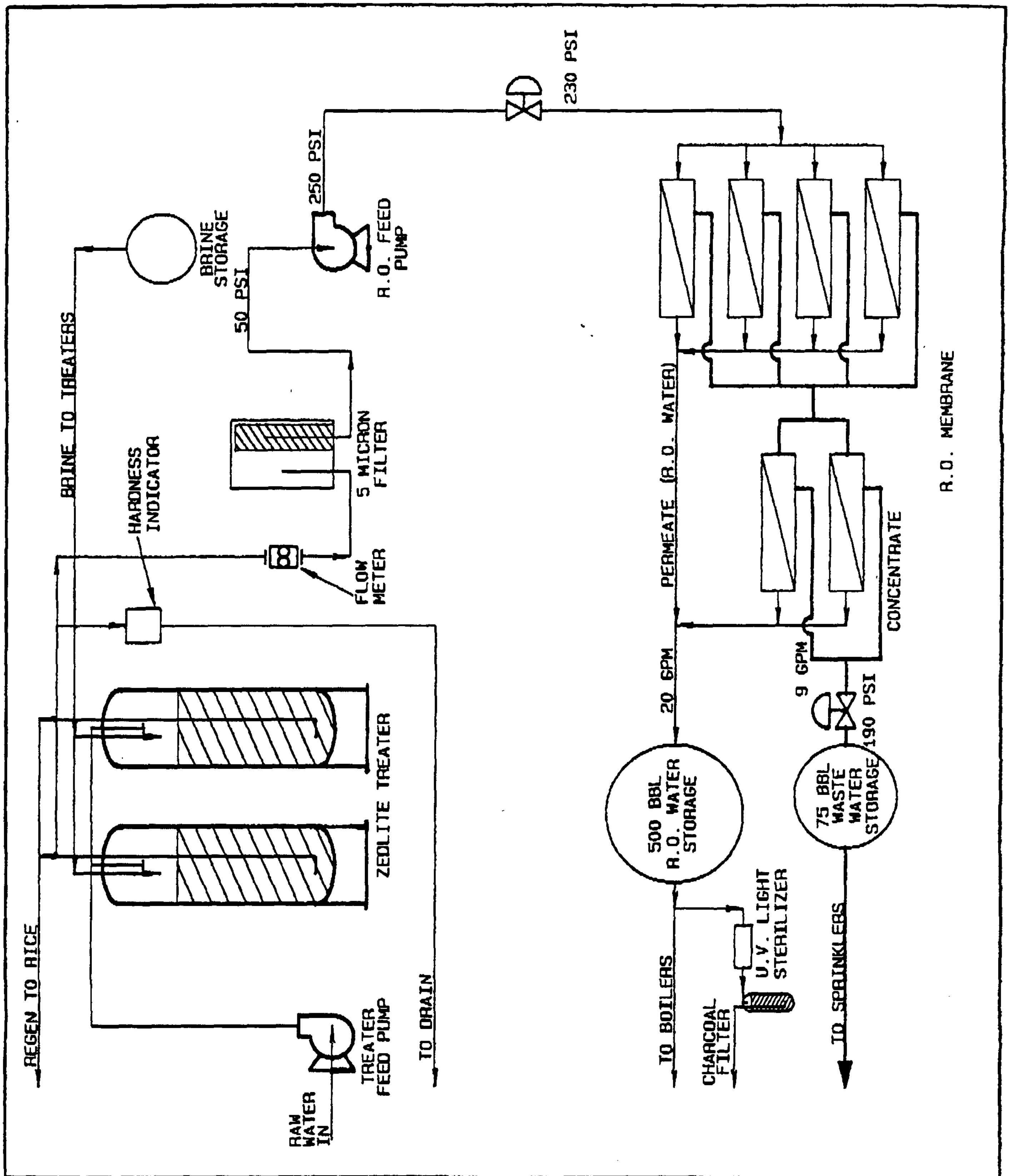
GENERAL DESCRIPTION

REVERSE OSMOSIS WATER TREATMENT

SECTION VI

REVERSE OSMOSIS WATER TREATMENT

The Reverse Osmosis Unit and the Zeolite treaters are located south of the office. This unit was designed for boiler feed water. Following is a one line diagram of the flow through the treaters. Each outlet is labelled with a designated destination. The regeneration water will continue to be delivered to Rice, whereas the waste water from the Reverse Osmosis unit will be evapotranspirated from the evaporation areas.



NO.	REVISION	BY	DATE	CHK	APPR	ISSUE CONST.		NO. OF UNITS REQUIRED THUS		WO-AFE NO.
						DATE	BY	WARREN PETROLEUM COMPANY A DIVISION OF CHEVRON U.S.A. INC. TULSA, OKLAHOMA		
								REVERSE OSMOSIS SYSTEM		
								PLANT 118 MONUMENT		LEA COUNTY NM
								DRAWN GMT	DATE 8/4/89	SCALE NONE
								CHECKED	DATE	DRAWING NO.
								APPR.	DATE	118-1002

The Monument Plant has two Zeolite treaters. One is always in raw water service and one in regeneration/standby service. They are both rated at 50 GPM, with a softening capacity of 600,000 grains.

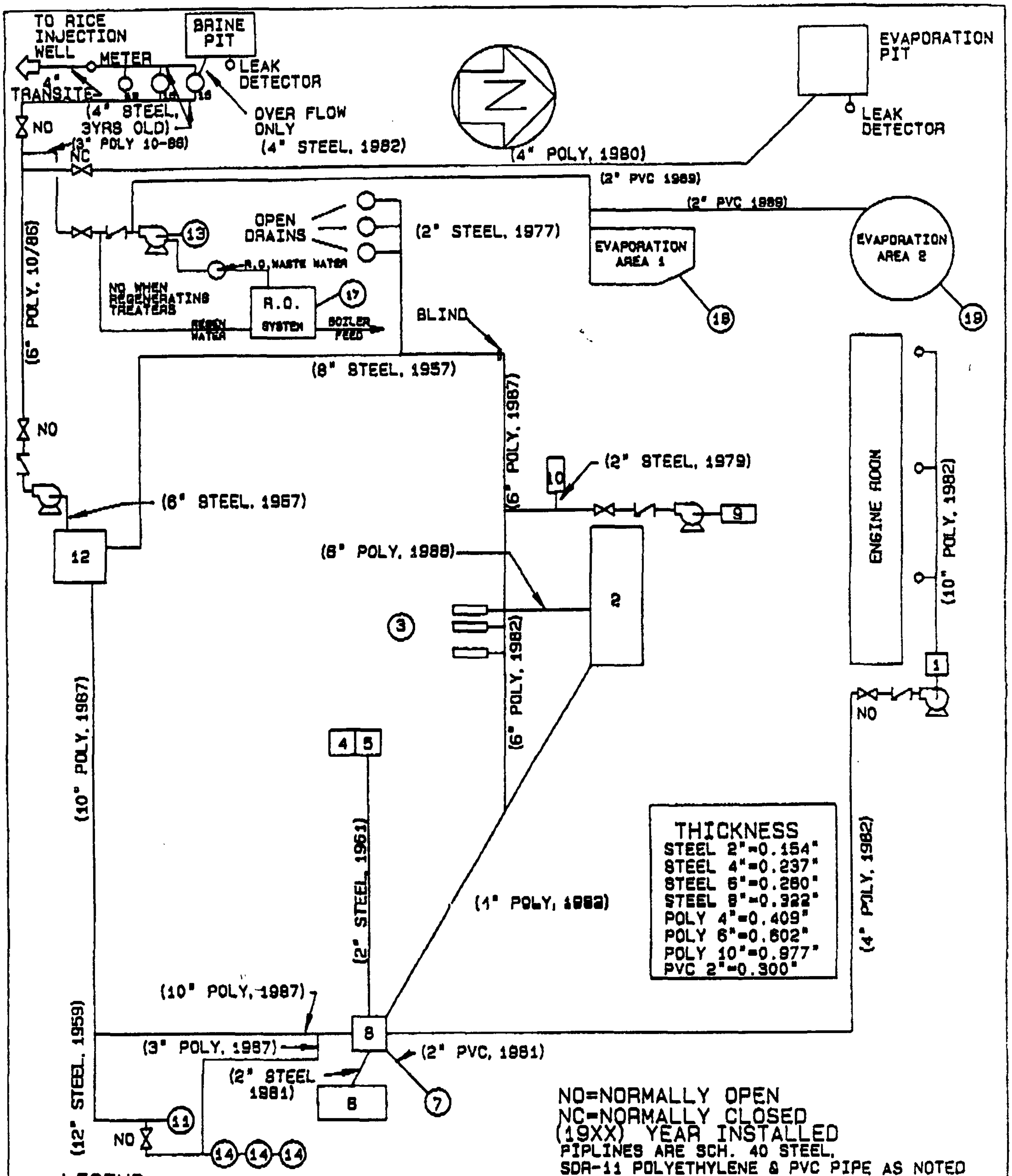
A Calgon water hardness indicator samples the treater water discharge once every 10 minutes. The window will appear green when the water has less than 3 ppm hardness and red when above. Red indicates that the treating bed has become saturated with Ca^+ and Mg^+ cations and allowing some of them to pass through. It is time to switch beds and regenerate the existing saturated bed.

A flow meter measures the gallons of water treated by one bed. The meter will trigger a bed switch at the set gallonage or can be manually triggered.

The regeneration cycle consists of a backwash, which fluffs the resin, making more surface area available for the Na^+ cation exchange. The fluff cycle lasts 10 minutes. A long period is allowed, usually 45 minutes plus, for salt solution to pass through the bed. The salt/brine solution is aspirated by eduction from the black tank into the bed. The Na^+ replaces the Ca^+ and Mg^+ on the surface of the Zeolite and the Ca^+, Mg^+ solution is flushed down the Rice Engineering disposal line.

After the timer cuts the salt flow, the bed goes through a slow wash to rid "non-bedded" salt from the beds and to settle the resin. Then a "hard" wash takes place to give a final clean. Both wash cycles go to Rice disposal.

The bed is then placed in a standby mode until required.



NO=NORMALLY OPEN
NC=NORMALLY CLOSED
(19XX) YEAR INSTALLED
PIPLINES ARE SCH. 40 STEEL,
SDR-11 POLYETHYLENE & PVC PIPE AS NOTED

LEGEND

1-NORTH ENGINE ROOM SUMP
2-COOLING TOWER
3-CONDENSORS
4-BOILER
5-BOILER
6-BOILER
7-H_2S SCRUBBER
8-EAST SUMP
9-SOUTH ENGINE ROOM SUMP
10-CONDENSORS
11-CONDENSATE TANK
12-SOUTH MAIN SUMP
13-ZEOLITE H_2O TREATER
14-SHELL TANKS (3)
15-WASTE WATER STORAGE (2)
16-WASTE WATER OIL SKIMMER
17-REVERSE OSMOSIS SYSTEM
18-EVAPORATION 1
19-EVAPORATION 2

Revised Per Field 7/89
Revised Per Field 4/88

NO. OF UNITS REQUIRED THUS			WO-AFE NO.
WARREN PETROLEUM COMPANY A DIVISION OF CHEVRON U.S.A.			
WASTE WATER SYSTEM LAYOUT			
PLANT 118 MONUMENT			LEA, COUNTY, NM.
DRAWN HPK	DATE 10/11/85	SCALE NONE	
CHECKED LLJ	DATE 10/11/85	DRAWING NO.	
APPR. PDA	DATE 10/11/85	118-1001-1	

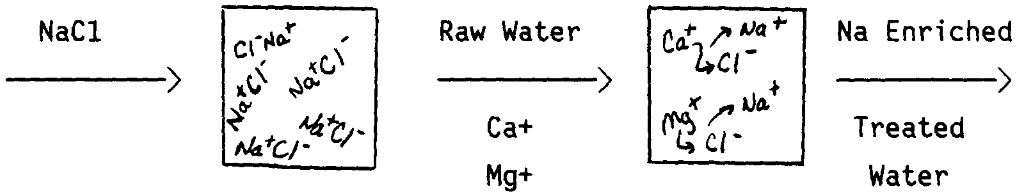
SECTION VI
REVERSE OSMOSIS WATER TREATMENT

HOW A ZEOLITE TREATER WORKS:

ZEOLITE: is a polystyrene resin material with a strong ability to split salts into positively charged ions called "cations" and negatively charged ions called "anions".

The purpose of the Zeolite treater is to exchange the scale forming cations, such as calcium and magnesium, with the more desirable cation sodium. This process is referred to as "ion exchange".

The sodium cation Na+ comes by passing a salt solution, or brine NaCl over the Zeolite resin. The molecule of salt is split into cation Na+ and anion Cl-.



Zeolite
Regeneration
Cycle

Zeolite
Treating
Cycle

Once the Na+ and Cl- saturation of the Zeolite resin bed is accomplished, raw water is passed over the resin. The Ca+ (calcium) cation and Mg+ (magnesium) cation replace the Na+ on the resin. The Na+ is released in the water and carried to the Reverse Osmosis membranes.

INTRODUCTION

Reverse Osmosis is a pressure driven membrane separation process that is capable of separating dissolved solutes from a solvent, usually water. The solute may be organic or inorganic in nature and range in size from 1-10 Angstroms or less. The ability of reverse osmosis membranes to reject organic substances depends upon the molecular weight, geometry of the solute, and other factors. A well designed reverse osmosis system is capable of removing 90-99% of most dissolved organic and inorganic compounds.

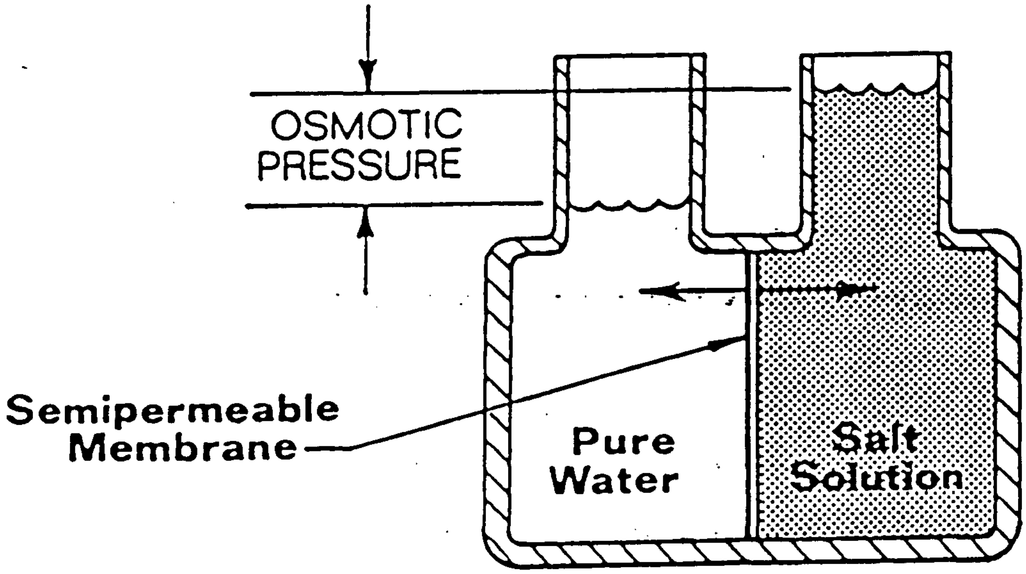
Desal's reverse osmosis membranes are constructed from cellulose acetate, polyamides, or other polymers. The present generation of high rejection - high flow TFM™ membranes are manufactured by depositing thin films of rejecting materials over bases selected for their superior support and flow characteristics.

Most current reverse osmosis applications are related to water treatment for commercial, industrial, municipal, agricultural, and military facilities. However, reverse osmosis technology is expanding into wastewater treatment/reclamation, metal recovery, and custom industrial separations due to energy-saving operation versus competitive processes such as distillation. Please consult the Desal Reverse Osmosis Product Summary and Technical Bulletins for details.

REVERSE OSMOSIS THEORY

When a salt solution is separated from demineralized water by a semipermeable membrane, the higher osmotic pressure of the salt solution causes demineralized water to flow into the salt solution compartment. (See figure below). Water will continue to flow and rise in the salt solution compartment until the increase in water height equals the osmotic pressure of the salt solution. If pressure is exerted on the salt solution compartment, water can be made to flow in the reverse direction. This is the process of reverse osmosis.

OSMOTIC EQUILIBRIUM



Osmotic pressure of a solution is expressed by the following equation:

$$\Pi = \phi \sum Mi RT$$

where,

Π = osmotic pressure, atm

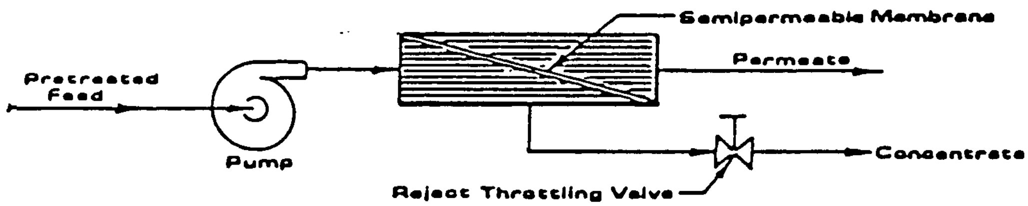
ϕ = osmotic pressure coefficient (about 0.93 for most dilute salt solutions)

$\sum Mi$ = sum of the ions present expressed as moles/kg of solution (approximately equal to moles/liter for most dilute solutions)

R = gas constant, 0.082 liter-atm/°K-mole

T = temperature, °K

A simplified flow diagram of a typical RO system shows how the RO process operates. Pressure is applied to the feed stream by a pump, producing permeate and concentrate which are continuously withdrawn. Concentrate contains a high level of dissolved solids while the permeate contains a low level.



Water and salt flux across a reverse osmosis membrane are defined by the following equations:

$$Q_w = A\ (\Delta P - \Delta \Pi)$$

$$Q_s = B\ (\Delta C)$$

where,

Q_w = permeate flow, gm (water)/cm^2-sec
Q_s = salt flow, gm (salt)/cm^2-sec
A = water permeability constant, gm(water)/cm^2-sec-atm
B = salt permeability constant, cm/sec
P = pressure differential across the membrane, atm
$\Delta\Pi$ = osmotic pressure differential across the membrane, atm
ΔC = concentration gradient across the membrane, gm(salt)/cm^3

Permeate flow, Q_w, is proportional to the driving pressure minus the differential osmotic pressure.

Salt flow is independent of pressure and is a function of the difference in dissolved solids concentration across the membrane.

Qualitative changes in flux rate and salt passage quotient (product water TDS/average feed water TDS) caused by independent increases in RO system operating parameters and feed water concentration are tabulated below.

VARIABLES AFFECTING FLUX RATE AND SALT PASSAGE

Increasing Variable	Flux	Salt Passage Quotient
Net driving pressure	Increases	Decreases
Temperature	Increases	No change
Recovery	Decreases	Increases
Feed-brine velocity	Increases	Decreases
Feed TDS	Decreases	Increases
Feed Foulants	Decreases	Increases

As indicated by the permeate flow equation, an increase in net driving pressure results in an increased flux rate. Salt flow, Q_S, does not change with pressure, so that increased permeation rates result in a dilution of the permeate stream and a lowering of the salt passage quotient.

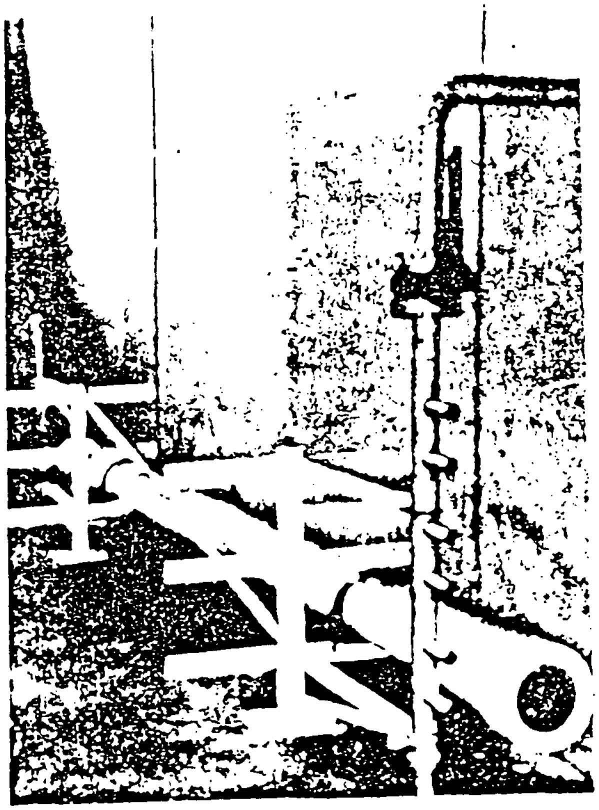
Coefficients of permeate and salt passage (A and B) show about the same increase with temperature. For this reason, no change in the salt passage quotient is seen with temperature increases.

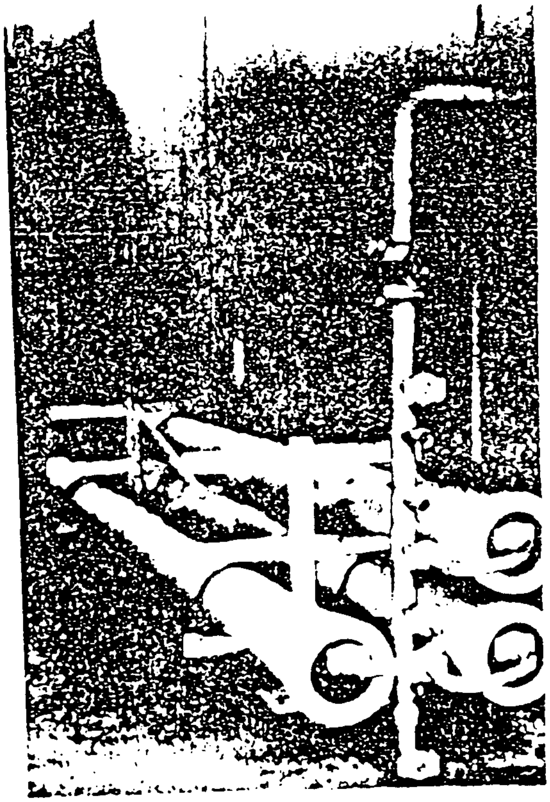
Increased product recovery will increase the average feed-brine osmotic pressure. The result is higher salt passage due to the increased feed-brine TDS concentration and a lower net driving pressure.

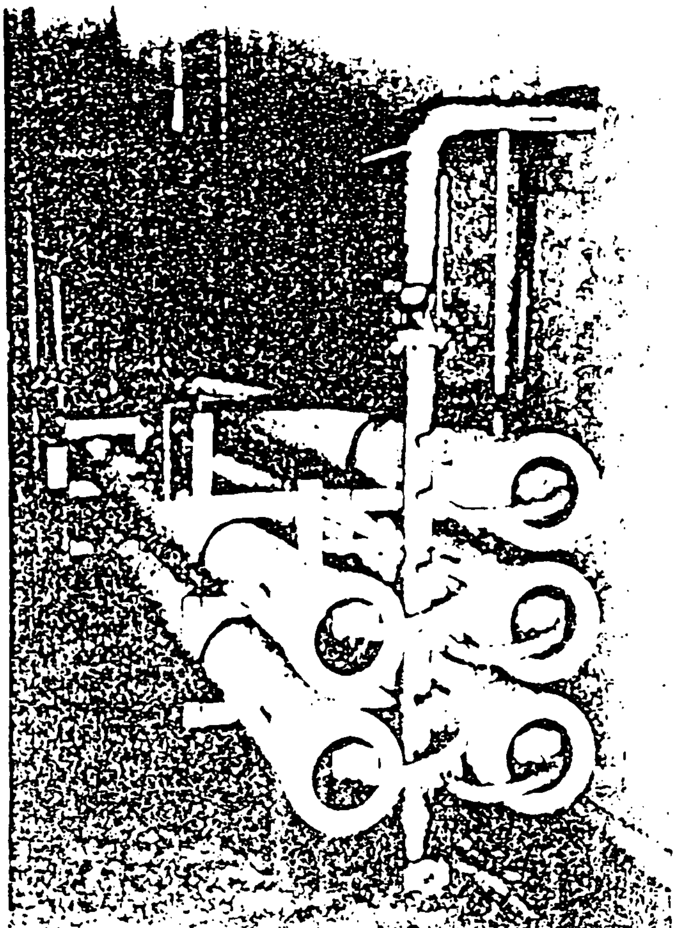
Concentration polarization refers to a local salt concentration increase at the membrane surface. The salt left at the membrane surface as a result of permeate passage cannot diffuse away from the membrane fast enough to prevent a local salt concentration increase. Feed-brine velocity is a significant factor in reducing the thickness of this stagnant boundary layer. Reduction of the boundary layer thickness decreases salt passage.

At constant feed pressure, increased feedwater TDS decreases the net driving force across the membrane by increasing osmotic pressure. Salt passage increases due to a higher ΔC term in the salt passage equation.

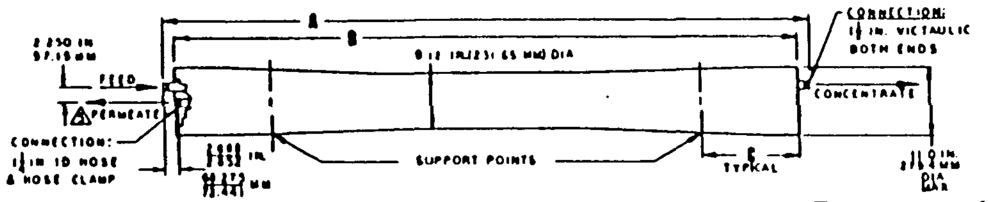
Foulants present in the feedwater deposit on membrane surfaces and increase the thickness of the laminar boundary layer. The results are increased resistance to permeation and concentration polarization.

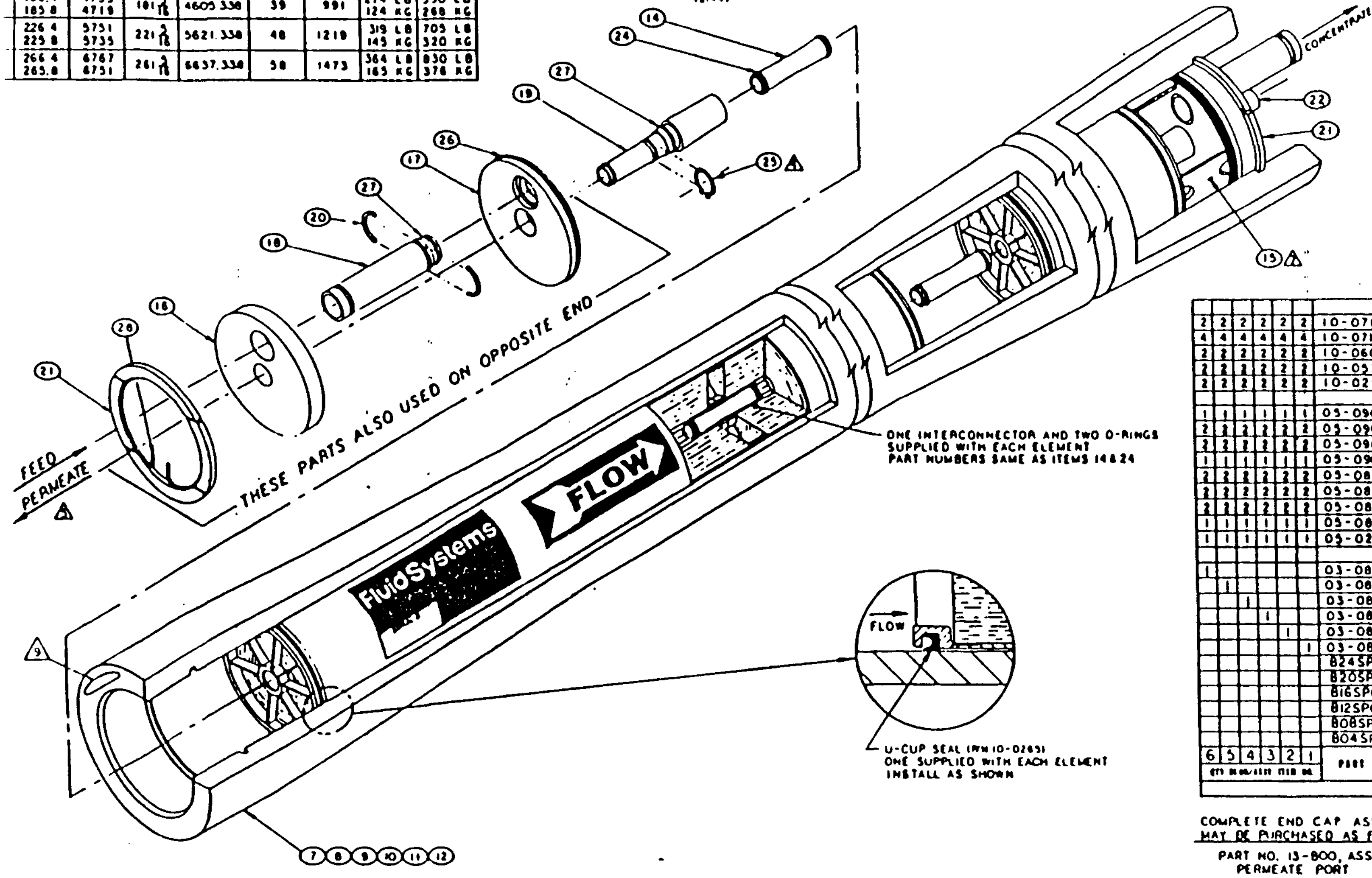






INTERFACE DIMENSIONS							
A IN	A MM	B IN	B MM	C IN	C MM	APPROX WT.	
		± 3/8	±9.525	± 1/2	±12.7	FRP TUBE ASSY	LOADED ASSY, WET
66.4 65.8	1687 1671	61 5/16	1557.338	16	406	134 LB 61 KG	225 LB 102 KG
106.4 105.8	2703 2687	101 5/16	2573.338	21	533	184 LB 83 KG	350 LB 159 KG
146.4 145.8	3719 3703	141 5/16	3589.338	30	762	229 LB 104 KG	470 LB 213 KG
186.4 185.8	4735 4719	181 5/16	4605.338	39	991	274 LB 124 KG	590 LB 268 KG
226.4 225.8	5751 5735	221 5/16	5621.338	48	1219	319 LB 145 KG	705 LB 320 KG
266.4 265.8	6767 6751	261 5/16	6637.338	58	1473	364 LB 165 KG	830 LB 378 KG





NOTES:

1 INSTALLATION AND REMOVAL OF END CAP ASSY REQUIRES LUBRICANT ON O-RINGS AND O-RING PATHS TO REDUCE FRICTION.

2 TO INSTALL ELEMENTS, APPLY LUBRICANT ON U-CUP SEALS AND INTERCONNECTOR O-RINGS TO REDUCE FRICTION.

3 CAUTION: EXCESSIVE USE OF LUBRICANTS SHOULD BE AVOIDED TO PREVENT BLOCKING OF FLOW CHANNELS AND AVOID FOULING OF MEMBRANE SURFACES.

4 TO INSTALL AND REMOVE RETAINING RING, TRUARC PLIERS, PART NO 0604 OR EQUIVALENT IS RECOMMENDED.

5 PERMEATE MAY BE TAKEN FROM EITHER END OF ASSY BY INTERCHANGING END CAP ASSEMBLIES.

6 MAX OPERATING PRESSURE – 600 PSI.

7 THRUST RING MUST BE INSTALLED ON THE CONCENTRATE DISCHARGE END OF THE ASSEMBLY.

8 NOTE ON LUBRICANTS: DIFFERENT LUBRICANTS MAY BE UTILIZED. GLYCERIN IS WATER SOLUBLE AND IS RECOMMENDED IN MOST APPLICATIONS. SILICONE LUBRICANTS MAY ALSO BE APPLIED; HOWEVER, AS THEY ARE NOT WATER SOLUBLE, CARE MUST BE UTILIZED TO AVOID EXCESS APPLICATION.

9 FRP PRESS. TUBE SERIAL NO./IDENT. TAG.

6	5	4	3	2	1	PART NO.	DESCRIPTION	ITEM
								29
2	2	2	2	2	2	10-0712	RETAINING RING (FOR SEGMENTED RING SET)	28
4	4	4	4	4	4	10-0716	O-RING (FOR FEED/CONC PORT, PERM PORT, PERM PLUG)	27
2	2	2	2	2	2	10-0602	O-RING (FOR END PLUG)	26
2	2	2	2	2	2	10-0530	RETAINING RING (FOR PERM PORT & PERM PLUG)	25
2	2	2	2	2	2	10-0251	O-RING (FOR INTERCONNECTOR)	24
								23
1	1	1	1	1	1	05-0907	PERMEATE PLUG (BLACK ACETAL)	22
2	2	2	2	2	2	05-0902	SEGMENTED RING SET	21
2	2	2	2	2	2	05-0901	RETAINING RING SET (FOR FEED/CONC PORT)	20
1	1	1	1	1	1	05-0900	PERMEATE PORT (BLACK ACETAL)	19
2	2	2	2	2	2	05-0899	FEED/CONCENTRATE PORT (316 STN STL)	18
2	2	2	2	2	2	05-0898	END PLUG	17
2	2	2	2	2	2	05-0897	SUPPORT PLATE	16
1	1	1	1	1	1	05-0895	THRUST RING	15
1	1	1	1	1	1	05-0227	INTERCONNECTOR	14
								13
1						03-0806	FRP PRESSURE TUBE	12
	1					03-0805	FRP PRESSURE TUBE	11
		1				03-0804	FRP PRESSURE TUBE	10
			1			03-0803	FRP PRESSURE TUBE	9
				1		03-0802	FRP PRESSURE TUBE	8
					1	03-0801	FRP PRESSURE TUBE	7
						B24SP00	PRESSURE TUBE ASSY	6
						B20SP00	PRESSURE TUBE ASSY	5
						B16SP00	PRESSURE TUBE ASSY	4
						B12SP00	PRESSURE TUBE ASSY	3
						B08SP00	PRESSURE TUBE ASSY	2
						B04SP00	PRESSURE TUBE ASSY	1

PARTS LIST

COMPLETE END CAP ASSEMBLIES MAY BE PURCHASED AS FOLLOWS:

PART NO. 13-800, ASSY WITH PERMEATE PORT

PART NO. 33-800, ASSY WITH PERMEATE PLUG

Fluid Systems

TITLE: PRESSURE TUBE ASSY 8 IN. CLOSE-COUPLED STANDARD PRESSURE ELEMENTS FRP PRESSURE TUBE

DRAWING NO. 22-463 REVISION C

DESAL-3LP PERFORMANCE DATA

Specific ion rejections for Desal-3LP operating on Escondido Tap Water are tabulated below. In general, Desal-3LP Performance will be related to the feedwater composition and RO design and operating parameters. Some of the factors that influence performance will be discussed in Section 6.

Ion	Concentration, mg/l	% Rejection
Na^+	70.0	98.0
Ca^{+2}	57.0	99.5
Mg^{+2}	20.0	99.5
HCO_3^-	168.0	98.1
SO_4^{-2}	131.0	99.5
CL^-	49.0	98.8
SiO_2	12.4	98.0
TDS	518.0	98.7

---

*Determined at 200 psi and 25% recovery.

$$\text{Specific ion rejection} = 1 - \frac{\text{Concentration of ion in permeate}}{\text{Concentration of ion in feed}}$$

DESAL-3LP GENERAL SYSTEM DESIGN GUIDELINES

1. The minimum concentrate flow is determined by the crossflow velocity in the last element in a given vessel. For design purposes, the following criteria may be used to approximate minimum concentrate flow:

   a. Minimum CONCENTRATE to PERMEATE flow ratio in last element of the last stage: 6:1

   b. Minimum CONCENTRATE to PERMEATE flow ratio in last element of all other stages: 5:1

2. Recommended Vessel Arrays:

   2-stage systems . . . 4:2

   3-stage systems . . . 4:2:1

3. Recovery/Number of Stages:

   50% recovery . . . . 1 stage

   75% recovery . . . . 2 stages

   90% recovery . . . . 3 stages

4. Number of Elements Per Vessel: 1-6

5. Maximum Permeate Flow Per Element -- See flux rates at standard conditions in Section 4.

6. Maximum Pressure Drop Per Element: 12 psi (0.8 Bar)

7. Maximum Pressure Drop Per Vessel: 50 psi (3.4 Bar)

8.

Element Diameter	Maximum Feed Flow GPM	M^3/Hr
4 inch	20	4.54
8 inch	80	18.17

SECTION V

GENERAL DESCRIPTION -

GAS PROCESSING INDUSTRY AND SPECIFIC REFERENCES

FOR

THE MONUMENT PLANT

SECTION V
GENERAL DESCRIPTION
GAS PROCESSING INDUSTRY

Natural Gas Processing Plants extract liquid hydrocarbons from raw natural gas. Please refer to the block flow diagram which directly follows.

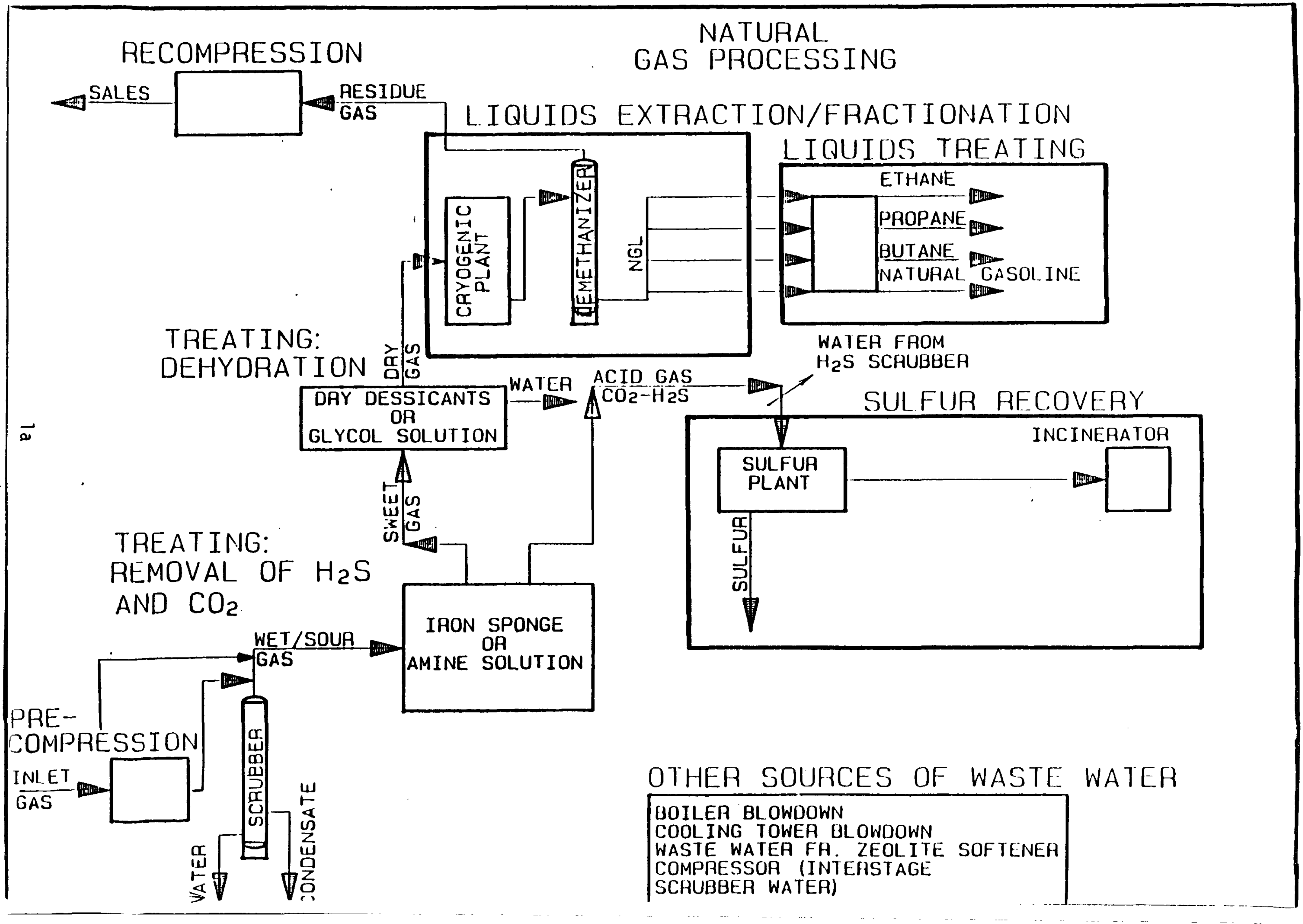
The liquid hydrocarbon components of natural gas are ethane (C_2), propane (C_3), butane (C_4), and natural gasoline (C_5+). The remaining gas, from which the liquids are extracted, is almost entirely methane (C_1).

Treating for the Removal of Hydrogen Sulfide and Carbon Dioxide

The raw natural gas, termed inlet gas, may contain varying amounts of impurities. The most common contaminants are water (H_2O), hydrogen sulfide (H_2S), and carbon dioxide (CO_2). The gas is compressed and then enters the first phase of natural gas processing, which is treatment to remove the impurities.

The term acid gas refers to the presence of H_2S and CO_2 in the raw natural gas. Sour gas has a high concentration of sulfur components. Sweet gas has small quantities of sulfur compounds, usually less than 0.25 grain of H_2S per 100 standard cubic feet of gas, and as such, bypasses iron sponge or amine treating.

The acid gas may be removed from the inlet gas stream by an absorption process where the incoming stream contacts a liquid that selectively reacts with and removes the acid gas. This liquid, mono- or diethanolamine is regenerated by heat, thereby driving off the gases. The resultant amine liquid then reacts with more acid gas in a continuing cycle of reaction, then regeneration. The gases released from the amine may then be combusted to SO_2 in a flare stack, or incinerator. If the acid gas exists in a large concentration, it will not be combusted, but will enter a sulfur recovery plant, which removes elemental sulfur from the stream. Any unoxidized H_2S, which occurs in small amounts, is


NATURAL
GAS PROCESSING
RECOMPRESSION
SALES
RESIDUE
GAS
LIQUIDS EXTRACTION/FRACTIONATION
LIQUIDS TREATING
CRYOGENIC PLANT
DEMETHANIZER
NGL
ETHANE
PROPANE
BUTANE
NATURAL GASOLINE
TREATING:
DEHYDRATION
DRY GAS
DRY DESSICANTS OR GLYCOL SOLUTION
WATER
ACID GAS
CO2-H2S
WATER FROM
H2S SCRUBBER
SULFUR RECOVERY
SULFUR PLANT
INCINERATOR
SULFUR
SWEET GAS
TREATING:
REMOVAL OF H2S
AND CO2
WET/SOUR
GAS
IRON SPONGE OR AMINE SOLUTION
PRE-
COMPRESSION
INLET
GAS
SCRUBBER
WATER
CONDENSATE
OTHER SOURCES OF WASTE WATER
BOILER BLOWDOWN
COOLING TOWER BLOWDOWN
WASTE WATER FR. ZEOLITE SOFTENER
COMPRESSOR (INTERSTAGE
SCRUBBER WATER)

Treating for the Removal of Hydrogen Sulfide and Carbon Dioxide

oxidized to SO_2 by the sulfur plant incinerator. This incinerator is located after the last sulfur plant catalytic bed. Also note that an H_2S scrubber may exist prior to the entry of the gas stream into the sulfur plant. This scrubber removes water from the gas.

Treating for the Removal of Water

The inlet gas, now minus the acid gas components, enters the next phase of gas processing. This is the removal of water from the gas.

The water may be removed by an absorption, or an adsorption process. Both processes may be used in tandem.

Triethylene glycol removes water from the gas by absorption. The glycol is then reconcentrated by removal of the water with heat. This is a continuous cycle. Either alone, or in conjunction with the glycol system, a molecular sieve dehydraytion system may exists. The molecular sieve is a dessicant which absorbs water from the gas is regenerated by heat to restore its absorptive capability.

Whether removed by glycol or molecular sieve, the water driven off during regeneration exists in the steam phase, then condenses through exchangers and leaves the process as a liquid.

Natural Gas Processing - Removal of Gas Liquids

The extraction of the gas liquids from the gas stream, which is now sweet and dry, is accomplished in several ways. Warren's New Mexico plants use the cryogenic method. Basically, the gas stream is cooled and the non-methane hydrocarbons are then condensed and recovered. In some instances, the liquids are also treated to remove water and/or acid gas components.

The Gas Processing Industry:

Its Function and Role in Energy Supplies

Gas Processors Association
1812 First Place
Tulsa, OK 74103

INTRODUCTION

The gas processing industry is a major segment of the oil and gas industry, distinct from either crude oil or natural gas production, separate from oil refining or gas distribution, yet indispensable to all. As a separate and identifiable function, it is probably the least known and least understood part of the petroleum industry.

In simple terms, the gas processing industry refines raw natural gas from the earth into saleable, useful energy forms for use in a wide variety of applications. Through the gas processing industry's plants flows approximately 60% of the nation's petroleum energy production, which emerges in the form of merchantable natural gas, liquefied petroleum gases, motor fuel components, and raw materials for a myriad of basic petrochemicals.

Natural gas occurs deep below the surface of the earth in two principal forms: associated gas and non-associated gas.

Associated gas is found in crude oil reservoirs, either dissolved in the crude oil, or in conjunction with crude oil deposits. It is produced from oil wells along with the crude. It separates, or is separated from, the oil at the casinghead of the well, which leads to the synonymous term "casinghead gas." It may also be called "oil-well gas" or "dissolved gas." In the industry's beginning, virtually all processed gas was from oil wells.

Non-associated gas occurs in reservoirs separate from crude oil. Its production is not incidental to the production of crude oil. It is commonly called "gas-well gas" or "dry gas." Today about 75% of all natural gas produced is non-associated gas.

In addition, the reservoirs of many oil fields found since 1935 produce neither true gases nor true liquids. The material might properly be called a "two-phase fluid." It is neither a gas because of its high density, nor a liquid because no surface boundary exists between gas and liquid. These reservoirs, called "gas condensate" reservoirs, are usually deeper with higher pressures, which pose special problems in production and processing.

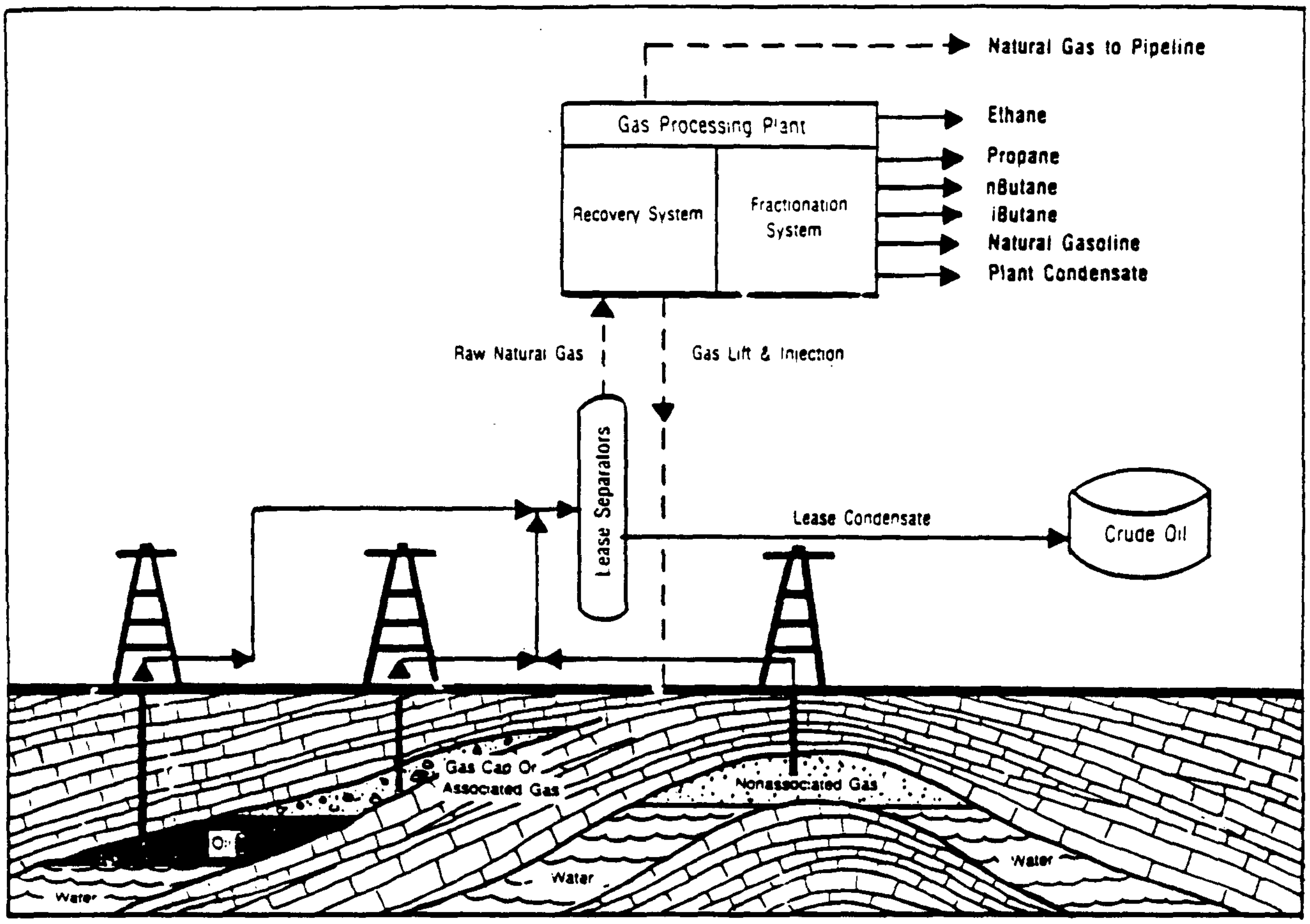
From whatever reservoir, natural gas as produced from the earth has widely varying composition, depending on the field, the formation, or the reservoir from which it is produced. The principal constituents of natural gas are methane and ethane, but most gases contain varying amounts of heavier components, such as propane, butane, pentane, and heavier hydrocarbons that may be removed by any of a number of processing methods.

The removal of individual hydrocarbons by processing is possible because of the differences in physical properties. Each component has a distinctive weight, boiling point, and other physical characteristics, making its separation from other components a relatively simple physical operation.

Gas processors describe gas as "rich" (wet), or "lean" (dry) depending on its content of heavy components. These are relative terms, but as used in the industry, a rich gas may contain five or six gallons or more of recoverable hydrocarbons per thousand cubic feet; a lean gas usually contains less than one gallon of recoverable liquids per thousand cubic feet.

Natural gas may also contain water, hydrogen sulfide, carbon dioxide, nitrogen, helium, or other components that may be diluents and/or contaminants. In any case, natural gas as produced rarely is suitable for pipe line transportation or commercial use. Natural gas in commercial distribution systems is composed almost entirely of methane and ethane, with moisture and other contaminants removed to very low concentrations.

Therefore, all natural gas is processed in some manner to remove unwanted



water vapor, solids and/or other contaminants that would interfere with pipe line transportation or marketing of the gas. In addition, and equally important, most natural gas is processed to separate from the gas those hydrocarbon liquids that have higher value as separate products.

These natural gas liquids (NGL's) are part of a family of saturated hydrocarbons called paraffins. Each compound has a chemical formula C_nH_{2n+2}. The principal natural gas liquids include:

Ethane: Exists as a liquid only under very high pressures (800 psi) or at extremely low temperatures (−135°F). It is recovered and transported in either the liquid or gaseous state principally for use as feedstock for ethylene, the most important basic petrochemical produced today.

Propane: Recovered and handled as a liquid at pressures over 200 pounds, or at temperatures below −44°F. Its principal uses are as feedstock for production of ethylene and propylene, and as LP-gas for heating fuel, engine fuel, and industrial fuel.

Butane: Recovered and handled as a liquid under moderate pressure. Its principal uses are to provide needed volatility to gasoline motor fuel; as domestic LP-gas fuel, either alone or in mixtures with propane; and as a feedstock for the manufacture of butadiene, a key ingredient of synthetic rubber.

Iso-butane: The chemical isomer of butane, it is fractionated and produced as a separate product principally for the manufacture of alkylate, a vital ingredient of high-octane motor gasoline.

Natural Gasoline: A mixture of pentanes and heavier hydrocarbons, with small amounts of butane and iso-butane. Industry specifications define its physical properties in terms of vapor pressure at 100°F (10 to 34 psi), and percentage evaporated at 140°F (25 to 85%). It is recovered as a liquid, principally for use as a motor fuel component.

If the gas contains hydrogen sulfide, a poisonous gas, it is removed and further processed for recovery of elemental sulfur. Most carbon dioxide is removed to prevent destructive corrosion and to inject into crude oil reservoirs for enhanced oil recovery (EOR). Some helium is extracted for its unique properties as an inert gas.

In addition, gas processing performs vital functions, both economically and technically, in the recovery of crude oil through reservoir pressure maintenance, miscible floods, and other secondary recovery methods. Many of these projects would not be economically possible except for the revenues generated by extraction and sale of natural gas liquids.

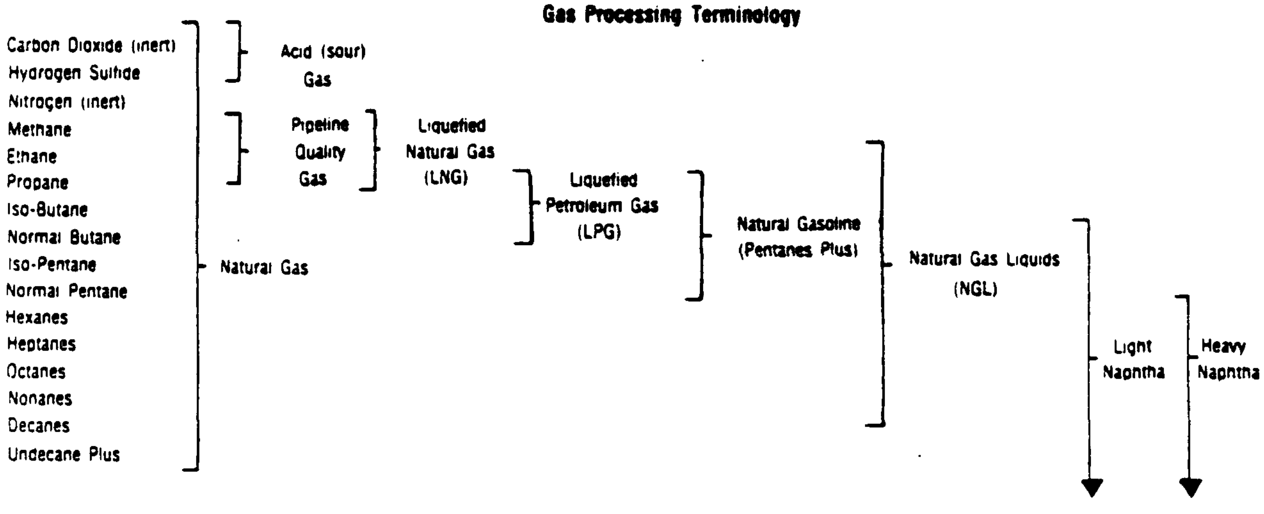
PROCESSING AND MANUFACTURE

Natural gas processing involves two basic operations: (1) extraction of the natural gas liquids from the gas stream: and (2) fractionation of the natural gas liquids into their separate components. Additional processing is usually required to treat and condition both the natural gas and the gas liquids.

Natural gas processing may be as simple as drying the gas by passing it through a fixed bed of a desiccant material, or it may be as complex as complete liquefaction of the total gas stream by cooling to extremely low temperatures. Extraction of heavier gas liquids (pentane and heavier) can be achieved by simple compression and moderate cooling of the natural gas stream.

However, the modern gas processing industry uses a variety of sophisticated processes to treat natural gas and extract natural gas liquids from the gas stream. The two most important extraction processes are the absorption and cryogenic expander processes. Together, these processes account for an estimated 90% of total natural gas liquids production.

Gas Processing Terminology



ABSORPTION PROCESS

The basic step in the absorption process is removal of NGL components from the natural gas by contact with an absorbing oil. Liquid recovery is enhanced by refrigerating the absorption oil. Recovery levels may also be increased by lowering the molecular weight of the absorption oil. Depending on operating conditions, approximately 85% of the propane and essentially all of the heavier natural gas liquids are absorbed in the oil. The lighter fractions – methane, ethane, and some of the propane – are not recovered in the absorbing oil and pass through the absorber tower as merchantable pipeline quality natural gas.

The bottoms effluent from the absorption tower consists of rich absorption oil mixed with absorbed propane, butanes, pentanes, and other heavier natural gas liquids. This stream is then fed to lean oil stills where the absorbed liquids are distilled from the absorber oil by heating the mixture to a temperature above the boiling point of the natural gas liquids, but below that of the absorber oil. The stripped absorber oil is then recirculated to the absorption tower, and the mixed stream of natural gas liquids is piped to the fractionation system for further separation into individual NGL components.

The fractionation system may be an integral part of the gas processing plant, or it may be a "central fractionator" many miles from the primary production. A central fractionator may receive mixed streams of natural gas liquids from many plants.

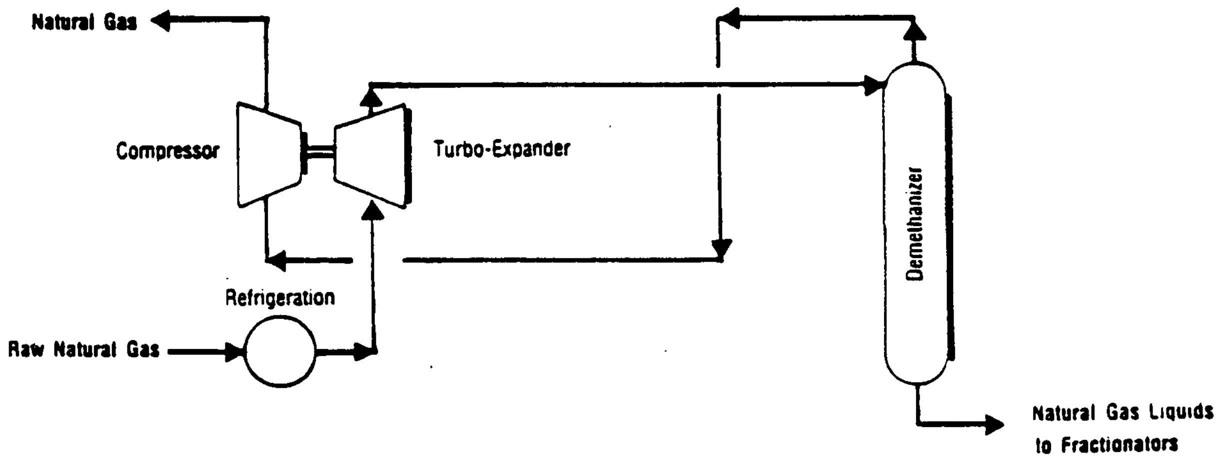
TURBO EXPANDER PROCESS

In recent years, ethane has become increasingly desirable as a petrochemical feedstock. This has resulted in the construction of many plants that recover ethane and heavier hydrocarbons from natural gas at temperatures ranging down to minus 150°F.

Combinations of external refrigeration and liquid flash-expansion refrigeration with gas turbo expansion cycles are employed to attain the low temperatures desired for high ethane recovery.

In the turbo-expander process, the absorber and still facilities are replaced by an expansion turbine, which accomplishes the separation of gas liquids from the natural gas stream by auto-refrigeration to extremely low temperatures.

Simplified Flow Diagram Absorption-Fractionation



Recoveries of 90-95% ethane and all of the heavier hydrocarbons have been achieved with the expander process. The mixed liquid product from the expander plant is then fractionated or may be delivered by pipeline to a central fractionation facility for fractionation into separate NGL components.

FRACTIONATION

Fractionation of a mixed NGL stream into separate components is accomplished by controlling the temperature of the stream in a fractionator to take advantage of the difference in boiling points of separate products. Fractionators are usually named for the overhead or top product. Therefore, a deethanizer implies that the top product is ethane; a depropanizer indicates that the top product is propane, etc. Natural gas liquids are normally fractionated by boiling the lighter products from the heavier products in the following order:

Deethanizer: The first step in the fractionating sequence is to separate the ethane and propane, with the ethane going overhead and the propane and heavier components passing from the bottom of the fractionator.

Depropanizer: The next step in the processing sequence is to separate the propane and the isobutane, with the propane going overhead and the isobutane and heavier components passing from the bottom of the depropanizer.

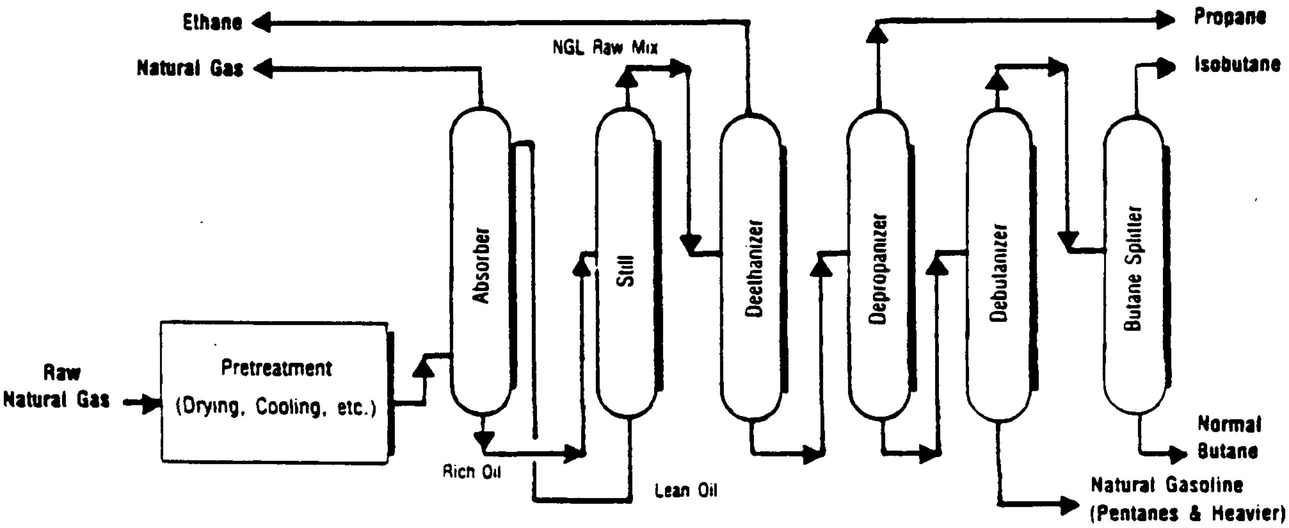
Debutanizer: The next fractionation step is separation of the butanes from the pentanes plus stream. The butanes (both iso and normal) pass overhead and the pentanes plus pass from the bottom of the fractionator.

Butane Splitter or Deisobutanizer: When it is desirable to do so, the butanes which pass overhead from the debutanizer may be separated into iso and normal butanes. The isobutane goes overhead and the normal butane is drawn from the bottom of the tower.

OTHER ROUTINE GAS PROCESSING

As noted earlier, both natural gas and natural gas liquids may require additional treating or processing, either before or after extraction of liquids.

Simplified Flow Diagram Absorption—Fractionation



The most common treatment of natural gas is removal of excess water vapor. which is necessary to prevent formation of hydrates and freezing in pipeline transmission systems. Techniques for dehydrating natural gas include:

-Absorption using liquid desiccants. usually a glycol compound

-Adsorption. using solid desiccants such as silica gel. activated alumina. or molecular sieves

-Dew point depression by injection of anti-freeze compounds such as glycols or alcohols

-Expansion refrigeration which cools the gas stream below the dew point of entrained water vapor.

Removal of excess moisture from some natural gas liquids. principally propane. is also necessary and is accomplished most often with solid desiccants or molecular sieves.

Additional treatment of both natural gas and natural gas liquids is usually required to remove hydrogen sulfide and carbon dioxide. This process in the industry is called "sweetening." Many process methods are used. most of which rely on either chemical reactions. physical solution. or adsorption. Each process has unique advantages. depending on the concentration of hydrogen sulfide. carbon dioxide. and other conditions.

The most common chemical processes are based on contact with amine solutions. These solutions react with unwanted acid gas constituents to form other compounds which can then be removed.

Physical solvent processes include a number of patented chemicals and processing schemes which function much the same as the oil absorption process for removal of liquids from gas.

Adsorption processes involve the removal of unwanted components by passing the gas or liquid through a bed of solid material that has been designed or treated to selectively extract carbon dioxide. hydrogen sulfide. or other contaminants.

SULFUR RECOVERY

The sour gas effluent from a sweetening unit must be further treated. either for disposal or for recovery of sulfur contained in the gas. At plants where hydrogen sulfide concentrations are very low. it is not economical to install sulfur recovery facilities. In these cases. the sour gas is disposed of by incineration.

At higher concentrations. the sour gas is usually processed in a sulfur recovery facility to recover elemental sulfur. The Claus process is the most widely used process for converting hydrogen sulfide into elemental sulfur. The process utilizes thermal and catalytic reactions to achieve conversion of up to 97% of hydrogen sulfide to elemental sulfur. "Tail gas clean up" processes reduce sulfur emissions significantly and boost overall efficiency of sulfur recovery to 98+%.

OTHER SPECIALIZED GAS PROCESSING

Depending on gas composition and other factors. the gas processing function may also include additional processing such as:

- Carbon dioxide removal and transport for enhanced oil recovery
- Helium recovery for commercial sale
- Nitrogen removal to increase heating value of the gas
- Liquefaction of the total gas stream to produce liquefied natural gas.

All of these process functions require specialized processes and additional investment.

PROFILE OF THE U.S. GAS PROCESSING INDUSTRY

PROCESSING PLANTS

There are approximately 859 gas processing plants in the United States, most of which are located in five states: Texas, Louisiana, Oklahoma, Kansas, and New Mexico. These five states account for about 86% of total U.S. gas processing capacity, gas processed, and natural gas liquids production.

Plant sizes range from less than 1 million cubic feet per day up to more than 2.5 billion cubic feet per day. The 200 smallest plants (about 25% of total) are less than 10 million cubic feet per day capacity, and account for only about 1% of total industry capacity.

The 200 largest plants (25% of total) have capacities greater than 80 million cubic feet per day and account for nearly 80% of total industry capacity. Approximately 92% of total gas capacity is in 375 plants (44% of total) with capacities greater than 35 million cubic feet per day. Production of natural gas liquids averages less than 2,000 barrels per day per plant, with maximum production ranging up to 25,000 barrels per day in the largest plants.

Approximately 100 of the 859 U.S. gas processing plants include sulfur recovery facilities, with a total capacity of about 4,500 tons per day of elemental sulfur. Sulfur production from gas plants accounts for about 13% of total U.S. sulfur production.

In addition, there are approximately 20 central fractionating plants operating in the United States. These fractionators may handle the mixed natural gas liquids production of a single separation facility, or may process mixed streams from many plants, some of which may be located hundreds of miles away. These fractionators separate these raw mixed NGL streams from recovery facilities into saleable products such as ethane, propane, butane, or specified mixtures, according to the user's needs.

COMPANIES

The U.S. gas processing industry is composed of an estimated 300 companies, ranging in size from the largest integrated oil companies to the single plant owner-operator.

The 20 largest gas processing companies produce about 70% of total U.S. production of natural gas liquids.

U.S. GAS PROCESSING PLANTS

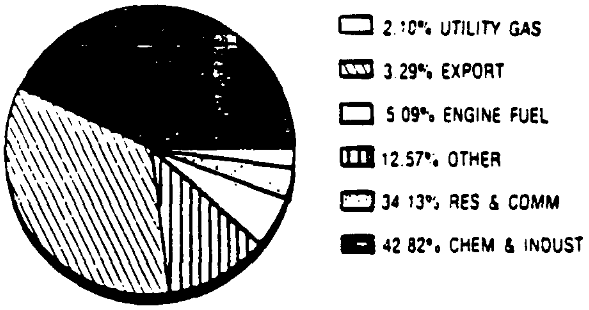
State	No. Plants	Gas Capacity, mmcfd	Gas throughput, mmcfd	NGL Products, m B/D
Texas	411	25,090	13,380	618
Louisiana	100	22,601	14,070	333
Oklahoma	103	4,765	3,110	145
Kansas	23	4,894	2,648	45
New Mexico	41	3,626	2,211	96
	678	60,976	35,419	1,237
Other	181	9,508	5,738	218
U.S. Total	859	70,484	41,157	1,455

NATURAL GAS LIQUIDS SUPPLY/DEMAND

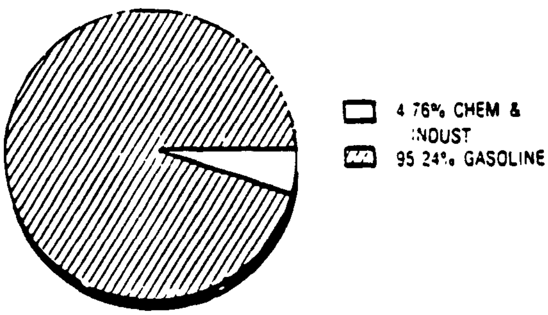
U.S. gas plant production of natural gas liquids totals some 570 million barrels per year, or approximately 1.5 million barrels per day. The distribution of this production during 1984 is as follows:

Ethane	28.7%
Propane	34.2%
Normal and Iso-Butane	19.6%
Pentanes plus, including plant condensate	17.5%

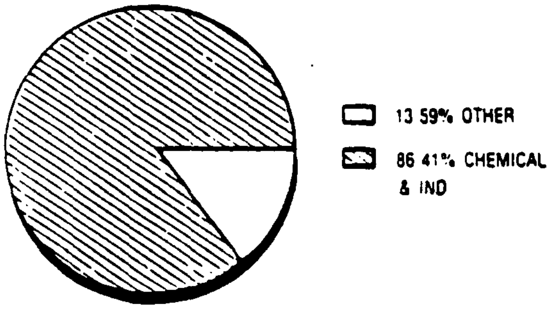
PROPANE CONSUMPTION



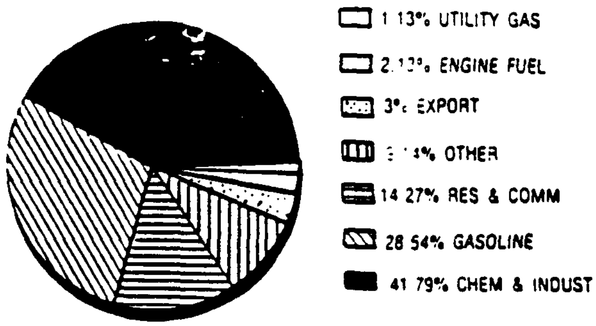
PENTANES + CONSUMPTION



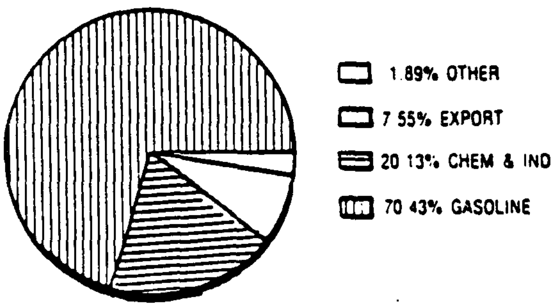
ETHANE CONSUMPTION



NGL CONSUMPTION



BUTANE CONSUMPTION



PHYSICAL PROPERTIES OF NATURAL GAS LIQUIDS COMPONENTS

Component	Vapor Pressure psia @ 100 F.	Boiling Point @ 14.7 psia	Specific Gravity 60 F./60 F.
Methane	(5,000)	−259	0.3
Ethane	(800)	−127	0.356
Propane	190	−43.7	0.508
n-Butane	51.6	31.1	0.584
i-Butane	72.2	10.9	0.536
n-Pentane	15.6	96.9	0.631
i-Pentane	20.4	82.1	0.625
Hexane	5.0	155.7	0.664
Heptane	1.6	209.2	0.688

In addition, field facilities handling natural gas prior to delivery into a gas processing plant produce an estimated 350 thousand barrels per day of lease condensate, which is usually transported to refineries along with crude oil.

Total U.S. supply of natural gas liquids is augmented by refinery production and imports.

Refineries produce and market about 120 million barrels per year, or about 325 thousand barrels per day, of natural gas liquids, mainly propane. Refinery yields of natural gas liquids amount to 2-3% of total crude oil charged to the refinery.

Total imports of natural gas liquids are approximately 70 million barrels per year, or roughly 200 thousand barrels per day. About 80% of these imports are from Canada.

Approximately 80% of total U.S. natural gas liquids production is consumed in three major uses: petrochemical feedstocks; motor gasoline manufacture; and residential and commercial heating fuels. The remainder is used in a wide variety of applications, including engine fuels, industrial fuels, utility peak shaving, crop drying, and other agricultural and process fuel applications.

TRANSPORTATION AND STORAGE

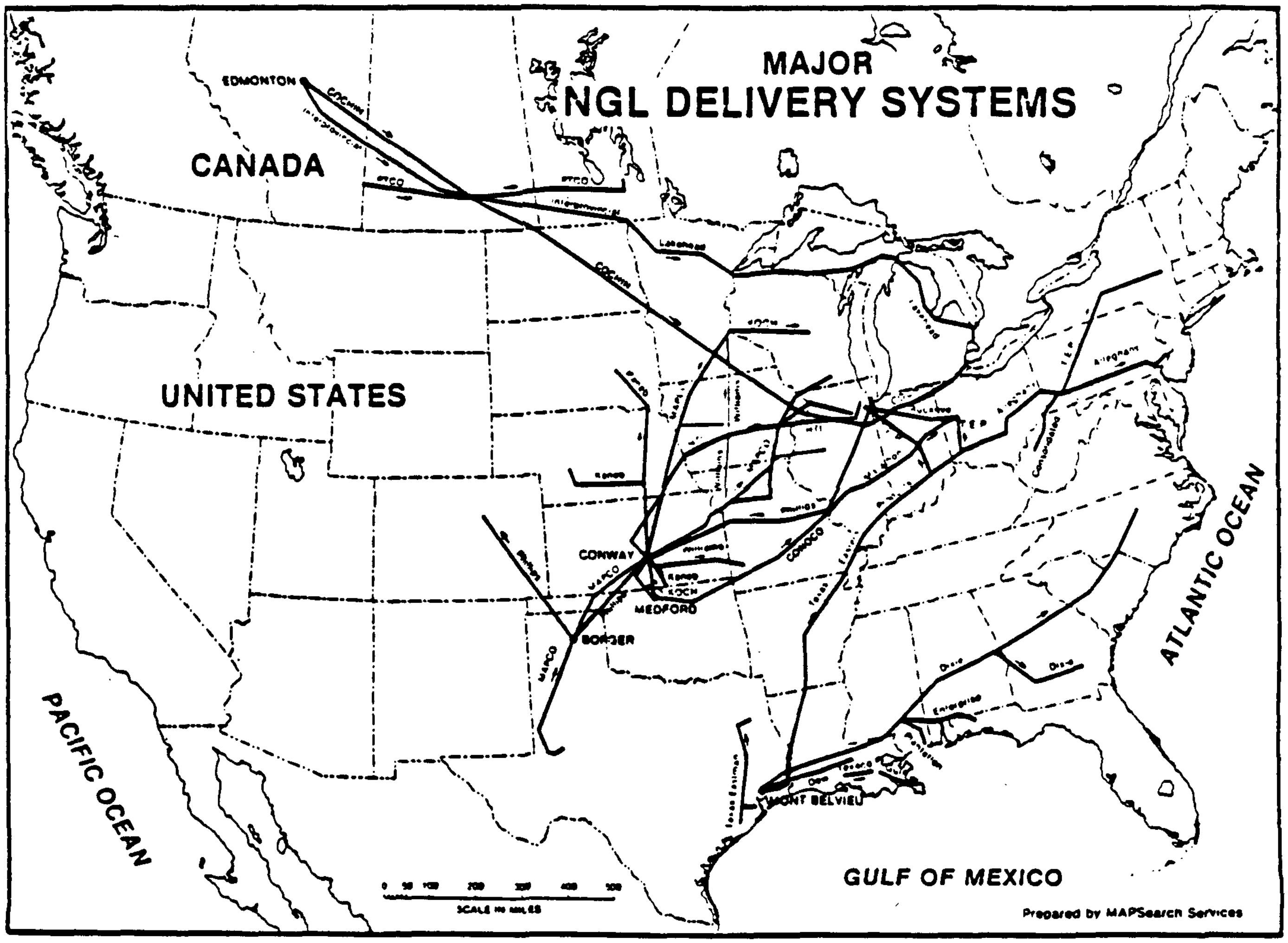
A national network of some 70 thousand miles of high pressure pipelines transport unfractionated NGL streams from production areas to fractionating centers and then transport finished products to major markets.

Four major pipelines extend from the West Texas-New Mexico fields to the major terminal and fractionation center of the U.S. – Mont Belvieu, Texas, located near the petrochemical and refining center of the nation. Other pipeline systems deliver West Texas-New Mexico natural gas liquids to a second major terminal, storage, and fractionation point in central Kansas.

From Mont Belvieu, two major pipeline systems deliver LP-gas fuels to the northeastern and southeastern United States.

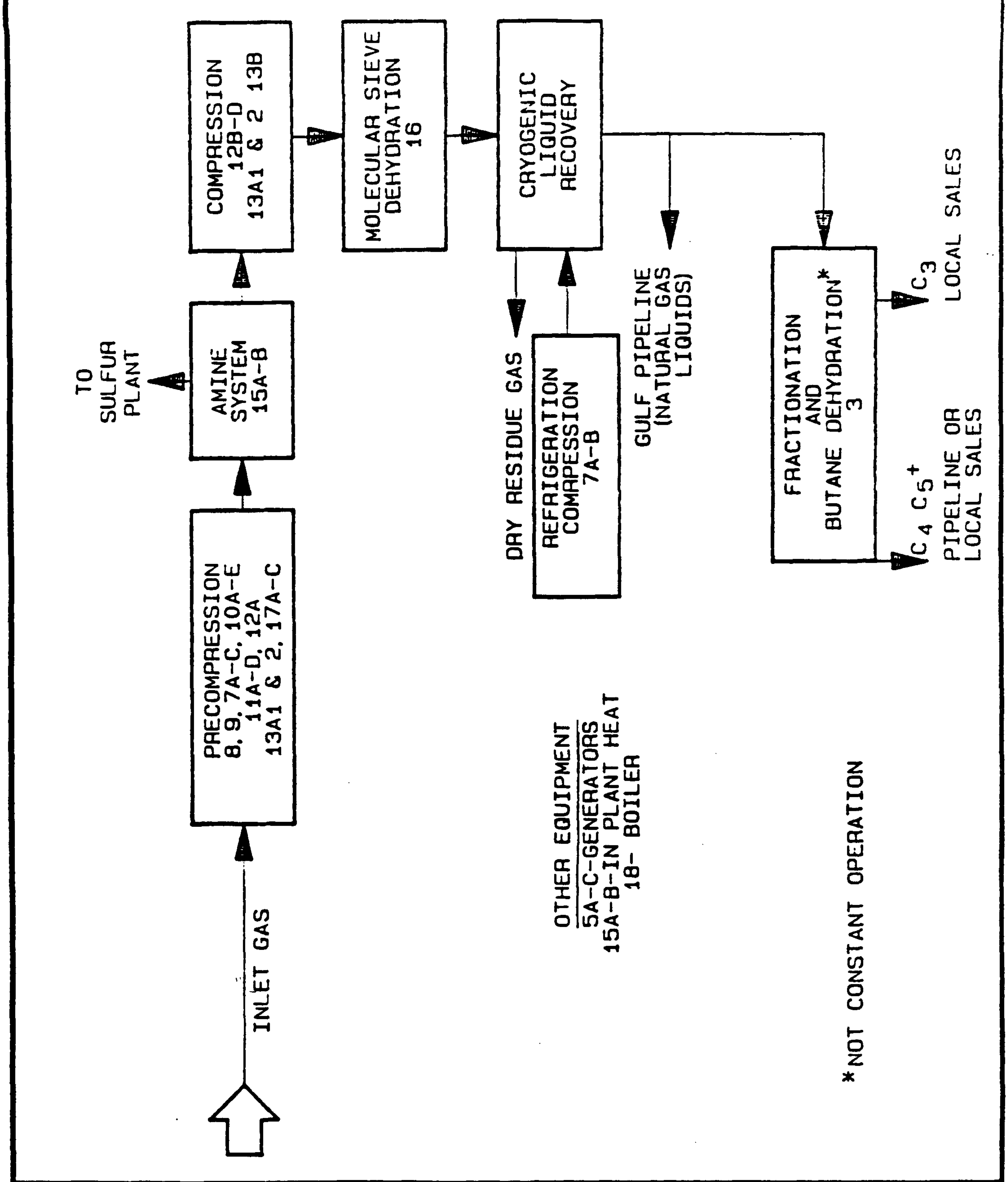
Several pipeline systems extend from central Kansas storage and fractionating facilities into west and upper midwest markets.

Total natural gas liquids production is relatively constant throughout the year. However, depending on weather and other factors, demand may vary considerably. Therefore the industry has installed and operates underground storage facilities totaling nearly half a billion barrels capacity. The bulk of this capacity is located near the refining and petrochemical complexes of the Texas and Louisiana Gulf Coasts, with a second major installation in the midcontinent hub of central Kansas.



NATURAL GAS PROCESSING FOR THE MONUMENT PLANT

The following diagram outlines gas processing for the Monument Plant. The numbers present for each process represent Warren identifiable unit numbers for individual compressors or heaters needed to complete each phase of the process.



NO.	REVISION	BY	DATE	CHK	APPR	ISSUE CONST. DATE	ISSUE CONST. BY

NO. OF UNITS REQUIRED THUS | NO-AFE NO.

WARREN PETROLEUM COMPANY

PROCESS FLOW DIAGRAM

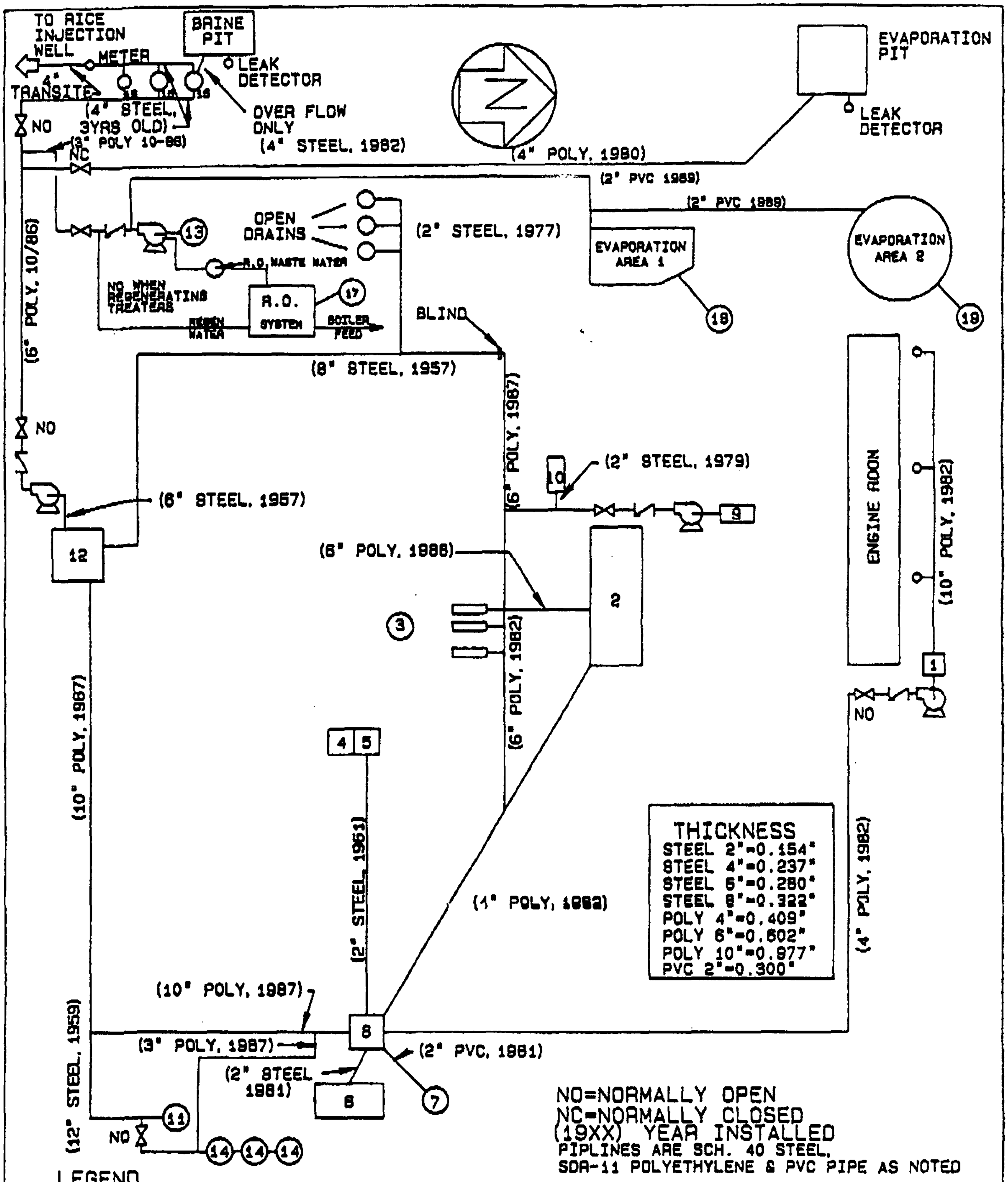
PTL. 118 MONUMENT N.M.

DRAWN LP	DATE 2-11-85	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPR.	DATE	118-2000

NATURAL GAS PROCESSING FOR THE MONUMENT PLANT

The generalized block flow diagram presented at the beginning of this section lists sources of wastewater that are in association with gas processing. These discharges, along with inlet gas scrubber (process) water, are the major sources for disposal for gas processing plants.

The Wastewater System Disposal diagram for the Monument Plant directly follows. This diagram also shows the final disposition of the water. This is reiterated on the summary pages presented at the end of this section.



NO=NORMALLY OPEN
NC=NORMALLY CLOSED
(19XX) YEAR INSTALLED
PIPLINES ARE SCH. 40 STEEL, SDR-11 POLYETHYLENE & PVC PIPE AS NOTED

LEGEND
1-NORTH ENGINE ROOM SUMP
2-COOLING TOWER
3-CONDENSORS
4-BOILER
5-BOILER
6-BOILER
7-H_2S SCRUBBER
8-EAST SUMP
9-SOUTH ENGINE ROOM SUMP
10-CONDENSORS
11-CONDENSATE TANK
12-SOUTH MAIN SUMP
13-ZEOLITE H_2O TREATER
14-SHELL TANKS (3)
15-WASTE WATER STORAGE (2)
16-WASTE WATER OIL SKIMMER
17-REVERSE OSMOSIS SYSTEM
18-EVAPORATION 1
19-EVAPORATION 2

Revised Per Field 7/89
Revised Per Field 4/88

NO. OF UNITS REQUIRED THUS				WO-AFE NO.
WARREN PETROLEUM COMPANY A DIVISION OF CHEVRON U.S.A.				
WASTE WATER SYSTEM LAYOUT				
PLANT 118 MONUMENT				LEA, COUNTY, NM.
DRAWN	HPK	DATE 10/11/85	SCALE	NONE
CHECKED	LLJ	DATE 10/11/85	DRAWING NO.	
APPR.	PDA	DATE 10/11/85		118-1001-1

SUMP/PUMP INFORMATION FOR THE MONUMENT PLANT

The capacity of each sump is as follows:

North Engine Room Sump 7,200 gallons.
South Engine Room Sump 10,200 gallons.
East Sump 13,400 gallons.
Main Sump 11,300 gallons.

The capacity of the sump into which all effluent flows is 21,840 gallons stored in three tanks. Any overflow would go to the brine pit. The effluent in the tanks is then sent to the Rice Engineering well by gravity feed. There is no pump on the discharge line to Rice Engineering. The sump capacities upstream of the three tanks are listed above. We do not have pump curves for the two pumps that deliver effluent to the three tanks.

SUMMARY OF WASTE WATER DISCHARGE
MONUMENT PLANT

Inlet Scrubber Water ——>	|	<—— Interstage Scrubber Water First, Second and Third
Wash Water - Engine Room ——>	|	<—— H_2S Scrubber Water
Dehydration Water ——>	|	<—— Boiler Blowdown Water
General Plant Runoff ——>	|	
Cooling Tower Blowdown ——>	|	<—— Brine Water from Zeolite Softner
	|	——> Evaporation Pit/Brine Pond Emergency Use Only
	↓	

RICE INJECTION WELL

Note:

In the event of any emergency shutdown of the Rice Injection Well, waste water would be sent to the evaporation pond for 30 days. If Rice Engineering did not resume injection, the water would be hauled from the plant by vacuum truck and delivered to an alternate, state approved well.

Reverse Osmosis reject water ——> Agricultural Evaporation Area

Accidental Spill: Procedures in the Spill Control and Countermeasure Plan would would take effect.

CLIMAX CHEMICAL COMPANY

Monument, New Mexico
(505) 393-7143

John C. Good
Environmental Specialist
Computer Services

Mailing Address:
PO Box 2548
Hobbs, NM 88240

February 15, 1991

Bruce Swanton
Hazardous and Radioactive Waste Program
NM Environmental Improvement Division
1190 St. Francis Dr
Santa Fe, NM 87503

Bruce:

Enclosed please find "Petition for Alternate Concentration Limits". The document was prepared utilizing the EPA's "Alternate Concentration Limit Guidance Document". This EPA publication is the guideline for enforcement personnel to use when evaluating ACL petitions. I followed the guidelines as much as possible, however, certain specifics of the Climax situation make portions of the Guidance document either irrelavent or impossible to meet at this time. The Guidance document is not really aimed at a situation where ACL's are requested on the basis of contaminated water downgradient from the point of compliance, but rather it is aimed at a situation where contaminants are above MCL's at the point of compliance but will attenuate to below health risk levels at the Point of Exposure. This situation is hard to match to Climax's situation.

The document submitted is prepared as fully as can be prepared at this time with the available data. As stated in the Petition, more data will be gathered as regards plume extent, hydrology, and soil contamination during the Closure process and the boundary well installation and monitoring.

John Good, Env. Specialist
Climax Chemical Company

CLIMAX CHEMICAL COMPANY

Monument, New Mexico

EPA ID NO. NMD 990753931

CHEMICAL MANUFACTURING FACILITY

NEW MEXICO
HAZARDOUS WASTE MANAGEMENT REGULATIONS

HAZARDOUS WASTE FACILITY
PETITION FOR
ALTERNATE CONCENTRATION LIMITS

DATE: February 15, 1991

TABLE OF CONTENTS

I. INTRODUCTION

This petition for "Alternate Concentration Limits" has been prepared in accordance with the requirements of the United States Environmental Protection Agency as contained in 40 CFR 264.94 which provide the standards by which "alternate concentration limits" for ground water contamination for permitted RCRA facilities may be granted by the USEPA Regional Administrator or his designee.

A. General Description of Facility

Climax Chemical Company's Monument, New Mexico plant is located 3 miles west of Monument, New Mexico in Lea County. The street address is:

Climax Chemical Company
Highway 322 West
Monument, New Mexico 88265

The mailing address is:

Climax Chemical Company
PO Box 2548
Hobbs, New Mexico 88240

Climax Chemical's property consists of all of Section 35, T.19S, R.36E (except for a small portion of the NE corner of the section), and the south 1/2 of the north 1/2 of the SW Quarter Section of Section 36, T.19S, R.36E (a 660' X 2640' strip extending east from the plant entrance). See Figure 1.

The plant is a producer of hydrochloric acid and sodium sulfate. The sulfuric acid plant is not in operation at this time.

The contact for hazardous waste activities at Climax Chemical Company is:

John C. Good
Environmental Specialist
(505) 393-7143

Land Uses: Other industries lie southeast of the facility, but in excess of 1000 feet beyond the facility boundaries, except for a brine pond. The rest of the surrounding area is undeveloped with oil wells scattered (approximately one every 40 acres) through the region.

Hazardous Waste Management Facility Boundary: The hazardous waste management facility consists of three surface impoundments and all contiguous land, and structures, other appurtenances, and improvements on the land, used for treating, storing or disposing of "hazardous waste".

Injection and Withdrawal Wells: Climax's property has one injection well (see Figure 1). Oil and gas producing wells are located on each 40 acre tract within the property. These wells essentially produce from zones below 4000 feet.

Surface Waters: There are no springs, other surface water bodies, or drinking wells listed in the public records or otherwise known to the applicant within 1/4 mile of the facility property boundary. Substantial investigation by an independent hydrologist, T.E. Kelly, Geohydrology Associates, Inc. of Albuquerque, New Mexico, has been conducted in this regard.

General: Access to Climax Chemical Company's Monument plant can be obtained from U.S. Highway 62 west of Hobbs, New Mexico, by turning south on State Highway 8 to Monument (about 5 miles), then west on State Highway 322 for about 3 miles. After a left and then righthand curve in the highway, Climax's entrance is the first road to the right.

B. Topographic Maps

Photographically enlarged (to a 1"=200' scale) U.S. Geological Survey maps with a 5-foot contour interval were previously submitted to NMEID and USEPA with Climax's Closure Plan (12/30/90). Surveyed points on these maps include monitoring wells, property boundaries, buildings, plant structures, surface impoundments, and the active surface drainage pond. In addition computer generated contours of the area have been produced utilizing all surveyed locations and elevations, and were previously submitted with the Closure Plan.

In summary, the topography of the area slopes from the northwest to the southeast with a 60 ft drop in elevation over the distance between RCRA well #1-3 and RCRA well #10-10, approximately 8600 feet.

C. Point Of Compliance, Point Of Exposure (POC, POE)

The site specific POC as regards Climax's Heavy Metals/Volatile Organics contaminant plume would be along Climax's south-easterly property boundaries.

The POE, defined in the ACL Guidance document as "the point at which it is assumed a potential receptor can

#5-3	Reaction products, Cadmium, Silver, and Trichloroethene are present in this well.
#10-10	Reaction products, Cadmium and Silver are present in this well. No Volatile Organics have been detected in this well
#12-9	Reaction products, Cadmium, and Silver are present in this well. No Volatile Organics have been detected.

Well #1-3, a true upgradient well located in the northwest corner of Climax's property was sampled during the last two quarters of 1990. No hazardous constituents were detected in this well.

B. Spatial Characterization of Hazardous Constituents

Figures 2 and 3 are computer generated contours of the known Silver and Cadmium contamination. Data from Wells 4-3, 5-3, 10-10, and 12-9 were used to generate these contours. Contours for Trichloroethene and 1,2-Dichloroethane are not possible at this time, as only one well is showing the presence of either of the constituents, and a minimum of three are necessary to generate a contour of any value.

Due to the fact that the aquifer beneath Climax's property was in fact created by the disposal of effluent in the surface impoundments, it will be assumed that the vertical extent of the contaminant plumes is the entire thickness of the aquifer (5-7 feet) in the vicinity of the affected monitoring wells.

C. Physical and Chemical Characteristics of the Waste in the Regulated Unit

The low pH effluent previously disposed of in the surface impoundments was an acidic discharge from the hydrochloric acid plant quench system.

Disposal of the waste, which was diluted with plant effluent, was accomplished in three surface impoundment treatment ponds. At the end of 1984, Climax started manual addition of lime to neutralize the low pH effluent being discharged from its facility. In March 1986, Climax completed a continuous automatic elementary neutralization unit (ENU), utilizing a lime slurry to continuously neutralize the low pH effluent. Thus, effluent going to the impoundments was neutralized for almost two years, with continuous pH control from the ENU for over seven months. Effluent discharge to the

Climax's facility. This modeling utilized the HCl surface impoundments as the source of contamination and Sulfate as the indicator contaminant. This study has been previously submitted to both NMEID and USEPA. Details of the parameters of the study and the relevant assumptions as to aquifer and solute characterization can be obtained by cross-referencing this document. The pertinent conclusion of the computer modeling is contained in item 8, page 32 of the report; "- - - , the rate of movement of the waste plume varies with the hydrologic parameters, including the gradient and transmissivity. In general, the movement is toward the east and south, which also is the region where water in the alluvium has been contaminated by oil-field brines. However, if it is assumed that there is no ground water loss by evapotranspiration, the average horizontal movement of the 1000 mg/l iso-sulfate contour is about 22 feet per year."

Further investigation of the groundwater velocity will be conducted during the installation of boundary monitoring wells as contained in the Summary and Conclusion section of this ACL Petition.

V. PATTERNS OF RAINFALL

Southeast New Mexico is a semi-arid climate with average annual precipitation of 12-15 inches. The average evaporation rate exceeds the average annual precipitation. Rain storms in late Spring and early Summer with daily precipitation amounts of 2"-3" occur occasionally and would be considered 5-10 year storms.

VI. PROXIMITY OF SURFACE WATER AND GROUND WATER USERS

There are no surface water bodies in the vicinity of Climax's facilities.

Figure 4 is a scale drawing of Townships 19S, 20S; Ranges 35E-38E. All domestic, municipal, and stock wells listed by the NM State Engineer's Office are located on this drawing. Figures 4A through 4AA are expanded views of each quadrant of each Township and Range. Table 1 is a photocopy of the water well inventory obtained from the State Engineer's office listing all of the plotted wells. This list also includes Chloride and Specific Conductance levels for these wells and the dates analysis was made.

VII. CURRENT AND FUTURE USES OF GROUND WATER AND SURFACE WATER IN THE AREA

Due to prior brine contamination by the petroleum industry, also indicates that as of August 6, 1990, all four wells continued to show the presence of significant amounts of condensate. A search of the records regarding this on-going recovery operation at Warren Petroleum revealed no indication as to the downgradient extent of this hydrocarbon contamination. Figure 13 is a computer generated contour utilizing the inches of condensate reported to be on top of the groundwater in the August 6, 1990 letter from the Warren Petroleum General Manager to Dave Boyer, NM OCC, as the "Z" value.

IX. POTENTIAL HEALTH RISKS

Due to the general brackish nature of the groundwater downgradient from Climax Chemical, and due to the extreme hydrocarbon contamination of the aquifer in the immediate downgradient area of the aquifer, Climax does not feel that any health risks are posed by the presence of Cadmium, Silver, TCE, and Ethylene Dichloride in the concentrations determined to be present.

X. POTENTIAL DAMAGE TO WILDLIFE, VEGETATION, AGRICULTURE, AND PHYSICAL STRUCTURES

No damage to wildlife, vegetation, agriculture, or physical structures will result from the allowance of the four contaminant constituents noted in the aquifer beneath Climax to remain in the aquifer. The hydrocarbon contamination noted under Warren Petroleum will render the aquifer unusable as it moves downgradient. Climax's contaminant plume will follow the hydrocarbon plume. It is our understanding that a total bioremediation of the hydrocarbon plume and affected subsurface strata is not contemplated at this time, thus all areas of the aquifer that the hydrocarbon plume enters during its downgradient migration will become basically unusable due to adsorption of the condensate material to the aquifer matrix material. It is assumed that total bioremediation of the hydrocarbon contamination is not contemplated due to the already unusable nature of the downgradient aquifer due to brine contamination.

Basically, the water downgradient from Climax Chemical has been contaminated beyond usability by the petroleum industry through brine disposal and hydrocarbon leakage. The addition of Heavy Metal and Volatile Organic contamination at just above MCL's as the Climax plume moves through this area will not adversely affect the usability of the aquifer, since it is already unusable without the effect of Climax's constituents.

XI. PERSISTENCE AND PERMANENCE OF POTENTIAL ADVERSE EFFECTS

Due to the low contamination level of the constituents noted in Climax's contamination plume as compared to the quality of groundwater immediately downgradient from Climax, the persistence of the Climax contributed constituents will not be relative to the overall persistence of contamination within the aquifer downgradient from Climax. In discussing this matter with an official of the NM Oil Conservation Commission, it was stated that the aquifer downgradient from Climax Chemical and Warren Petroleum is considered by NM OCC and the NM State Engineer's Office to be basically unusable for the next 10,000 years. (Certainly an insupportable statement to make, but made nonetheless.)

XII. SUMMARY AND CONCLUSIONS

The aquifer immediately downgradient from Climax's RCRA monitoring wells which show the presence of Appendix IX constituents (4-3, 12-9, 10-10, and 5-3) is highly contaminated with hydrocarbons in the vicinity of Warren Petroleum Company, and oil-field brine contamination as indicated by Chloride levels as high as 2500 mg/l and TDS levels as high as 6000 mg/l in a area downgradient from Climax's facility approximately 1-1½ miles. Although New Mexico Water Quality Regulations consider any water with a TDS level less than 10,000 mg/l as a recoverable resource, the presence of the hydrocarbon plume from Warren Petroleum's underground leakage makes remediation of the high Chloride and TDS groundwater downgradient from Warren Petroleum an unlikely prospect.

Climax Chemical feels that it is apparent from the evidence submitted that remediation of the groundwater at the downgradient boundaries of Climax's property, or remediation of groundwater at the limits of an as-yet undefined off-site plume extending into Warren Petroleum's property will have no beneficial effect on the future usability of the groundwater downgradient from Climax.

Climax Chemical Company requests that Alternate Concentration Limits equal to 10 times (10X) the MCL's for the <u>four identified Appendix IX constituents</u> be granted for the groundwater present at the downgradient extent of Climax's property. Climax proposes to meet the following conditions upon granting of ACL's:

1. Eight monitoring wells will be installed along Climax's downgradient property line at 600 foot intervals as shown on Figure 14. In addition, Monitoring Wells 4-D and 4-E, as indicated on Figures 1 and 14, shall be installed immediately downgradient from the HCl surface impoundments.

2. Installation of the monitoring wells shall be as in

Replaces following page · Submitted by CCC in Climax's contamination plume as compared to the quality of groundwater immediately downgradient from Climax, the persistence of the Climax contributed constituents will not be relative to the overall persistence of contamination within the aquifer downgradient from Climax. In discussing this matter with an official of the NM Oil Conservation Commission, it was stated that the aquifer downgradient from Climax Chemical and Warren Petroleum is considered by NM OCC and the NM State Engineer's Office to be basically unusable for the next 10,000 years. (Certainly an insupportable statement to make, but made nonetheless.)

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Climax Chemical Company requests that Alternate Concentration Limits equal to 10 times (10X) the MCL's for the four identified Appendix IX constituents, (and that Alternate Concentration Limits equal to 10 times (10X) the MCL's for any Appendix IX constituents present, but not yet detected,) be granted for the groundwater present at the downgradient extent of Climax's property. Climax proposes to meet the following conditions upon granting of ACL's: (not possible to grant for unknowns)

1. Eight monitoring wells will be installed along Climax's downgradient property line at 600 foot intervals as shown on Figure 14. In addition, Monitoring Wells 4-D and 4-E, as indicated on Figures 1 and 14, shall be installed immediately downgradient from the HCl surface impoundments.

XIII. REFERENCES

1. *Alternate Concentration Limit Guidance, Part 1, ACL Policy and Information Requirements*, Office of Solid Waste, Waste Management Division, U.S. Environmental Protection Agency, EPA/530-SW-87-017, July 1987.

2. *Climax Chemical Company - Water Quality Assessment Plan (Final Revision)*, September 24, 1990

3. *Climax Chemical Company - Closure Plan (First Revision)*, December 31, 1990.

4. *Geohydrologic Evaluation In Vicinity of Climax Chemical Company Site, Monument, New Mexico*, Geohydrology Associates, Inc., July 1980.

5. *Hydrologic Evaluation and Computer Assessment of Climax Chemical Facility, Monument, New Mexico*, Geohydrology Associates, Inc., March 1986.

6. *"Water Quality in Southeastern New Mexico, Listed by Location"*, State of New Mexico, State Engineer's Office, May 7, 1987, pages 444-447, 469-473.

7. *"Warren Petroleum" enforcement files*, State of New Mexico, Land Office, Oil Conservation Division

APPENDIX SECTION

TABLE 1
ATTACHMENT 1
FIGURES 1 - 14

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
LISTED BY LOCATION

Location	DPN	WBF	Use	Date Cltd	Pt. of Cltn.	Cltr.	Chlorides mg/liter	Conduct. K x 10e6	Temp. deg. F	File No.	Ref. No.	Addl. Data	Card Date	Source
** 19S.36E.28.42212														
19S.36E.28.42212		TOG	STK	79/10/19	TANK	SEO	28	552	0	L				
19S.36E.28.42212		TOG	STK	84/10/11	DP	SEO	32	530	63	L			1184	
** 19S.36E.30.12111														
19S.36E.30.12111		CAL	STK	84/10/11	DP	SEO	51	740	63	L 01757			1184	
** 19S.36E.31.141113														
19S.36E.31.141113		QAL	STK	79/11/08	DP	SEO	66	761	0	L				
19S.36E.31.141113		QAL	STK	84/10/11	DP	SEO	80	660	63	L			1184	
19S.36E.31.141113		QAL	STK	84/11/08	DP	SEO	92	857	66	L			1284	
** 19S.36E.32.113112														
19S.36E.32.113112		QAL	IRR	29/11/20	DP	USG	79	0	64	L		X		U
19S.36E.32.113112		QAL	IRR	84/10/11	TS40	SEO	54	710	64	L			1184	
** 19S.36E.32.114113														
19S.36E.32.114113		QAL	STK	84/10/11	DP	SEO	49	680	63	L			1184	
** 19S.36E.35.441														
19S.36E.35.441			OIL	68/01/25	DISPIT	SEO	*********	186000	0	L				
** 19S.37E.01.21341														
19S.37E.01.21341		TOG	REC	65/09/08	DP	SEO	100	1285	67	L 01842				
19S.37E.01.21341		TOG	REC	71/09/08	DP	SEO	97	913	66	L 01842				
19S.37E.01.21341		TOG	REC	77/07/15	DP	SEO	44	676	66	L 01842			0777	
19S.37E.01.21341		TOG	REC	84/ 9/26	DP	SEO	51	723	62	L 01842			1084	
** 19S.37E.04.111414														
19S.37E.04.111414		TOG	DOM	79/10/15	YT	SEO	34	605	56	L				
** 19S.37E.04.111432														
19S.37E.04.111432		TOG	DOM	64/07/24	YT	OCC	107	0	0	L 02490		X		P
19S.37E.04.111432		TOG	DOM	85/ 2/07	DP	SEO	35	609	63	L 02490			0385	
** 19S.37E.04.111444														
19S.37E.04.111444		TOG	DOM	29/09/19		USG	32	0	62	L		X	PLUG	U
** 19S.37E.04.11333														
19S.37E.04.11333		TOG	IRR	64/07/22	DP	OCC	350	0	0	L 01611		X		P
19S.37E.04.11333		TOG	IRR	65/09/08	DP	SEO	35	670	68	L 01611			0877	
19S.37E.04.11333		TOG	IRR	71/09/22	DP	SEO	91	707	66	L 01611			0877	
19S.37E.04.11333		TOG	IRR	77/07/13	DP	SEO	30	630	0	L 01611			0777	
19S.37E.04.11333		TOG	IRR	84/ 9/19	DP	SEO	28	563	67	L 01611			1084	
** 19S.37E.04.411122														
19S.37E.04.411122		TOG	IRR	79/10/17	DP	SEO	34	607	66	L 04466				
19S.37E.04.411122		TOG	IRR	84/ 9/19	DP	SEO	42	649	65	L 04466			1084	

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
LISTED BY LOCATION

Location	DPN	WBF	Use	Date Cltd	Pt. of Cltn.	Cltr.	Chlorides mg/liter	Conduct. K x 10e6	Temp. deg. F	File No.	Ref. No.	Addl. Data	Card Date	Source
** 19S.37E.32.411343														
19S.37E.32.411343		TOG	DOM	79/10/25	YT	SEO	260	1601	0	L 07626				
19S.37E.32.411343		TOG	DOM	84/11/07	YT	SEO	134	1057	0	L 07626			1284	
** 19S.37E.32.41322														
19S.37E.32.41322		TOG	IRR	79/10/25	DP	SEO	226	1427	0	L				
19S.37E.32.41322		TOG	IRR	84/ 9/20	DP	SEO	235	1593	0	L			1084	
** 19S.37E.34.112412														
19S.37E.34.112412		TOG	DOM	79/11/29	YT	SEO	60	731	0	L 00743 S4				
19S.37E.34.112412		TOG	DOM	84/ 9/26	YT	SEO	49	700	0	L 00743 S4			1284	
19S.37E.34.112412		TOG	DOM	84/11/07	YT	SEO	59	725	0	L 00743 S4			1284	
** 19S.37E.34.334322														
19S.37E.34.334322		TOG	IRR	79/10/11	DP	SEO	94	1038	67	L 00744 S2	L 00744			
** 19S.38E.01.314242														
19S.38E.01.314242		TOG	IRR	79/10/17	SFRKLR	SEO	240	1866	0	L 00640				
** 19S.38E.02.13321														
19S.38E.02.13321		TOG	MUN	53/05/29		USG	80	849	0	L 00946		X	PLUG U	
** 19S.38E.03.13133														
19S.38E.03.13133		TOG		57/08/14	YT	SEO	80	0	0	L				
** 19S.38E.04.112243														
19S.38E.04.112243		TOG	DOM	57/08/14	DP	SEO	88	0	0	L				
** 19S.38E.04.12124														
19S.38E.04.12124		TOG	DOM	57/08/14	DF	SEO	104	0	0	L 00230				
** 19S.38E.04.12414														
19S.38E.04.12414		TOG	PPP	57/08/13	DP	SEO	327	0	0	L			ABDN	
** 19S.38E.04.24332														
19S.38E.04.24332		TOG	DOM	79/10/18	YT	SEO	28	655	66	L				
** 19S.38E.04.243321														
19S.38E.04.243321		TOG	DOM	57/08/12	YT	SEO	40	0	0	L				
19S.38E.04.243321		TOG	DOM	79/10/18	YT	SEO	90	816	65	L				
** 19S.38E.04.243323														
19S.38E.04.243323		TOG	DOM	57/08/14	YT	SEO	64	0	0	L				
19S.38E.04.243323		TOG	DOM	76/11/23	YT	SEO	59	720	0	L				
19S.38E.04.243323		TOG	NOT	85/ 2/14	YT	SEO	120	1030	0	L			0385	
** 19S.38E.04.24333														
19S.38E.04.24333		TOG	DOM	75/03/17	YT	DNR	46	610	0	L				0

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
LISTED BY LOCATION

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20S.34E.22.222333		TRC	STK	84/10/12	DP	SEO	662	3830	64	CP			1184	
** 20S.34E.34.43421														
20S.34E.34.43421		TOG	STK	72/10/02	DP	USG	21	443	0	CP		X	0279	U
20S.34E.34.43421		TOG	STK	79/10/18	TANK	SEO	186	928	0	CP				
20S.34E.34.43421		TOG	STK	84/10/12	DP	SEO	430	1700	0	CF			1184	
** 20S.35E.01.22211														
20S.35E.01.22211		TOG	STK	79/10/24	DP	SEO	188	1318	65	L				
20S.35E.01.22211		TOG	STK	84/10/11	DP	SEO	88	810	62	L			1184	
** 20S.35E.05.31424														
20S.35E.05.31424		TOG	STK	79/10/23	DP	SEO	368	3741	65	L 04158				
20S.35E.05.31424		TOG	STK	79/11/28	DP	SEO	366	3968	65	L 04159				
20S.35E.05.31424		TOG	STK	84/10/11	SBBLR	SEO	367	3960	64	L 04158			1184	
** 20S.35E.06.331332														
20S.35E.06.331332		TOG	STK	79/10/23	DP	SEO	676	5154	0	L 04157				
** 20S.35E.31.12311														
20S.35E.31.12311		TOG	STK	79/11/08	DP	SEO	20	557	0	L				
20S.35E.31.12311		TOG	STK	84/10/16	DP	SEO	30	570	64	L			1084	
** 20S.35E.33.43413														
20S.35E.33.43413		TOG	STK	79/11/08	DP	SEO	56	677	0	L				
** 20S.35E.35.33432														
20S.35E.35.33432		TOG	STK	79/11/08	DP	SEO	12	443	0	L				
** 20S.36E.01.111														
20S.36E.01.111			OIL	68/01/25	DISPIT	SEO	1380	5840	0	L				
** 20S.36E.03.33111														
20S.36E.03.33111		TOG	STK	79/10/19	DP	SEO	144	932	66	L				
20S.36E.03.33111		TOG	STK	84/10/12	DP	SEO	169	1060	63	L			1184	
** 20S.36E.09.13440														
20S.36E.09.13440		TOG	STK	79/10/19	DP	SEO	548	2566	66	L				
20S.36E.09.13440		TOG	STK	84/10/12	DP	SEO	434	2350	63	L			1184	
** 20S.36E.10.32114														
20S.36E.10.32114		QAL	STK	72/08/28	DP	OCC	79	520	0	L				O
20S.36E.10.32114		QAL	STK	76/11/01	DP	SEO	66	889	66	L				
20S.36E.10.32114		QAL	STK	79/10/19	DP	SEO	68	880	66	L				
20S.36E.10.32114		QAL	STK	84/10/12	DP	SEO	92	980	64	L			1184	
** 20S.36E.11.42243														
20S.36E.11.42243		QAL	STK	72/08/28	DP	OCC	1000	1450	0	L				O
20S.36E.11.42243		QAL	STK	76/11/01	DP	SEO	918	3969	63	L				

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
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** 20S.37E.08.423223														
20S.37E.08.423223		TOG	DOM	79/10/25	YT	SEO	520	2356	66	L				
20S.37E.08.423223		TOG	STK	84/ 9/26	YT	SEO	686	3806	0	L			1184	
** 20S.37E.09.112122														
20S.37E.09.112122		TOG	STK	79/11/29	DP	SEO	176	1256	65	L				
** 20S.37E.09.33122														
20S.37E.09.33122		TOG	STK	79/10/25	DP	SEO	584	2543	63	L				
** 20S.37E.13.32130														
20S.37E.13.32130		TOG	STK	79/11/08	DP	SEO	68	770	0	L				
** 20S.37E.16.314141														
20S.37E.16.314141		TOG	STK	79/10/24	DP	SEO	2350	11676	67	L				
20S.37E.16.314141		TOG	STK	85/ 2/06	TS30	SEO	2950	12117	0	L			0385	
** 20S.37E.19.214144														
20S.37E.19.214144		TOG	SRO	79/11/28	DP	SEO	156	1377	60	L 04410 S	L 04410			
20S.37E.19.214144		TOG	SRO	84/10/03	DP	SEO	188	1410	0	L 04410 S			1184	
** 20S.37E.28.24413														
20S.37E.28.24413		TOG	STK	79/11/07	TANK	SEO	1019	5845	0	L				
20S.37E.28.24413		TOG	STK	85/ 2/08	DP	SEO	1000	5571	0	L			0385	
** 20S.37E.29.34443														
20S.37E.29.34443		QAL	STK	60/11/22	DP	OCC	295	0	0	L		X		P
20S.37E.29.34443		QAL	STK	77/07/14	TS120	SEO	248	1565	0	L			ABDN	
20S.37E.29.34443		QAL	STK	79/11/28	DP	SEO	296	2525	65	L				
** 20S.37E.31.44421														
20S.37E.31.44421		TOG	STK	79/11/08	DP	SEO	144	1903	0	L				
** 20S.37E.35.423411														
20S.37E.35.423411		TOG	STK	79/11/08	DP	SEO	78	748	0	L				
20S.37E.35.423411		TOG	STK	85/ 2/06	TS91	SEO	66	906	0	L			0385	
** 20S.38E.01.34431														
20S.38E.01.34431		TOG	OWD	78/05/03		OCC	57	0	0	L			ABDN	O
20S.38E.01.34431		TOG	OWD	78/05/17	TS105	SEO	82	1033	0	L			ABDN	
20S.38E.01.34431		TOG	STK	84/ 9/25	DP	SEO	165	1077	0	L			1184	
** 20S.38E.02.141114														
20S.38E.02.141114		QAL	STK	78/05/17	DP	SEO	75	954	66	L				
20S.38E.02.141114		QAL	STK	84/ 9/25	DP	SEO	147	1233	68	L			1184	
** 20S.38E.02.212211														
20S.38E.02.212211		QAL	IRR	65/09/09	DP	SEO	310	2220	0	L 02061 S	L 02061			

WATER QUALITY IN SOUTHEASTERN NEW MEXICO
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20S.38E.02.212211		QAL	IRR	77/06/17	DP	SEO	400	2665	66	L 02061 S	L 02061		0677	
** 20S.38E.02.412422														
20S.38E.02.412422		QAL	STK	78/05/03		OCC	57	0	0	L 03947				0
20S.38E.02.412422		QAL	STK	78/05/17	DP	SEO	52	753	66	L 03947				
20S.38E.02.412422		QAL	STK	85/ 2/14	DP	SEO	96	950	64	L 03947			0385	
** 20S.38E.06.143121														
20S.38E.06.143121		TOG	DOM	79/11/08	YT	SEO	100	1047	0	L				
20S.38E.06.143121		TOG	DOM	85/ 2/13	YT	SEO	243	1550	0	L			0385	
** 20S.38E.08.122224														
20S.38E.08.122224		TOG	STK	79/11/08	DP	SEO	54	730	0	L				
20S.38E.08.122224		TOG	STK	84/ 9/25	DP	SEO	63	742	66	L			1184	
** 20S.38E.11.41440														
20S.38E.11.41440		TOG	STK	78/05/17	TS39	SEO	726	3881	0	L			ABDN	
20S.38E.11.41440		TOG	STK	85/ 2/05	TS39	SEO	84	948	0	L			0385	
** 20S.38E.11.414441														
20S.38E.11.414441		TOG	NOT	78/05/03		OCC	341	0	0	L			ABDN	0
20S.38E.11.414441		TOG	STK	78/05/17	TS37	SEO	333	2162	0	L			ABDN	
** 20S.38E.12.314112														
20S.38E.12.314112		TOG	OWD	78/05/03		OCC	1443	0	0	L			ABDN	0
20S.38E.12.314112		TOG	OWD	78/05/17	TS62	SEO	13330	44803	0	L			ABDN	
** 20S.38E.12.42222														
20S.38E.12.42222		TOG	OWD	78/05/17	TS81	SEO	97	872	0	L			ABDN	
20S.38E.12.42222		TOG	OWD	85/ 2/05	TS74	SEO	7	799	0	L			0385	
** 20S.38E.12.44222														
20S.38E.12.44222		QAL	OWD	78/05/03		OCC	85	0	0	L			ABDN	0
20S.38E.12.44222		QAL	OWD	78/05/17	TS88	SEO	71	876	0	L			ABDN	
20S.38E.12.44222		QAL	OWD	85/ 2/05	TS85	SEO	104	909	0	L			0385	
** 20S.38E.13.141224														
20S.38E.13.141224		QAL	STK	78/05/03		OCC	341	0	0	L				0
20S.38E.13.141224		QAL	STK	78/05/17	DP	SEO	339	2207	0	L				
20S.38E.13.141224		QAL	STK	85/ 2/05	DP	SEO	326	1989	65	L			0385	
** 20S.38E.17.11212														
20S.38E.17.11212		TOG	STK	79/11/08	DP	SEO	188	1285	0	L				
** 20S.38E.17.141341														
20S.38E.17.141341		TOG	STK	79/11/08	DP	SEO	90	915	0	L				
20S.38E.17.141341		TOG	STK	84/ 9/25	DP	SEO	99	923	65	L			1184	

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** 20S.38E.17.33410														
20S.38E.17.33410		TOG	STK	79/11/08	DP	SEO	52	722	0	L 02137				
** 20S.38E.19.312141														
20S.38E.19.312141		QAL	DOM	54/04/02	DP	USG	39	627	0	L		X		U
20S.38E.19.312141		QAL		58/09/09	TS85	SEO	49	376	0	L		X		U
** 20S.39E.07.134442														
20S.39E.07.134442		TOG	STK	78/05/03		OCC	142	0	0	L				O
20S.39E.07.134442		TOG	STK	78/05/17	DP	SEO	105	1148	0	L				
20S.39E.07.134442		TOG	STK	84/ 9/25	DP	SEO	131	1128	65	L			1184	
** 20S.39E.07.31113														
20S.39E.07.31113		TOG	OWD	78/05/03		OCC	57	0	0	L			ABDN	O
20S.39E.07.31113		TOG	OWD	78/05/17	TS98	SEO	79	778	0	L			ABDN	
20S.39E.07.31113		TOG	OWD	85/ 2/05	TS95	SEO	69	810	0	L			0385	
** 20S.39E.19.122122														
20S.39E.19.122122		TOG	STK	78/05/03		OCC	199	0	0	L				O
20S.39E.19.122122		TOG	STK	78/05/17	DP	SEO	165	1324	0	L				
** 20S.39E.20.12314														
20S.39E.20.12314		TOG	DOM	78/05/17		SEO	151	1383	0	L				
20S.39E.20.12314		TOG	DOM	84/ 9/25	DP	SEO	148	1581	64	L			1284	
** 20S.39E.20.123143														
20S.39E.20.123143		TOG	STK	78/05/17	DP	SEO	288	2107	0	L				
** 21S.17E.13.122112														
21S.17E.13.122112		QAL	STK	56/ 4/26	DP	USG	4	660	65	19		X	483	U
** 21S.23E.02.33434														
21S.23E.02.33434		QAL	STK	85/ 8/29	DP	SEO	16	1256	0	RA			0186	
** 21S.23E.14.21221														
21S.23E.14.21221		PQ	STK	54/ 1/12	DP	USG	11	3210	0	RA			0685	U
** 21S.23E.22.241444														
21S.23E.22.241444		PGR	STK	54/ 1/11	DP	USG	31	693	0	RA			0685	U
** 21S.23E.23.232														
21S.23E.23.232		PEN	PPP	66/ 3/25	DISPIT	SEO	7950	22952	0	RA			0783	
21S.23E.23.232		PEN	PPP	66/ 4/00	DISPIT	SEO	5920	19375	0	RA			0783	
21S.23E.23.232		PEN	PPP	66/ 5/10	DISPIT	SEO	2000	0	0	RA			0783	
21S.23E.23.232		PEN	PPP	66/10/24	DISPIT	SEO	2070	8710	0	RA			0783	
21S.23E.23.232		PEN	PPP	67/ 4/06	DISPIT	SEO	6000	18410	0	RA			1282	
21S.23E.23.232		PEN	PPP	67/ 5/03	DISPIT	SEO	6000	17440	0	RA			0783	
21S.23E.23.232		PEN	PPP	67/ 6/06	DISPIT	SEO	9370	26170	0	RA			0783	
21S.23E.23.232		PEN	PPP	68/ 1/15	DISPIT	SEO	2300	9305	0	RA			0783	

ATTACHMENT 1

LETTERS FROM WARREN PETROLEUM TO
NEW MEXICO OIL CONSERVATION COMMISSION
REGARDING CONDENSATE RECOVERY

(REFERENCED FACILITY MAP INCLUDED)

Chevron

Warren Petroleum Company
A Division of Chevron U.S.A. Inc.
P.O. Box 67, Monument, NM 88265

Manufacturing Department

OIL CONSERVATION DIVISION
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'89 DEC 26 AM 9 20

December 18, 1989

State of New Mexico
Oil Conservation Division
Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87405-2088

Attention: Dave Boyer

Dear Dave,

Attached for your reference is a copy of a map previously sent showing the locations of three (3) ground water monitoring wells at Warren Petroleums Monument Gas Processing Plant in Lea County, New Mexico. As of this date we are continuing to pump well WP-3 but at a slower rate. To-date we have recovered 8,643.5 gallons (205.8 barrels) of condensate from this well. Our pumping rate has been reduced from an initial 110 gallons per day during the first 44 days to around 60 gallons per day over the last month. We have had to raise our pump one quarter to one half inch periodically to avoid pumping water.

On December 15, 1989 we bailed wells 5-9, WP-1 and WP-2. Well 5-9 showed 1-1/2" of condensate and WP-1 showed 1-3/4" of condensate while WP-2 showed 0" (not even a trace).

I feel we are making headway on this problem as Well 5-9 shows a considerable reduction from previous samples.

We will continue to pump this well and keep you informed.

If you have any questions, please feel free to call me at 393-2823 or Urmas Kelmser at (415) 620-5953.

David K. Bhul
K. A. Peterson
Plant Manager

KAP/sm
attachment
cc: L. T. Reed
M. L. Ingram
Urmas Kelmser

Chevron

Warren Petroleum Company
A Division of Chevron U.S.A. Inc.
P.O. Box 67, Monument, NM 88265

Manufacturing Department

DIVISION
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'90 MAR 22 AM 9 29

March 19, 1990

State of New Mexico
Oil Conservation Division
Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87405-2088

Attention: Dave Boyer

Dear Dave,

Attached for your reference is a copy of a map previously sent showing the locations of three (3) ground water monitoring wells at Warren Petroleums Monument Gas Processing Plant in Lea County, New Mexico. As of this date we are continuing to pump well WP-3. To-date we have recovered 12,293.5 gallons (292.7 barrels) of condensate from this well. Our pumping rate is now down to 48 gallons per day over the last 76 days (since my last letter). We have had to continue to raise our pump one-quarter to one-half inch periodically to avoid pumping water.

On March 16, 1990 we bailed our three open test wells. Well 5-9 showed 1-3/4" of condensate, WP-1 showed 7" and WP-2 showed 0" as before.

We are studying the increase of condensate in WP-1. This is surprising since no known source of condensate is or has been in the vicinity of this well.

We will be pumping this well within 3 weeks to study its characteristics and the reaction on the other wells.

If you have any questions, please feel free to call me at 393-2823 or Urmas Kelmser at (415) 620-5953.

K. A. Peterson

K. A. Peterson
Plant Manager

KAP/sm
attachment
cc: L. T. Reed
M. L. Ingram
Urmas Kelmser

Chevron

Warren Petroleum Company
A Division of Chevron U.S.A. Inc.
P.O. Box 67, Monument, NM 88265

Manufacturing Department

OIL CONSERV ON DIVISION
RECEIVED

'90 AUG 13 AM 9 08

August 6, 1990

State of New Mexico
Oil Conservation Division
Land Office Building
P. O. Box 2088
Santa Fe, New Mexico 87405-2088

Attention: Dave Boyer

Dear Dave,

Attached for your reference is a copy of a map previously sent showing the locations of three (3) ground water monitoring wells at Warren Petroleums Monument Gas Processing Plant in Lea County, New Mexico. We are continuing to pump well WP-3 and as indicated in my letter of March 19, 1990 have also pumped well WP-1. To date we have recovered 18,088.5 gallons (430 barrels) of condensate from these wells. Our pumping rate has averaged 42 gallons per day over the last 139 days. The pumps were shut off and all wells were bailed on this date after sitting for 72 hours. The results were WP-1 - 1/2" of condensate; WP-2 - 0" condensate; WP-3 - 3/4" of condensate; and well 5-9 - 3/4" condensate. These show a dramatic improvement from the March 19th levels.

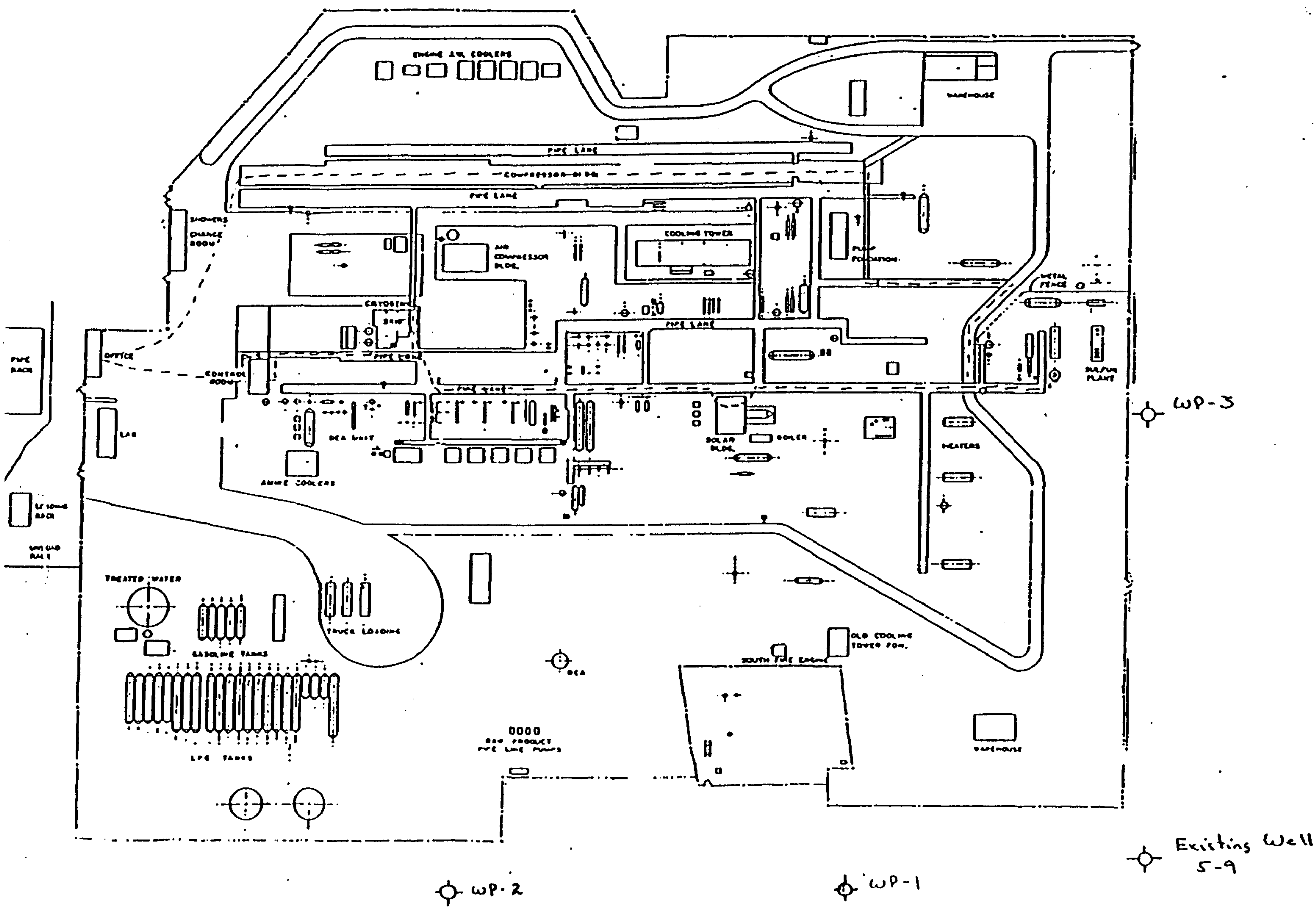
I believe we are continuing to make progress on these wells and will keep you informed.

If you have any questions, please feel free to call me at 393-2823 or Urmas Kelmser at (415) 620-5953.

K A Peterson
K. A. Peterson
Plant Manager

KAP/sm
attachment
cc: L. T. Reed
B. G. Schulz
Urmas Kelmser

MONUMENT PLANT



FIGURES

FIGURE 13 - "Surfer" generated contour utilizing inches of condensate on top of aquifer as "Z" value. Values were obtained from correspondence from Warren Petroleum to Oil Conservation Commission (August 6, 1990).

FIGURE 14 - Facility Site Map (Figure 1) modified to show approximate location of proposed downgradient boundary wells for Point of Compliance ACL monitoring.

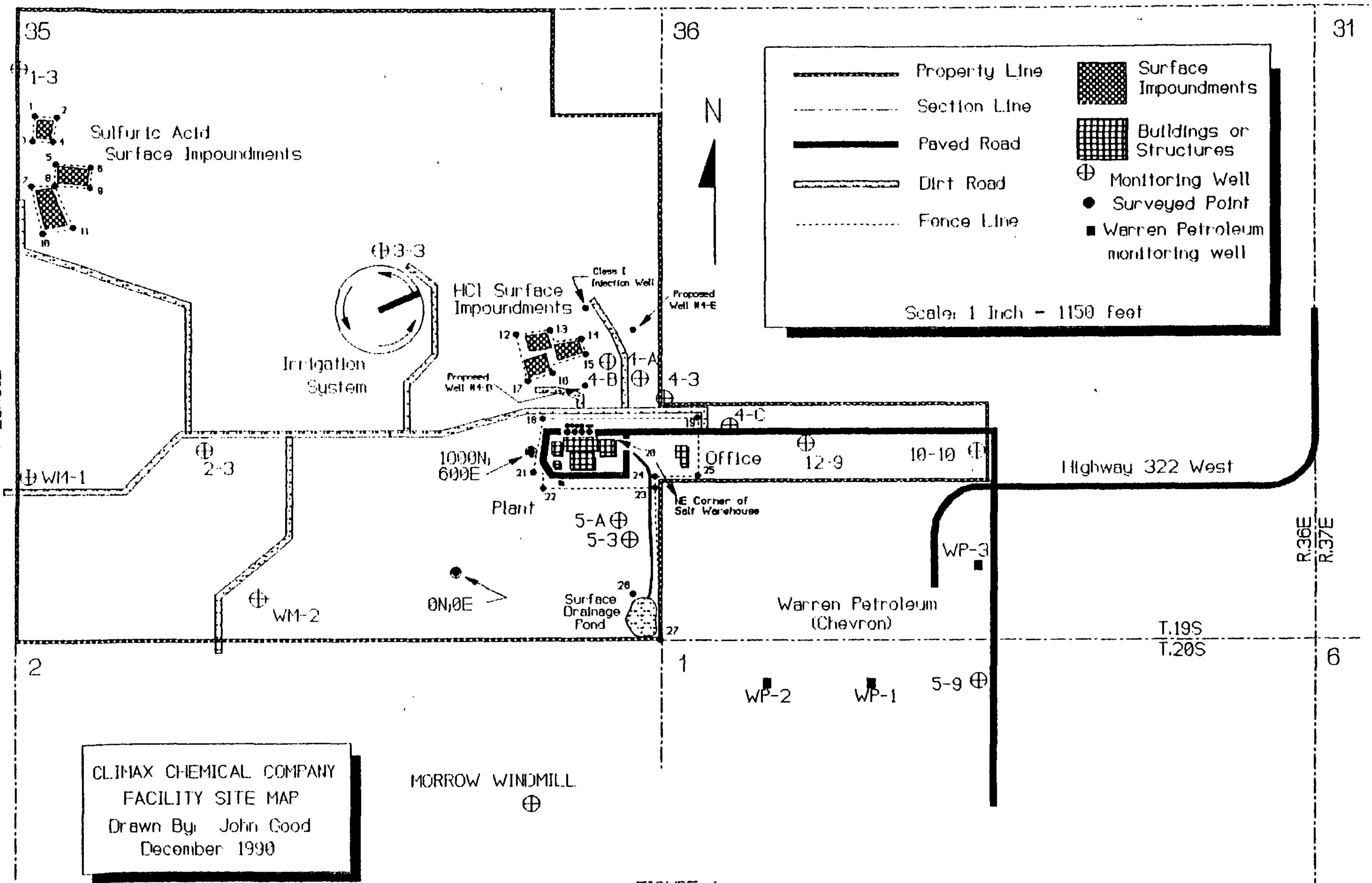


FIGURE 1

FIGURE 1

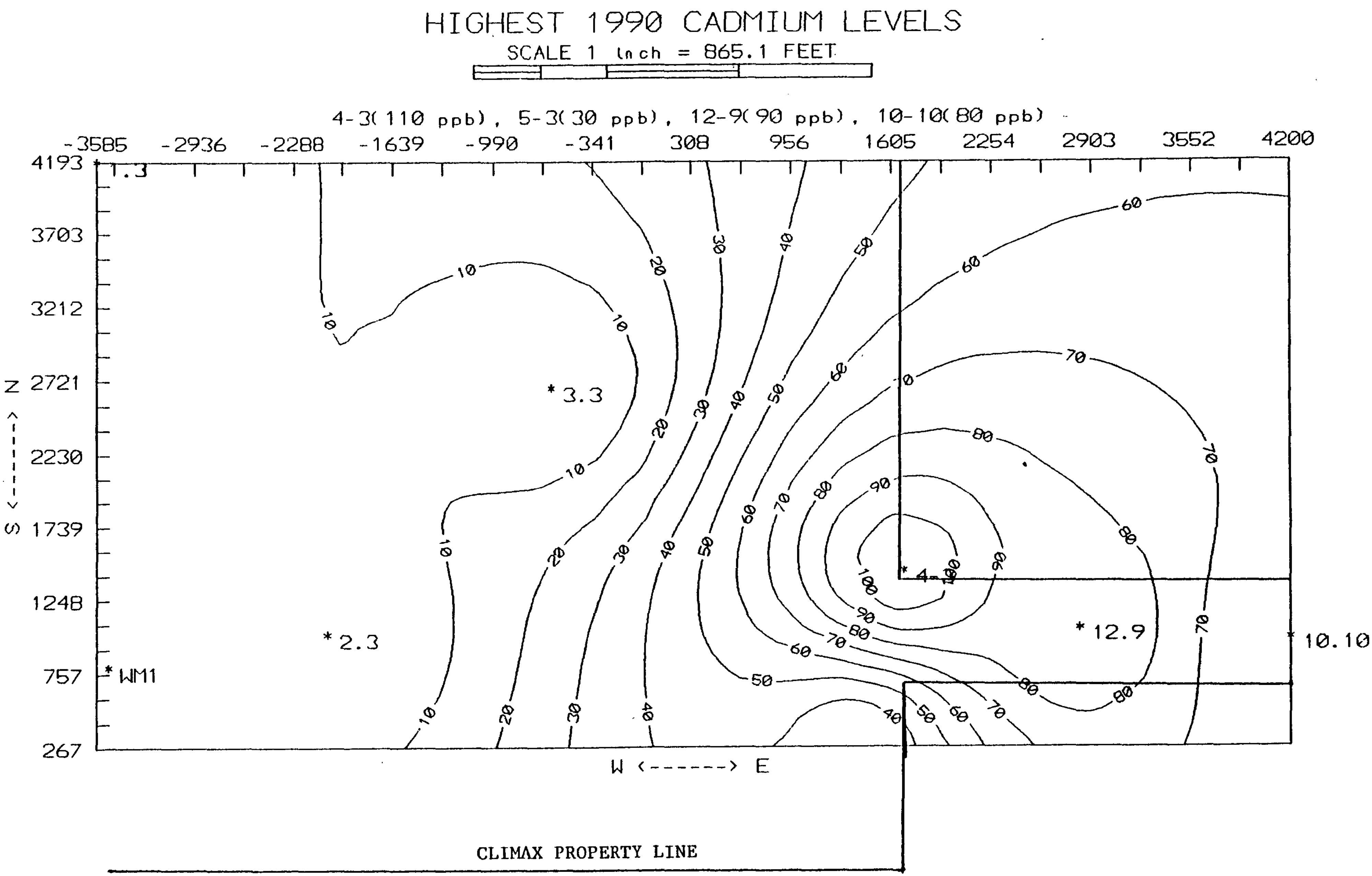
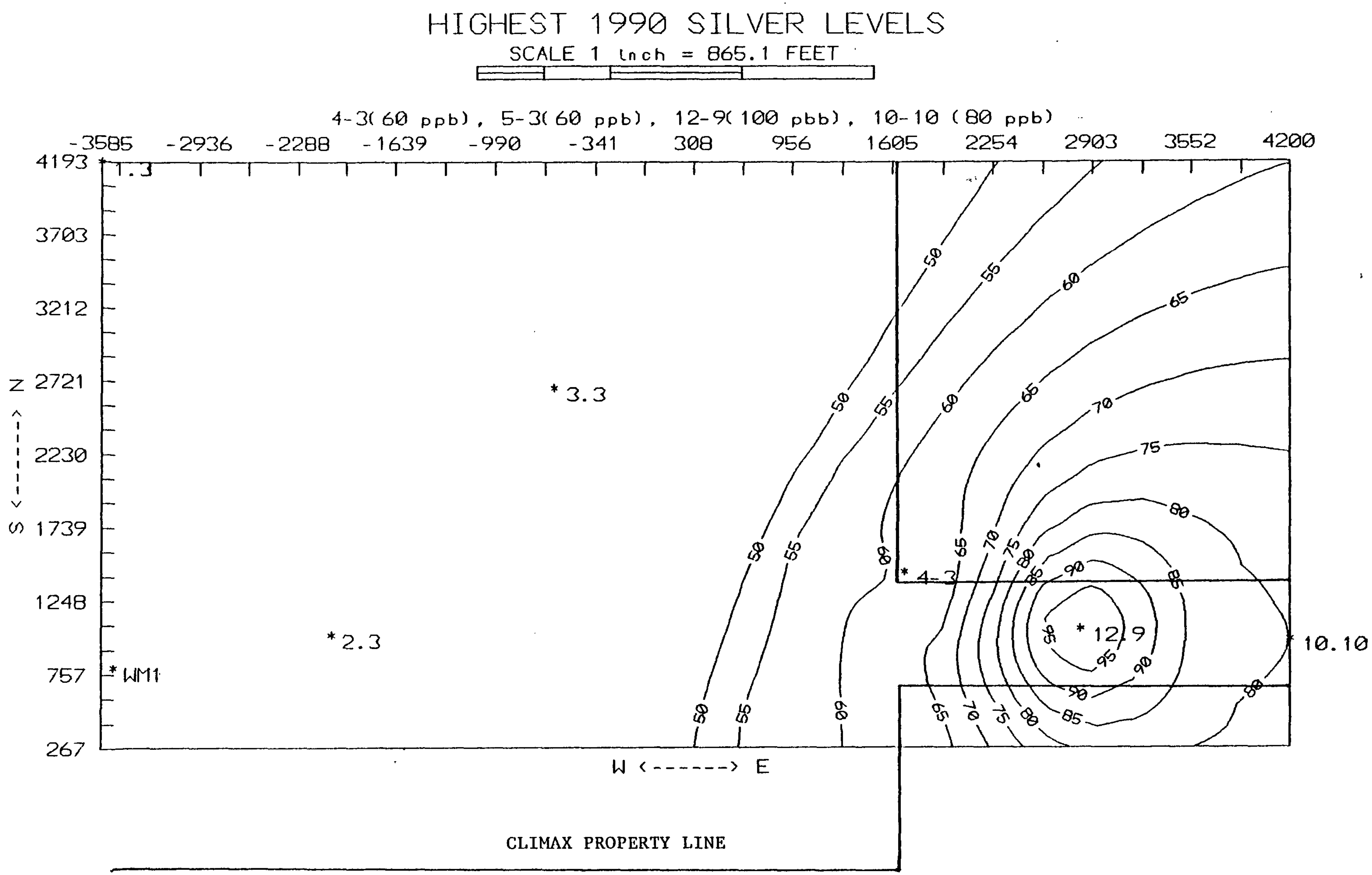

HIGHEST 1990 CADMIUM LEVELS
SCALE 1 inch = 865.1 FEET
4-3(110 ppb), 5-3(30 ppb), 12-9(90 ppb), 10-10(80 ppb)
-3585 -2936 -2288 -1639 -990 -341 308 956 1605 2254 2903 3552 4200
4193 3703 3212 2721 2230 1739 1248 757 267
N <------> S
W <------> E
* 1.3
* 3.3
* 2.3
* WM1
* 4-3
* 12.9
* 10.10
CLIMAX PROPERTY LINE

FIGURE 2



HIGHEST 1990 SILVER LEVELS
SCALE 1 inch = 865.1 FEET
4-3(60 ppb), 5-3(60 ppb), 12-9(100 pbb), 10-10 (80 ppb)
-3585 -2936 -2288 -1639 -990 -341 308 956 1605 2254 2903 3552 4200
4193 3703 3212 2721 2230 1739 1248 757 267
N <------> S
W <------> E
*1.3
*3.3
*2.3
*WM1
*4-3
*12.9
*10.10
50 55 60 65 70 75 80 85 90 95
CLIMAX PROPERTY LINE

FIGURE 3

WELL LOCATIONS PLOTTED
FROM STATE ENGINEER'S
SOUTHEAST NEW MEXICO
WELL LOCATION LIST

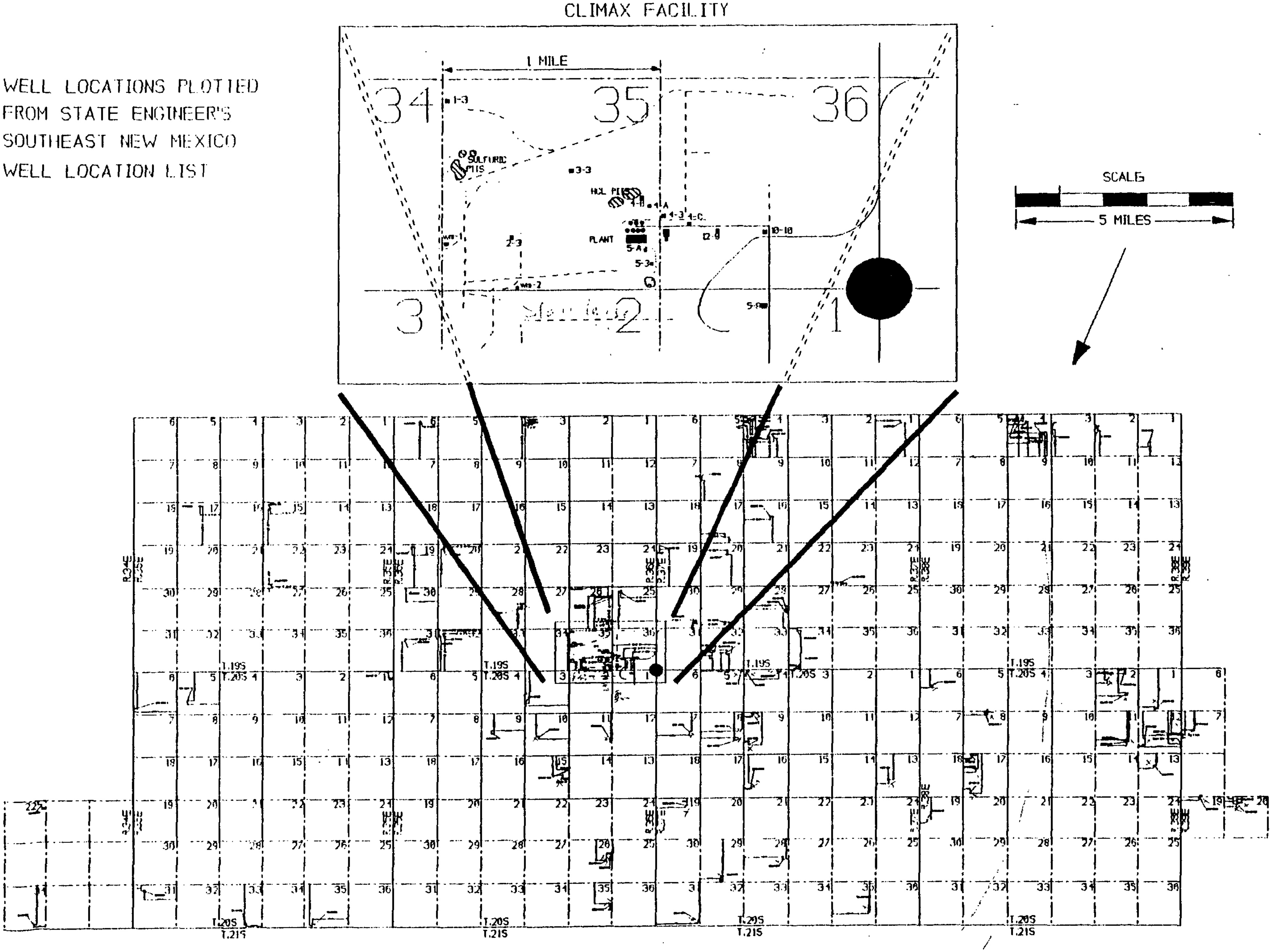
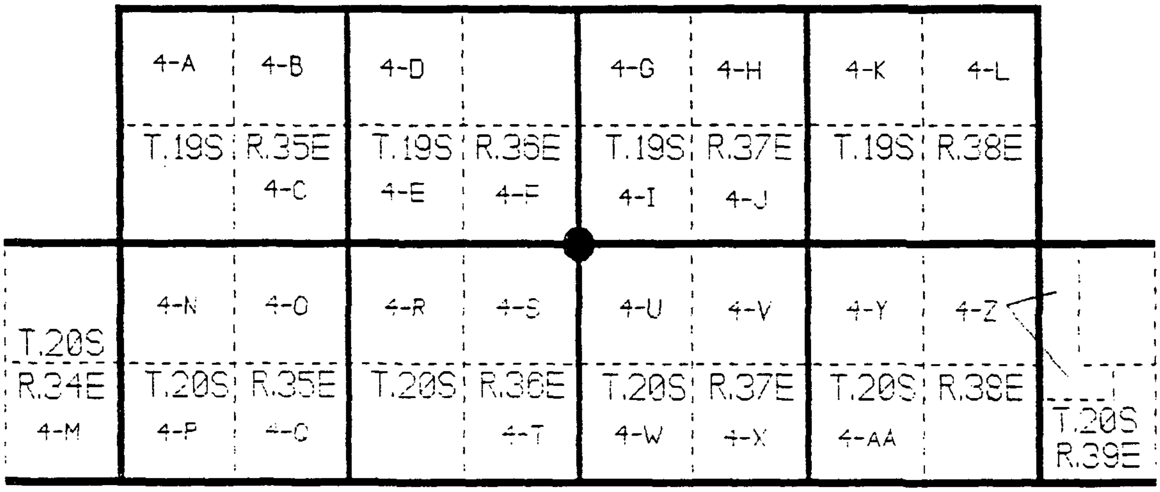


FIGURE 4

FIGURE 4

Figures 4-A through 4-AA that follow are expanded views of each Township and Range quadrant shown in Figure 4 that have water wells plotted on them. Well designations and measurements to relavent Section Lines are shown. Measurements are in feet-inches because the drawing was plotted with feet as the unit of measurement. Each section is exactly 25 ft. The "X" and "Y" coordinate of each well was determined by measuring from the 0,0 point denoted by the large black circle in Figure 4. "X" and "Y" coordinate values for each well thusly derived were then entered into the "Surfer" computer contouring program to generate the various Chloride and TDS contour plots displayed as Figures 5 - 12.

KEY TO LOCATIONS OF FIGURES 4-A through 4-AA



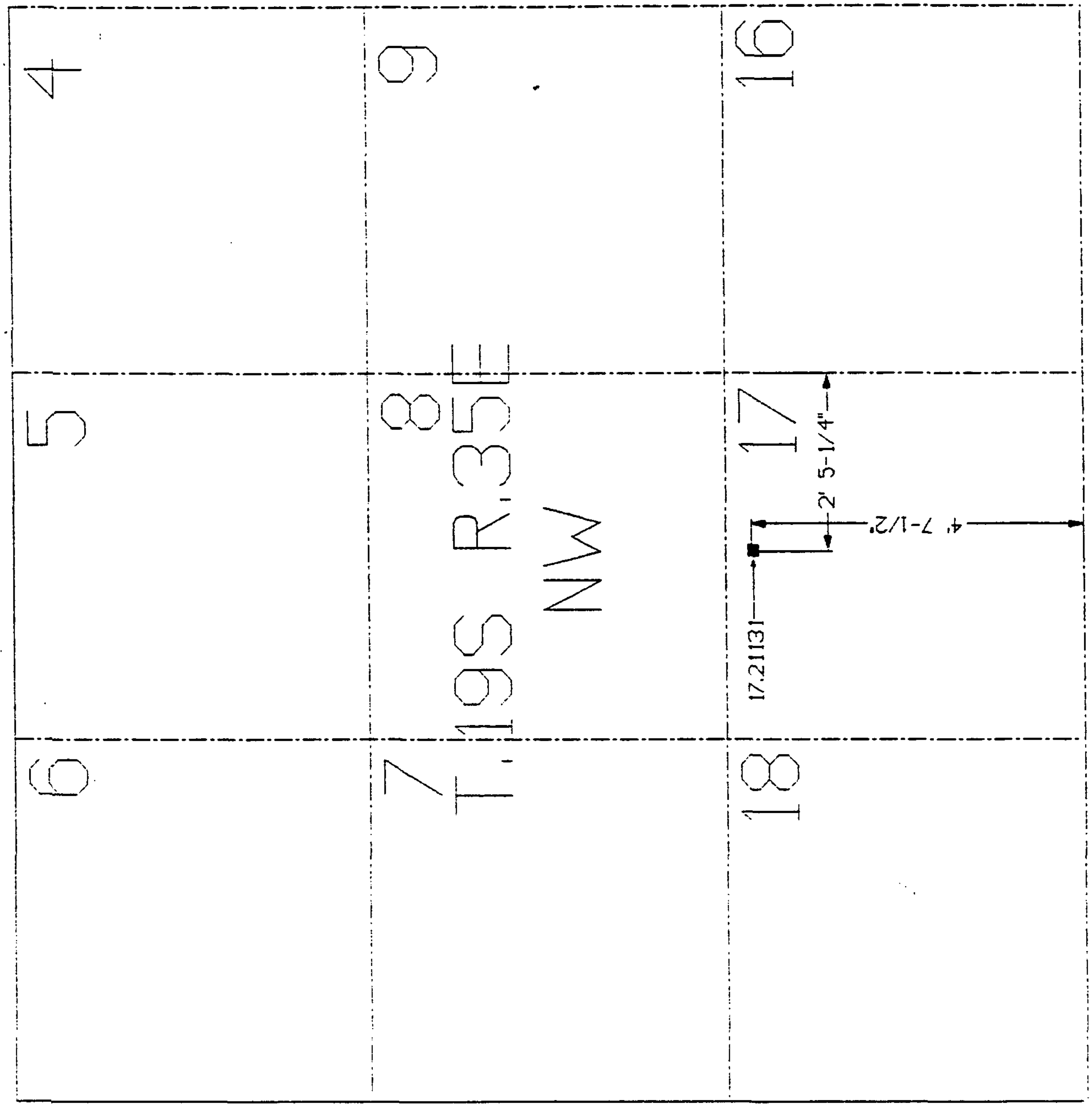
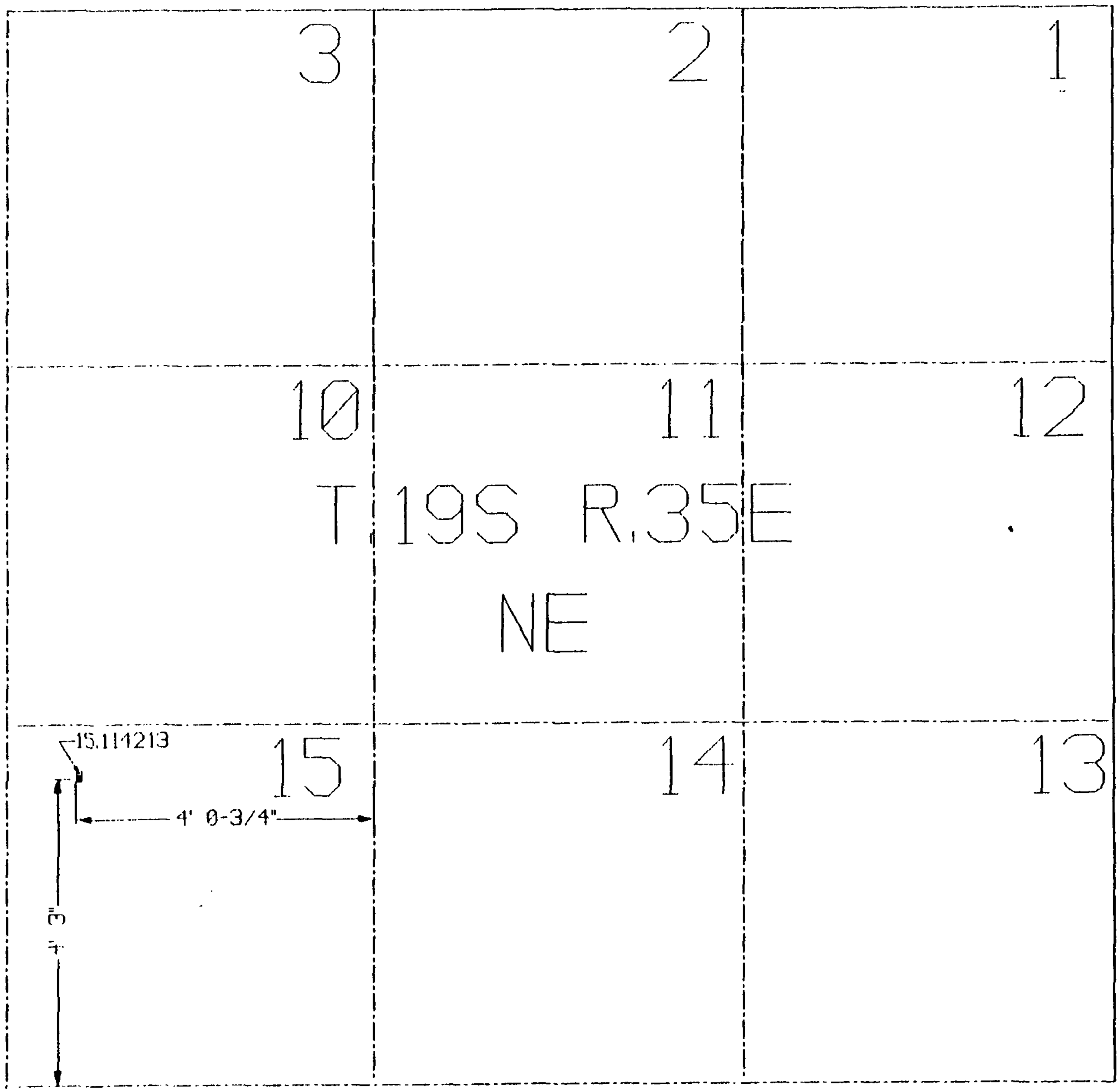
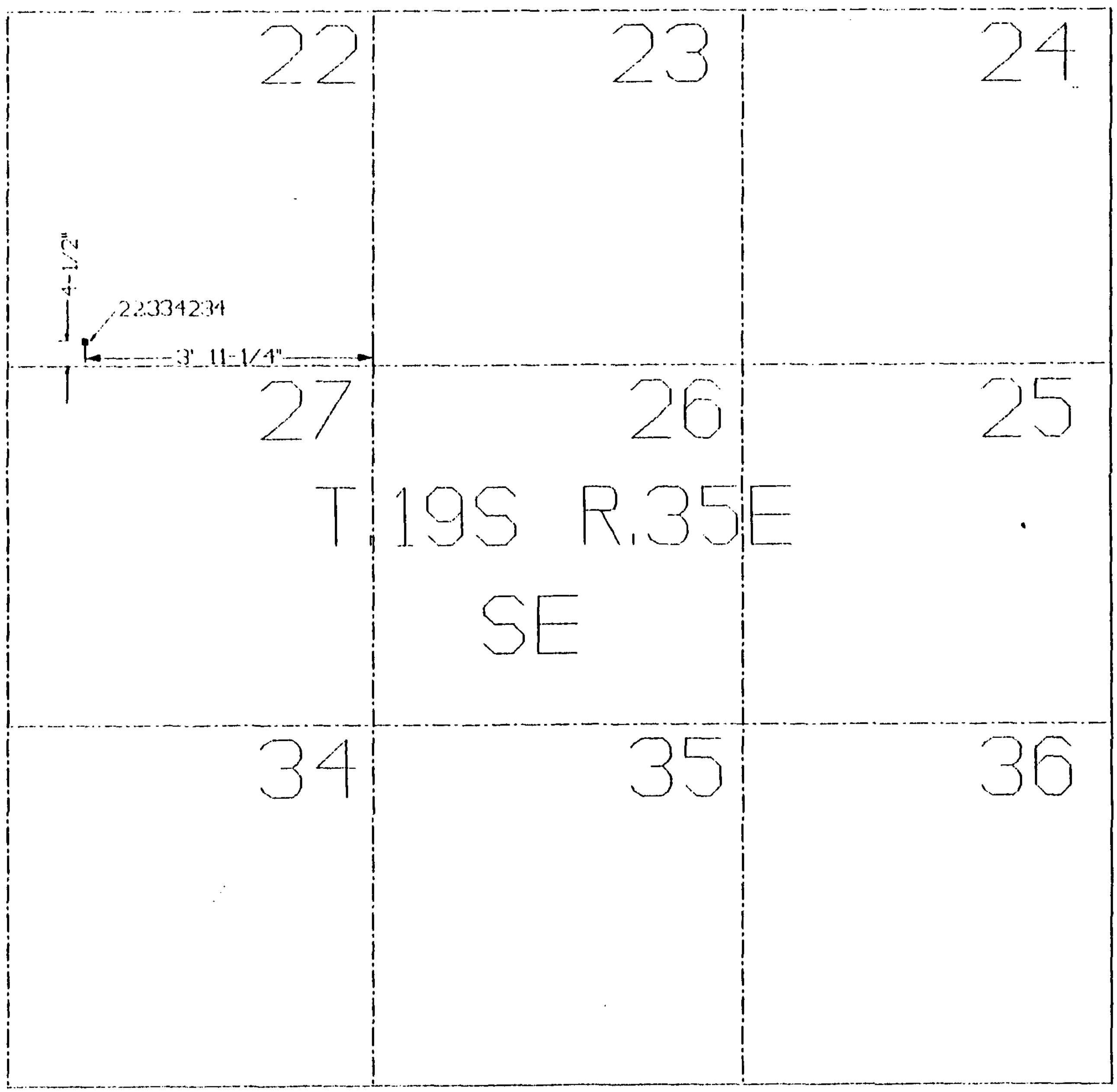


Figure 4-A



3
2
1
10
11
12
T. 19S R. 35E
NE
15.114213
15
14
13
4' 0-3/4"
4' 3"



22
23
24
4-1/2"
22334234
3' 11-1/4"
27
26
25
T.19S R.35E
SE
34
35
36

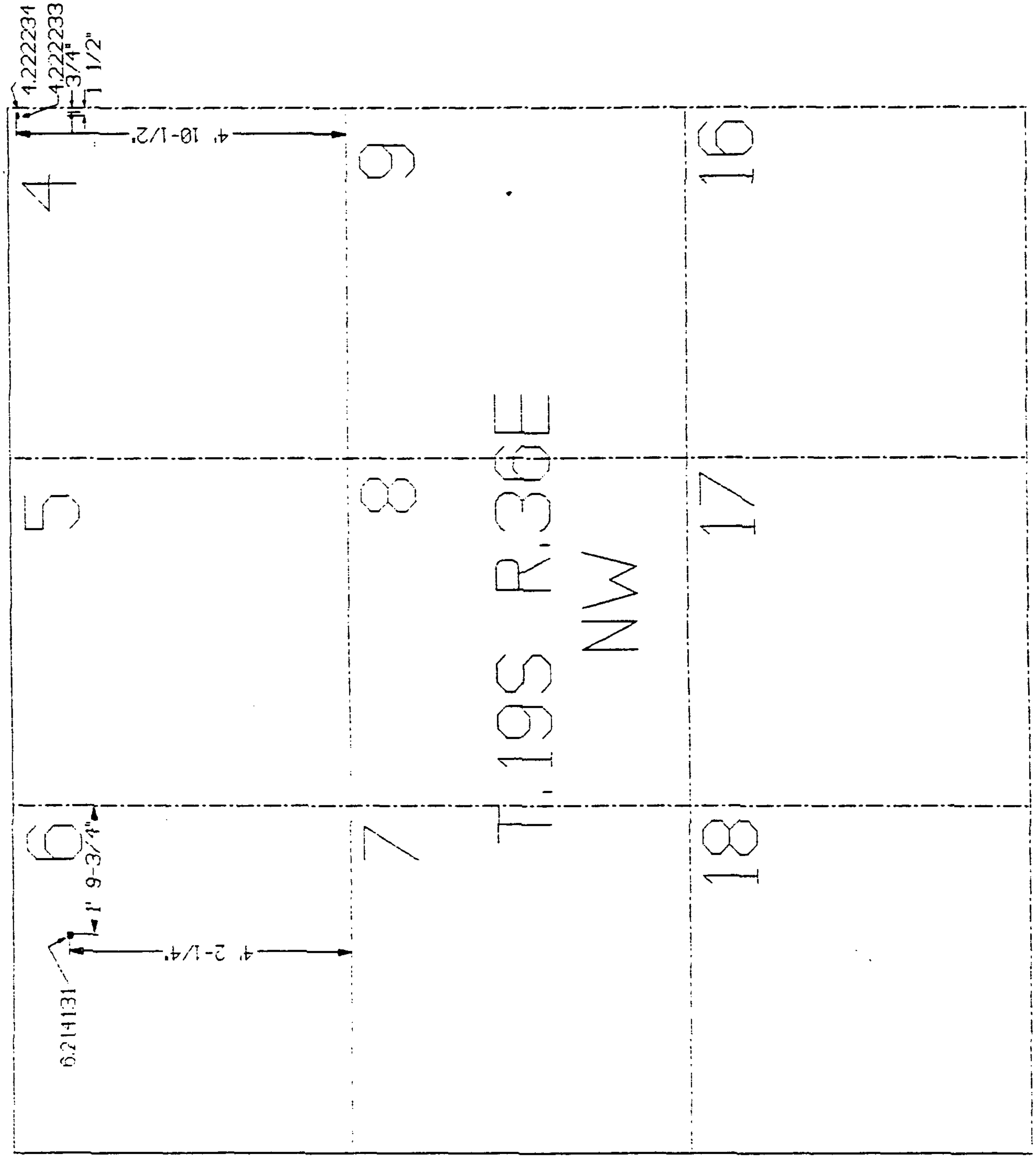
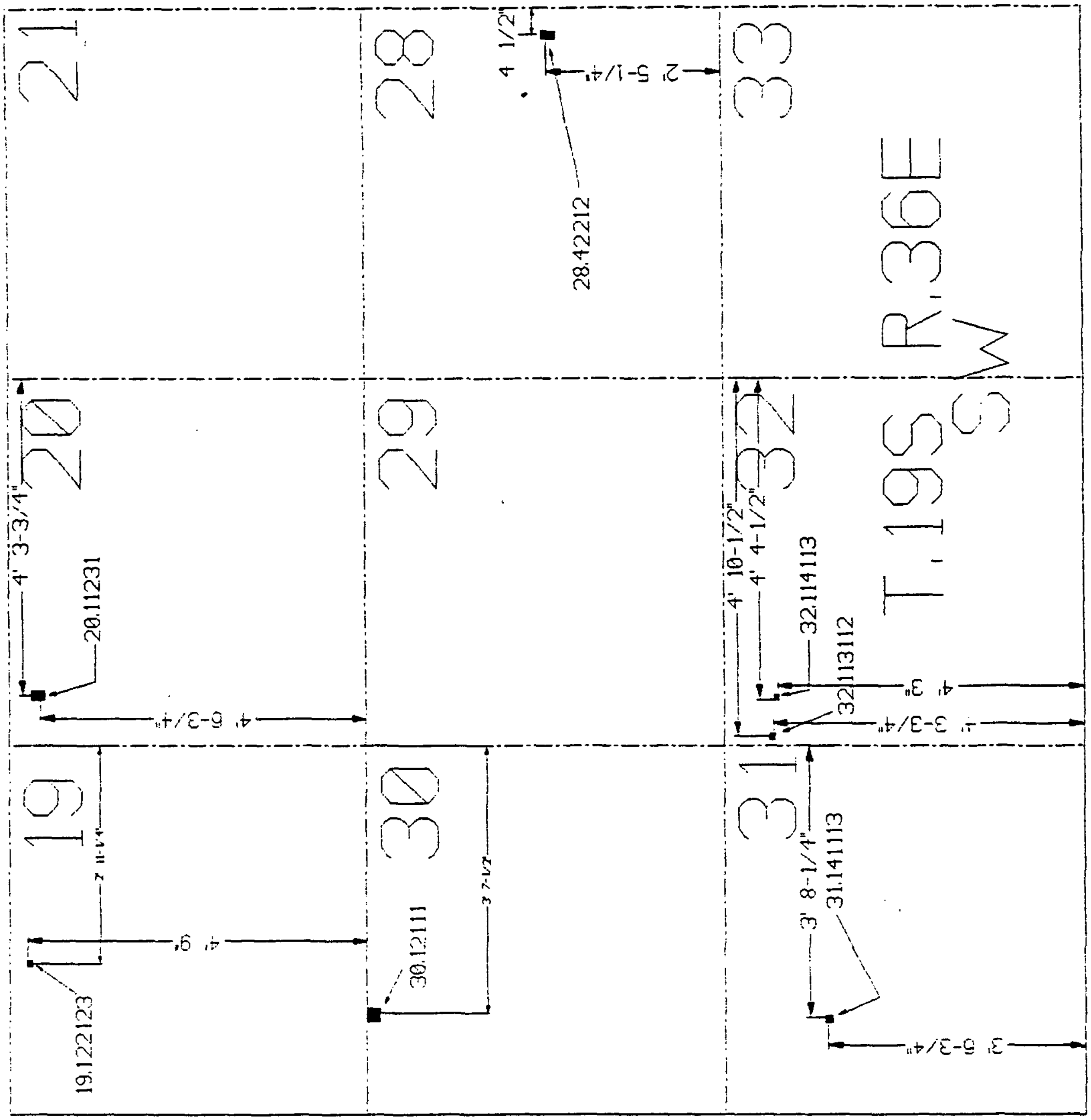
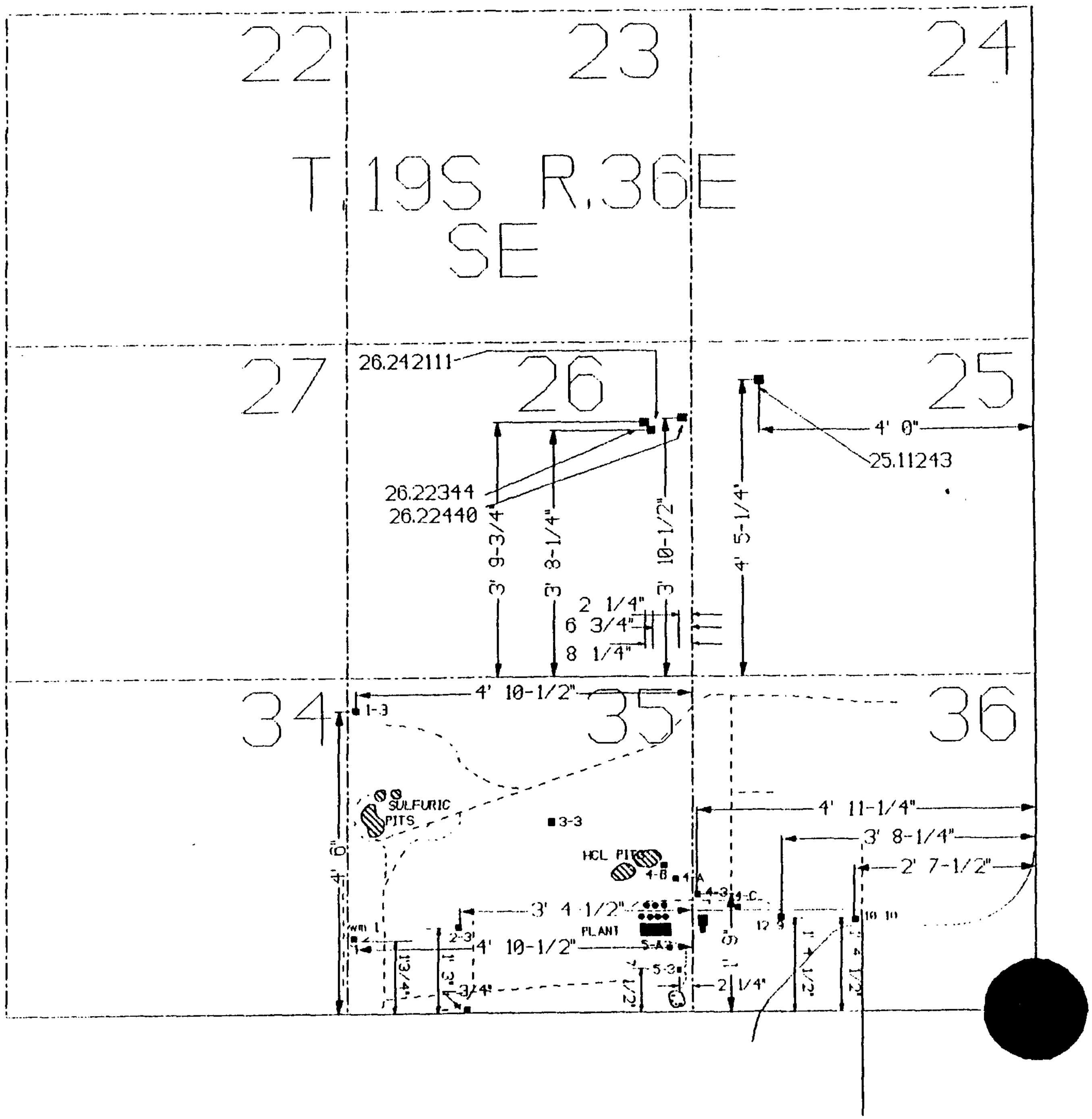

1.222231
4.222233
3/4"
1 1/2"
4' 10-1/2"
4
9
16
5
8
17
6
7
18
T.19S R.36E
NW
1' 9-3/4"
4' 2-1/4"
6.214131

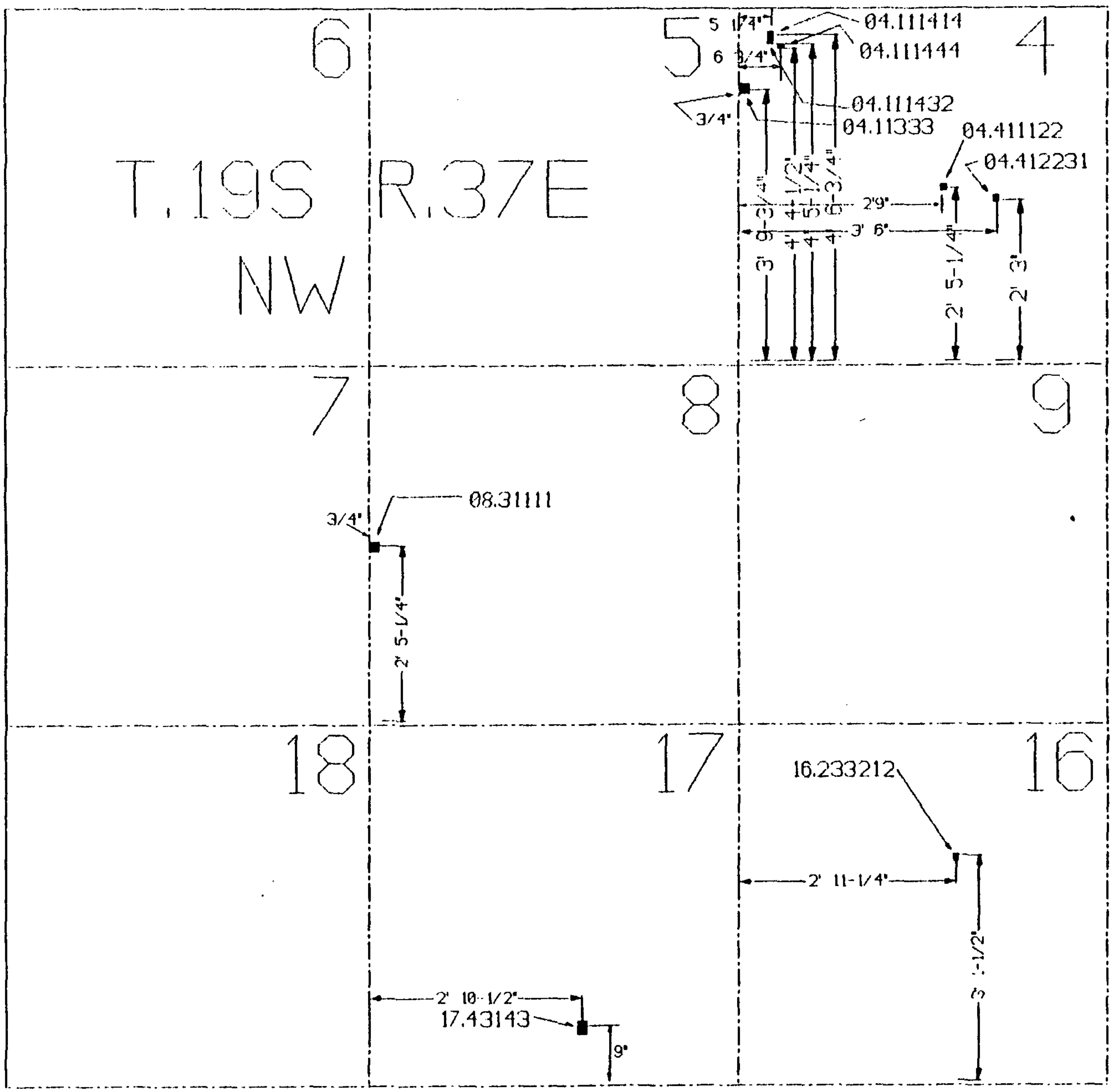
Figure 4-D



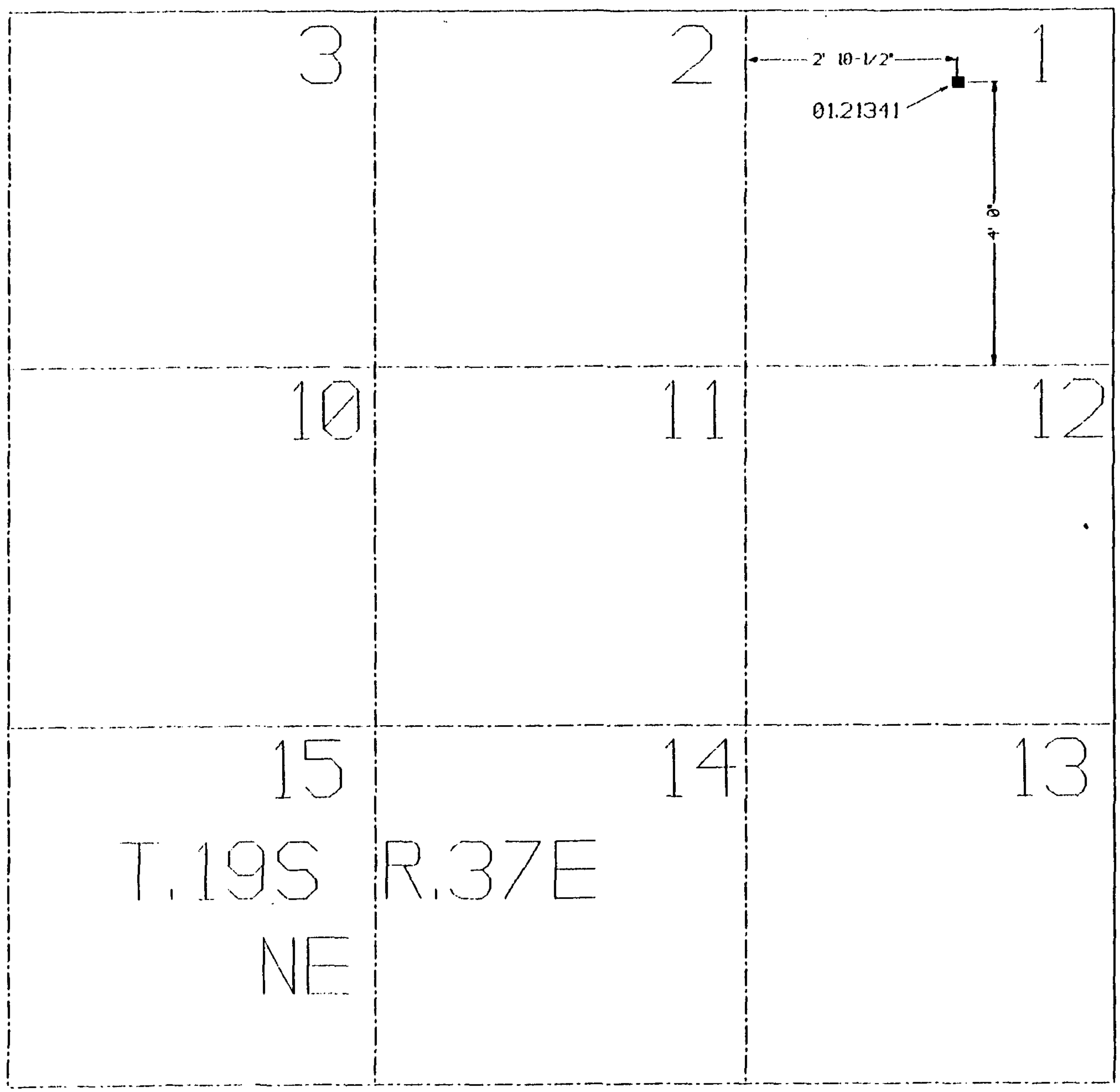
19
20
21
28
29
30
31
32
33
T.19S
R.36E
19.122123
20.11231
28.42212
30.12111
31.141113
32.114113
32.113112
4' 9"
4' 6-3/4"
4' 3-3/4"
4 1/2"
2' 5-1/4"
4' 10-1/2"
4' 4-1/2"
4' 3"
3' 8-1/4"
3' 6-3/4"

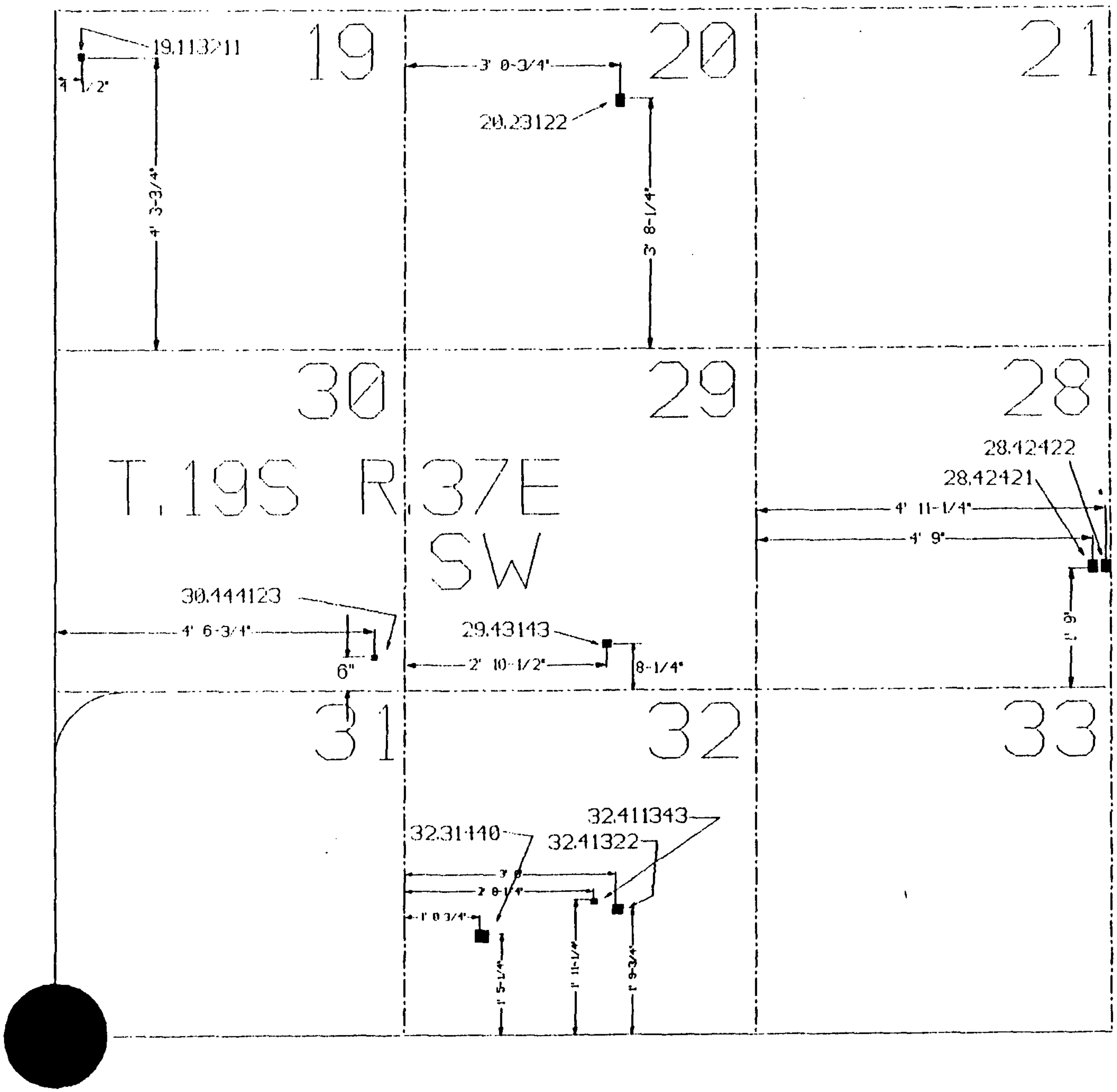
Figure 4-E

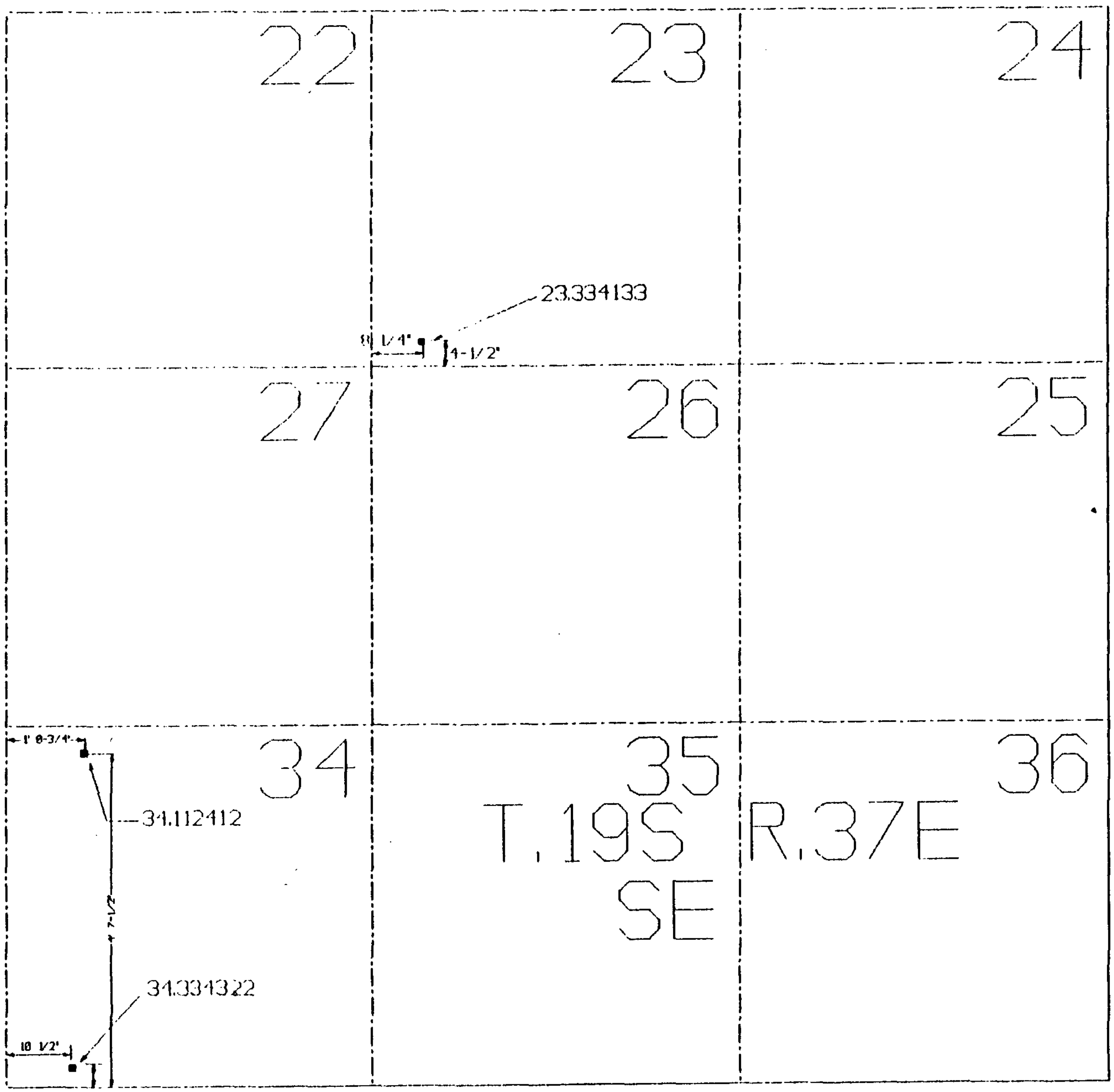

T.19S R.36E
SE
22
23
24
27
26
25
34
35
36
26.242111
26.22344
26.22440
25.11243
4' 0"
3' 9-3/4"
3' 8-1/4"
3' 10-1/2"
4' 5-1/4"
2 1/4"
6 3/4"
8 1/4"
4' 10-1/2"
1-3
4' 6"
SULFURIC PITS
3-3
HCL PITS
4-B
4-A
4-3
4-C
4' 11-1/4"
3' 8-1/4"
2' 7-1/2"
3' 4 1/2"
PLANT
2-3
4' 10-1/2"
5-A
5-3
2 1/4"
1'3/4"
1' 3"
3/4"
1/2"
12 3
10 10



T.19S R.37E
NW
6
5
4
7
8
9
18
17
16
04.111414
04.111444
04.111432
04.11333
04.411122
04.412231
08.31111
16.233212
17.43143
3' 9-3/4"
4' 4-1/2"
4' 5-1/4"
4' 6-3/4"
2'9"
3' 6"
2' 5-1/4"
2' 3"
3/4"
2' 5-1/4"
2' 11-1/4"
2' 10-1/2"
9"


3
2
1
2' 10-1/2"
01.21341
4' 0"
10
11
12
15
14
13
T.19S R.37E
NE


T.19S R.37E
SW
19
20
21
30
29
28
31
32
33
19.113211
4' 3-3/4"
1/2"
3' 0-3/4"
20.23122
3' 8-1/4"
28.42422
28.42421
4' 11-1/4"
4' 9"
1' 9"
30.444123
4' 6-3/4"
6"
29.43143
2' 10-1/2"
8-1/4"
32.31440
32.41322
32.411343
3' 0
2' 0-1/4"
1' 0-3/4"
1' 5-1/4"
1' 11-1/4"
1' 9-3/4"


22
23
24
23.334133
8 1/4"
4-1/2"
27
26
25
34
35
36
1' 0-3/4"
34.112412
7-1/2
34.334322
10 1/2"
T.19S
SE
R.37E

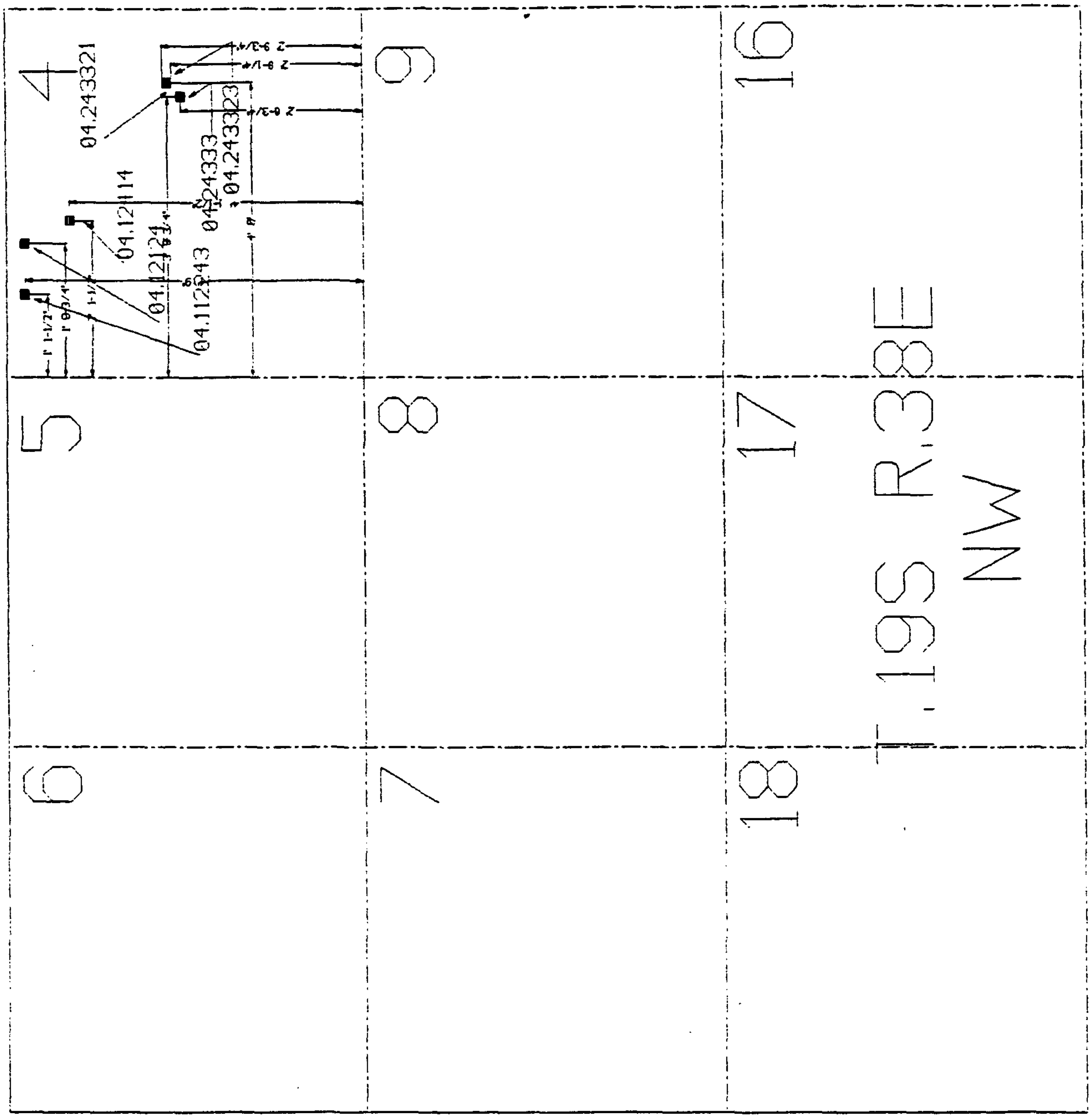
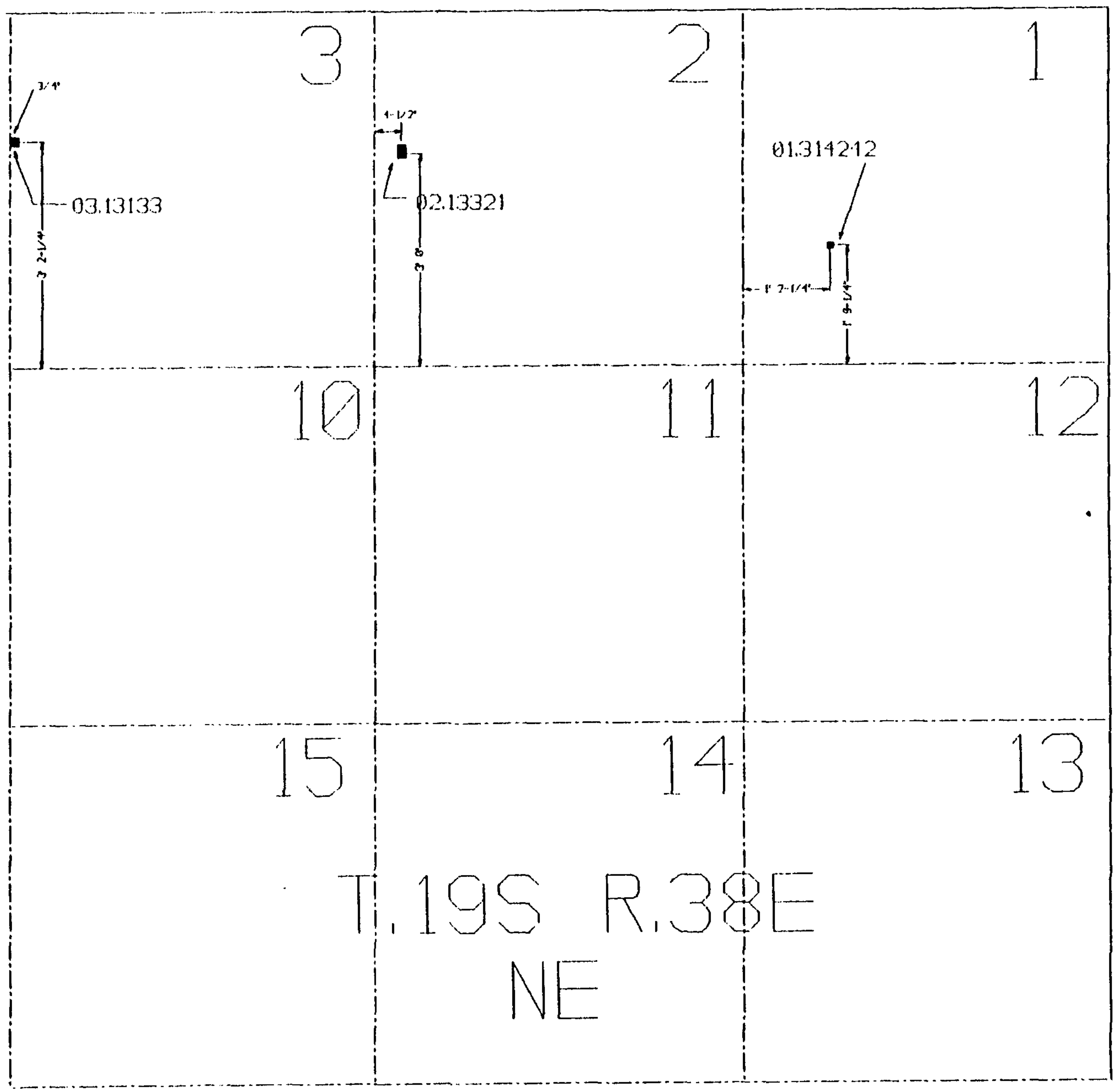
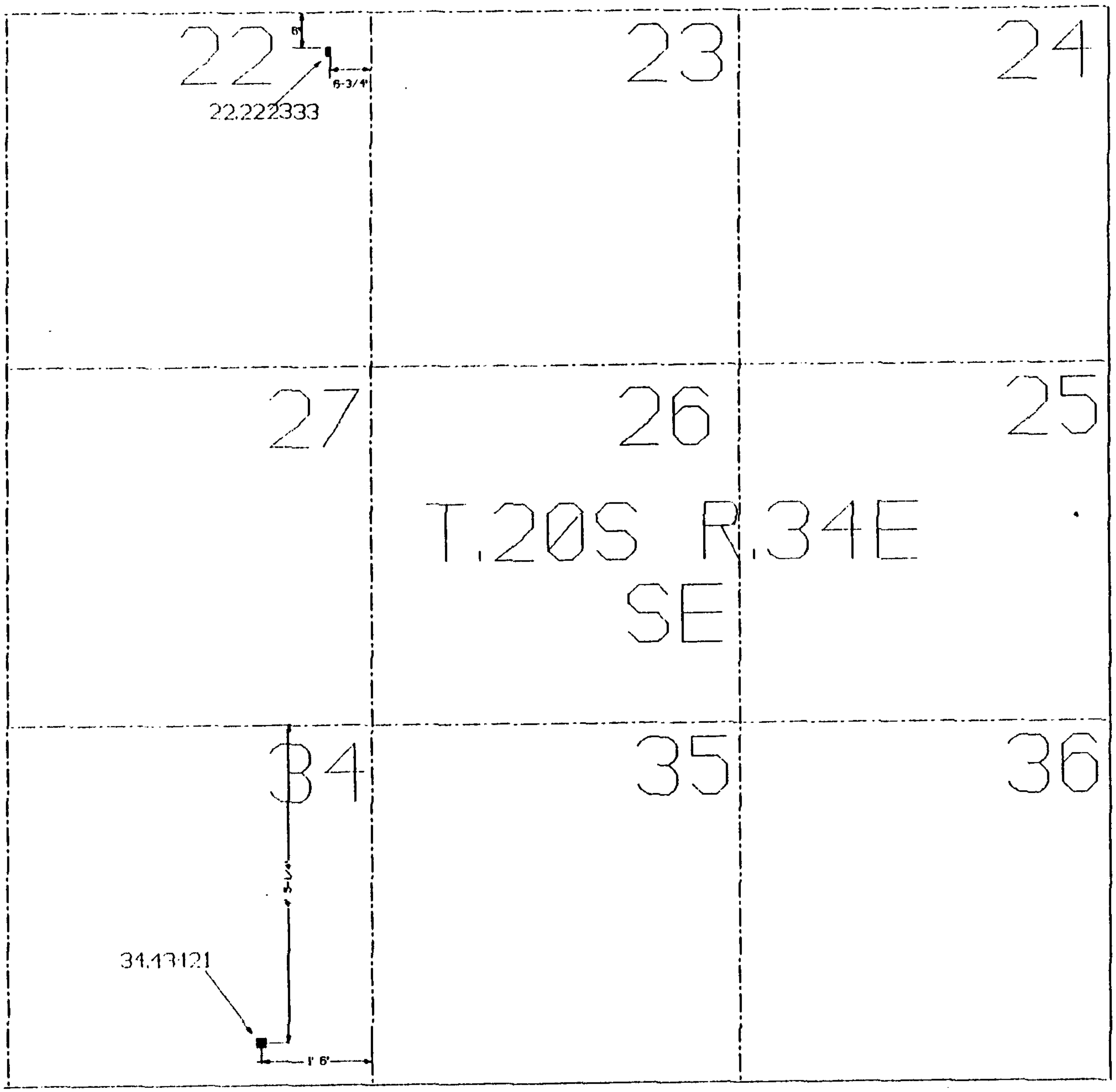
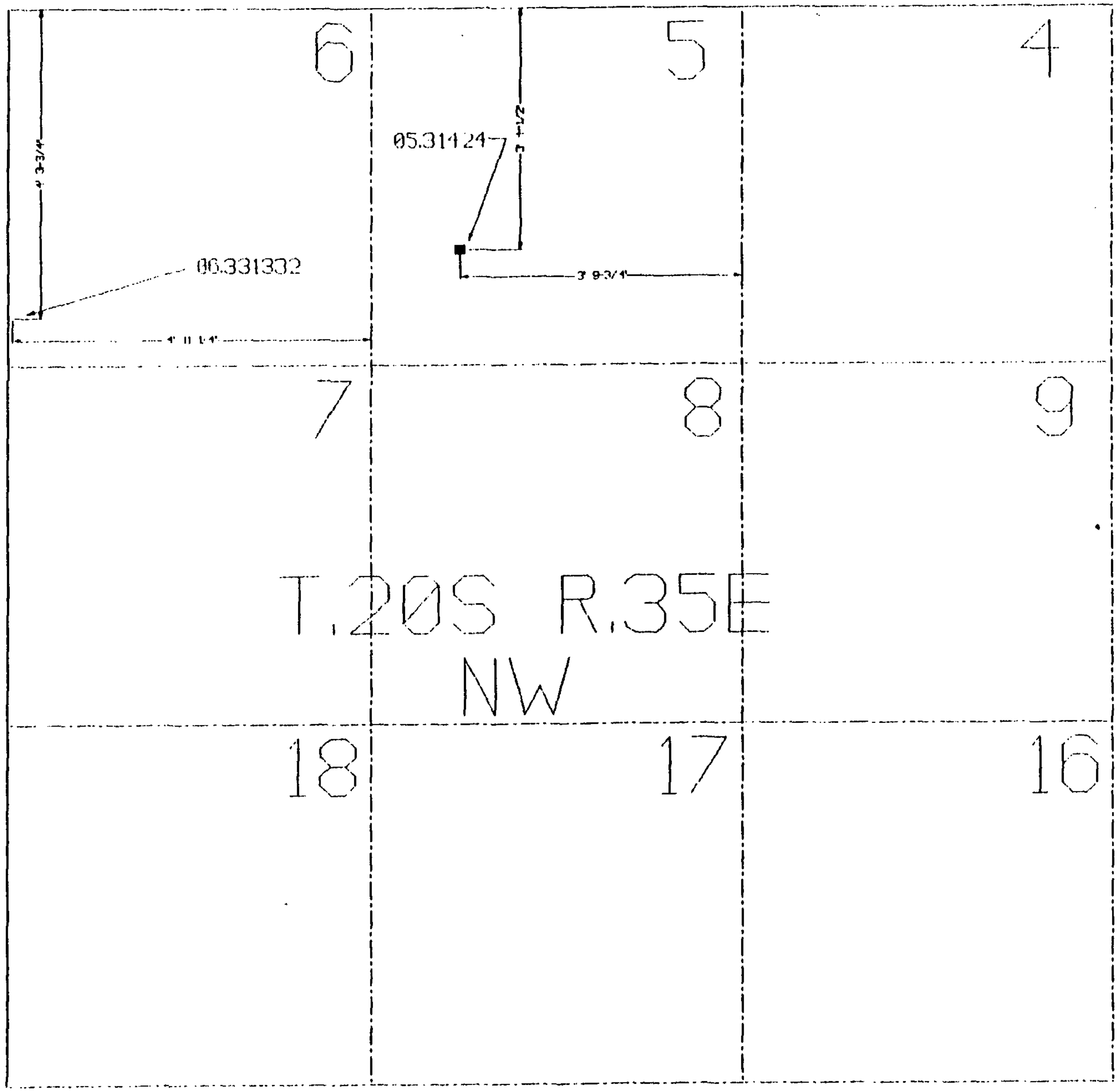

4
5
6
9
8
7
16
17
18
T.19S R.38E
NW
04.243321
04.243333
04.243323
04.121114
04.121124
04.112243

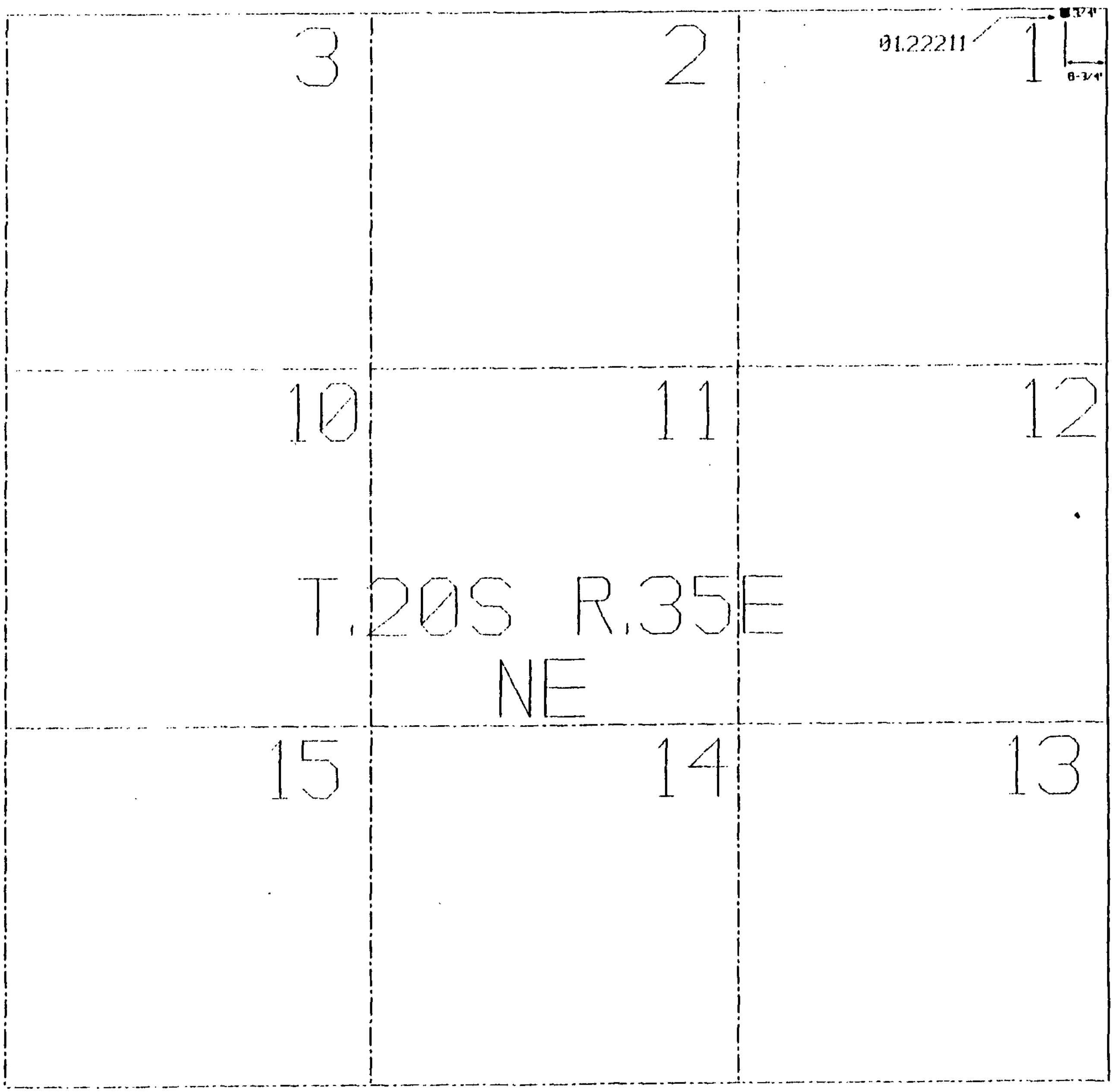
Figure 4-K


3
2
1
3/4"
03.13133
3' 2-1/4"
1-1/2"
02.13321
3' 8"
01.314212
1' 2-1/4"
1' 9-1/4"
10
11
12
15
14
13
T.19S R.38E
NE

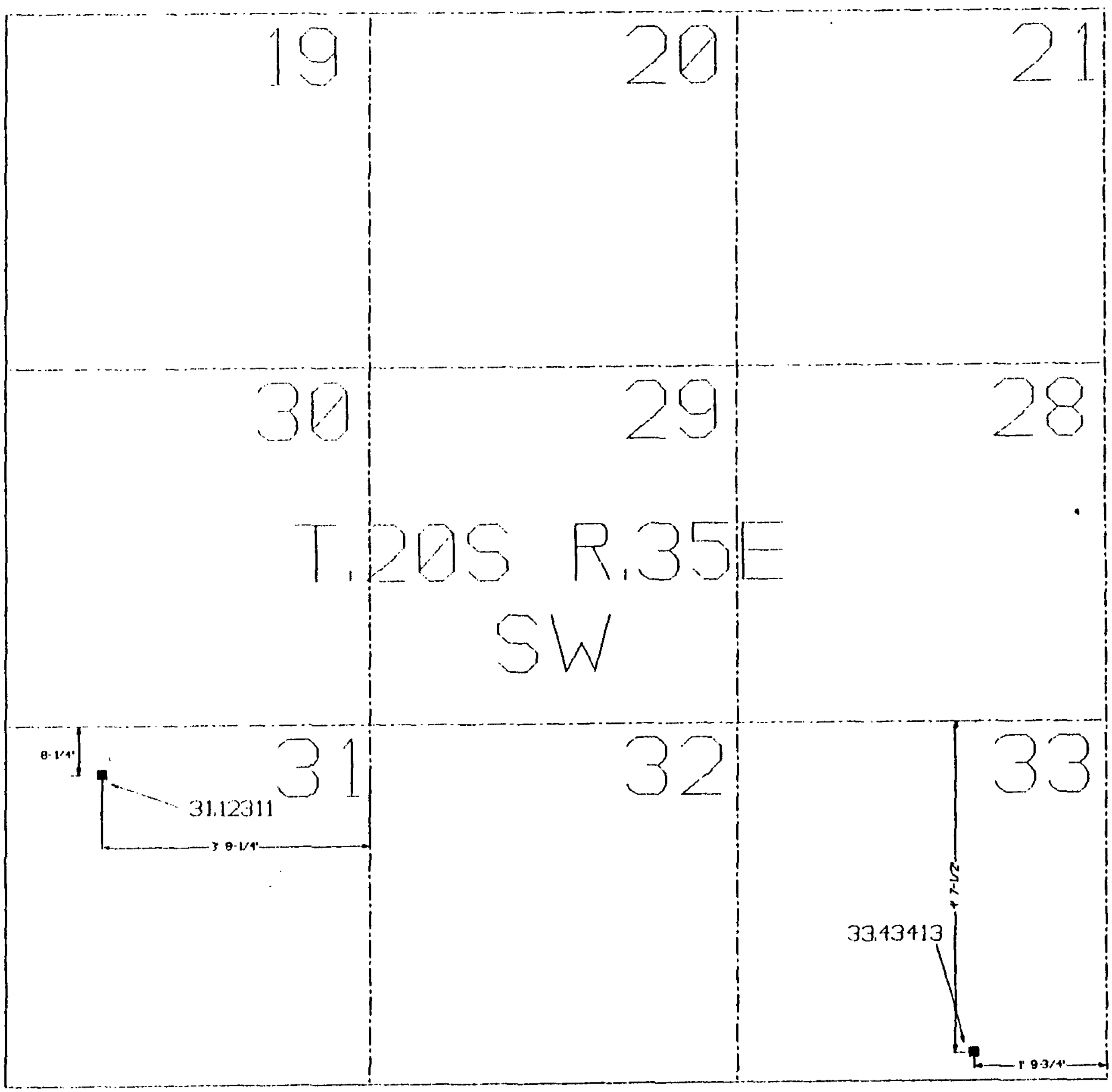

22
23
24
27
26
25
34
35
36
T.20S R.34E
SE
22.222333
6-3/4'
34.43121
1' 6'



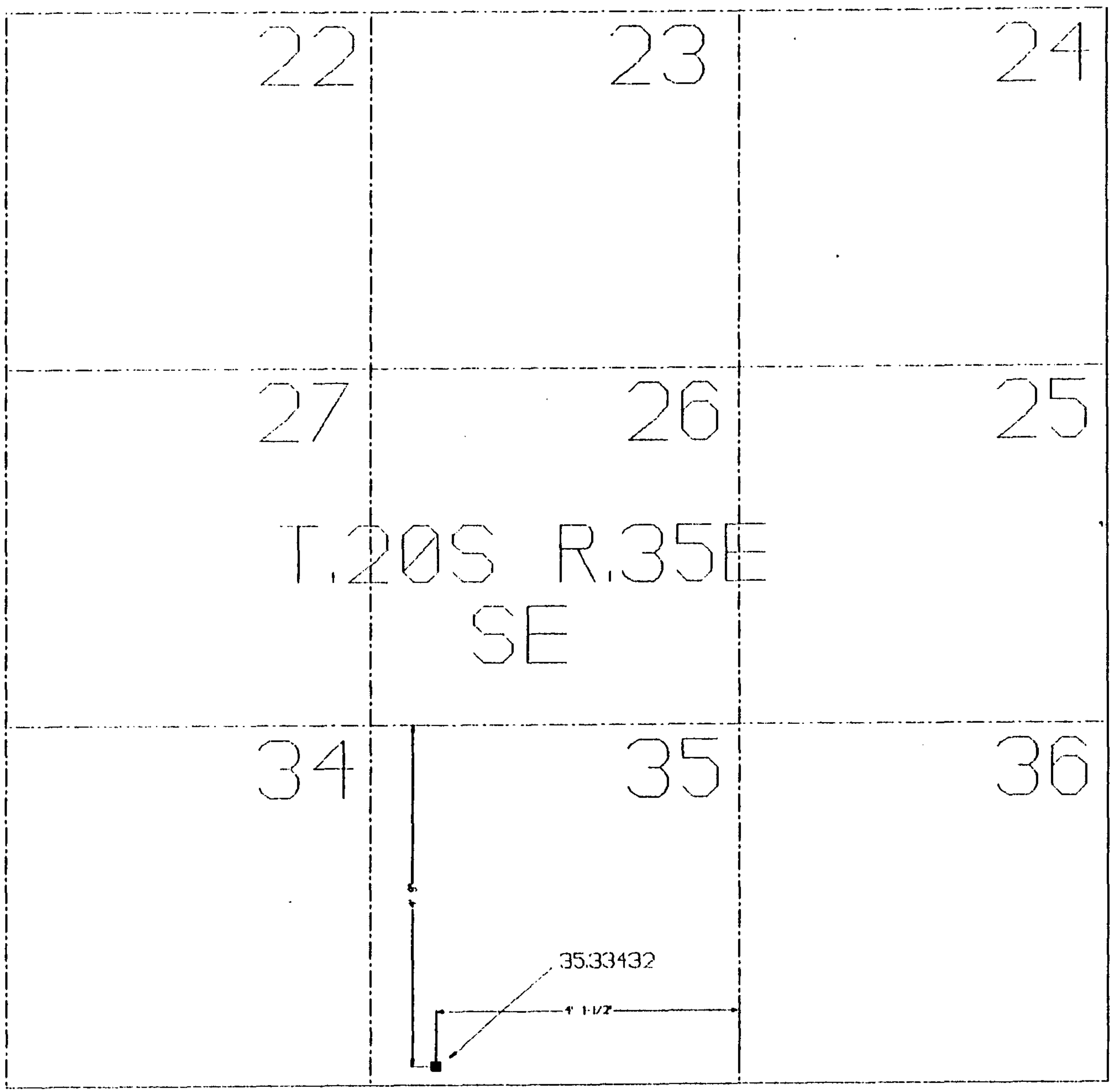
6
5
4
05.314124
06.331332
7
8
9
T.20S R.35E
NW
18
17
16

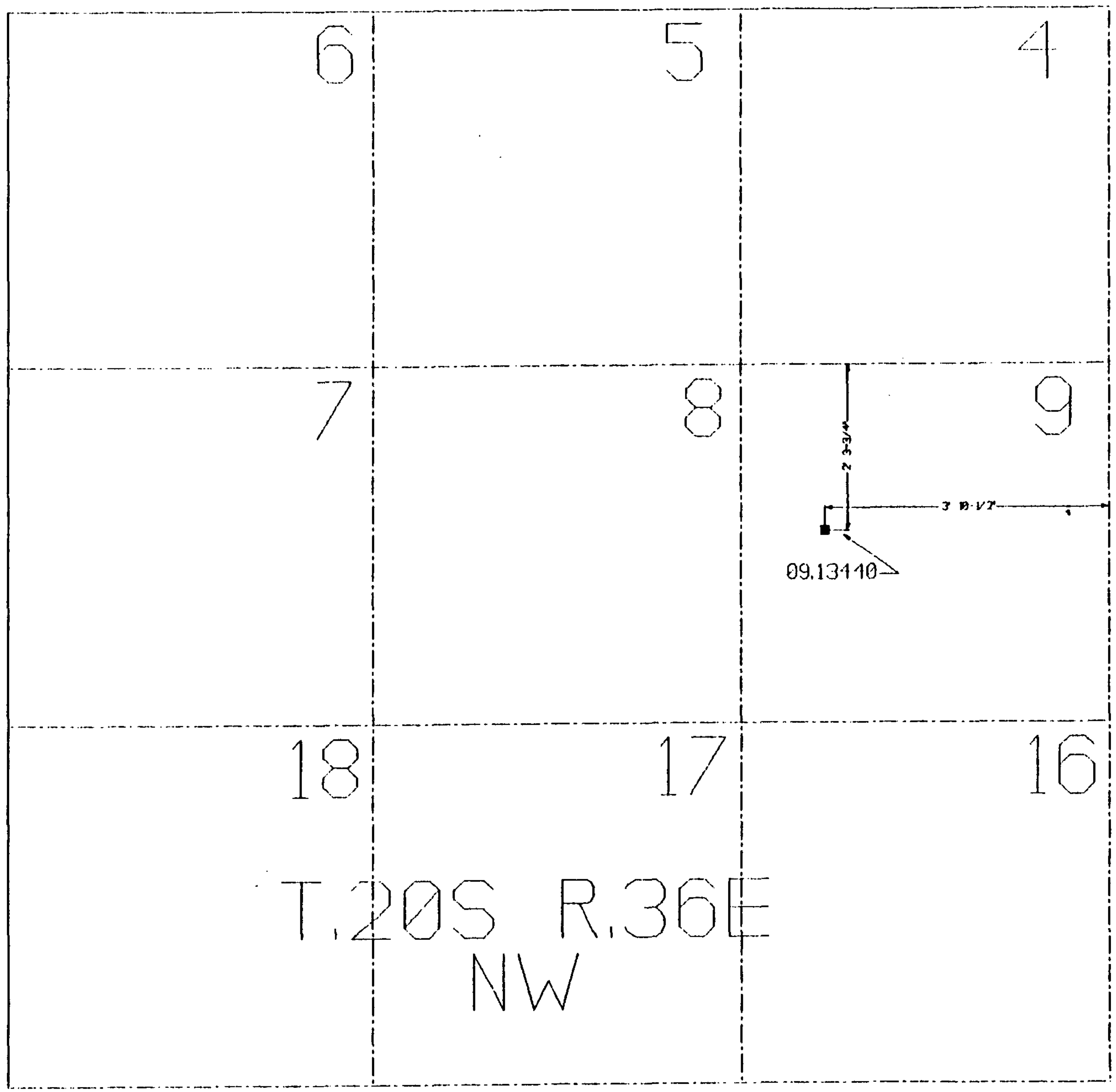


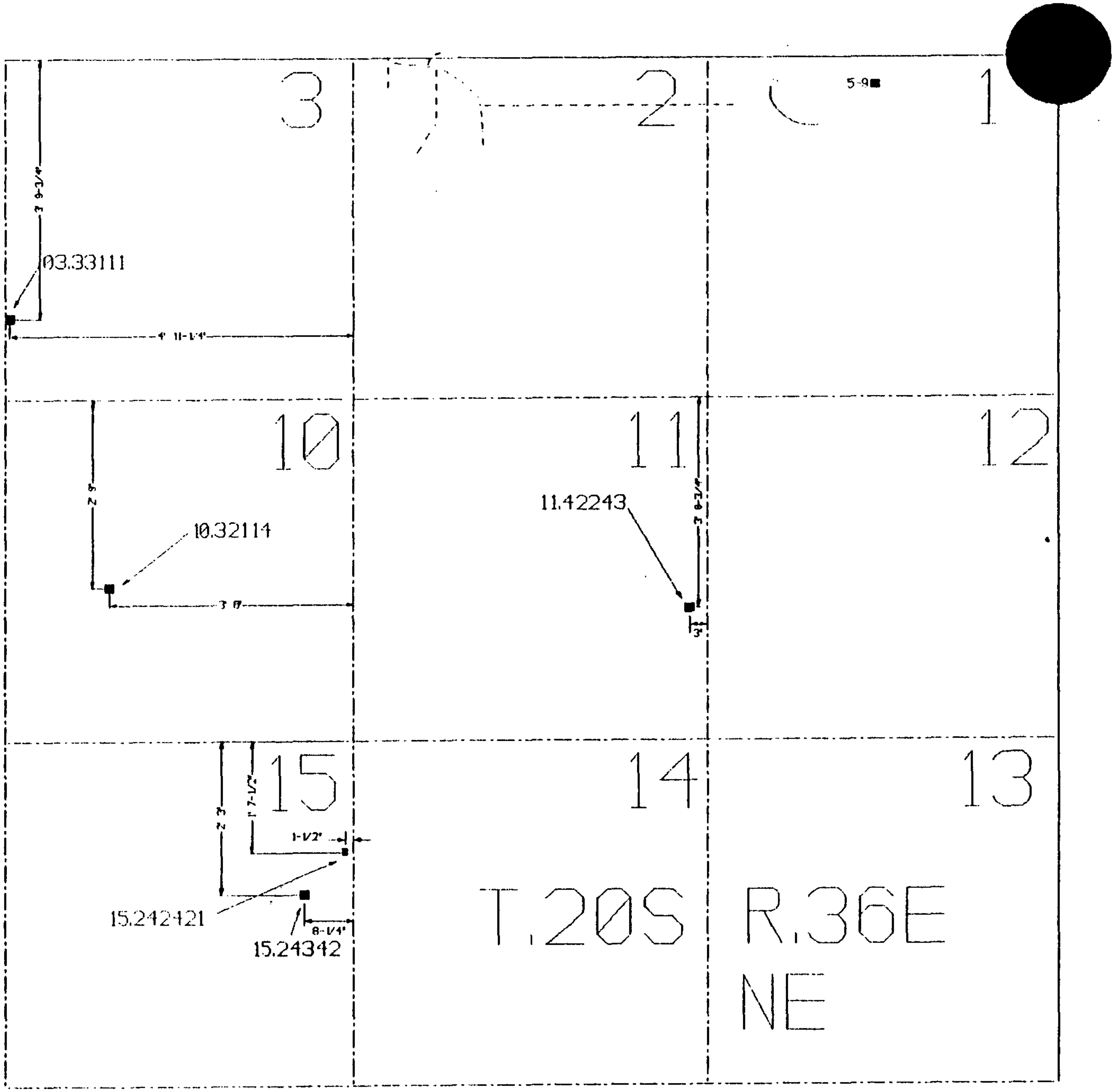
01.22211
3
2
1
10
11
12
T.20S R.35E
NE
15
14
13



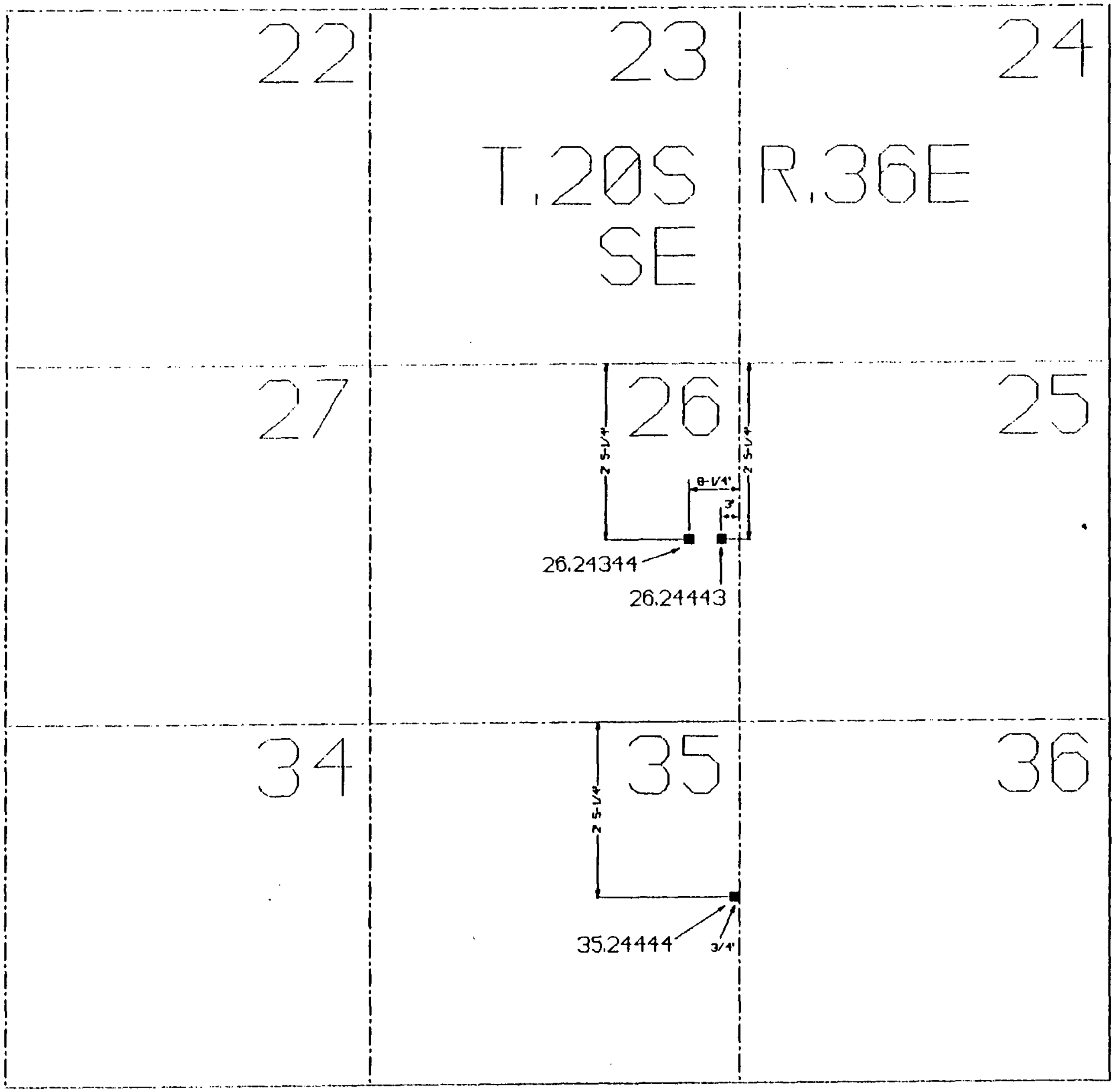
19
20
21
30
29
28
T.20S R.35E
SW
31
32
33
8-1/4"
31.12311
3' 8-1/4"
33.43413
4' 7-1/2
1' 9-3/4"

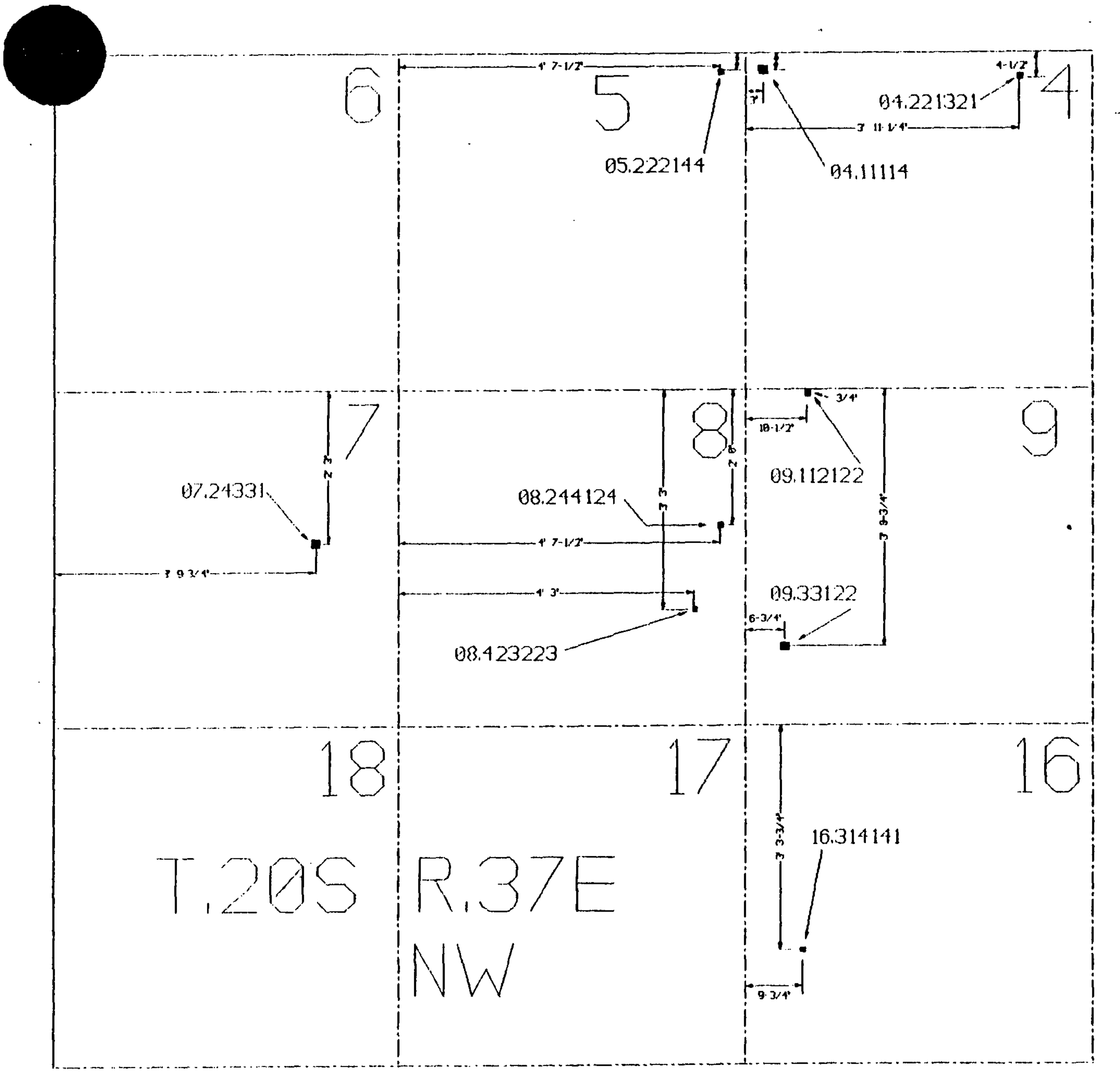

22
23
24
27
26
25
T.20S R.35E
SE
34
35
36
35.33432
4' 1-1/2"

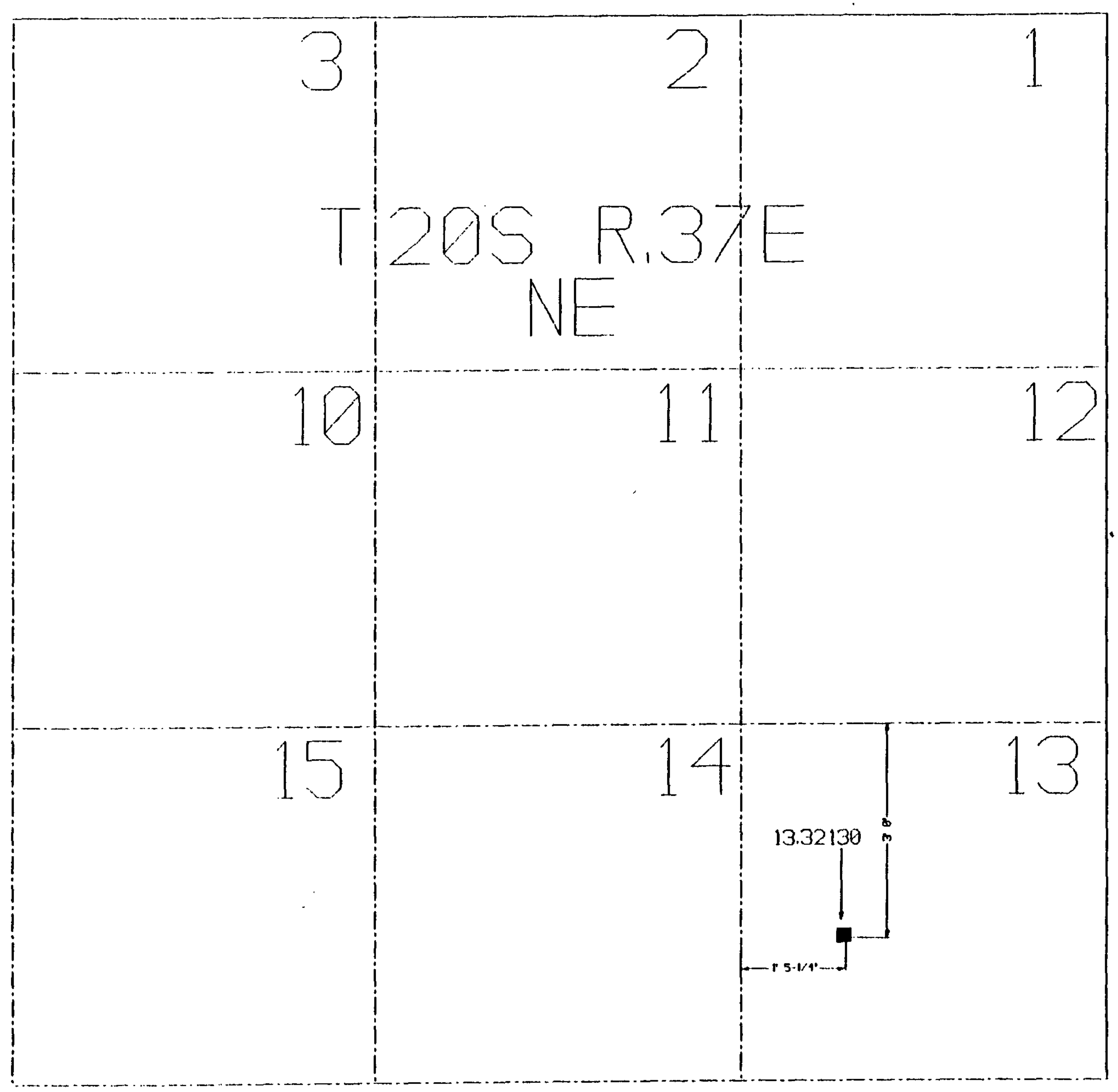

6
5
4
7
8
9
2' 3-3/4"
3' 10-1/2"
09.13110
18
17
16
T.20S R.36E
NW



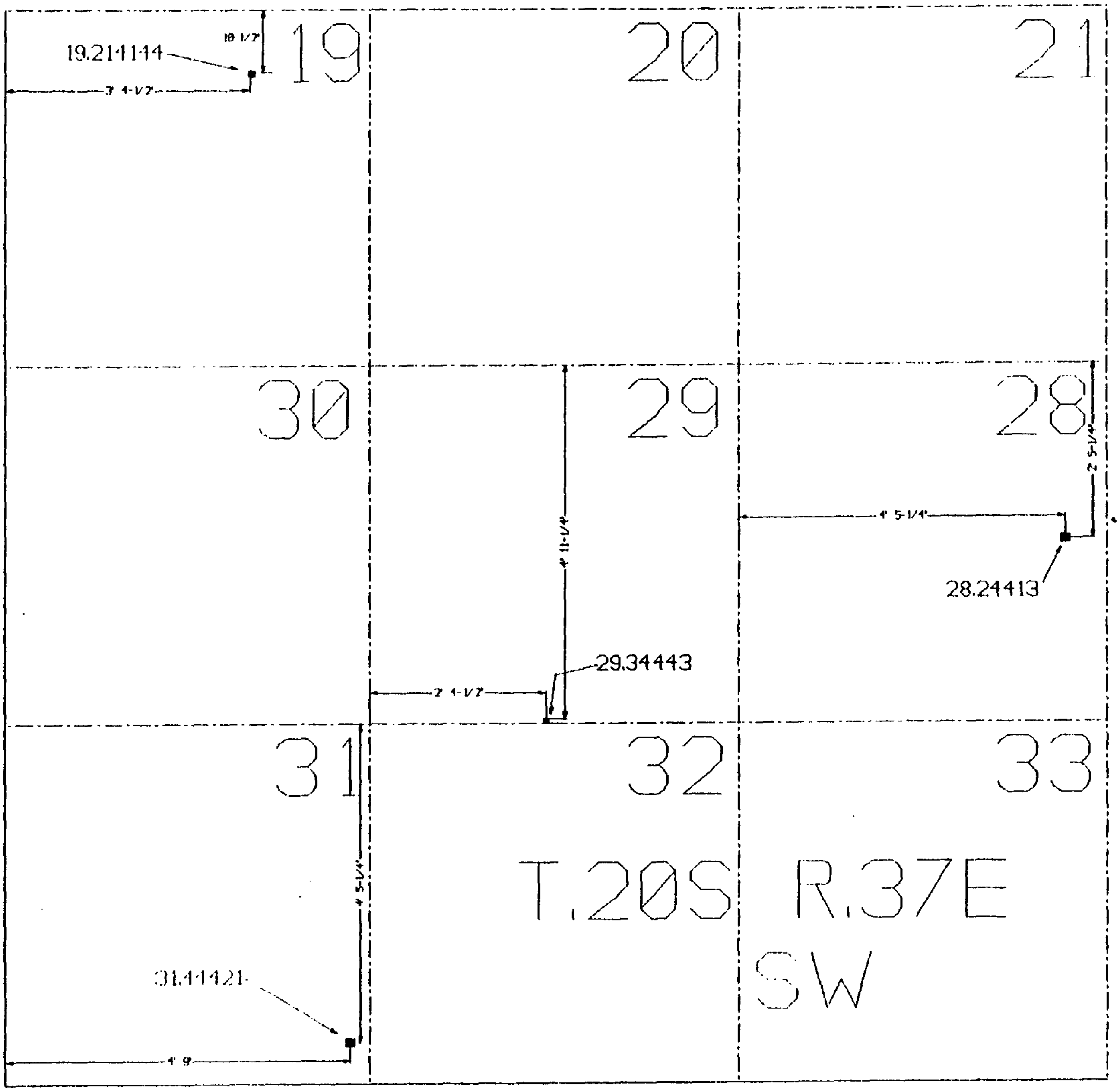
3
2
1
5-9
03.33111
3' 9-3/4"
4' 11-1/4"
10
11
12
10.32114
2' 9"
3' 8"
11.42243
3' 8-3/4"
3"
15
14
13
15.242421
15.24342
2' 3"
1' 7-1/2"
1-1/2"
8-1/4"
T.20S
R.36E
NE


22
23
24
T.20S R.36E
SE
27
26
25
2 5-1/4"
8-1/4"
3"
26.24344
26.24443
34
35
36
35.24444
3/4"


6
5
4
7
8
9
18
17
16
T.20S R.37E
NW
04.221321
04.11114
05.222144
07.24331
08.244124
08.423223
09.112122
09.33122
16.314141
4' 7-1/2"
3' 11-1/4"
4-1/2"
3' 9-3/4"
4' 3"
10-1/2"
3/4"
6-3/4"
3' 3-3/4"
9-3/4"



3
2
1
T 20S R.37E
NE
10
11
12
15
14
13
13.32130
3 8'
1' 5-1/4'



19
20
21
30
29
28
31
32
33
T.20S R.37E
SW
19.214114
10 1/2"
3' 4-1/2"
29.34443
2' 4-1/2"
4' 11-1/4"
28.24413
4' 5-1/4"
2' 5-1/4"
31.44421
4' 9"
4' 5-1/4"

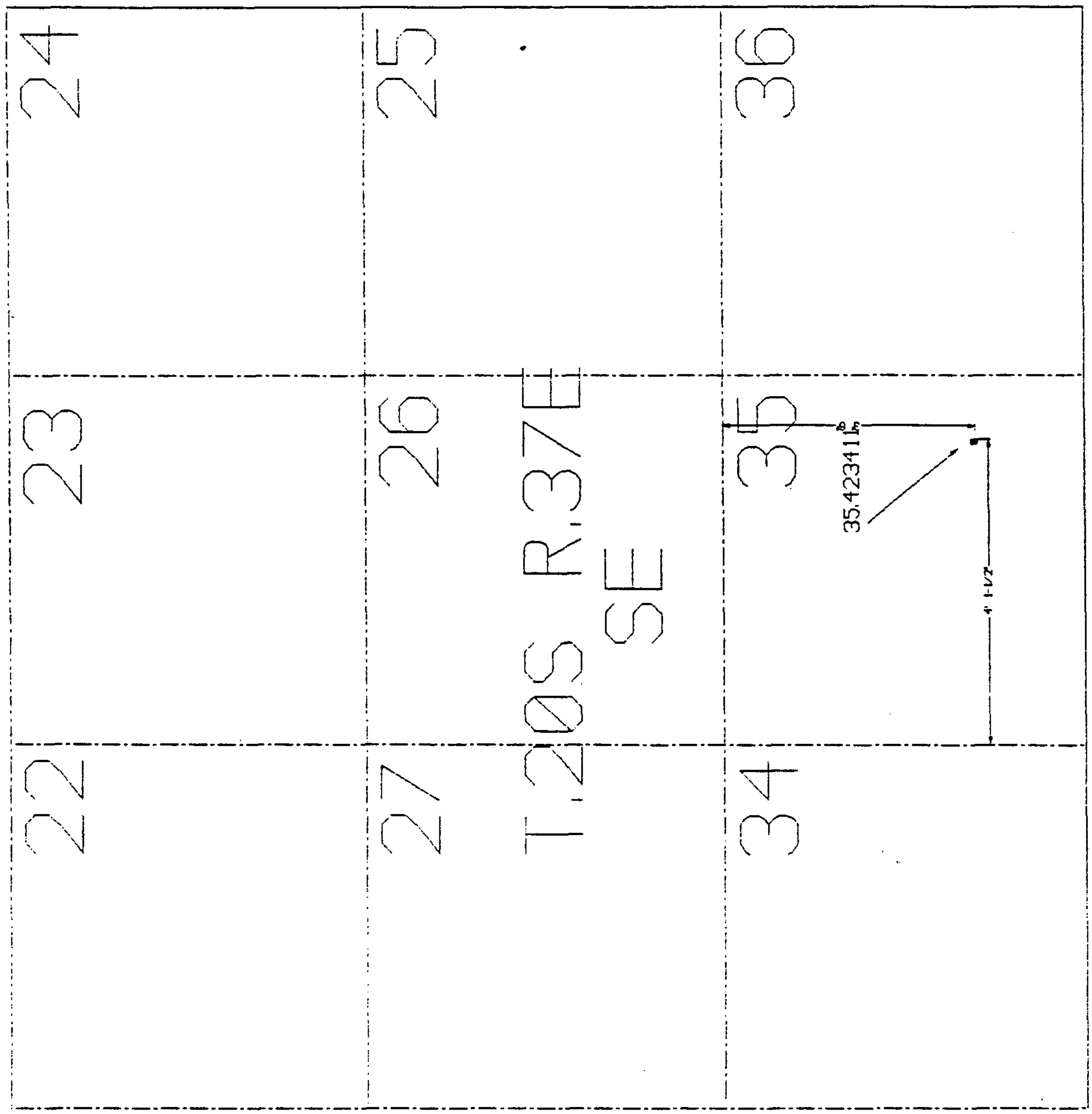
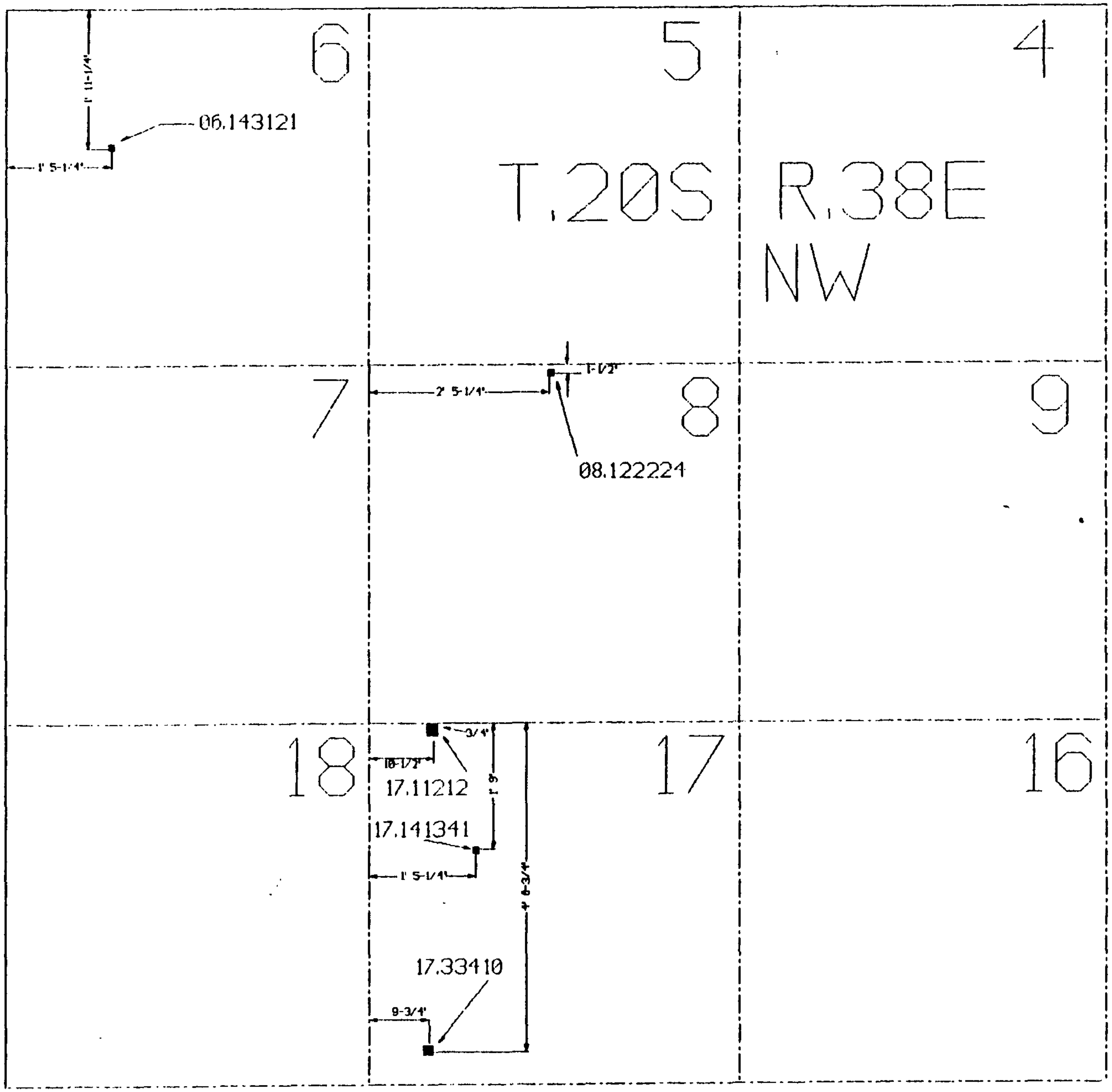
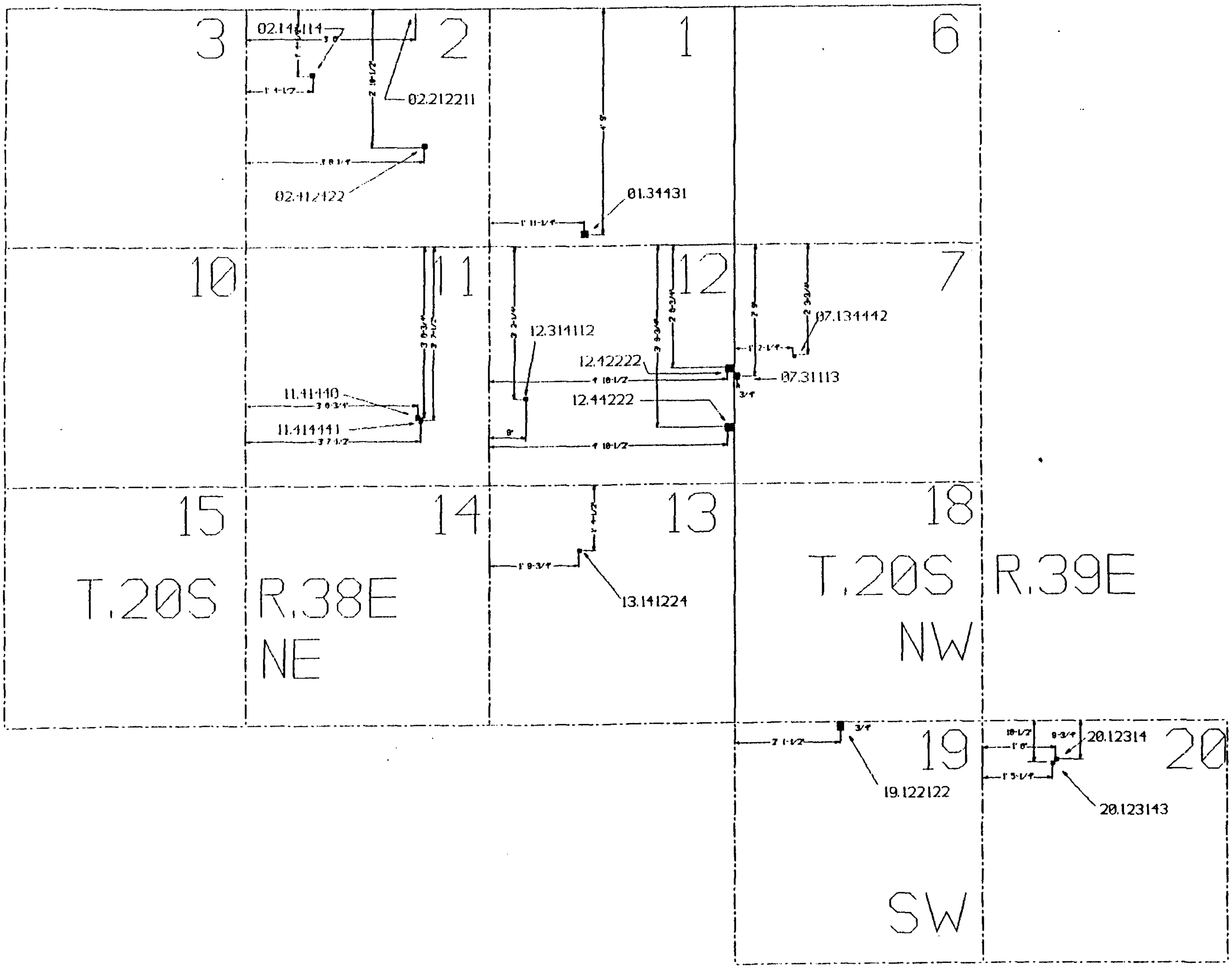


Figure 4-Y



6
5
4
T.20S R.38E
NW
06.143121
1' 11-1/4"
1' 5-1/4"
7
8
9
1-1/2"
2' 5-1/4"
08.122224
18
17
16
3/4"
10-1/2"
17.11212
1' 9"
17.141341
1' 5-1/4"
4' 6-3/4"
17.33410
9-3/4"


3
2
1
6
10
11
12
7
15
14
13
18
19
20
T.20S R.38E
NE
T.20S R.39E
NW
SW
02.141114
02.212211
02.412422
01.34431
07.134442
07.31113
12.314112
12.42222
12.44222
11.41440
11.414441
13.141224
19.122122
20.12314
20.123143

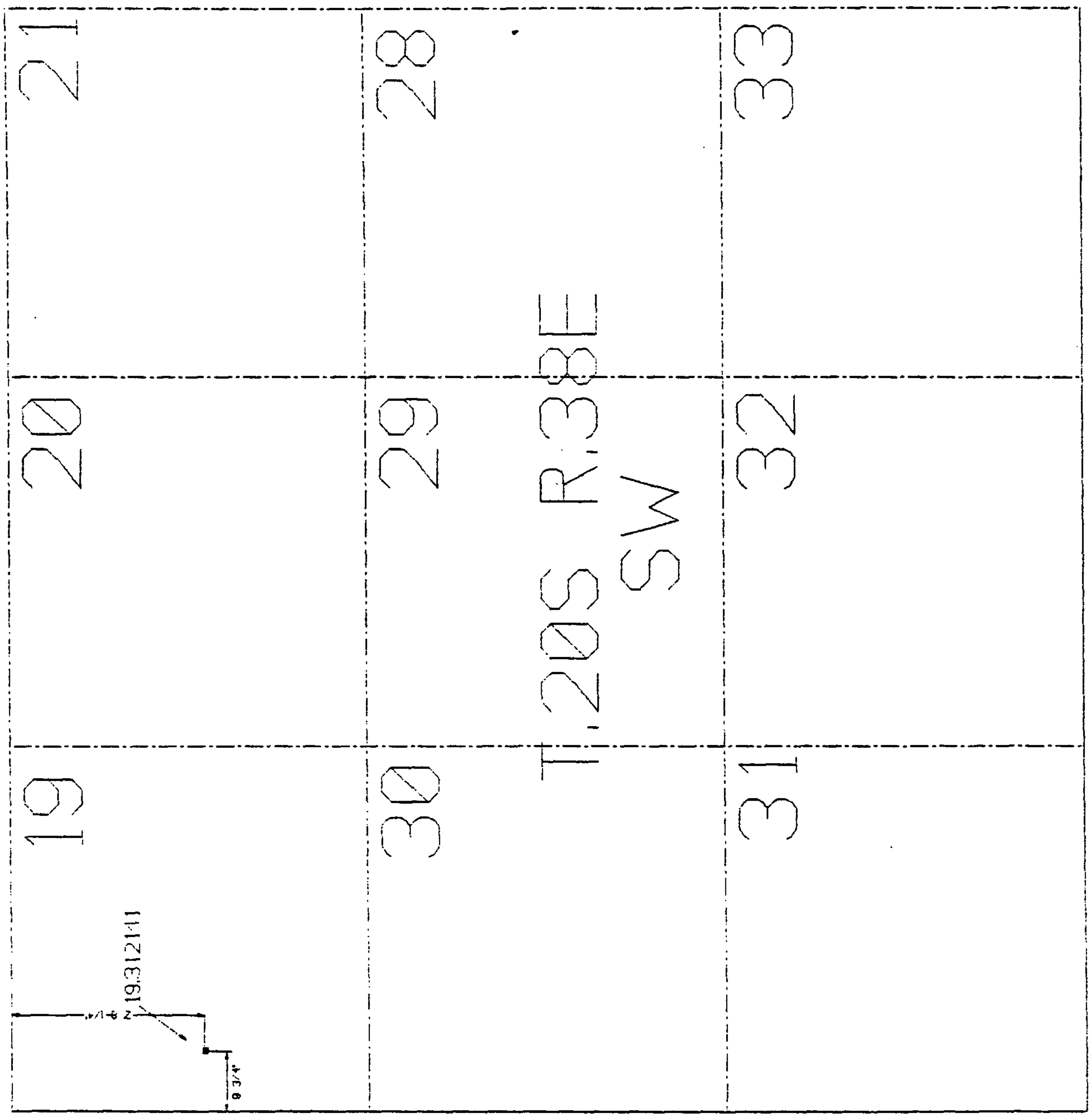


Figure 4-AA

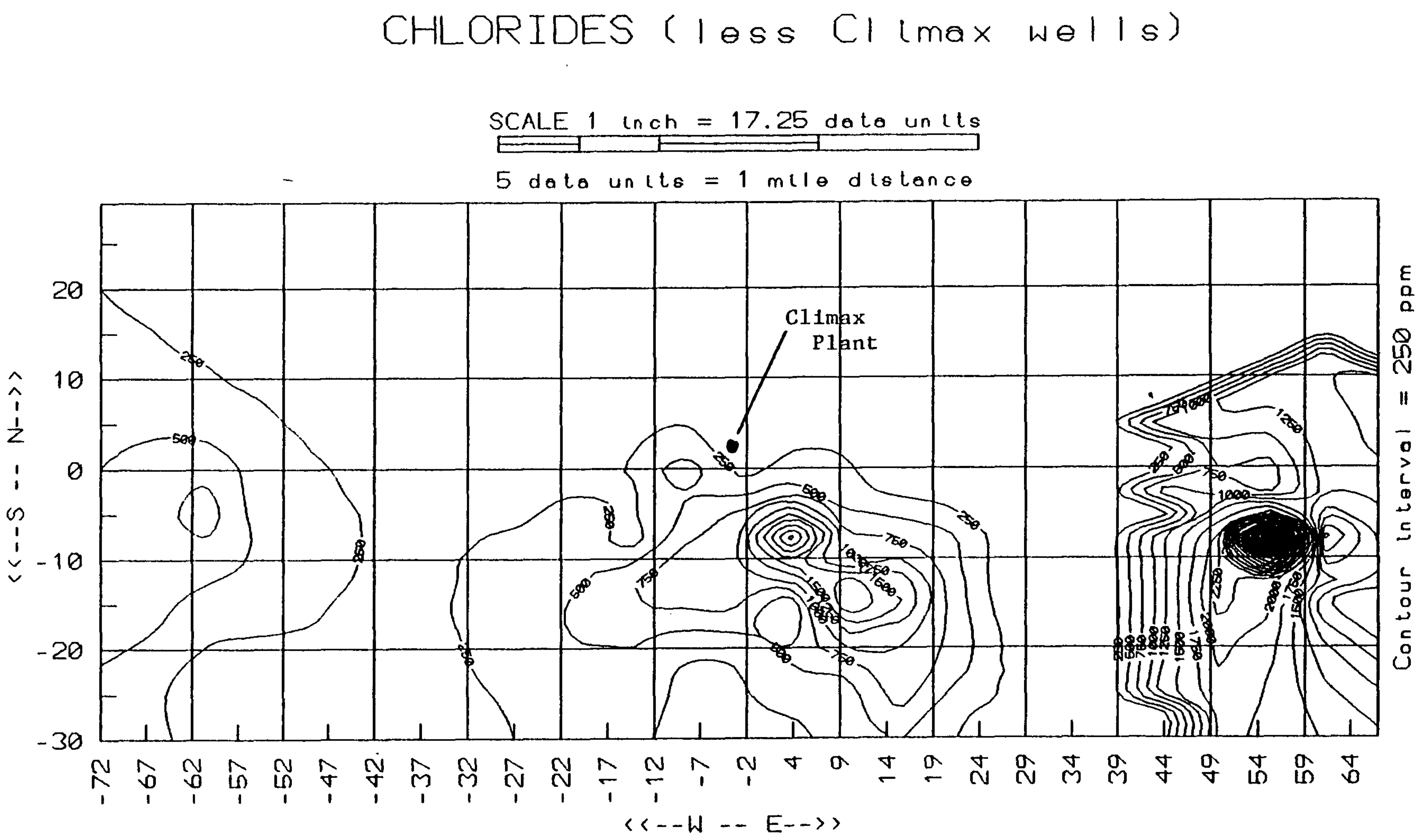


FIGURE 5

FIGURE 5

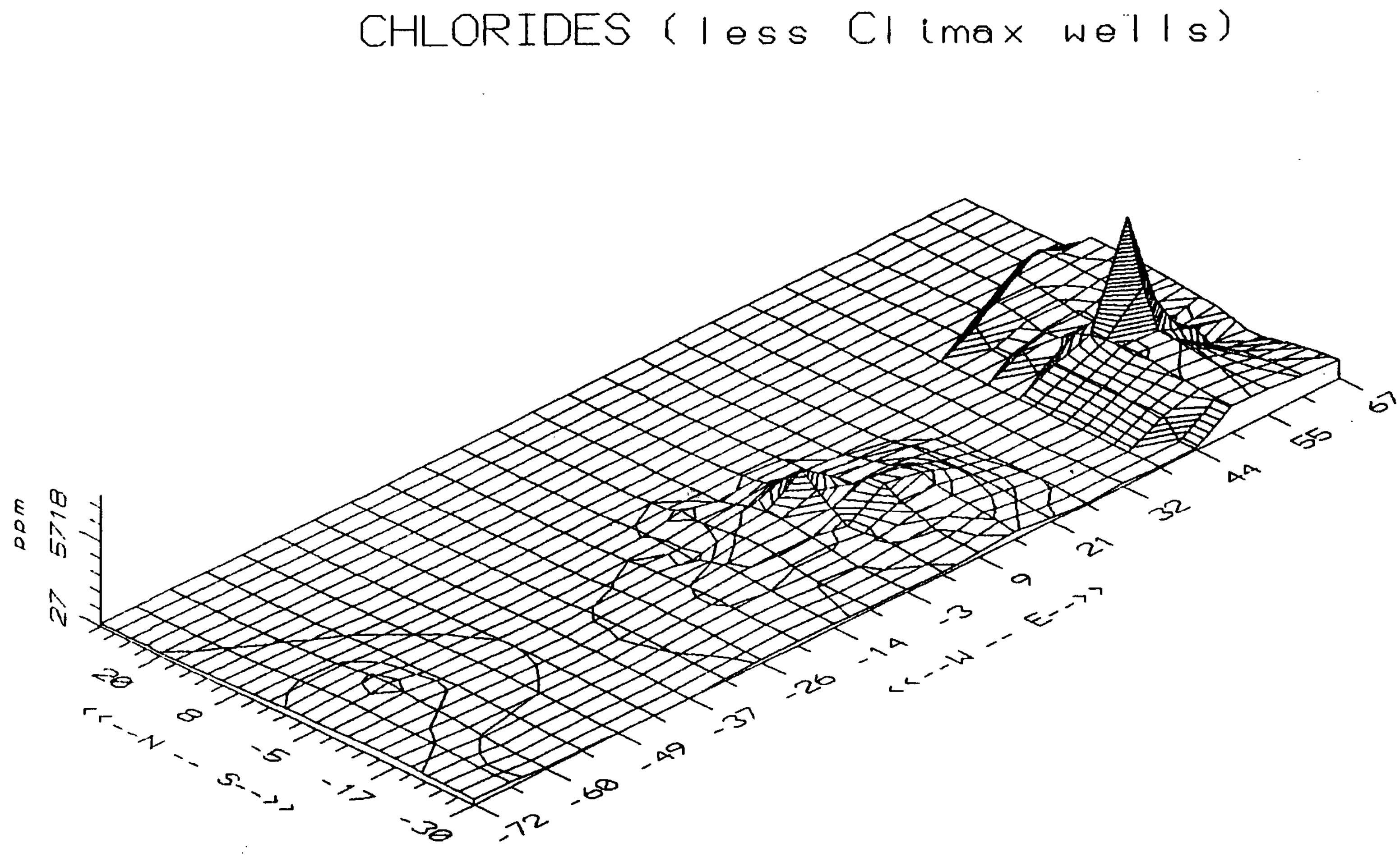

CHLORIDES (less Climax wells)
ppm
27
5718
<<--N -- S-->>
20
8
-5
-17
-30
<<--W -- E-->>
-72
-60
-49
-37
-26
-14
-3
9
21
32
44
55
67

FIGURE 6

TDS (less Climax wells)

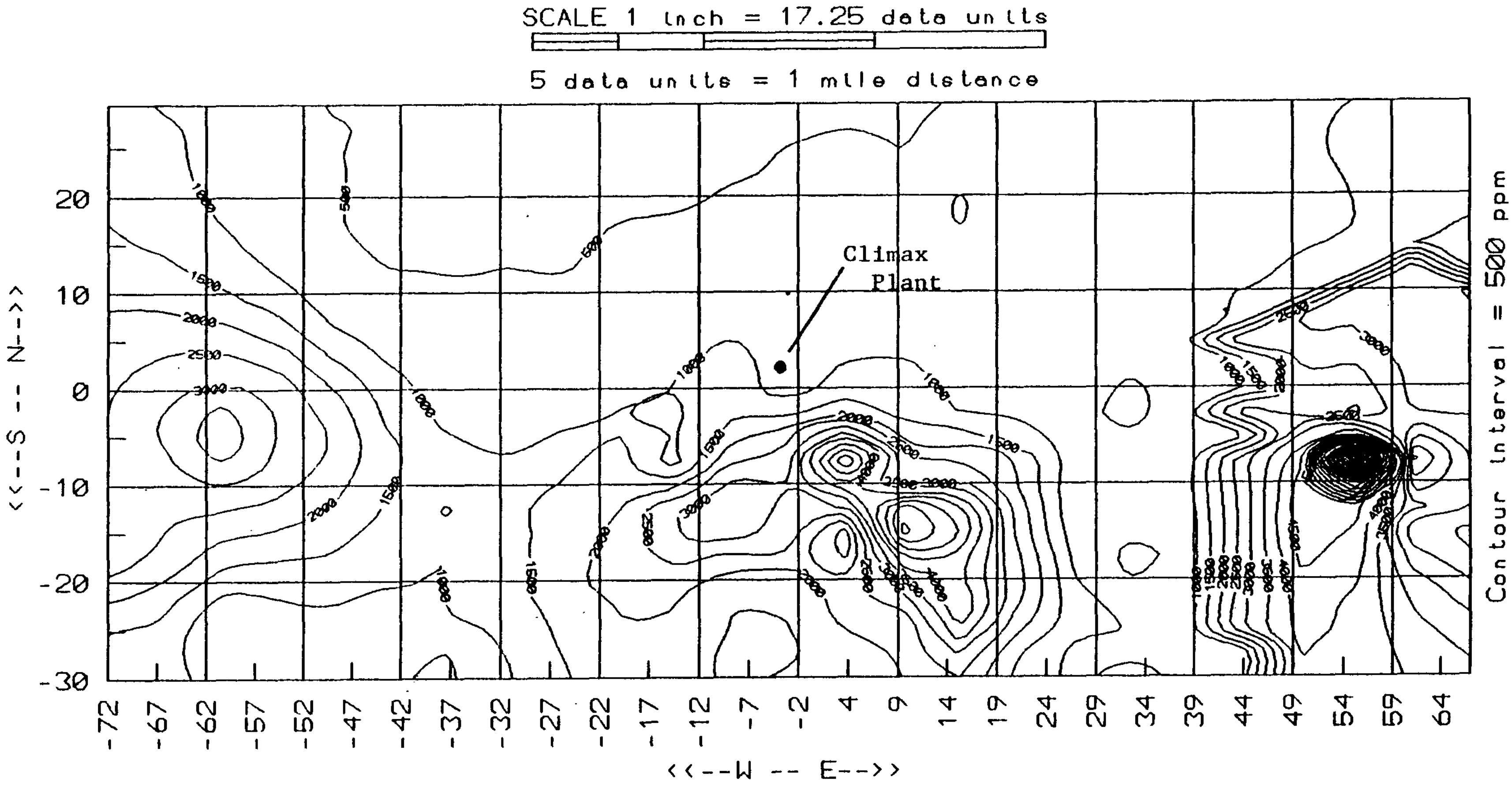


FIGURE 7

TDS (less Climax wells)

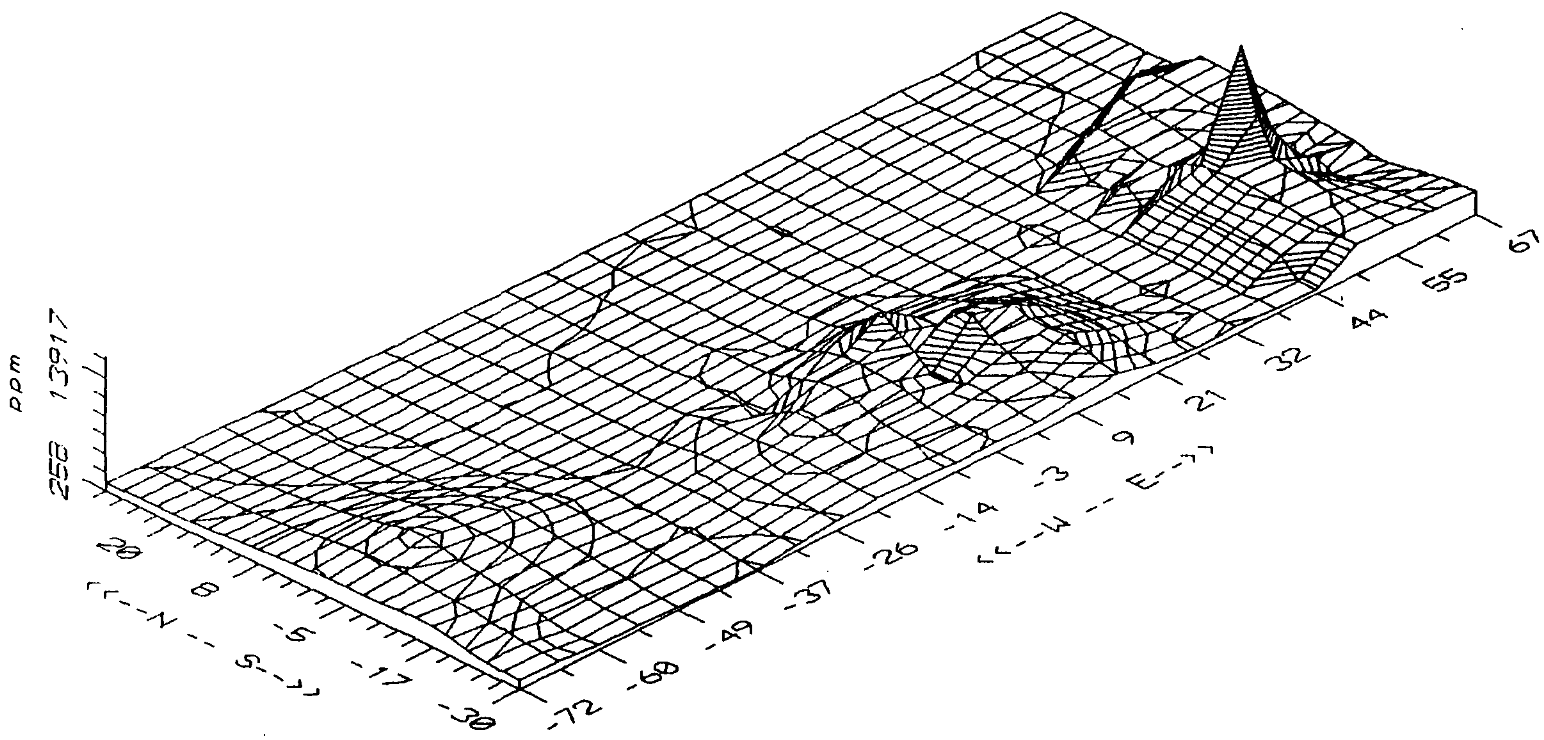


FIGURE 8

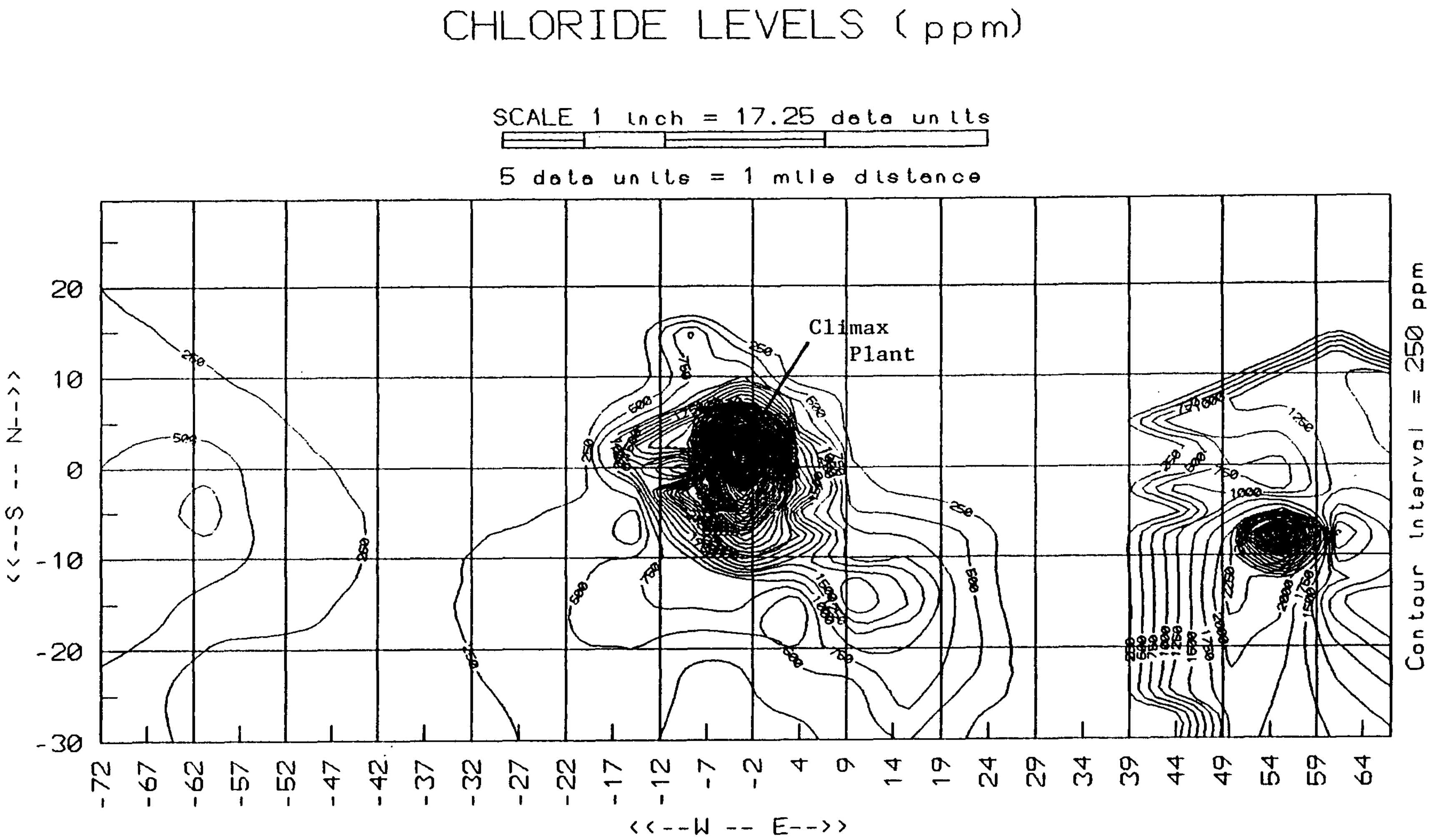


FIGURE 9

FIGURE 9

CHLORIDE LEVELS (ppm)

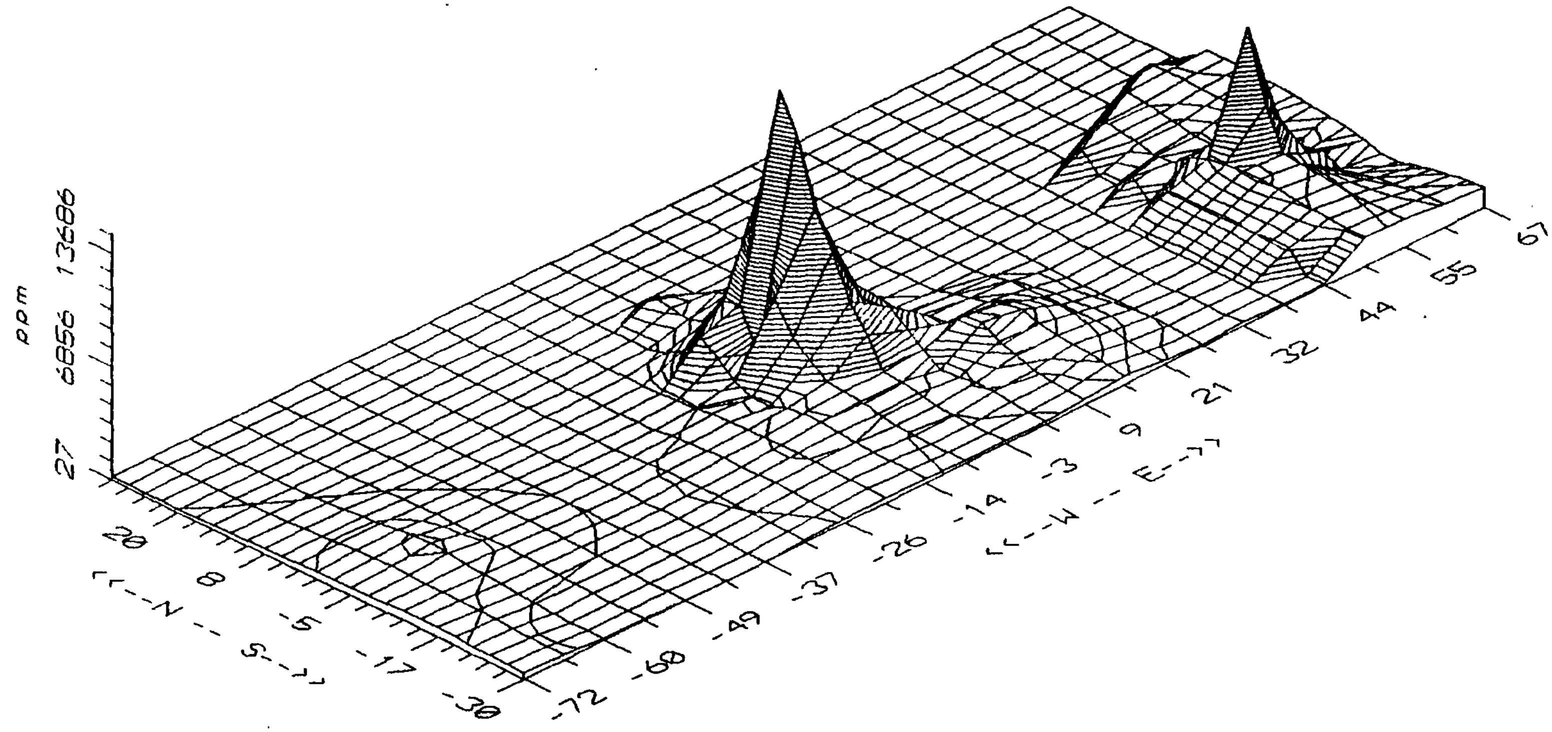


FIGURE 10

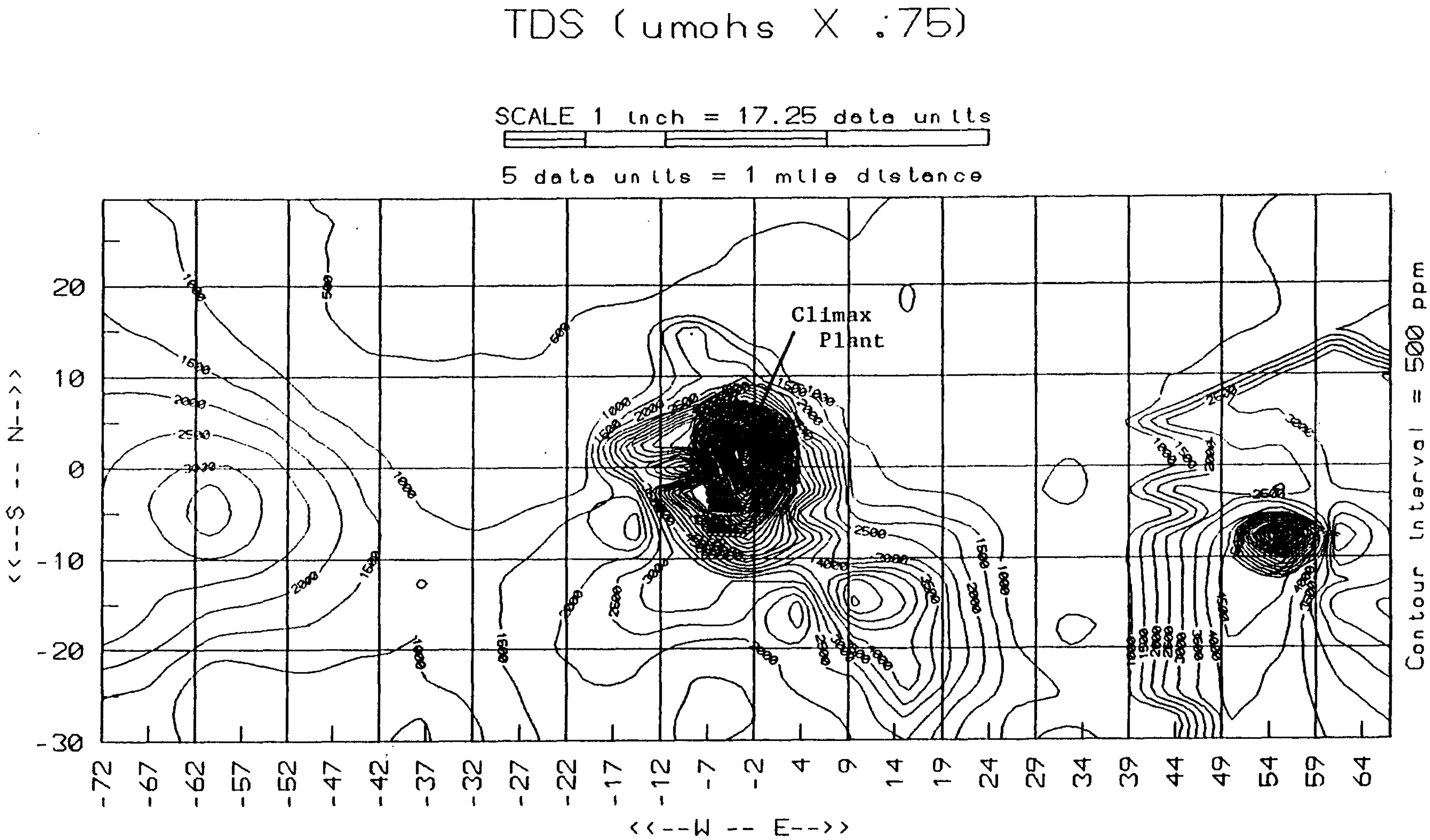


FIGURE 11

FIGURE 11

TDS (umohs X .75)

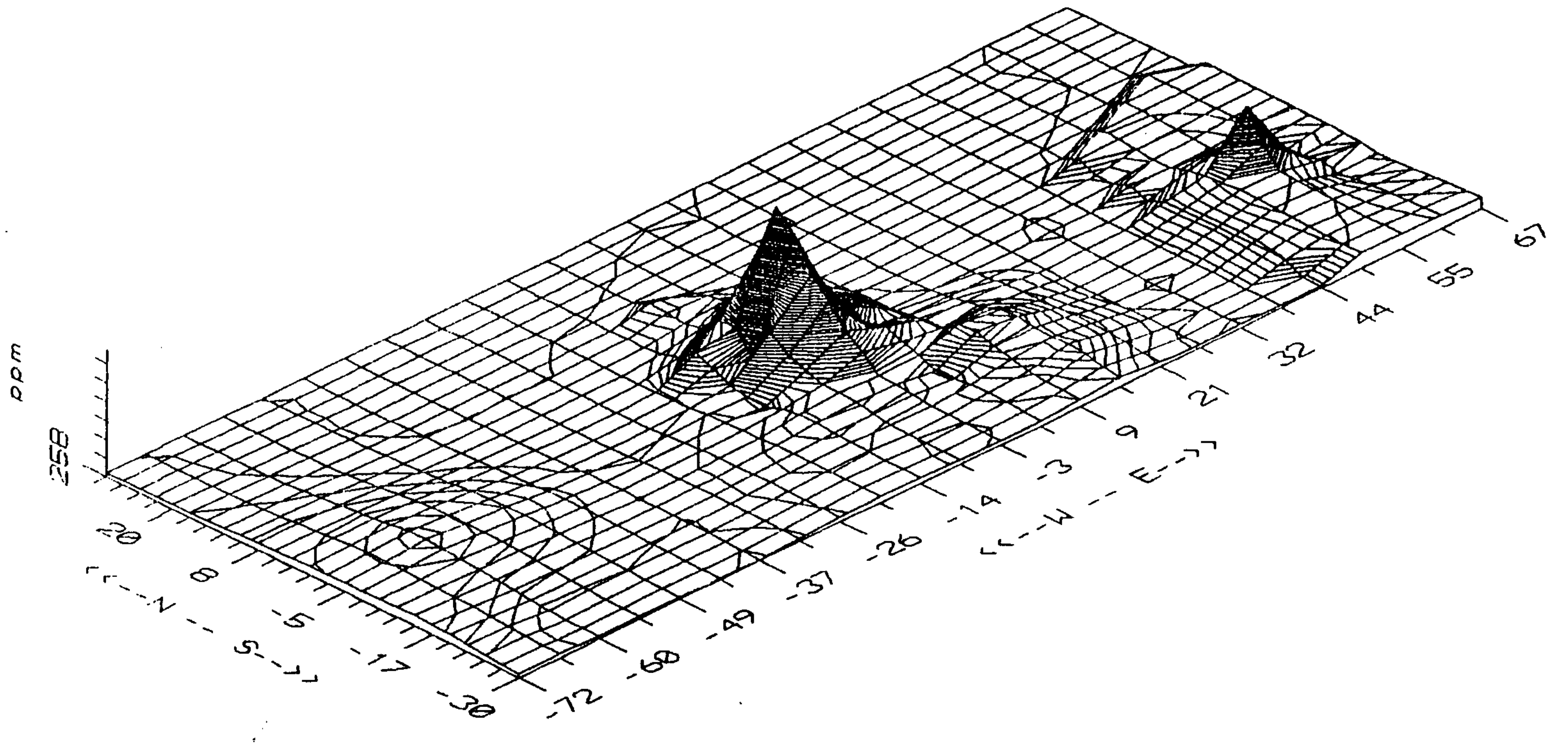
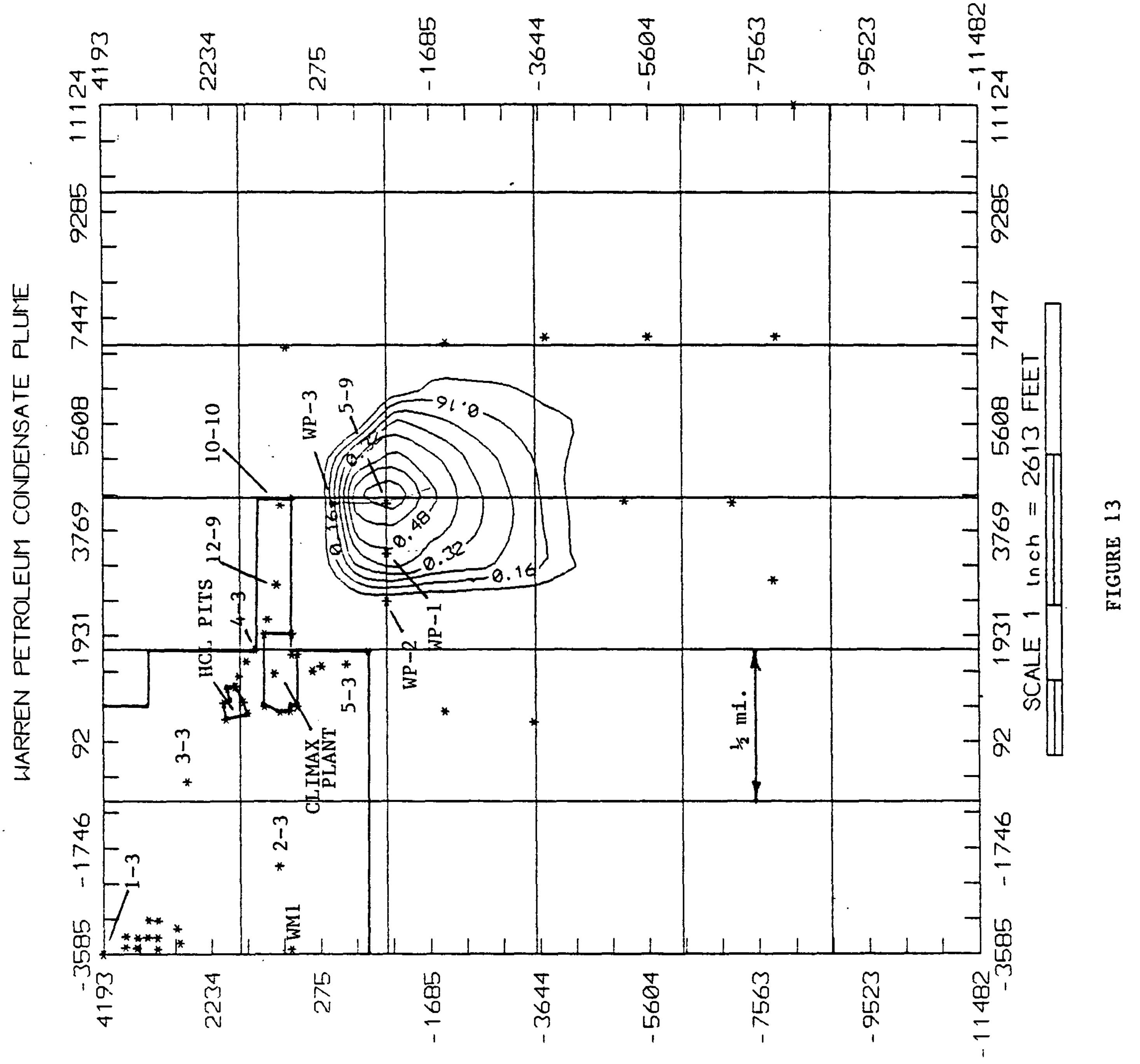


FIGURE 12



WARREN PETROLEUM CONDENSATE PLUME
SCALE 1 inch = 2613 FEET
FIGURE 13
10-10
12-9
4-3
HCL PITS
CLIMAX PLANT
5-3
3-3
2-3
1-3
WM1
WP-1
WP-2
WP-3
5-9
0.16
0.32
0.48
½ mi.
4193
2234
275
-1685
-3644
-5604
-7563
-9523
-11482
-3585
-1746
92
1931
3769
5608
7447
9285
11124

FIGURE 13

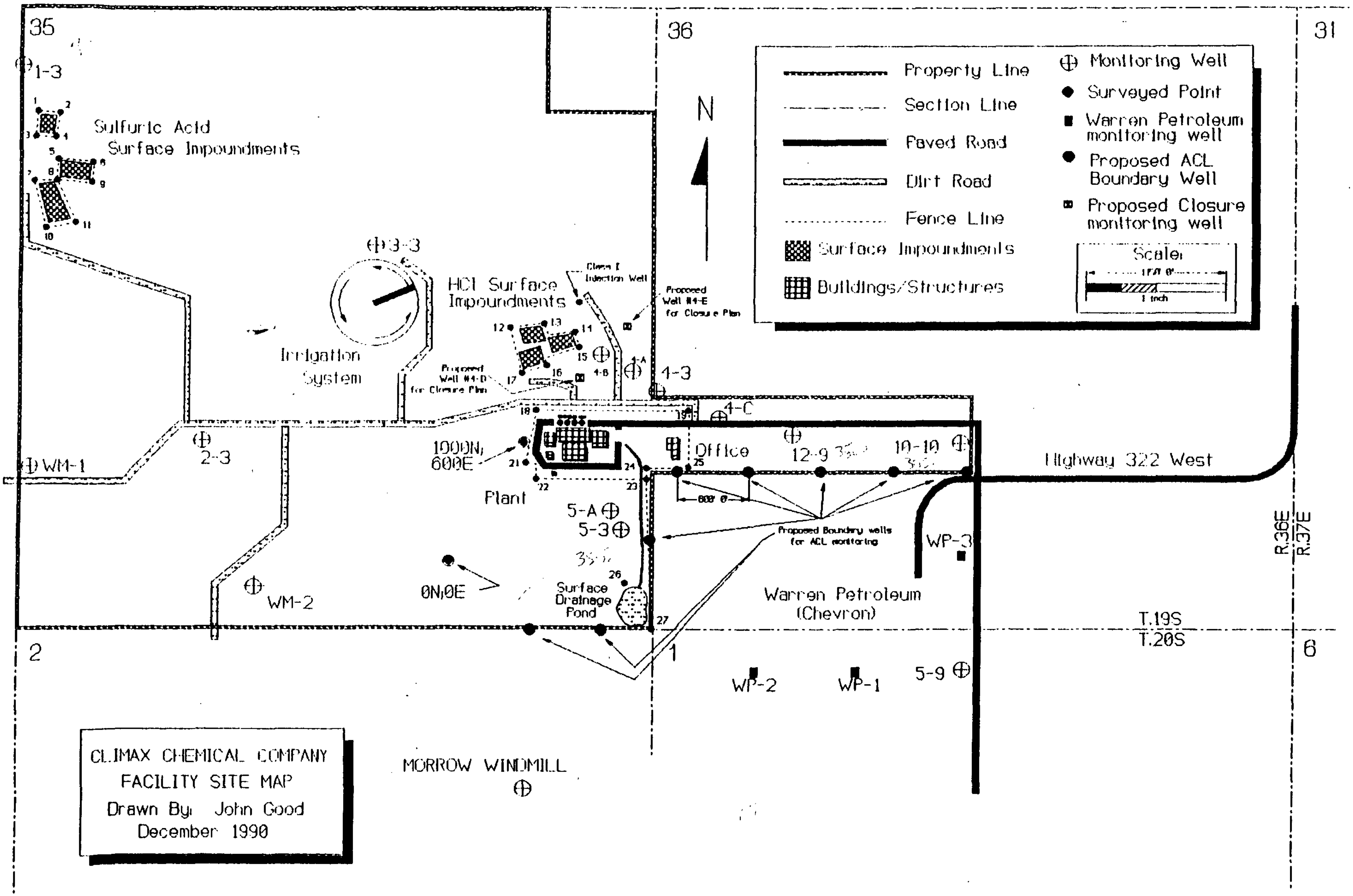

35
36
31
2
1
6
1-3
Sulfuric Acid
Surface Impoundments
3-3
Irrigation
System
HCl Surface
Impoundments
Class I
Injection Well
Proposed
Well #4-E
for Closure Plan
Proposed
Well #4-D
for Closure Plan
4-A
4-B
1-3
4-C
WM-1
2-3
WM-2
1000N,
600E
Plant
Office
12-9
10-10
5-A
5-3
0N,0E
Surface
Drainage
Pond
Proposed Boundary wells
for ACL monitoring
Warren Petroleum
(Chevron)
WP-3
WP-2
WP-1
5-9
Highway 322 West
R.36E
R.37E
T.19S
T.20S
N
Property Line
Section Line
Paved Road
Dirt Road
Fence Line
Surface Impoundments
Buildings/Structures
Monitoring Well
Surveyed Point
Warren Petroleum
monitoring well
Proposed ACL
Boundary Well
Proposed Closure
monitoring well
Scale:
1 inch
MORROW WINDMILL
CLIMAX CHEMICAL COMPANY
FACILITY SITE MAP
Drawn By: John Good
December 1990

FIGURE 14

FILE COPY

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION

UPDATE FOR DISCHARGE PLANS
MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

MARCH 1, 1985

Warren Petroleum Company
MANUFACTURING DEPARTMENT

P. O. Box 1589
Tulsa, Oklahoma 74102

March 1, 1985

MAR 4 1985

RECEIVED

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
Box 2088
Santa Fe, NM 87501

Attn: Philip L. Baca, Environmental Engineering Specialist

Re: Monument, Saunders, and Vada Discharge Plans
Information Requested for Continued Review Process

Dear Mr. Baca:

The attached information is provided as you requested in your letter of November 6, 1984. Your correspondence of December 28, 1984 provided a March 1, 1985 submittal date for this material.

If you have any questions or need further information, please contact Linda Johnson or me at 918/560-4119.

Very truly yours,

L. T. Reed, Director
Environmental Affairs

LTR:cm

Attachments

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION

UPDATE FOR DISCHARGE PLANS
MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

L. T. Reed, Director
Environmental Affairs
P. O. Box 1589
Tulsa, Oklahoma 74102
(918) 560-4119

TABLE OF CONTENTS

SECTION I

SECTION I

MONUMENT GAS PROCESSING PLANT

Part A(1): PROVIDE TOPOGRAPHIC MAP OF PLANT SITE.
Refer to Appendix A.

Part A(2): CHEMICAL ANALYSIS OF PLANT EFFLUENT STREAM.
Refer to Appendix B.

Part A(3): DESCRIPTION OF WASTE OIL DISPOSAL.
Oil collected in the scrubbers is hauled from the plant by Oil Processing Company.

Part A(4): DESCRIPTION OF PROCEDURES ADDRESSING CONTAINMENT AND CLEANUP IN CASE OF SPILLS.
In the event of a spill, the procedures described in the plant's Spill Prevention Control and Countermeasure Plan will take effect. Refer to Appendix C.

Part A(5): DESCRIPTION OF INSPECTION PROCEDURES AND FREQUENCY FOR LEAKS IN PIPING AND EQUIPMENT.
The plant is manned twenty-four hours per day. A visual inspection of all of the plant operations (including the waste closest to the plant leading to the Rice injection well) is made at a minimum of three times a day and most of the time it is made once every four hours.

Part A(6): DESCRIPTION OF THE PLANT PROCESS.
Refer to Appendix D.

Part A(7): HYDROLOGICAL AND GEOLOGICAL DATA.
Refer to Appendix E.

Part B(1): CONTINGENCY PLAN IN THE EVENT OF A SHUTDOWN AT THE INJECTION WELL.
In the event of any shutdown of the Rice Engineering injection well, the evaporation pond would be used. The evaporation pond is lined and has a reserve time of approximately thirty days. Nearing the end of that thirty day period, should the Rice well still be shutdown, the effluent would be hauled to another approved disposal well. The location of an alternate well will take place in advance of the actual need for the disposal site. All information involved in a shutdown for the Rice well will be used to determine an alternate disposal site.

Part B(2): STATUS OF EVAPORATION PIT.
The evaporation pit would be used in the event of an emergency, as described in Part B(1). It is lined and has a leak detection system. Please refer to Appendix F for further details.

Part B(3): OVERFLOW TO BRINE PIT.
Overflow held in the brine pit is pumped to the Rice Engineering injection well.

Part B(4): PLANT LAYOUT
Refer to Appendix G.

SECTION I

SAUNDERS GAS PROCESSING PLANT

Part A(1): PROVIDE TOPOGRAPHIC MAP OF PLANT SITE.
Refer to Appendix A.

Part A(2): CHEMICAL ANALYSIS OF PLANT EFFLUENT STREAM.
Refer to Appendix B.

Part A(3): DESCRIPTION OF WASTE OIL DISPOSAL.
Scrubber oil and used oil is sold to the Gandy Corporation.

Part A(4): DESCRIPTION OF PROCEDURES ADDRESSING CONTAINMENT AND CLEANUP IN CASE OF SPILLS.
In the event of a spill, the procedures described in the plant's Spill Prevention Control and Countermeasure Plan will take effect. Refer to Appendix C.

Part A(5): DESCRIPTION OF INSPECTION PROCEDURES AND FREQUENCY FOR LEAKS IN PIPING AND EQUIPMENT.
A daily visual inspection of the plant is made by Warren personnel. Any leaks are repaired as soon as possible. This inspection also includes checking the waste line closest to the plant leading from the plant to the Maud Saunders injection well.

Part A(6): DESCRIPTION OF THE PLANT PROCESS.
Refer to Appendix D.

Part A(7): HYDROLOGICAL AND GEOLOGICAL DATA.
Refer to Appendix E.

Part C(1): RETENTION PONDS.
The retention ponds which were described in the Waste Water Discharge Plan of October 23, 1980, have been filled in.

Part C(2): CONTINGENCY PLAN IN THE EVENT OF A SHUTDOWN AT THE INJECTION WELL.
In the event that the Gillespie injection well should ever be shutdown, the effluent would go to the Maud Saunders injection well. If both wells were shutdown, Gandy Corporation would be used to haul the water to an approved disposal site. Gandy Corporation has the current bid for waste water disposal when needed and scrubber oil sales.

Part C(3): WASTE WATER DISPOSAL SYSTEM.
Refer to Appendix H.

Part C(4): PLANT LAYOUT.
Refer to Exhibit G.

Part C(5): SURGE TANKS.
There are four surge tanks. The two south-most tanks are 1,000 barrel capacity per tank. The two north-most tanks are 210 barrel capacity per tank.

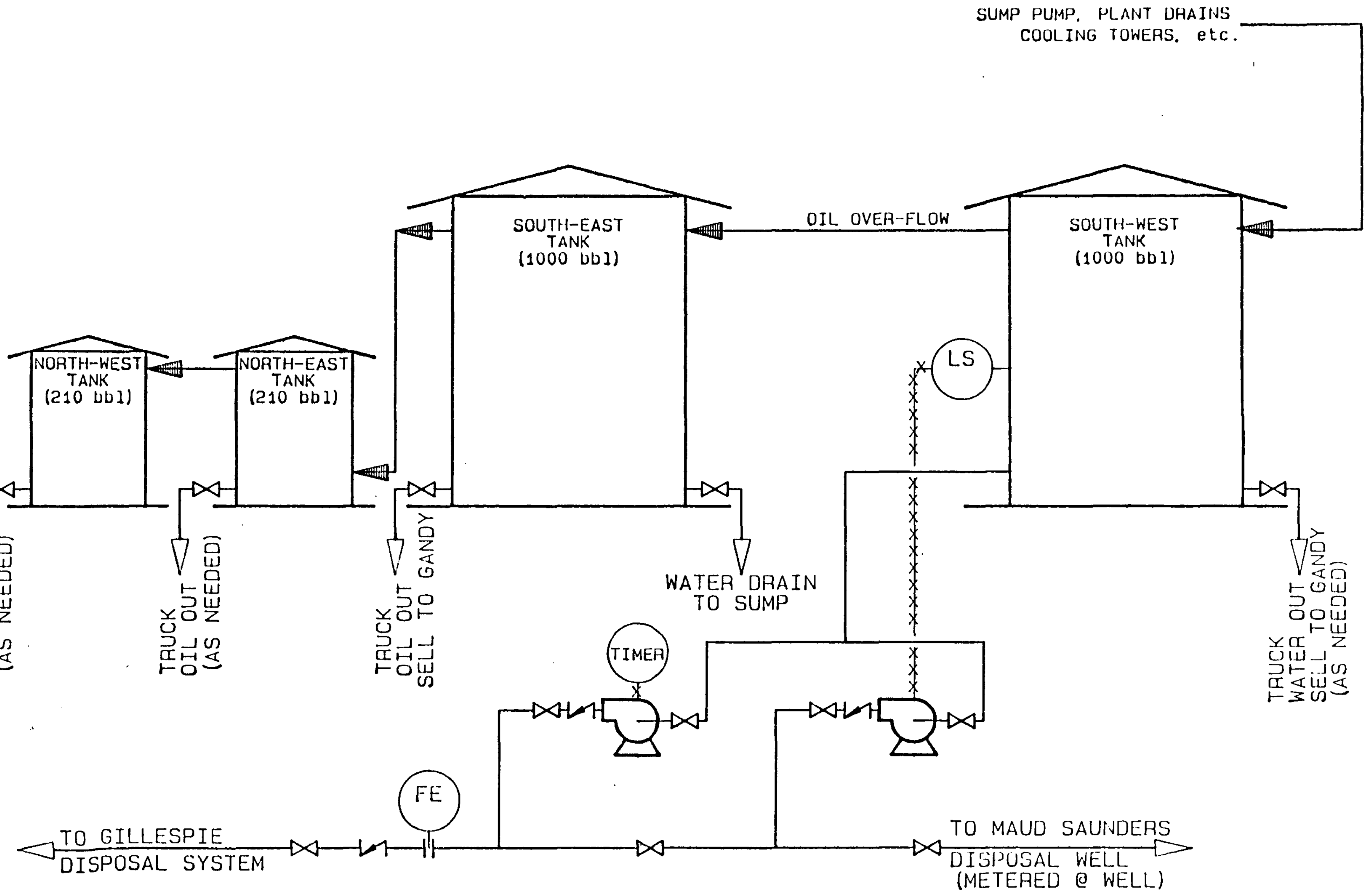
The four are welded steel tanks in which water and oil separate. The water then goes to the Gillespie or Maud Saunders injection well (or may be trucked from the plant). The remaining scrubber oil that separates out is sold to the Gandy Corporation who hauls it from the plant. Please refer to Page 4(a) which directly follows.

Part C(6): POLYETHYLENE PIPELINE TO THE GILLESPIE INJECTION WELL.
The portion of pipeline to the Gillespie well that is near the plant is periodically inspected by Warren personnel.

The shutdown of a check valve ensures that water will not back up into the plant. The check valves are not visually inspected. Rather, the four surge tanks are periodically gaged by the lab technician. It will be known that a check valve is not working by gaging the tanks. A check valve failure will result in the accumulation of water in the second 1,000 barrel tank. In the event that the amount of water in the second 1,000 barrel tank reaches 300 to 500 barrels of water, Gandy Corporation will begin hauling the water from the plant.

The pipeline is two feet below the lease road. Pipeline casing was considered and found to be unnecessary since there is no danger of fractures in the line due to traffic which consists of the vehicle of the pumper (gager) for the area wells.

WASTE WATER SYSTEM
SAUNDERS PLANT



SECTION I

VADA GAS PROCESSING PLANT

Part A(1): PROVIDE TOPOGRAPHIC MAP OF PLANT SITE.
Refer to Appendix A.

Part A(2): CHEMICAL ANALYSIS OF PLANT EFFLUENT STREAM.
Refer to Appendix B.

Part A(3): DESCRIPTION OF WASTE OIL DISPOSAL.
Scrubber oil and used oil is sold to the Gandy Corporation.

Part A(4): DESCRIPTION OF PROCEDURES ADDRESSING CONTAINMENT AND CLEANUP IN CASE OF SPILLS.
In the event of a spill, the procedures described in the plant's Spill Prevention Control and Countermeasure Plan will take effect. Refer to Appendix C.

Part A(5): DESCRIPTION OF INSPECTION PROCEDURES AND FREQUENCY FOR LEAKS IN PIPING AND EQUIPMENT.
A daily visual inspection of the plant is made by Warren personnel. Any leaks are repaired as soon as possible.

Part A(6): DESCRIPTION OF THE PLANT PROCESS.
Refer to Appendix D.

Part A(7): HYDROLOGICAL AND GEOLOGICAL DATA.
Refer to Appendix E.

Part D(1): WASTE WATER DISPOSAL SYSTEM.
Refer to Appendix H.

Part D(2): API TANKS.
The area around the two API tanks is diked. There is an external gage glass on each tank.

Part D(3): EFFLUENT DISPOSAL.
The effluent contained within each of the two API tanks is trucked by the Gandy Corporation. The tanks contents is gaged daily and measured periodically by tape strapping to determine the amount that is hauled away. The produced water and oil is sold to Gandy as needed.

Part D(4): SUMP CONSTRUCTION.
The compressor sump is concrete with a metal top. Approximate capacity is 500 gallons.

The generator sump is a buried tank of approximately 500 gallon capacity.

There are no construction drawings of either sump.

Part D(5): CONTINGENCY PLAN FOR TANK OR SUMP PUMP SHUTDOWN.

There is a standby sump pump for use in the event of a failure of one of the other two pumps. A portable gasoline pump is also maintained at the plant.

In the event that the oil tanks should be shutdown and/or all sump pumps should be inoperable, Gandy would be requested to vacuum the waste water directly from the sumps.

APPENDIX A

APPENDIX A

TOPOGRAPHIC MAPS FOR

MONUMENT, SAUNDERS, AND VADA PLANTS

APPENDIX A

TOPOGRAPHIC MAPS FOR

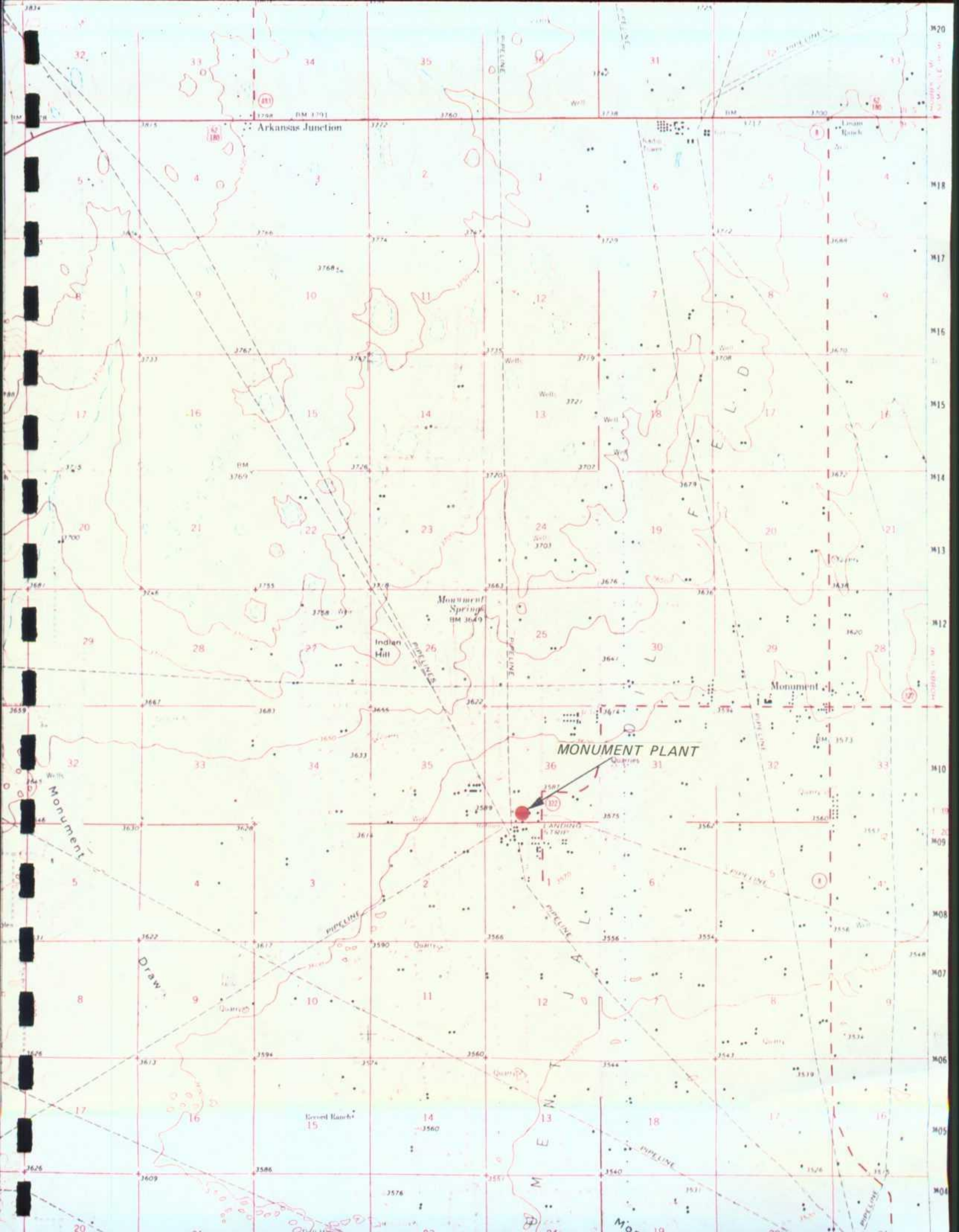
MONUMENT, SAUNDERS, AND VADA PLANTS

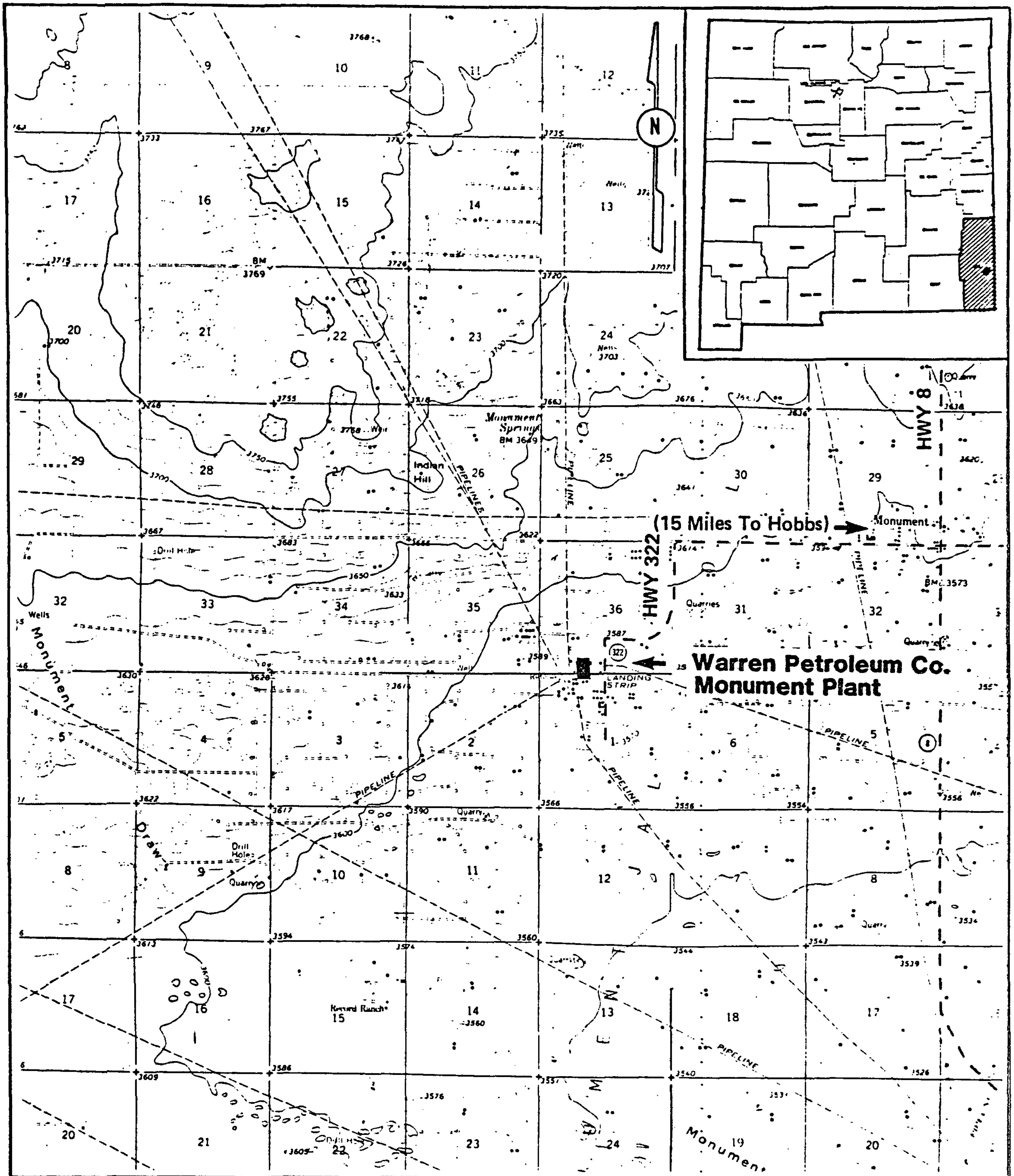
In addition to the portion of each topographic map showing the plant site provided in this Appendix, also enclosed is a complete copy of each entire topographic map which includes:

(1) Monument Quadrangle - New Mexico - Lea Co.
15 Minute Series (Topographic) for the Monument Plant

(2) Fort Ranch Quadrangle - New Mexico - Lea Co.
7.5 Minute Series (Topographic) for the Saunders Plant

(3) Lane Salt Lake Quadrangle - New Mexico - Lea Co.
7.5 Minute Series (Topographic) for the Vada Plant


MONUMENT PLANT
Arkansas Junction
Monument Springs
BM 3649
Indian Hill
Monument
PIPELINE
PIPELINES
LANDING STRIP
Monument
Draw
Quarries
Wells



PLANT LOCATIONS

SEC. 36, T-19-S, R-36-E and
SEC. 1, T-20-S, R-36-E

APPROX. EL. 3585'

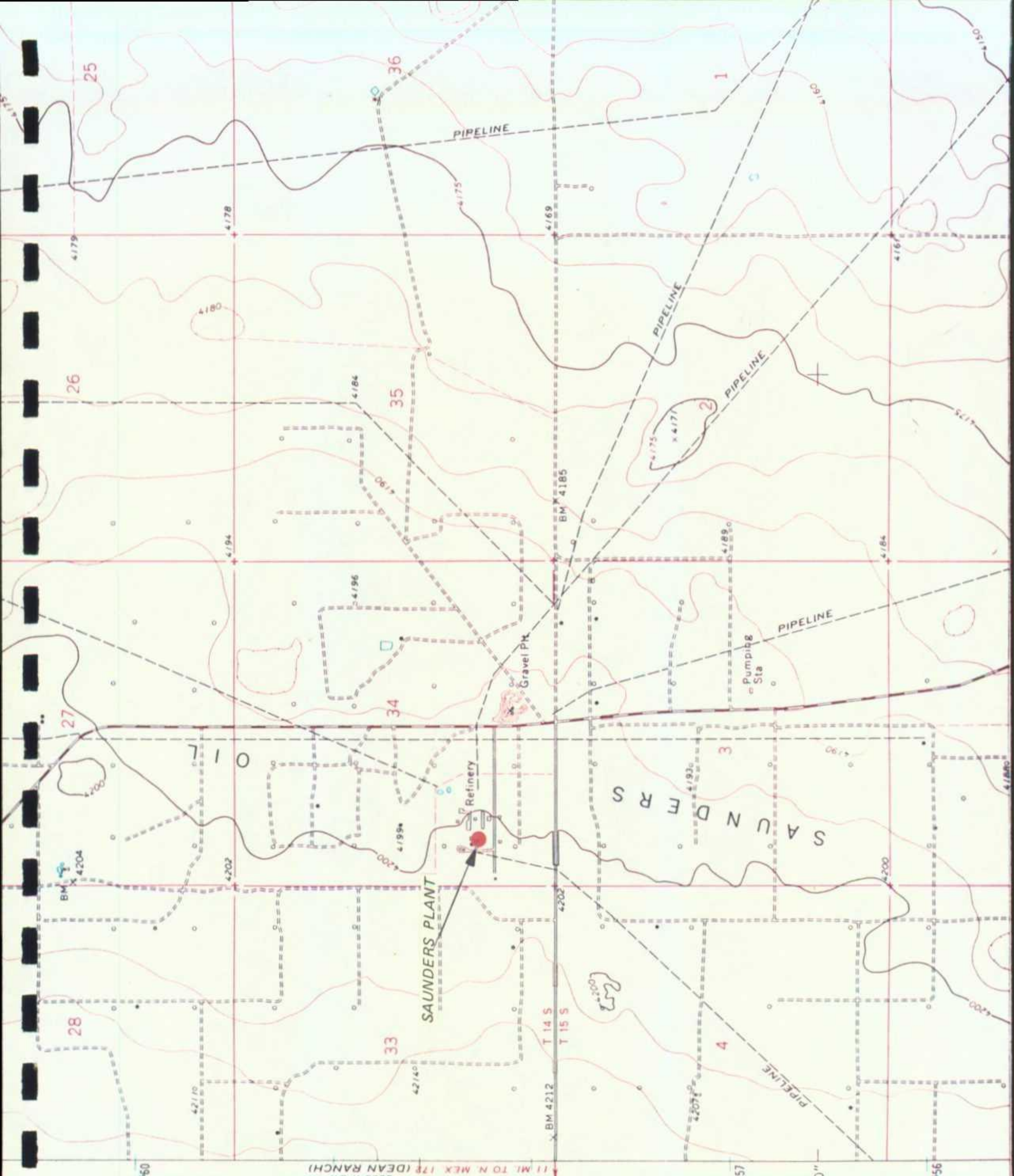
APPROX. LAT. 32°35' 40" N

APPROX. LONG 103°15' 44" W

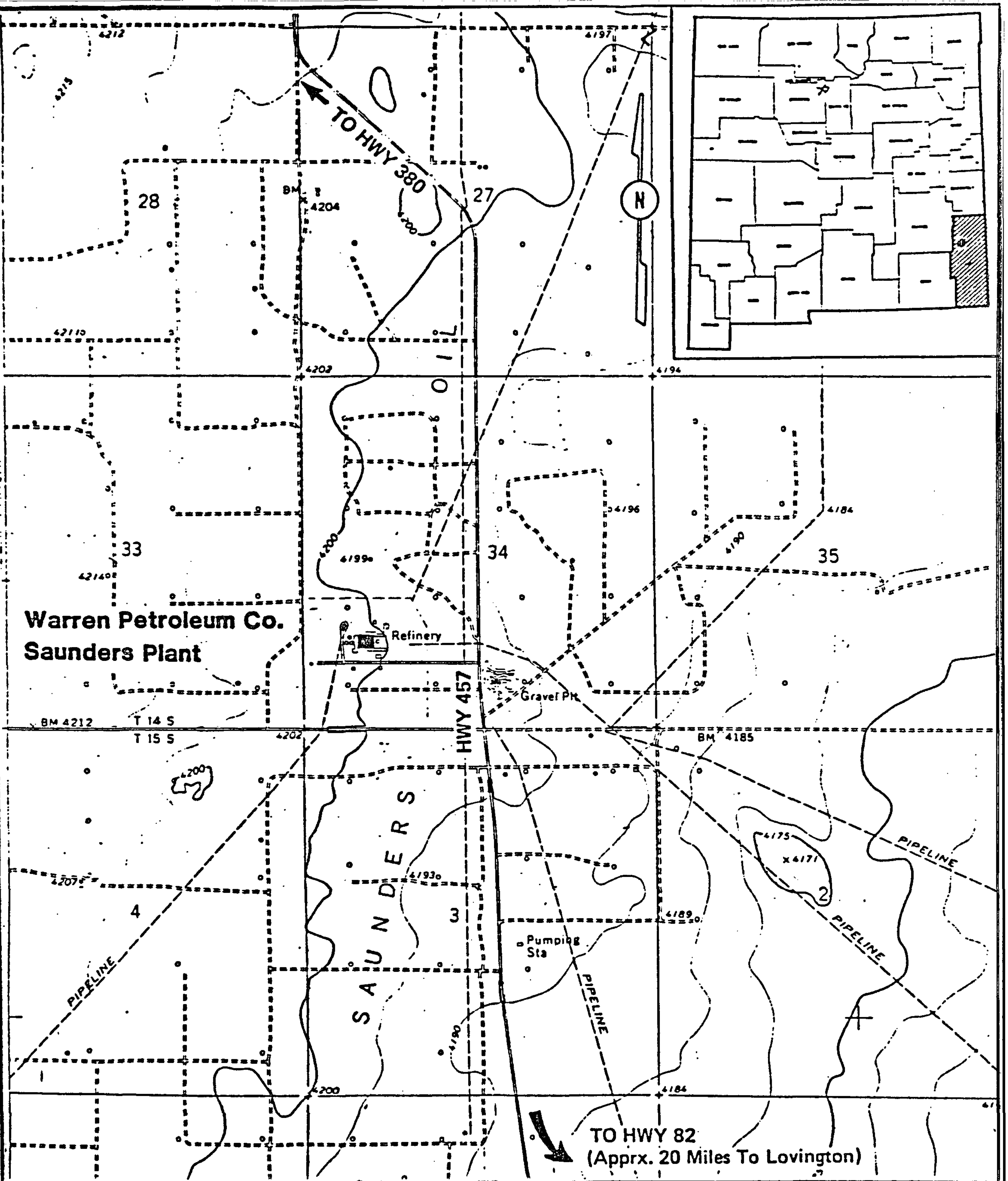
SCALE	DATE
1"=1 MI.	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

MONUMENT
PLANT NO.118
LEA CO. N.M.



PIPELINE
PIPELINE
PIPELINE
PIPELINE
PIPELINE
SAUNDERS PLANT
Refinery
Gravel Pit
Pumping Sta
SAUNDERS OIL
BM 4185
BM 4212
T 14 S
T 15 S
5250 II SW
11 MI. TO N. MEX. 172 (DEAN RANCH)
2'30"



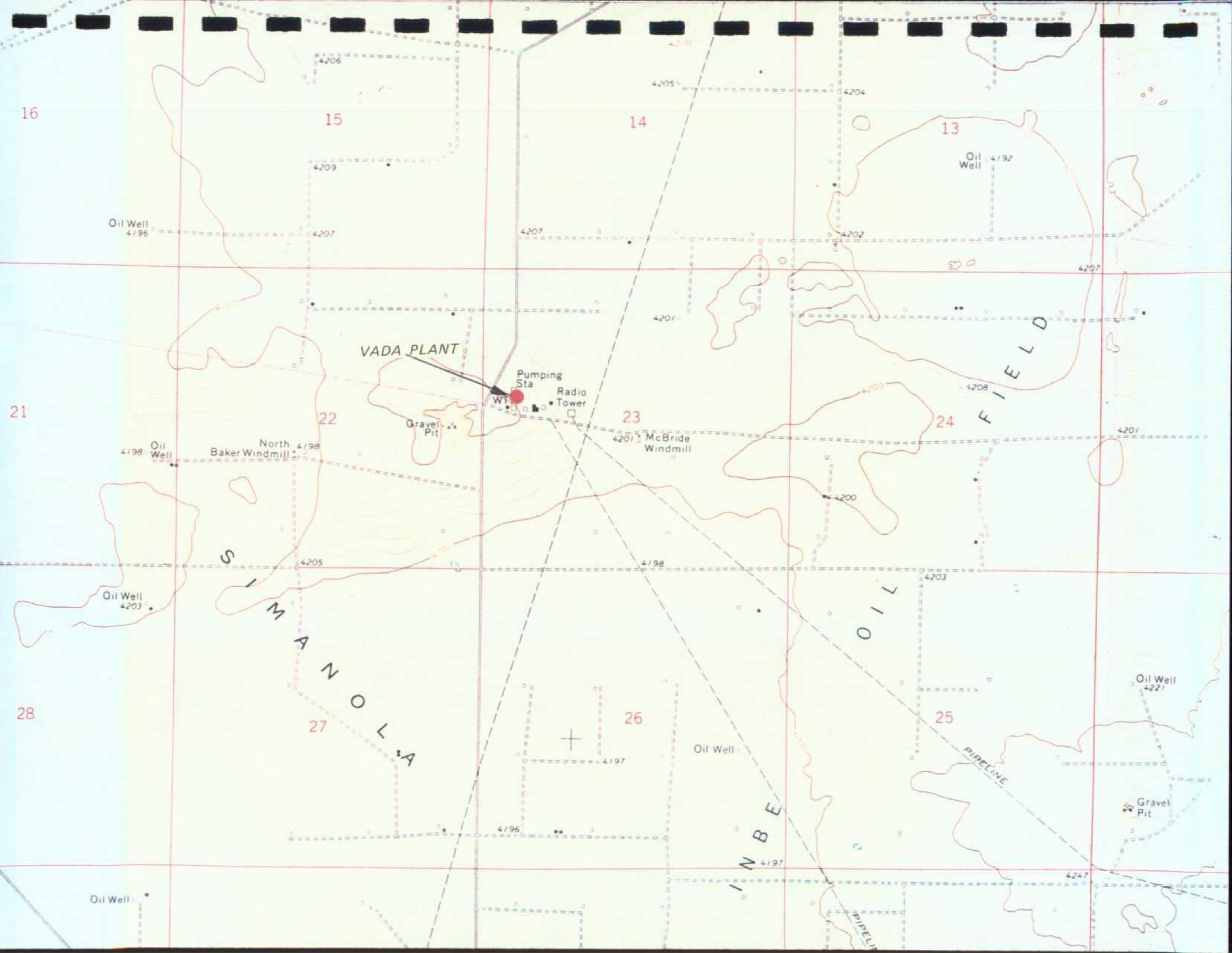
PLANT LOCATION
SEC.34, T-14-S, R-33-E

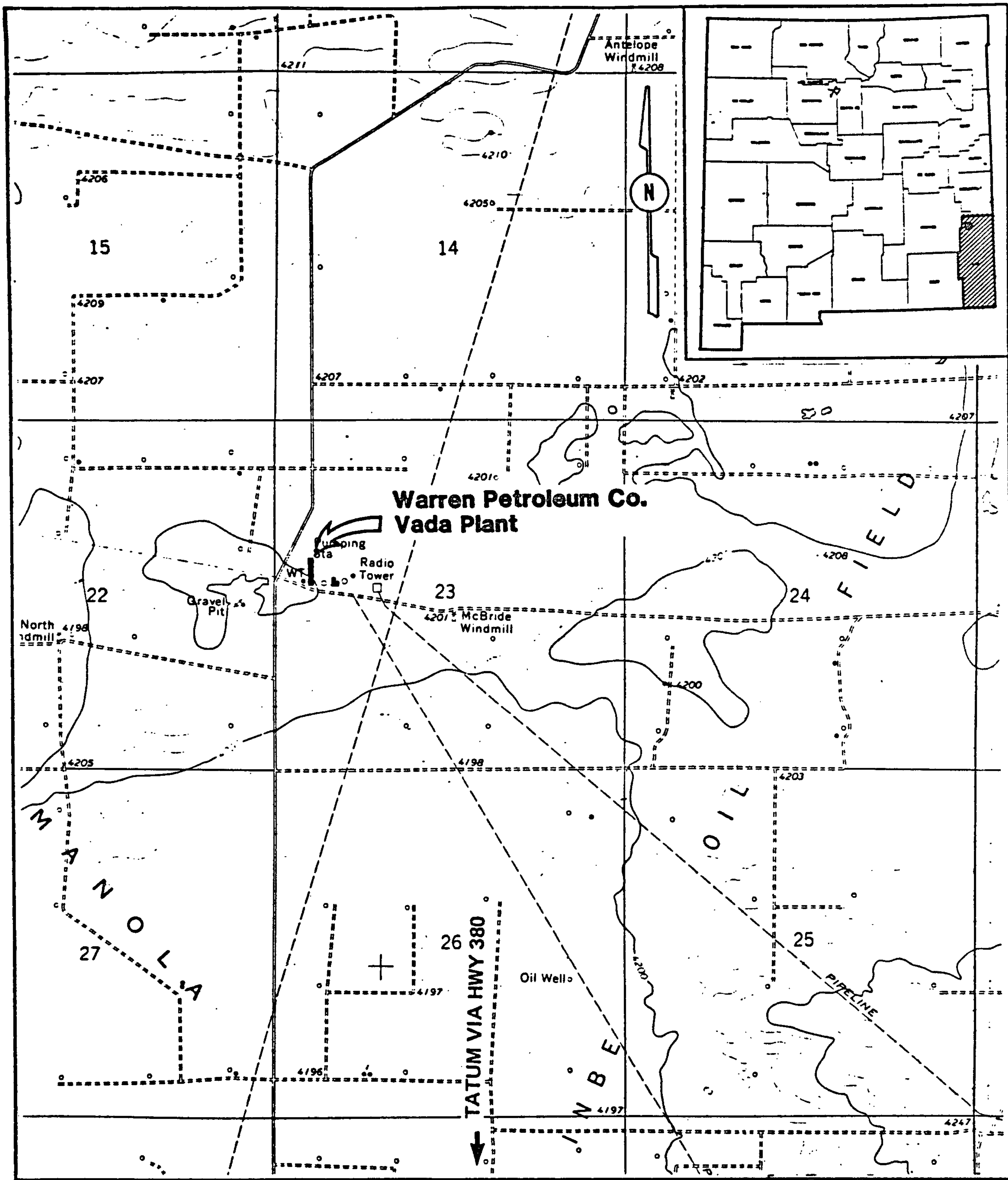
APPROX. EL. 4200
APPROX. LAT. 33°3' 28" N
APPROX. LONG. 103°36' 29" W

SCALE	DATE
1" = 2000'	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

SAUNDERS
PLANT No. 146
LEA CO., N.M.


VADA PLANT
Pumping Sta
Radio Tower
WT
Gravel Pit
McBride Windmill
North Baker Windmill
Oil Well
SIMANOLA
OIL FIELD
INBE
PIPELINE
Gravel Pit
16
15
14
13
21
22
23
24
28
27
26
25



PLANT LOCATION
SEC. 23, T-10-S, R-33-E

APPROX. EL. 4225'

APPROX. LAT. 33°25'00" N

APPROX. LONG. 103°33'30" W

SCALE	DATE
1" = 2000'	7-27-82

Warren Petroleum Company

A Division of Gulf Oil Corporation

TULSA, OKLAHOMA

VADA
PLANT NO. 139
LEA CO., N.M.

APPENDIX B

APPENDIX B

CHEMICAL ANALYSES FOR

MONUMENT, SAUNDERS, AND VADA PLANTS

APPENDIX B

CHEMICAL ANALYSES FOR MONUMENT, SAUNDERS, AND VADA PLANTS

The information provided, herein, as Appendices D and H describes the sources and disposition of waste water from the Monument, Saunders, and Vada Plants. Each plant has a disposal system whereby no effluent is allowed to reach the ground or to enter a navigable waterway.

Section I which appears at the beginning of this report details contingency measures that would be taken by each plant for waste water disposal should normally used removal methods ever be rendered inoperable. These procedures have been carefully formulated and would take effect in the event that an emergency would necessitate their implementation.

Appendix C, which follows contains a current copy of the Spill Prevention Control and Countermeasure (SPCC) Plan for each of the three facilities. The SPCC Plan is maintained on site and would be implemented in the event of a spill.

It is Warren's understanding from our meeting with Mr. P. L. Baca and Mr. D. G. Boyer on January 17, 1985 at the Oil Conservation Division Offices at the State Land Office Building in Santa Fe, that our discharge plans may be approved with the submittal of the SPCC Plan, Contingency Procedures, and basic waste water analyses. As such, the sample report, with each plant designated, is attached. To obtain highly consistent analyses of the effluent would be difficult due to the several sources throughout each plant which combine to provide the whole.

****
U N I C H E M   I N T E R N A T I O N A L

I N D U S T R I A L   D I V I S I O N

P.O. BOX 1499
HOBBS, NM 88240
505-393-7751

P.O. BOX 572
BORGER, TX 79007
806-273-6531

P.O. BOX 755
CASPER, WY 82601
307-235-5906

RT. 4 BOX 100
BOBBY LANE
BEAUMONT, TX 77705
409-724-6535

****
****

W A T E R   A N A L Y S I S

ALL RESULTS EXPRESSED IN PPM UNLESS OTHERWISE NOTED

CLIENT NAME: WARREN PETROLEUM COMPANY
FACILITY:
LOCATION: SOUTHEASTERN,N.M.

DATE: 01/30/85
SAMPLE DATE: 01/08/85
DATE ANALYZED: 01/30/85

SAMPLE IDENTIFICATION :	SAUNDERS PLANT WASTE WATER	VADA PLANT WASTE WATER	MONUMENT PLANT WASTE WATER
ZINC	NIL	0.08	0.05
LEAD	.04	NIL	NIL
CHROMIUM	0.3	0.02	0.1
BARIUM	.05	NIL	0.1
COBALT	NIL	NIL	NIL

NOTE: Sampling and analytical procedures used in these analyses conform with those outlined in Standard Methods for the Examination of Water and Wastewater (APHA) and/or Methods for Chemical Analysis of Water and Waste (EPA).

*** INDICATES THAT THIS TEST WAS NOT RUN

UNICHEM INTERNATIONAL

INDUSTRIAL DIVISION

P.O. BOX 1499	P.O. BOX 572	P.O. BOX 755	RT. 4 BOX 100 BOBBY LANE
HOBBS, NM 88240	BORGER, TX 79007	CASPER, WY 82601	BEAUMONT, TX 77705
505-393-7751	806-273-6531	307-235-5906	409-724-6535

WATER ANALYSIS

ALL RESULTS EXPRESSED IN PPM UNLESS OTHERWISE NOTED

CLIENT NAME: WARREN PETROLEUM COMPANY
FACILITY:
LOCATION: SOUTHEASTERN,N.M.

DATE: 01/30/85
SAMPLE DATE: 01/08/85
DATE ANALYZED: 01/30/85

SAMPLE IDENTIFICATION :		SAUNDERS PLANT WASTE WATER	VADA PLANT WASTE WATER	MONUMENT PLANT WASTE WATER
pH		8.03	10.30	8.10
PHENO ALKALINITY	(CaCO3)	NIL	7000	NIL
TOTAL ALKALINITY	(CaCO3)	256	8700	160
BICARBONATE	(HCO3)	312.3	NIL	195.2
CARBONATE	(CO3)	NIL	3820.0	NIL
HYDROXIDE	(OH)	NIL	1802.0	NIL
TOTAL HARDNESS	(CaCO3)	1368	124	360
CALCIUM	(Ca)	416.0	27.2	113.6
CALCIUM	(CaCO3)	1040	68	284
MAGNESIUM	(Mg)	78.7	13.4	18.2
MAGNESIUM	(CaCO3)	328	56	76
CHLORIDE	(Cl)	364	200	172
CHROMATE	(CrO4)	***	***	***
SULFATE	(SO4)	1927	2410	1497
TOTAL PHOSPHATE	(PO4)	13.3	NIL	7.8
ORTHO PHOSPHATE	(PO4)	11.9	NIL	7.8
POLY PHOSPHATE	(PO4)	1.4	NIL	NIL
SILICA	(SiO2)	112.4	27.7	93.5
SILICA	(CaCO3)	187.7	46.3	156.1
SPECIFIC CONDUCTANCE	(umhos)	1705	1240	845
IRON	(Fe)	1.10	1.30	2.50
COPPER	(Cu)	0.08	NIL	NIL
CALCULATED :				
TOTAL DISSOLVED SOLIDS		3881	14894	2840
SODIUM	(Na)	657	6594	742

ANALYZED BY: Jim Poindexter (HOBBS LAB)

APPROVED BY: Ted Schloss

*** INDICATES THAT THIS TEST WAS NOT RUN

APPENDIX C

APPENDIX C

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN FOR

MONUMENT, SAUNDERS, AND VADA PLANTS

MONUMENT PLANT

WARREN PETROLEUM COMPANY

DIVISION OF GULF OIL CORPORATION

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

QUICK REFERENCE REPORTING/NOTIFICATION PROCEDURES

QUICK REFERENCE DOCUMENT

SPILL CONTAINMENT AND NOTIFICATION PROCEDURES

If a spill occurs, the flow should be stopped and help acquired, if necessary. Contact Plant Manager or alternates if he is not available. Contain the spill using procedures in this plan. Refer to reporting requirements after spill cleanup. These procedures directly follow.

Contacts

B. R. Terrell....................................(505) 393-2823 or
(505) 392-4398
M. L. Ingram....................................(918) 560-4060 or
(918) 494-0037
D. E. Todd....................................(918) 560-4052 or
(918) 494-8779
L. T. Reed....................................(918) 560-4119 or
(918) 663-3397

Directed Contacts

National Response Center........................(800) 424-8802
Eighth Coast Guard District Duty Officer........(504) 589-6225
EPA Region VI...................................(214) 767-2720
Emergency Response (EPA Region VI)..............(214) 767-2666
New Mexico Oil Conservation Division
Santa Fe Office.............................(505) 827-5800
Hobbs District Office.......................(505) 393-6161
New Mexico Environmental Improvement Division
Santa Fe Office.............................(505) 984-0200
Carlsbad District Office....................(505) 887-3436 or
(505) 885-9023
New Mexico State Corporation Commission
Pipeline Division/Santa Fe..................(505) 827-4497

Miscellaneous Contacts

Fire Department.................................(505) 393-3060 (Monument)
911 (Hobbs)
Ambulance....................................... 911 (Hobbs)
Hospital..(505) 392-6581
Sheriff Department..............................(505) 393-2515
Equipment/Disposal Services.....................(505) 393-6664
(Oil Processing)

MONUMENT PLANT

SPILL NOTIFICATION PROCEDURES

Federal, state and local water pollution control agencies require that certain discharges be reported. Discharges exhibiting any of the characteristics described below must be reported to the appropriate government agencies as indicated.

OIL/HAZARDOUS SUBSTANCES
Reportable Spills
1. Any discharge of oil into or adjacent to navigable waters, or
2. Any release of a reportable quantity[1] of a hazardous substance to the environment (water, air, or land).

Report[3]
Immediate, by telephone.

Agencies
State of New Mexico Environmental Improvement Division: (Santa Fe) 505/984-0200, (Carlsbad) 505/887-3436, or 505/885-9023; and US Environmental Protection Agency-Emergency Response (Dallas Regional Office) 214/767-2666; and National Response Center 800/424-8802; and State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 or (Hobbs) 505/393-6161.

MAJOR BREAKS, SPILLS, OR LEAKS
Reportable Spills
1. Discharge of 25 or more barrels of crude oil or condensate or 100 barrels or more of salt water, none of which reaches a body of water, and/or,
2. Discharge of one or more barrels of crude oil or condensate or 25 barrels or more of salt water into a body of water, and/or
3. Endanger health or damage property.

Report[3]
As soon as possible by telephone. Written report within 10 days of incident to district office.

Agencies
State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 and (Hobbs) 505/393-6161.

MINOR BREAKS, SPILLS, OR LEAKS
Reportable Spills
Discharges between 5 to 25 barrels of crude oil or condensate or between 25 to 100 barrels of salt water, none of which reaches a body of water.

Report[3]
Written report within 10 days of incident to district office.

Agencies
State of New Mexico Oil Conservation Division-Hobbs District office: 505/393-6161

SPILL NOTIFICATION PROCEDURES - Continued

PIPELINE LEAK
Reportable Spills

1. Caused a death or caused a personal injury requiring hospitalization, and/or
2.[2] Required taking a segment of pipeline out of service, and/or
3.[2] Resulted in gas igniting, and/or
4. Caused an estimated property damage of $5,000 or more, or
5. Was significant although not part of 1. through 4., above.

Report[3]
Immediate by telephone. Written report within 10 days of incident.

Agencies
US Department of Transportation through the National Response Center 800/424-8802; and New Mexico State Corporation Commission (Santa Fe) 505/827-4497.

[1]Reportable quantities of hazardous substances are listed in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations), prepared by Gulf Oil Corporation - pages 40-117-1 through 40-117-4; Hazardous Wastes are listed in the Federal Register, Volume 45-No. 98, May 19, 1980.

[2]Notice is not required if 2. and 3. occurred solely as a result of, or in connection with, a planned or routine maintenance or construction.

[3]Contents of Telephone Report
Described in further detail in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations) - Prepared by Gulf Oil Corporation, Page 40-112-2 through 40-112-3.

a. Name, title, and telephone number of reporter.
b. Name of facility.
c. Name of owner or operator.
d. Location of facility.
e. Time and type of incident (e.g., fire, explosion, etc.)
f. Location of spill or discharge including name of waters involved.
g. Type and quantity of material spilled.
h. Other information that may be required.
i. Request the name of the person to whom you reported.

Additional information to be included in the written report:

a. Initial startup date of facility.
b. Maximum storage or handling capacity, daily average throughput.
c. Description of facility including process flows, plot plan, and topographic map.
d. Copy of SPCC Plan.
e. Cause of the spill(s).
f. Corrective action(s) taken.
g. Preventive measure(s) taken.
h. Extent of any physical damage and/or personal injuries.

All reported information should be logged and documented for record keeping purposes.

Rule 116-State of New Mexico-Energy and Minerals Department-Oil Conservation Division Rules and Regulations (3-1-82).

RULE 116. NOTIFICATION OF FIRE, BREAKS, LEAKS, SPILLS, AND BLOWOUTS

The Division shall be notified of any fire, break, leak, spill, or blowout occurring at any injection or disposal facility or at any oil or gas drilling, producing, transporting, or processing facility in the State of New Mexico by the person operating or controlling such facility.

"Facility," for the purpose of this rule, shall include any oil or gas well, any injection or disposal well, and any drilling or workover well; any pipe line through which crude oil, condensate, casinghead or natural gas, or injection or disposal fluid (gaseous or liquid) is gathered, piped, or transported (including field flow-lines and lead-lines but not including natural gas distribution systems); any receiving tank, holding tank, or storage tank, or receiving and storing receptacle into which crude oil, condensate, injection or disposal fluid, or casinghead or natural gas is produced, received, or stored; any injection or disposal pumping or compression station including related equipment; any processing or refining plant in which crude oil, condensate, or casinghead or natural gas is processed or refined; and any tank or drilling pit or slush pit associated with oil or gas well or injection or disposal well drilling operations or any tank, storage pit, or pond associated with oil or gas production or processing operations or with injection or disposal operations and containing hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, or other deleterious chemicals or harmful contaminants.

Notification of such fire, break, leak, spill, or blowout shall be in accordance with the provisions set forth below:

1. Well Blowouts. Notification of well blowouts and/or fires shall be "immediate notification" described below. ("Well blowout" is defined as being loss of control over and subsequent eruption of any drilling or workover well, or the rupture of the casing, casinghead, or wellhead of any oil or gas well or injection or disposal well, whether active or inactive, accompanied by the sudden emission of fluids, gaseous or liquid, from the well.)

2. "Major" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 25 or more barrels of crude oil or condensate, or 100 barrels or more of salt water, none of which reaches a watercourse or enters a stream or lake; breaks, spills, or leaks in which one or more barrels of crude oil or condensate or 25 barrels or more of salt water does reach a watercourse or enters a stream or lake; and breaks, spills, or leaks of hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, gases, or other deleterious chemicals or harmful contaminants of any magnitude which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" described below.

3. "Minor" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 5 barrels or more but less than 25 barrels of crude oil or condensate, or 25 barrels or more but less than 100 barrels of salt water, none of which reaches a watercourse or enters a stream or lake, shall be "subsequent notification" described below.

4. Gas Leaks and Gas Line Breaks. Notification of gas leaks from any source or of gas pipe line breaks in which natural or casinghead gas of any quantity has escaped or is escaping which may with reasonable probability endanger human health or result in substantial damage to property shall be "immediate notification" described below. Notification of gas pipe line breaks or leaks in which the loss is estimated to be 1000 or more MCF of natural or casinghead gas but in which there is no danger to human health nor of substantial damage to property shall be "subsequent notification" described below.

5. Tank Fires. Notification of fires in tanks or other receptacles caused by lightning or any other cause, if the loss is, or it appears that the loss will be, 25 or more barrels of crude oil or condensate, or fires which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" as described below. If the loss is, or it appears that the loss will be at least 5 barrels but less than 25 barrels, notification shall be "subsequent notification" described below.

6. Drilling Pits, Slush Pits, and Storage Pits and Ponds. Notification of breaks and spills from any drilling pit, slush pit, or storage pit or pond in which any hydrocarbon or hydrocarbon waste or residue, strong caustic or strong acid, or other deleterious chemical or harmful contaminant endangers human health or does substantial surface damage, or reaches a watercourse or enters a stream or lake in such quantity as may with reasonable probability endanger human health or result in substantial damage to such watercourse, stream, or lake, or the contents thereof, shall be "immediate notification" as described below. Notification of breaks or spills of such magnitude as to not endanger human health, cause substantial surface damage, or result in substantial damage to any watercourse, stream, or lake, or the contents thereof, shall be "subsequent notification" described below, provided however, no notification shall be required where there is no threat of any damage resulting from the break or spill.

IMMEDIATE NOTIFICATION. "Immediate Notification" shall be as soon as possible after discovery and shall be either in person or by telephone to the district office of the Division district in which the incident occurs, or if the incident occurs after normal business hours, to the District Supervisor, the Oil and Gas Inspector, or the Deputy Oil and Gas Inspector. A complete written report ("Subsequent Notification") of the incident shall also be submitted in duplicate to the appropriate district office of the Division within ten days after discovery of the incident.

SUBSEQUENT NOTIFICATION. "Subsequent Notification" shall be a complete written report of the incident and shall be submitted in duplicate to the district office of the Division district in which the incident occurred within ten days after discovery of the incident.

CONTENT OF NOTIFICATION. All reports of fires, breaks, leaks, spills, or blowouts, whether verbal or written, shall identify the location of the incident by quarter-quarter, section, township, and range, and by distance and direction from the nearest town or prominent landmark so that the exact site of the incident can be readily located on the ground. The report shall specify the nature and quantity of the loss and also the general conditions prevailing in the area, including precipitation, temperature, and soil conditions. The report shall also detail the measures that have been taken and are being taken to remedy the situation reported.

WATERCOURSE, for the purpose of this rule, is defined as any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART I

GENERAL INFORMATION

PART I

GENERAL INFORMATION
SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

1. Facility name: Monument Plant No. 118

2. Facility type: Gas Processing

3. Facility location: S/W ¼, Section 36, R36E, T19S, NW ¼, Section 1, R36E, T20S

4. Owner or operator name and address: Warren Petroleum Company
   Division of Gulf Oil Corporation
   1350 S. Boulder, Box 1589
   Tulsa, OK 74102

5. Name and title of oil spill prevention contact:

   B. R. Terrell - Plant Manager

6. Did facility experience a reportable oil spill event during the twelve months prior to 1-10-74 (effective date of 40 CFR, Part 112)? No
   (If yes, complete Attachment 1.)

Management Approval
This SPCC plan will be implemented as herein described:

Signature: B. R. Terrell

Name:
Title: B. R. Terrell - Plant Manager

Certification
I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Registered Professional Engineer: Jim R. Bruce
(Print)
Jim R. Bruce
(Signature)

(Seal)

Date: 12-18-84 Registration No. 4946 State: New Mexico

Last Certification: 12-22-81

PART I - GENERAL INFORMATION - Continued

7. Potential spills - prediction and control:

Source	Major Type of Failure	Total Quantity (Bbls)	Rate (Bbls/Hr)	Flow Direction	Secondary Containment
Oil Slop Tank (1)	Rupture	500	500	S	Earthen Dike
Slop Oil/ Water Tank (2)	Rupture	500	500	S	Earthen Dike
Oil Slop Tank (3)	Rupture	150	150	N	Earthen Dike

Discussion: Sources 1 and 2 above are 500 barrel capacity each, bolted, closed tanks. Source 3, above has 150 barrel capacity, welded, closed tank.

8. Are containment, diversionary structures, or equipment to prevent oil from reaching navigable waters practicable? (If NO, complete Attachment 2.) Yes.

9. Inspections and Records:

   a. Do the required inspections follow written procedures as contained in this plan? No.

   b. Are the written procedures and inspection records signed by the appropriate supervisor or inspector attached?

      Comment: Inspections are not of such a nature that written procedures would be required. The plant is inspected at least three times per day.

10. Personnel, training, and spill prevention procedures:

   a. Are personnel properly instructed in the following?

      1. Operation and maintenance of equipment to prevent oil discharges. Yes

      2. Applicable pollution control laws, rules, and regulations? Yes

         Describe procedures employed for instruction: All employees at this location have received written and verbal communication that no hydrocarbons or other materials are to be released upon land. They have been made aware of the seriousness of land-water pollution.

   b. Are scheduled prevention briefings for the operating personnel conducted frequently enough to assure adequate understanding of the SPCC plan? Yes

PART I - GENERAL INFORMATION - Continued

Describe briefing program: In addition to written communication, there is verbal communication concerning pollution prevention and control. All employees at this location are aware of our company's commitment in the area of pollution control.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE A

DESIGN AND OPERATING INFORMATION

ONSHORE FACILITY (EXCLUDING PRODUCTION)

PART II, ALTERNATE A

DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) (Note: Flapper-type valves should not be used.)

   Diked areas are drained by use of a vacuum truck.

2. Drainage from undiked areas is controlled as follows: (Include description of ponds, lagoons, or catchment basins and methods of retaining and returning oil to facility.)

   All liquids (water and small amounts of oil) enter a closed drain system then enter an oil reclamation system where the oil is separated and is sold locally. The water is pumped to an evaporation pit and in turn, is injected into a disposal well. Please refer to Part V of this Spill Plan for a diagram of the waste water system for the plant.

3. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.)

   All diked areas are completely closed. When pure rainwater has accumulated so as to require the drainage from other areas within the plant, the water is visually inspected for the presence of oil. If no evidence of oil is present, the areas are drained. No drainage water enters a watercourse or storm drain.

B. Bulk Storage Tanks

1. Describe tank design, materials of constuction, fail-safe engineering features, and if needed, corrosion protection:

   500 barrel slop oil storage-vertical, bolted steel; 500 barrel slop oil/water separator-vertical bolted steel; 150 barrel slop oil storage-horizontal welded closed tank.

2. Describe secondary containment design, construction materials, and volume: *Slop oil storage-earthen diked, 1,500 barrel capacity; *slop /water separator-earthen dike 1,500 barrel capacity; slop oil storage-earthen dike, 500 barrel capacity.

3. Describe tank inspection methods, procedures, and record keeping: Tanks are externally inspected for rust, corrosion, and leaks.

**Tanks have a common 1,500 barrel dike.*

4. Internal heating coil leakage is controlled by one or more of the following control factors:
   a. Monitoring the steam return or exhaust lines for oil. Describe monitoring procedure: Not applicable.

   b. Passing the steam return or exhaust lines through a settling tank, skimmer, or other separation system. Not applicable.

   c. Installing external heating systems. Not applicable.

5. Disposal facilities for plant effluents discharged into navigable waters are observed frequently for indication of possible upsets which may cause an oil spill event. Not applicable.

Note: No effluents are discharged into navigable waters.

C. Facility Transfer Operations, Pumping and Inplant Process

1. Corrosion protection for buried pipelines:
   a. Are pipelines wrapped and coated to reduce corrosion? Yes
   b. Is cathodic protection provided for pipelines if determined necessary by electrolytic testing? Yes
   c. When a pipeline section is exposed, is it examined and corrective action taken as necessary? Yes

2. Are pipeline terminal connections capped or blank-flanged and marked if the pipeline is not in service or on standby service for extended periods? Yes

   Describe criteria for determining when to cap or blank-flange:

   All open lines are capped or blind flanged.

3. Are pipe supports designed to minimize abrasion and corrosion and allow for expansion and contraction? Yes

   Describe pipe support design:

   Piping on supports have been equipped with a slip-shoe between the pipe and support.

4. Describe procedures for regularly examining all aboveground valves and pipelines including flange joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces:

   Aboveground valves and pipelines are observed on a daily basis both within the plant and the field system.

5. Describe procedures for warning vehicles entering the facility to avoid damaging aboveground piping:

Non-company vehicles are allowed within the plant yard with written permission only.

D. Facility Tank Car and Tank Truck Loading/Unloading Rack
Does tank car and tank truck loading/unloading occur at the facility? If yes, complete 1 through 5 below. Yes.

1. Does loading/unloading procedures meet the minimum requirement and regulations of the Department of Transportation? Yes.

2. Does the unloading area have a quick drainage system? Not applicable.

3. Will the containment system hold the maximum capacity of any single compartment of a tank truck loaded/unloaded in the plant? Not applicable.

   Describe containment system design, construction materials, and volume: The products loaded and unloaded at this facility are gaseous at atmospheric conditions.

4. Is an interlocked warning light, a physical barrier system, or warning signs provided in loading/unloading areas to prevent vehicular departure before disconnect of transfer lines? Yes.

   Describe methods, procedures, and/or equipment used to prevent premature vehicular departure: Wheel chock blocks and ground line are in place before loading begins. They are removed upon completion of the loading operation.

5. Are drains and outlets on tank trucks and tank cars checked for leakage before loading/unloading or departure? Yes.

E. Security

1. Are plants fenced that are handling, processing, or storing oil? Yes

2. Are entrance gates locked and/or guarded when the plant is unattended or not in production? Yes

3. Are any valves which permit direct outward flow of a tank's contents locked closed when in non-operating or standby status? No

4. Starter controls on all oil pumps in non-operating or standby status are:

   a. locked in the off position. Not applicable.
   b. located at site accessible only to authorized personnel. Not applicable.

5. Discussion of items 1 through 4 as appropriate:

   2. Plant is never unattended.
   4. No oil pumps in service.

6. Discussion of lighting around the facility:

   Lighting is adequate enough for the plant personnel to observe anyone who arrives at the facility and to detect any problems or spills within the plant.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE B

DESIGN AND OPERATING INFORMATION

ONSHORE OIL PRODUCTION FACILITY

PART II, ALTERNATE B

DESIGN AND OPERATING INFORMATION
ONSHORE OIL PRODUCTION FACILITY

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) Not applicable.

2. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

3. Field drainage ditches, road ditches, and oil traps, sumps, or skimmers, if such exist, are inspected at regularly scheduled intervals for accumulation of oil. Yes.

   Describe inspection procedures, intervals, and methods employed to remove oil: A vacuum truck goes out daily to collect oil and water.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features: Not applicable.

2. Describe secondary containment design, construction materials, and volume: Not applicable.

3. Describe tank inspection methods, procedures, and recordkeeping: Not applicable.

C. Facility Transfer Operations

1. Describe scheduled basis for examinations of aboveground valves and pipelines and salt water disposal facilities:

   Aboveground equipment is observed for leaks on a routine basis by the Field Operator. All leaks or equipment problems are reported and repaired immediately.

2. Describe flowline maintenance program to prevent spills:

   Lines are checked for leaks on a routine basis.

D. Oil Drilling and Workover Facilities

1. A blowout preventer (BOP) assembly and well control system is installed before drilling below any casing string and, as required, during workover operations. Not applicable.

2. The BOP assembly is capable of controlling any expected wellhead pressure. Not applicable.

3. Casing and BOP installations conform to state regulations. Not applicable.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART III

SPILL HISTORY

SPILL HISTORY

There have been no spills at the Monument Plant. It is very unlikely that a spill would occur which would leave the property thereby entering a navigable waterway. However, Form S/WPC-SPCC-1, and example of which follows, will be used to record information should a spill occur.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

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OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calcualted.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART IV

ONSHORE FACILITY BULK STORAGE TANKS

DRAINAGE SYSTEM

(ATTACHMENT #3)

PART IV
ONSHORE FACILITY BULK STORAGE TANKS-DRAINAGE SYSTEM

Inspection Procedure: Diked areas are drained by use of a vacuum truck.

Record of drainage, bypassing, inspection, and oil removal from secondary containment: Not applicable.

Drainage Location	Drainage Date	Date Bypassing Open	Date Bypassing Closed	Inspection Date	Oil Removal	Signature	Installed Seal #

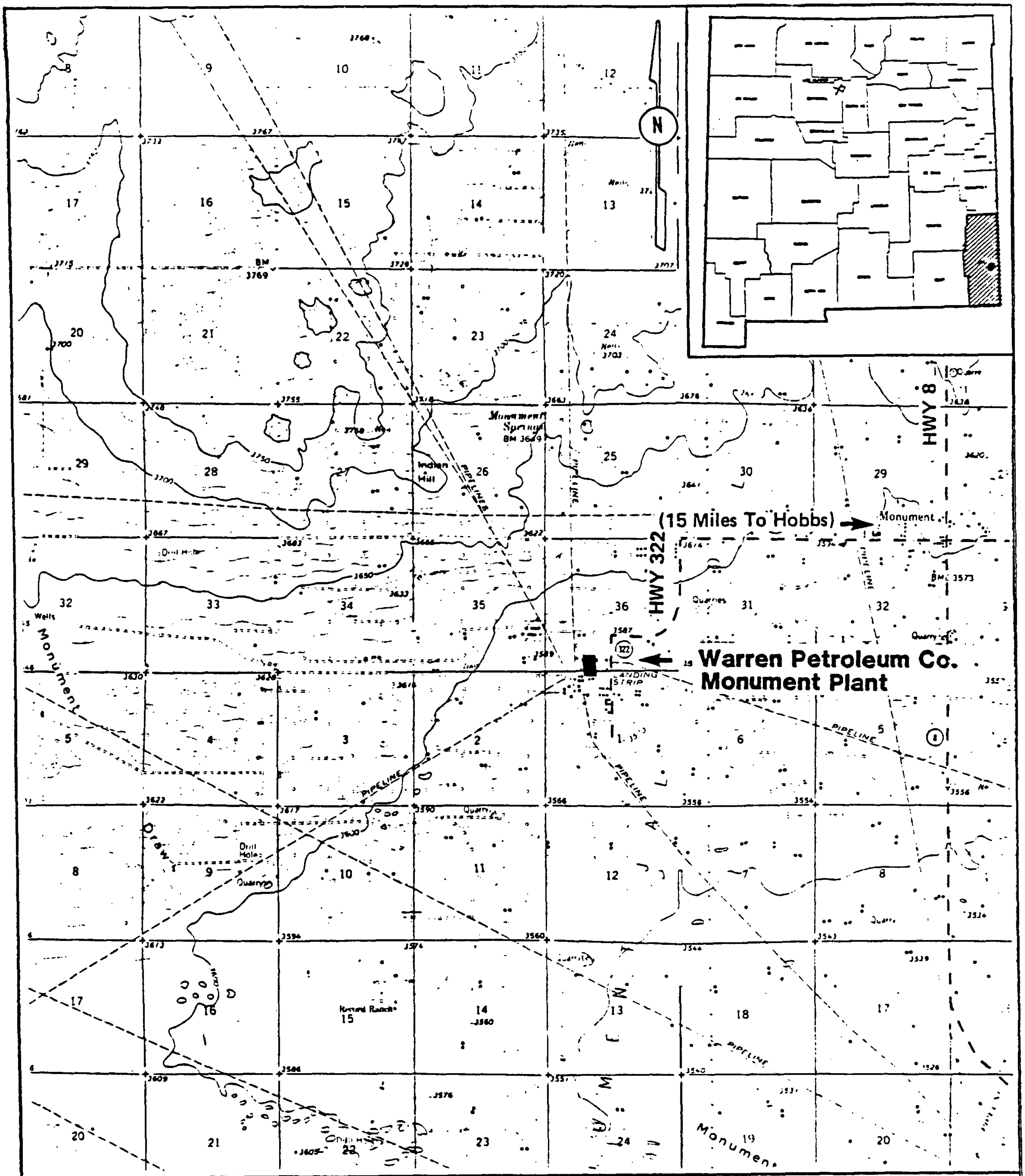
Only areas where there has been accumulated, uncontaminated rainfall are drained. Diked areas containing rainwater with accumulated oil are cleared by use of a vacuum truck.

MONUMENT PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART V

LOCATION MAPS/PLANS



PLANT LOCATIONS

SEC. 36, T-19-S, R-36-E and
SEC. 1, T-20-S, R-36-E

APPROX. EL. 3585'

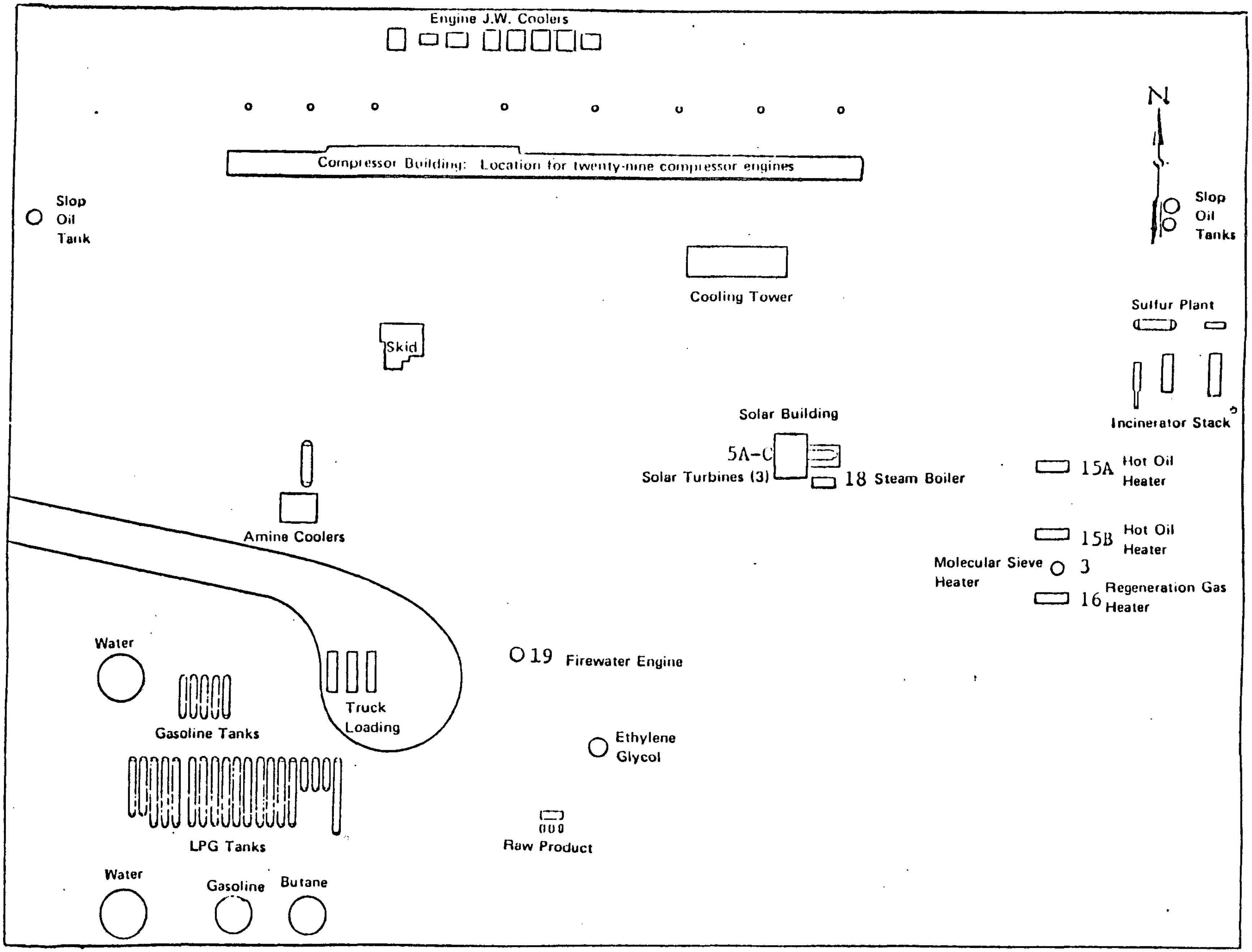
APPROX. LAT. 32°35' 40" N

APPROX. LONG 103°15' 44" W

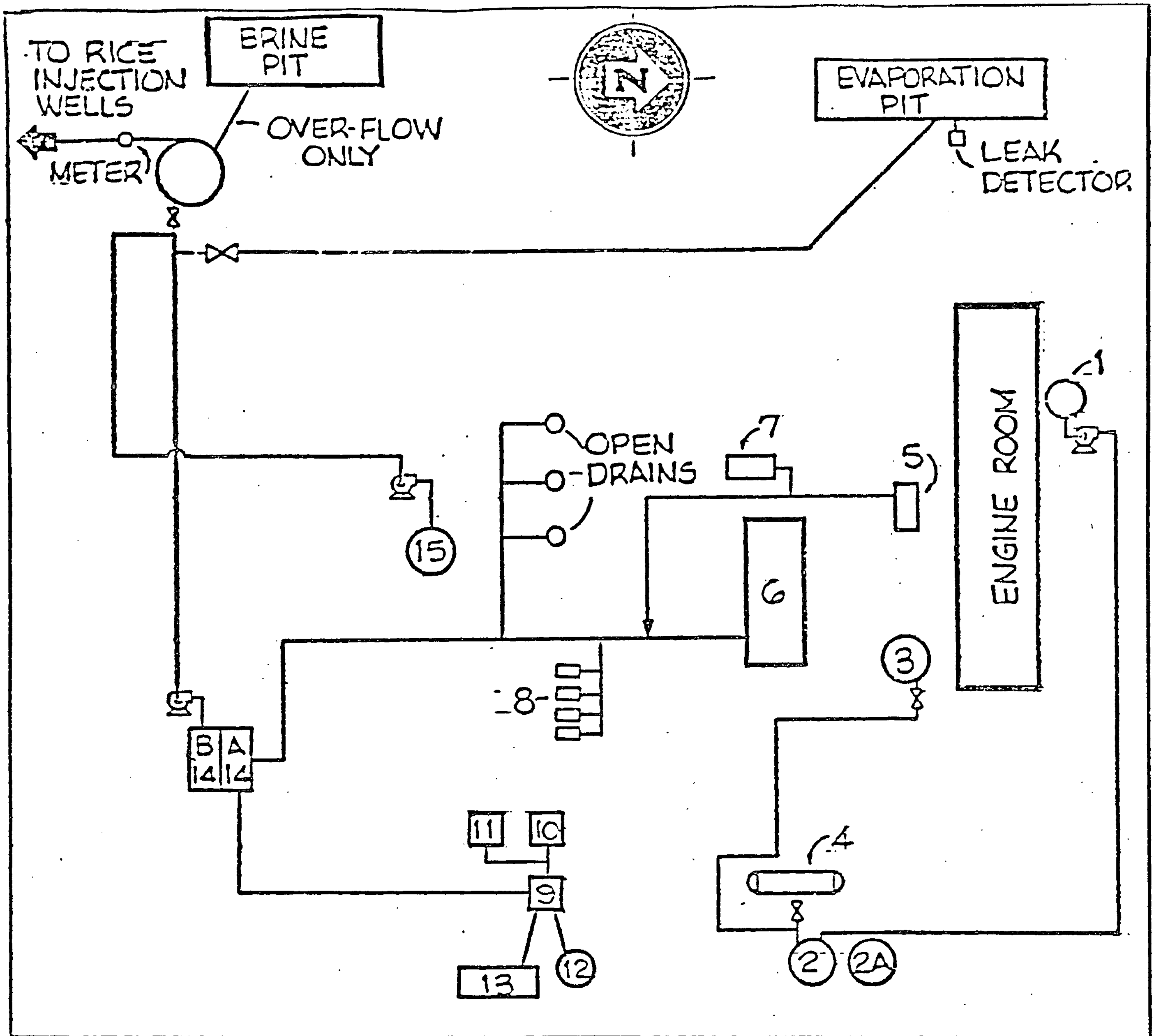
SCALE	DATE
1" = 1 MI.	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

MONUMENT
PLANT NO. 118
LEA CO. N.M.



WARREN PETROLEUM COMPANY
MONUMENT PLANT
PLOT PLAN



LEGEND

1. NORTH ENG. ROOM SUMP
2. SKIMMER TANK
2-A. BLACK OIL TANK
3. 2ND STAGE SCRUBBER
4. 1ST STAGE SCRUBBER
5. SOUTH ENGINE ROOM SUMP
6. COOLING TOWER
7. CONDENSORS
8. CONDENSORS
9. EAST SUMP
10. BOILER
11. BOILER
12. H_2S SCRUBBER
13. BOILER
14-A SKIMMER
14-B. SOUTH SUMP
15. ZEOLITE H_2O TREATERS
16. 3RD STAGE SCRUBBER

NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	BY

NO. OF UNITS REQUIRED, THUS | WO-AFE NO.

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM

MONUMENT PLT. MONUMENT, N.M.

DRAWN WKC	DATE 7-28-81	SCALE ~
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	

SAUNDERS PLANT

WARREN PETROLEUM COMPANY

DIVISION OF GULF OIL CORPORATION

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

QUICK REFERENCE REPORTING/NOTIFICATION PROCEDURES

QUICK REFERENCE DOCUMENT

SPILL CONTAINMENT AND NOTIFICATION PROCEDURES

If a spill occurs, the flow should be stopped and help acquired, if necessary. Contact Plant Manager or alternates if he is not available. Contain the spill using procedures in this plan. Refer to reporting requirements after spill cleanup. These procedures directly follow.

Contacts

F. C. Noah	(505) 396-3221 or (505) 392-6157
S. T. Wilson	(505) 396-5650
M. L. Ingram	(918) 560-4060 or (918) 494-0037
D. E. Todd	(918) 560-4052 or (918) 494-8779
L. T. Reed	(918) 560-4119 or (918) 663-3397

Directed Contacts

National Response Center	(800) 424-8802
Eighth Coast Guard District Duty Officer	(504) 589-6225
EPA Region VI	(214) 767-2720
Emergency Response (EPA Region VI)	(214) 767-2666
New Mexico Oil Conservation Division	
Santa Fe Office	(505) 827-5800
Hobbs District Office	(505) 393-6161
New Mexico Environmental Improvement Division	
Santa Fe Office	(505) 984-0200
Carlsbad District Office	(505) 887-3436 or (505) 885-9023
New Mexico State Corporation Commission	
Pipeline Division/Santa Fe	(505) 827-4497

Miscellaneous Contacts

Fire Department	(505) 398-5555 (Tatum); 396-2112 (Lovington)
Ambulance	(505) 398-5555 (Tatum); 396-2112 (Lovington)
Hospital	(505) 396-4195 (Lovington)
Sheriff (Lea County)	(505) 398-4444 (Tatum); 396-3611 (Lovington)
State Police	(505) 392-5588

Other Plant Personnel

D. E. Brown	(505) 396-3590
K. E. Buckley	(505) 396-5514
K. W. Mapp	(505) 396-3940
S. K. Scriviner	(505) 396-3033

Equipment/Disposal Services

QUICK REFERENCE DOCUMENT - Continued

Equipment/Disposal Services

ITEM	SUPPLIER	PHONE-DAY	PHONE-NIGHT
VACUUM TRUCK	FANNIE LEE MITCHELL, INC. LOVINGTON, NEW MEXICO	396-2620	396-2620
" "	I&W TRANSPORTS LOVINGTON, NEW MEXICO	396-3331	
" "	GANDY CORPORATION LOVINGTON, NEW MEXICO	396-4948 396-3012	
TANK TRUCK	FANNIE LEE MITCHELL, INC. LOVINGTON, NEW MEXICO	396-2620	396-2620
" "	I&W TRANSPORTS LOVINGTON, NEW MEXICO	396-3331	
" "	GANDY CORPORATION LOVINGTON, NEW MEXICO	396-4948	
BACKHOE	COLLIER CONSTRUCTION LOVINTON, NEW MEXICO	396-3936	396-3936
"	BASKETT'S WELDING LOVINGTON, NEW MEXICO	395-5197	396-5197
ROUSTABOUTS	GANDY CORPORATION LOVINGTON, NEW MEXICO	396-3012	
"	BASKETT'S WELDING LOVINGTON, NEW MEXICO	396-5147	396-5147
"	C&T ROUSTABOOUT SERVICE LOVINGTON, NEW MEXICO		

SAUNDERS PLANT

SPILL NOTIFICATION PROCEDURES

Federal, state and local water pollution control agencies require that certain discharges be reported. Discharges exhibiting any of the characteristics described below must be reported to the appropriate government agencies as indicated.

OIL/HAZARDOUS SUBSTANCES
Reportable Spills

1. Any discharge of oil into or adjacent to navigable waters, or
2. Any release of a reportable quantity[1] of a hazardous substance to the environment (water, air, or land).

Report[3]
Immediate, by telephone.

Agencies
State of New Mexico Environmental Improvement Division: (Santa Fe) 505/984-0200, (Carlsbad) 505/887-3436, or 505/885-9023; and US Environmental Protection Agency-Emergency Response (Dallas Regional Office) 214/767-2666; and National Response Center 800/424-8802; and State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 or (Hobbs) 505/393-6161.

MAJOR BREAKS, SPILLS, OR LEAKS
Reportable Spills

1. Discharge of 25 or more barrels of crude oil or condensate or 100 barrels or more of salt water, none of which reaches a body of water, and/or,
2. Discharge of one or more barrels of crude oil or condensate or 25 barrels or more of salt water into a body of water, and/or
3. Endanger health or damage property.

Report[3]
As soon as possible by telephone. Written report within 10 days of incident to district office.

Agencies
State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 and (Hobbs) 505/393-6161.

MINOR BREAKS, SPILLS, OR LEAKS
Reportable Spills
Discharges between 5 to 25 barrels of crude oil or condensate or between 25 to 100 barrels of salt water, none of which reaches a body of water.

Report[3]
Written report within 10 days of incident to district office.

Agencies
State of New Mexico Oil Conservation Division-Hobbs District office: 505/393-6161

PIPELINE LEAK

Reportable Spills

1. Caused a death or caused a personal injury requiring hospitalization, and/or
2.[2] Required taking a segment of pipeline out of service, and/or
3.[2] Resulted in gas igniting, and/or
4. Caused an estimated property damage of $5,000 or more, or
5. Was significant although not part of 1. through 4., above.

Report[3]

Immediate by telephone. Written report within 10 days of incident.

Agencies

US Department of Transporation through the National Response Center 800/424-8802; and New Mexico State Corporation Commission (Santa Fe) 505/827-4497.

[1]Reportable quantities of hazardous substances are listed in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations), prepared by Gulf Oil Corporation - pages 40-117-1 through 40-117-4; Hazardous Wastes are listed in the Federal Register, Volume 45-No. 98, May 19, 1980.

[2]Notice is not required if 2. and 3. occurred solely as a result of, or in connection with, a planned or routine maintenance or construction.

[3]Contents of Telephone Report
Described in further detail in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations) - Prepared by Gulf Oil Corporation, Page 40-112-2 through 40-112-3.

a. Name, title, and telephone number of reporter.
b. Name of facility.
c. Name of owner or operator.
d. Location of facility.
e. Time and type of incident (e.g., fire, explosion, etc.)
f. Location of spill or discharge including name of waters involved.
g. Type and quantity of material spilled.
h. Other information that may be required.
i. Request the name of the person to whom you reported.

Additional information to be included in the written report:

a. Initial startup date of facility.
b. Maximum storage or handling capacity, daily average throughput.
c. Description of facility including process flows, plot plan, and topographic map.
d. Copy of SPCC Plan.
e. Cause of the spill(s).
f. Corrective action(s) taken.
g. Preventive measure(s) taken.
h. Extent of any physical damage and/or personal injuries.

All reported information should be logged and documented for record keeping purposes.

Rule 116-State of New Mexico-Energy and Minerals Department-Oil Conservation Division Rules and Regulations (3-1-82).

RULE 116. NOTIFICATION OF FIRE, BREAKS, LEAKS, SPILLS, AND BLOWOUTS

The Division shall be notified of any fire, break, leak, spill, or blowout occurring at any injection or disposal facility or at any oil or gas drilling, producing, transporting, or processing facility in the State of New Mexico by the person operating or controlling such facility.

"Facility," for the purpose of this rule, shall include any oil or gas well, any injection or disposal well, and any drilling or workover well; any pipe line through which crude oil, condensate, casinghead or natural gas, or injection or disposal fluid (gaseous or liquid) is gathered, piped, or transported (including field flow-lines and lead-lines but not including natural gas distribution systems); any receiving tank, holding tank, or storage tank, or receiving and storing receptacle into which crude oil, condensate, injection or disposal fluid, or casinghead or natural gas is produced, received, or stored; any injection or disposal pumping or compression station including related equipment; any processing or refining plant in which crude oil, condensate, or casinghead or natural gas is processed or refined; and any tank or drilling pit or slush pit associated with oil or gas well or injection or disposal well drilling operations or any tank, storage pit, or pond associated with oil or gas production or processing operations or with injection or disposal operations and containing hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, or other deleterious chemicals or harmful contaminants.

Notification of such fire, break, leak, spill, or blowout shall be in accordance with the provisions set forth below:

1. Well Blowouts. Notification of well blowouts and/or fires shall be "immediate notification" described below. ("Well blowout" is defined as being loss of control over and subsequent eruption of any drilling or workover well, or the rupture of the casing, casinghead, or wellhead of any oil or gas well or injection or disposal well, whether active or inactive, accompanied by the sudden emission of fluids, gaseous or liquid, from the well.)

2. "Major" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 25 or more barrels of crude oil or condensate, or 100 barrels or more of salt water, none of which reaches a watercourse or enters a stream or lake; breaks, spills, or leaks in which one or more barrels of crude oil or condensate or 25 barrels or more of salt water does reach a watercourse or enters a stream or lake; and breaks, spills, or leaks of hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, gases, or other deleterious chemicals or harmful contaminants of any magnitude which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" described below.

3. "Minor" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 5 barrels or more but less than 25 barrels of crude oil or condensate, or 25 barrels or more but less than 100 barrels of salt water, none of which reaches a watercourse or enters a stream or lake, shall be "subsequent notification" described below.

4. Gas Leaks and Gas Line Breaks. Notification of gas leaks from any source or of gas pipe line breaks in which natural or casinghead gas of any quantity has escaped or is escaping which may with reasonable probability endanger human health or result in substantial damage to property shall be "immediate notification" described below. Notification of gas pipe line breaks or leaks in which the loss is estimated to be 1000 or more MCF of natural or casinghead gas but in which there is no danger to human health nor of substantial damage to property shall be "subsequent notification" described below.

5. Tank Fires. Notification of fires in tanks or other receptacles caused by lightning or any other cause, if the loss is, or it appears that the loss will be, 25 or more barrels of crude oil or condensate, or fires which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" as described below. If the loss is, or it appears that the loss will be at least 5 barrels but less than 25 barrels, notification shall be "subsequent notification" described below.

6. Drilling Pits, Slush Pits, and Storage Pits and Ponds. Notification of breaks and spills from any drilling pit, slush pit, or storage pit or pond in which any hydrocarbon or hydrocarbon waste or residue, strong caustic or strong acid, or other deleterious chemical or harmful contaminant endangers human health or does substantial surface damage, or reaches a watercourse or enters a stream or lake in such quantity as may with reasonable probability endanger human health or result in substantial damage to such watercourse, stream, or lake, or the contents thereof, shall be "immediate notification" as described below. Notification of breaks or spills of such magnitude as to not endanger human health, cause substantial surface damage, or result in substantial damage to any watercourse, stream, or lake, or the contents thereof, shall be "subsequent notification" described below, provided however, no notification shall be required where there is no threat of any damage resulting from the break or spill.

IMMEDIATE NOTIFICATION. "Immediate Notification" shall be as soon as possible after discovery and shall be either in person or by telephone to the district office of the Division district in which the incident occurs, or if the incident occurs after normal business hours, to the District Supervisor, the Oil and Gas Inspector, or the Deputy Oil and Gas Inspector. A complete written report ("Subsequent Notification") of the incident shall also be submitted in duplicate to the appropriate district office of the Division within ten days after discovery of the incident.

SUBSEQUENT NOTIFICATION. "Subsequent Notification" shall be a complete written report of the incident and shall be submitted in duplicate to the district office of the Division district in which the incident occurred within ten days after discovery of the incident.

CONTENT OF NOTIFICATION. All reports of fires, breaks, leaks, spills, or blowouts, whether verbal or written, shall identify the location of the incident by quarter-quarter, section, township, and range, and by distance and direction from the nearest town or prominent landmark so that the exact site of the incident can be readily located on the ground. The report shall specify the nature and quantity of the loss and also the general conditions prevailing in the area, including precipitation, temperature, and soil conditions. The report shall also detail the measures that have been taken and are being taken to remedy the situation reported.

WATERCOURSE, for the purpose of this rule, is defined as any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART I

GENERAL INFORMATION

PART I

GENERAL INFORMATION
SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

1. Facility name: Saunders Plant

2. Facility type: Onshore Gas Plant

3. Facility location: Approximately 11 miles west of Lovington, NM on Highway 82 then 10 miles north of Highway 82 on Highway 457, Lea County, NM.

4. Owner or operator name and address: Warren Petroleum Company
Box 1689
Lovington, NM 88260

5. Name and title of oil spill prevention contact: F. C. Noah
Plant Manager

6. Did facility experience a reportable oil spill event during the twelve months prior to 1-10-74 (effective date of 40 CFR, Part 112)? No
(If yes, complete Attachment 1.)

Management Approval
This SPCC plan will be implemented as herein described:

Signature: Original signed by F.C. Noah

Name: F. C. Noah
Title: Plant Manager

Certification
I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Registered Professional Engineer: Jim R. Bruce
(Print)

Jim R. Bruce
(Signature)

(Seal)

Date: 2-15-85 Registration No. 4946 State: NM

Previous Certification: 12/29/82

PART I-GENERAL INFORMATION - Continued

7. Potential spills - prediction and control:

Source	Major Type of Failure	Total Quantity (Bbls)	Rate (Bbls/Hr)	Flow Direction	Secondary Containment
1)Waste Water(4)	Rupture	2420	2420	NE	Dike
2)Condensate Storage(2)	Rupture	1904	1904	No Flow Low Spot	None
3)Amine (MEA) Storage	Leak	211	211	Low Area	None
4)Heaters(3)	Rupture	31	31	NE	Curb/Sump
5)Lube Oil Storage(2)	Leak	422	422	Low Area	None
6)Diesel Tank	Leak	36	36	NE	None
7)Heating Oil Storage	Leak	714	714	Low Area	None
8)Acid Tank	Leak	12	12	SE	None
9)Solvent Tanks(2)	Leak	12	12	SE	None
10)Methanol(2)	Leak	24	24	NE	None
11)Brine	Leak	210	210	S	None
12)Phosphate(2)	Leak	18	36	Low Area	None
13)Nitrite	Leak	12	12	S	None

1) There are four waste water tanks; two 1000 barrel tanks and two 210 barrel tanks. All tanks are welded steel and open to the atmosphere. Also, all are enclosed within an earthen dike. Spills from these tanks would be hauled away be vacuum trucks by outside contractors. Only one of the 1000 barrel tanks (neither of the 210 barrel tanks) is used for daily operation.

2) There are two condensate storage tanks (Tank #1: 714 Bbls; Tank #2, 1,190 Bbls) both of which hold a total of 1904 barrels. All three vessels are welded steel and are under pressure. In case of spills, the major portion of liquids would vaporize, and the remaining portion would be contained by plant personnel until vaporized.

3) The MEA storage tank is much larger than needed and is never fully utilized. The tank is welded steel vented to the atmosphere. Spills would be contained by plant personnel.

4) The oil spills from the heaters would be caused by the rupture of the internal tubing. Some of the oil would be held in the heater housing while spills would be drained to the sump pit from the large heater and contained by plant personnel.

5) There are two Lube Oil Storage tanks, each containing 211 Bbls. Any spill would be contained by plant personnel.

6-13) Spills from the remaining vessels would all be contained by plant personnel. Diesel (6) and methanol (10) would vaporize upon contact with the ambient atmosphere.

PART I-GENERAL INFORMATION - Continued

Additional drum storage contains lube oil. A maximum of 10 barrels of oil is stored and any spill would also be contained by plant personnel.

8. Are containment, diversionary structures, or equipment to prevent oil from reaching navigable waters practicable? (If NO, complete Attachment 2.) Yes.

9. Inspections and Records:

   a. Do the required inspections follow written procedures as contained in this plan? Not applicable.

   b. Are the written procedures and inspection records signed by the appropriate supervisor or inspector attached? Not applicable.

   Comment: Inspections at the plant do not require written procedures.

10. Personnel, training, and spill prevention procedures:

   a. Are personnel properly instructed in the following?

      1. Operation and maintenance of equipment to prevent oil discharges. Yes

      2. Applicable pollution control laws, rules, and regulations? Yes

      Describe procedures employed for instruction: All employees at this location have received written and verbal communication that no materials are to be released, the hazards of hydrocarbon spills and the seriousness of land and water pollution

   b. Are scheduled prevention briefings for the operating personnel conducted frequently enough to assure adequate understanding of the SPCC plan? Yes

   Describe briefing program: All employees have been verbally briefed on the procedures of containing spills and are reminded periodically about the procedures. All new employees receive a booklet concerning Warren's commitment to safety and it is reviewed and discussed with the Plant Manager. Included in this discussion is spill prevention control.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE A

DESIGN AND OPERATING INFORMATION

ONSHORE FACILITY (EXCLUDING PRODUCTION)

PART II, ALTERNATE A

DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) (Note: Flapper-type valves should not be used.)

   The plant has no diked primary storage areas. The dike around the waste water tanks is used as secondary containment only and vacuum trucks will be used to evacuate the area if needed.

2. Drainage from undiked areas is controlled as follows: (Include description of ponds, lagoons, or catchment basins and methods of retaining and returning oil to facility.)

   Plant drainage of all liquids enter a closed drainage system into an open sump pit. Liquids are then pumped to a storage tank where oil and water are separated. The water is pumped to a disposal well while the oil is hauled away by vacuum trucks. Refer to Part VI on this Spill Plan for drainage and disposal diagrams. In addition, scrubbers at booster site area are usually inspected daily and any accumulations are hauled away by vacuum trucks.

3. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.)

   Rainwater from secondary containment does not enter a storm drain or an open water course.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features, and if needed, corrosion protection:

   All tanks are vertical or horizontal welded steel. All tanks have been pressure tested to meet each service requirement.

2. Describe secondary containment design, construction materials, and volume: Waste water tanks - earthen dike that will contain 3000 barrels. Large heater - concrete pad with curbs, with closed drainage to sump.

3. Describe tank inspection methods, procedures, and record keeping: Tanks are externally inspected for rust and/or corrosion. No internal inspection is made as no corrosive products are stored.

4. Internal heating coil leakage is controlled by one or more of the following control factors:

a. Monitoring the steam return or exhaust lines for oil. Describe monitoring procedure: Not applicable.

b. Passing the steam return or exhaust lines through a settling tank, skimmer, or other separation system. Not applicable.

c. Installing external heating systems. Not applicable.

5. Disposal facilities for plant effluents discharged into navigable waters are observed frequently for indication of possible upsets which may cause an oil spill event. Not applicable.

C. Facility Transfer Operations, Pumping and Inplant Process

1. Corrosion protection for buried pipelines:
   a. Are pipelines wrapped and coated to reduce corrosion? Yes
   b. Is cathodic protection provided for pipelines if determined necessary by electrolytic testing? Not applicable.
   c. When a pipeline section is exposed, is it examined and corrective action taken as necessary? Yes

2. Are pipeline terminal connections capped or blank-flanged and marked if the pipeline is not in service or on standby service for extended periods? Yes

   Describe criteria for determining when to cap or blank-flange:

   All abandoned lines are capped or removed.

3. Are pipe supports designed to minimize abrasion and corrosion and allow for expansion and contraction? Yes

   Describe pipe support design:

   All pipe is supported by steel beams or concrete pads and have been equipped with a slip-shoe between pipe and support where necessary.

4. Describe procedures for regularly examining all aboveground valves and pipelines including flange joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces:

   All aboveground valves, piping, and flanges are observed on a daily basis.

5. Describe procedures for warning vehicles entering the facility to avoid damaging aboveground piping:

   Non-company vehicles are not allowed in the plant area without proper identification. Persons operating non-company vehicles are verbally cautioned as to dangers upon entering gas plants and aboveground piping.

D. Facility Tank Car and Tank Truck Loading/Unloading Rack
Does tank car and tank truck loading/unloading occur at the facility? If yes, complete 1 through 5 below. Yes.

1. Do loading/unloading procedures meet the minimum requirement and regulations of the Department of Transportation? Yes.

2. Does the unloading area have a quick drainage system? Not applicable.

3. Will the containment system hold the maximum capacity of any single compartment of a tank truck loaded/unloaded in the plant?

   Describe containment system design, construction materials, and volume: Products loaded or unloaded at this facility will vaporize at atmospheric pressure.

4. Is an interlocked warning light, a physical barrier system, or warning signs provided in loading/unloading areas to prevent vehicular departure before disconnect of transfer lines? Yes.

   Describe methods, procedures, and/or equipment used to prevent premature vehicular departure: During loading and unloading operations, the vehicle driver must remove ignition keys from the vehicle. The driver is not allowed to remain in the vehicle during loading or unloading operations. The driver actually makes the connections himself and proceeds with the operations.

5. Are drains and outlets on tank trucks and tank cars checked for leakage before loading/unloading or departure? Yes.

E. Security

1. Are plants fenced that are handling, processing, or storing oil? Yes

2. Are entrance gates locked and/or guarded when the plant is unattended or not in production? Not applicable.

3. Are any valves which permit direct outward flow of a tank's contents locked closed when in non-operating or standby status? No

4. Starter controls on all oil pumps in non-operating or standby status are:

   a. locked in the off position. No.
   b. located at site accessible only to authorized personnel. Yes.

5. Discussion of items 1 through 4 as appropriate:

   The plant is never unattended, and all valves, controls, etc. are monitored at all times.

6. Discussion of lighting around the facility:

   Lighting is adequate enough for the operators to observe anyone at the facility. The lighting is also sufficient to witness any spill event.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE B

DESIGN AND OPERATING INFORMATION

ONSHORE OIL PRODUCTION FACILITY

PART II, ALTERNATE B

DESIGN AND OPERATING INFORMATION
ONSHORE OIL PRODUCTION FACILITY

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) Not applicable.

2. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

3. Field drainage ditches, road ditches, and oil traps, sumps, or skimmers, if such exist, are inspected at regularly scheduled intervals for accumulation of oil. Yes.

   Describe inspection procedures, intervals, and methods employed to remove oil: Scrubbers at booster site area are usually inspected daily and any accumulations are hauled away be vacuum trucks.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features: Not applicable.

2. Describe secondary containment design, construction materials, and volume: Not applicable.

3. Describe tank inspection methods, procedures, and recordkeeping: Not applicable.

C. Facility Transfer Operations

1. Describe scheduled basis for examinations of aboveground valves and pipelines and salt water disposal facilities: Not applicable.

2. Describe flowline maintenance program to prevent spills: Not applicable.

D. Oil Drilling and Workover Facilities

1. A blowout preventer (BOP) assembly and well control system is installed before drilling below any casing string and, as required, during workover operations. Not applicable.

2. The BOP assembly is capable of controlling any expected wellhead pressure. Not applicable.

3. Casing and BOP installations conform to state regulations. Not applicable.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART III

SPILL HISTORY

SPILL HISTORY

There have been no spills at the Saunders Plant. It is very unlikely that a spill would occur which would leave the property thereby entering a navigable waterway. However, Form S/WPC-SPCC-1, an example of which follows, will be used to record information should a spill occur.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART IV

CONTINGENCY PLAN

(ATTACHMENT #2)

ATTACHMENT 2

OIL SPILL CONTINGENCY PLANS & WRITTEN COMMITMENT OF MANPOWER*

Secondary containment or diversionary structures are impracticable for this facility for the following reasons (attach additional pages, if necessary).

There is little likelihood of a spill could occur at this facility which would reach a waterway. Warren dedicates the commitment of personnel to inspect storage materials at least on a daily basis. Attention to any leaks will be immediate. Warren also dedicates the commitment of personnel to contain and remove any spilled material in an expedient manner.

<u>Yes</u> A strong oil spill contingency plan is intended.

<u>Yes</u> A written commitment of manpower is intended.

<u>General</u>

We are required, by law, to have at this location a "Prevention and Control Plan for Accidental Material Releases." This Plan includes procedures for the reporting, control, containment, and cleanup of any materials released. The term "Hazardous Material" includes any material that could adversely affect the well being of humans, animals, plant like, and/or environment due to its chemical composition, flammability or explosive characteristics. Of utmost importance, is the notification and protection of the public. This plan includes the notification of the public when a release is in an area that would present a hazard.

<u>Notification - Internal</u>

1. Any employee detecting a release of hazardous material shall, if practical, take steps to control or contain the release.

2. Call the supervisor on duty giving the location and nature of the release.

3. The supervisor on duty will notify the Plant Manager, Response Team Employees, and if necessary, Equipment, Medical, and Law Enforcement Agencies.

<u>Responsibility Chain</u>

PLANT MANAGER

Employee on Duty Supervisor on Duty

Response Team Equipment Material Law Enforcement Medical

Phone numbers for employees and outside sources are available in the Reporting/Notification procedures of this Spill Plan.

*This SPCC plan contains an oil spill contingency plan and includes the commitment of manpower to implement the plan.

ATTACHMENT #2 - Continued

Action Plan

The release of various materials can occur at certain locations in the plant process area and in the field gathering system. Primarily, should a release occur, the Operator's function will be to report and control (by closing valves, etc.) the release. The following will be our plan of action for releases at various locations:

1. Waste Water Tanks

   a. Operator on duty will manually stop the pumping into the tanks, and start pumps to waste water well, if necessary.
   b. The liquid that is contained within the dike will then be removed with a vacuum truck.
   c. The ground surface will then be cleaned up and reclaimed within the dike area.

2. All Other Sources of Spills

   a. The operator will shutdown appropriate pumps, and close valves to tanks at which the spill occurred.
   b. Operator will notify supervisor on duty, who will then call-in additional personnel, if necessary.
   c. If a dike is necessary, our equipment on site can be used to contain the spill or additional equipment can be called in, if needed.
   d. After containment, the spill will be removed by vacuum truck and the spill area cleaned up and reclaimed.

3. Plant Spills Public Safety

   a. Due to the location of the plant, public safety should not normally be effected. However, the Plant Manager will determine if any spills could be detrimental to the public safety and take appropriate preventive action.
   b. The preventive action taken will depend on the amount, type, and location of the spill, and the Plant Manager will use his/her discretion of measures taken. Therefore, no predetermined action can be set.

4. Saunders Gathering System

   Since our field gathering system is gas, our main concern regarding a field line rupture is public safety. The majority of the system, where a sudden release of natural gas were present would not present a definite hazard to home dwellers and/or motorists. If leaks do occur near living areas and roads, personnel living in the area will be notified and road-blocks established to protect motorists. Leaks are normally reported by the public to the plant. Whoever takes calls, will notify the supervisor on duty, who will in turn, call out field personnel to repair the leak.

5. Summary

   Our basic plan of action upon releases of any materials will be the same:

ATTACHMENT #2 - Continued

a. Detect the release.
b. Control the release, if possible, by shutting off the source.
c. Notify company personnel.
d. Protection of company and non-company personnel.
e. Protection of equipment and the environment.
f. Cleanup and repair.

6. Prevention

Every effort will be made to prevent spills and/or line breaks. Every employee is expected to report any situation that appears to be a potential problem. Constant surveillance by all employees is necessary to prevent Materials Releases.

7. Public Safety

Public Safety was previously discussed for plant and field procedures. The purpose of this section is to create a procedure to notify the public that a hazard exists in their area and to instruct them to evacuate the area. Should a line rupture occur near a public road that would endanger motorists using that road, we must notify the County Sheriff's Department of the exact location. We will then block the road until Law Enforcement Officials arrive. Should a line rupture occur near a public or private dwelling that might endanger human life, our personnel will immediately notify the endangered persons, and notify the County Sheriff's Department for further instructions.

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART V

ONSHORE FACILITY BULK STORAGE TANKS DRAINAGE SYSTEM

(ATTACHMENT #3)

PART V

ONSHORE FACILITY BULK STORAGE TANKS-DRAINAGE SYSTEM

Inspection Procedure: Diked areas are drained by use of a vacuum truck.

Record of drainage, bypassing, inspection, and oil removal from secondary containment: Not applicable.

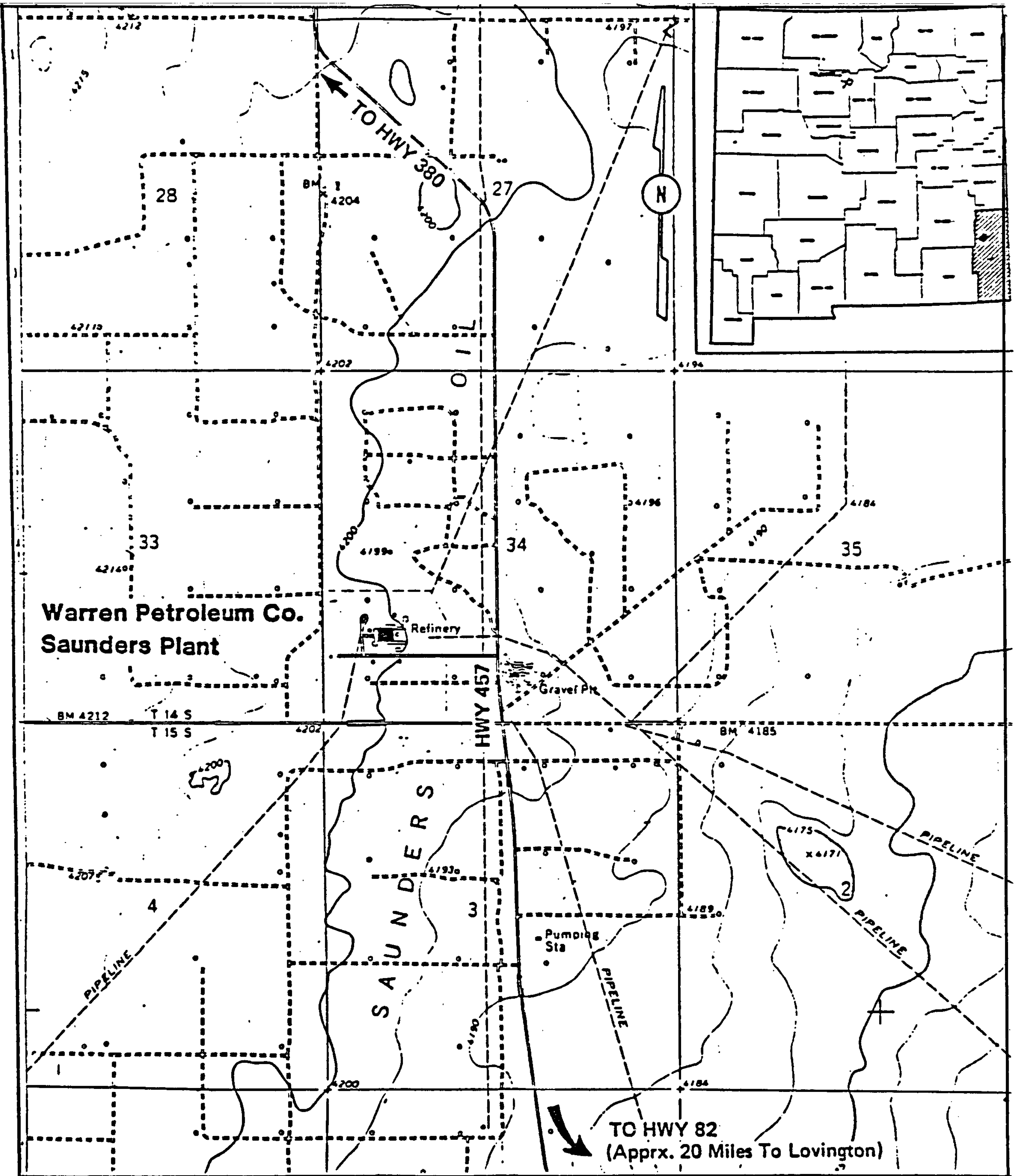
Drainage Location	Drainage Date	Date Bypassing Open	Date Bypassing Closed	Inspection Date	Oil Removal	Signature	Installed Seal #

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART VI

LOCATION MAPS/PLANS



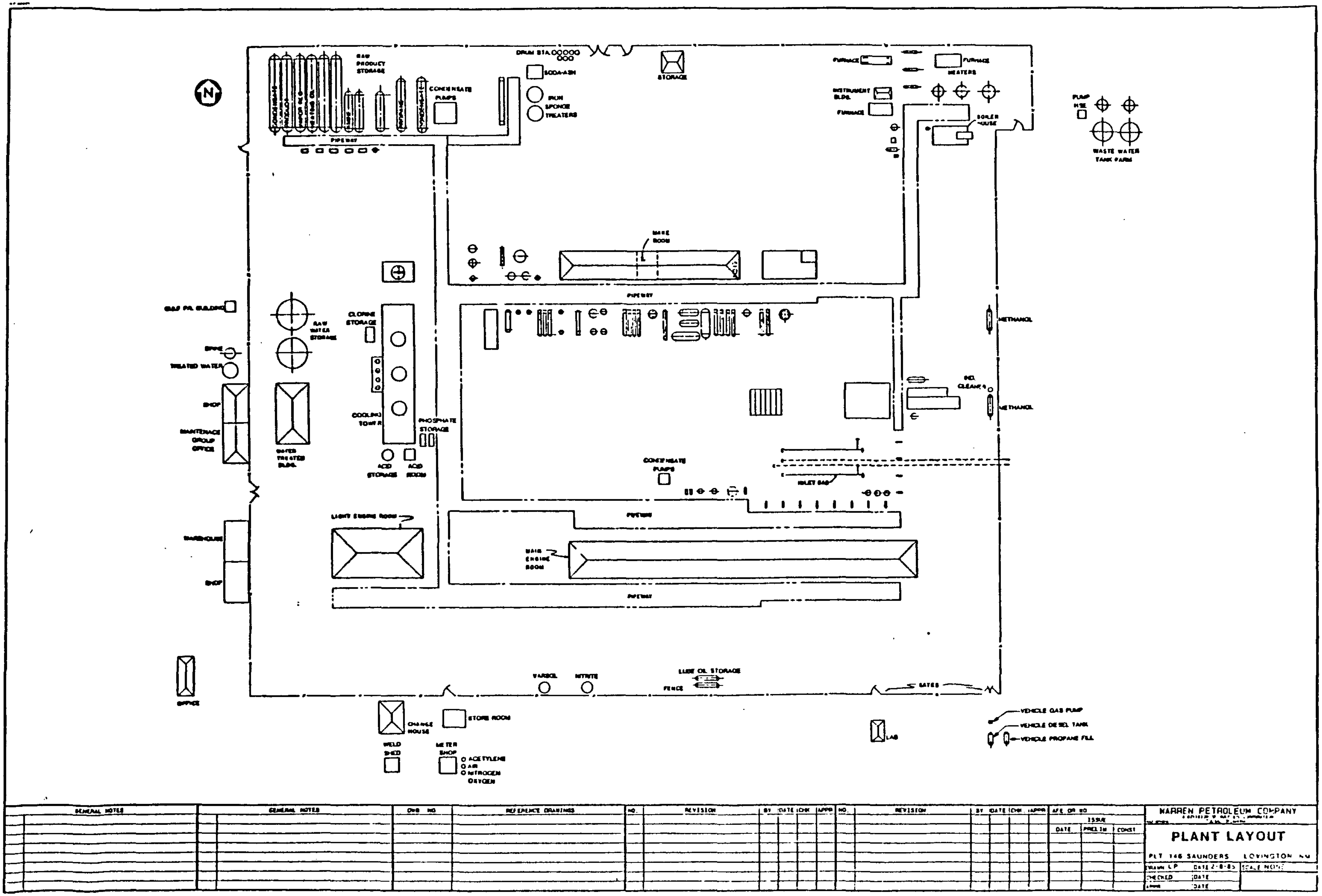
PLANT LOCATION
SEC.34, T-14-S, R-33-E

APPROX. EL. 4200
APPROX. LAT. 33°3' 28" N
APPROX. LONG. 103°36' 29" W

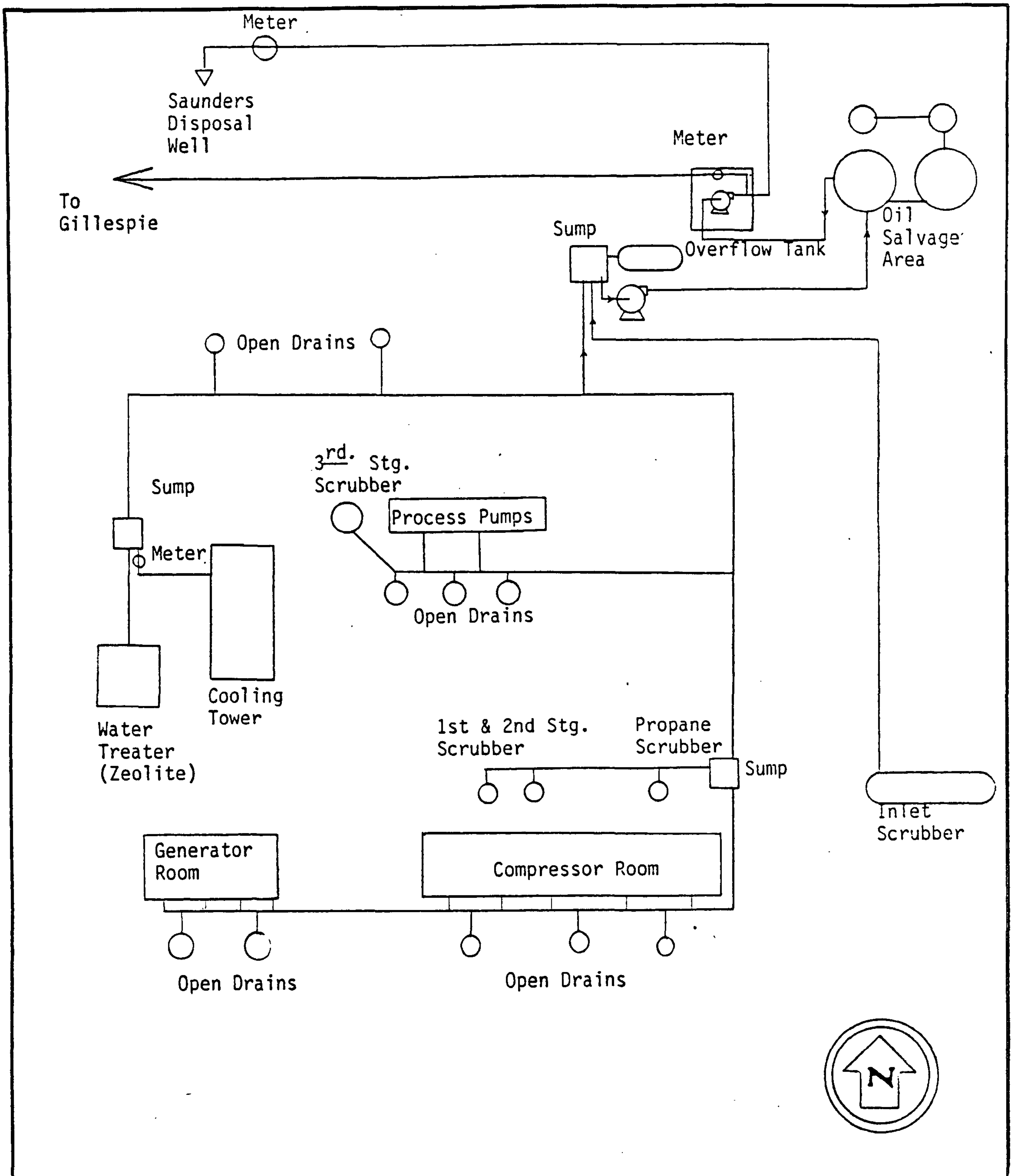
SCALE	DATE
1" = 2000'	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

SAUNDERS
PLANT No. 146
LEA CO., N.M.



WARREN PETROLEUM COMPANY
SAUNDERS PLANT
PLOT PLAN



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	BY

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

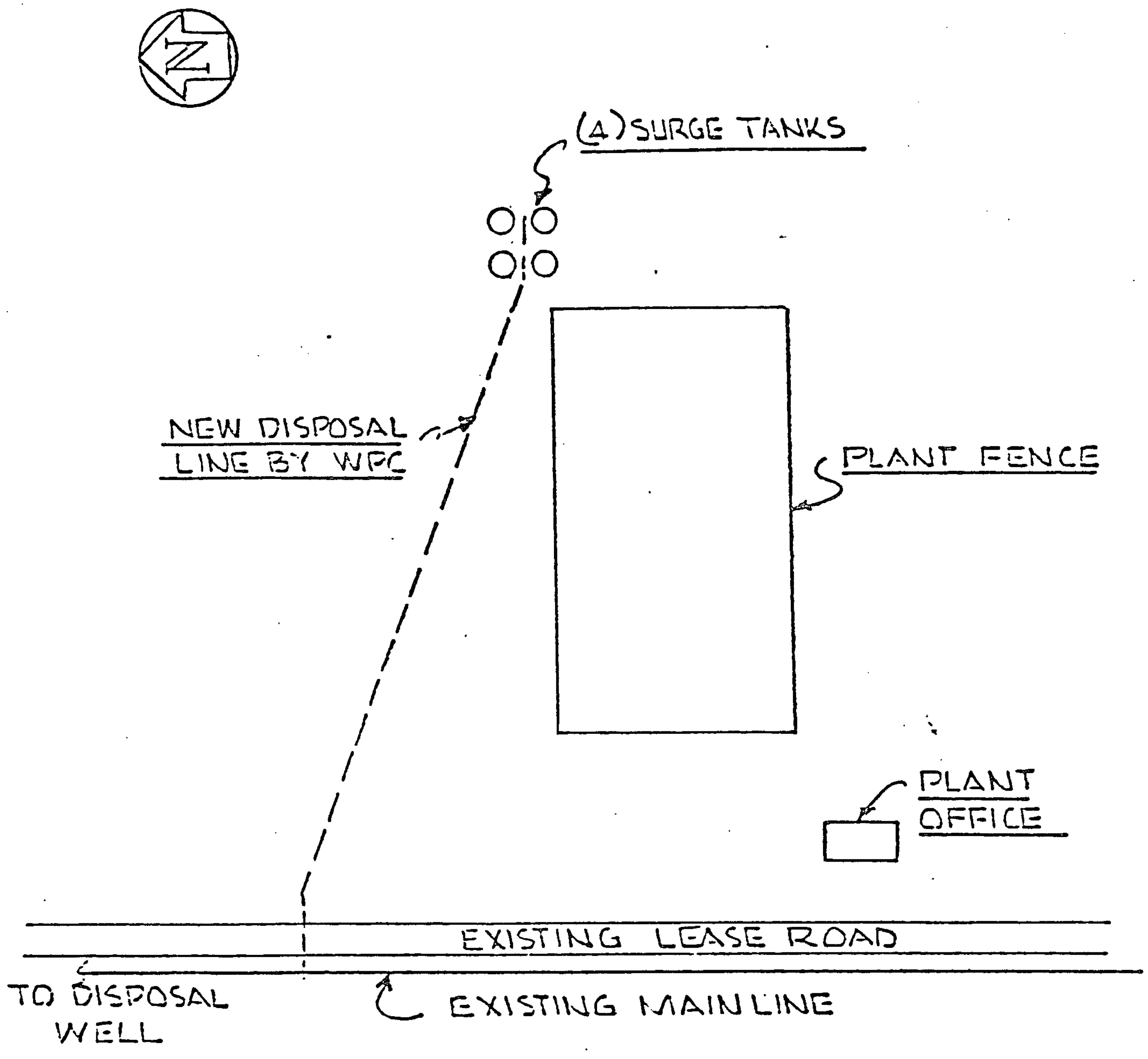
WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA

GULF 82341

Waste Water System

Saunders Plt. Lovington, N. M.

DRAWN RLM	DATE 1-22-85	SCALE ~~H~~
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	BY

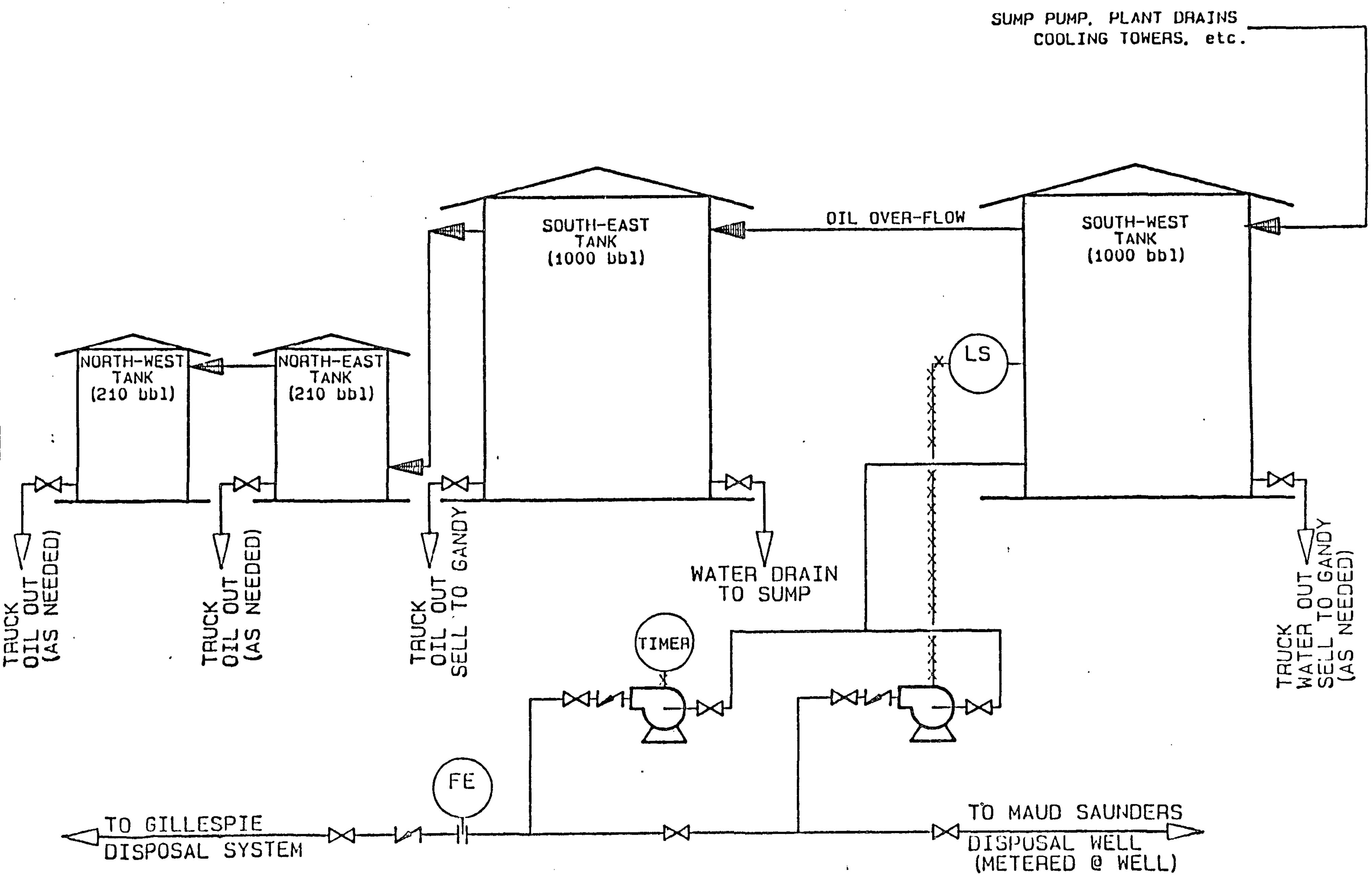
NO. OF UNITS REQUIRED THUS | WO-AFE NO.

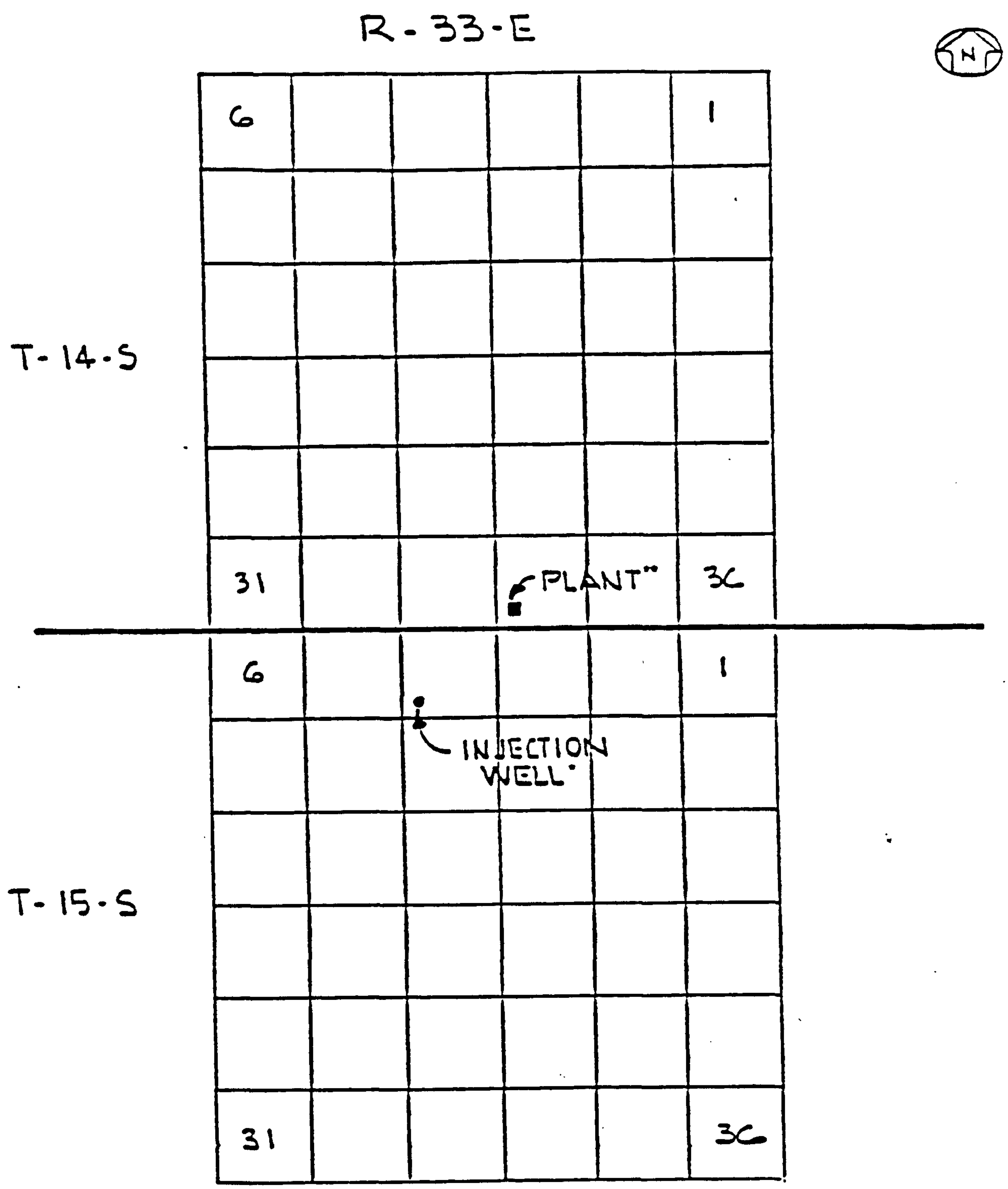
WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA GULF 8234

SAUNDERS PLANT DISPOSAL LINE TO INJECTION WELL
PLT. 146 LEA CO., LOVINGTON, NM

DRAWN P.K	DATE 11-2-81	SCALE NONE
CHECKED	DATE	DRAWING NO. 146-1003-0
APPROVED	DATE	

WASTE WATER SYSTEM
SAUNDERS PLANT





*LOCATION OF DISPOSAL WELL OPERATED BY CHARLES B. GILLESPIE

**LOCATION OF THE PLANT SITE. THE PROPOSED DISPOSAL WELL WILL BE LOCATED AT THE PLANT SITE.

NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST.	
1	WARREN WELL	LLJ	3-83				

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA
GULF 82341

SAUNDER PLANT AND INJECTION WELL LOCATION
PLT.146 LEA COUNTY, LOVINGTON, N.M.

DRAWN F.K.	DATE 11-2-81	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	146-1002-0

VADA PLANT

WARREN PETROLEUM COMPANY

DIVISION OF GULF OIL CORPORATION

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

QUICK REFERENCE REPORTING/NOTIFICATION PROCEDURES

QUICK REFERENCE DOCUMENT

SPILL CONTAINMENT AND NOTIFICATION PROCEDURES

If a spill occurs, the flow should be stopped and help acquired, if necessary. Contact Plant Manager or alternates if he is not available. Contain the spill using procedures in this plan. Refer to reporting requirements after spill cleanup. These procedures directly follow.

<u>Contacts</u>

F. C. Noah	(505) 396-3221 or (505) 392-6157
W. I. Mayfield	(505) 398-5566, 5561, or 2131
M. L. Ingram	(918) 560-4060 or (918) 494-0037
D. E. Todd	(918) 560-4052 or (918) 494-8779
L. T. Reed	(918) 560-4119 or (918) 663-3397

<u>Directed Contacts</u>

National Response Center	(800) 424-8802
Eighth Coast Guard District Duty Officer	(504) 589-6225
EPA Region VI	(214) 767-2720
Emergency Response (EPA Region VI)	(214) 767-2666
New Mexico Oil Conservation Division	
Santa Fe Office	(505) 827-5800
Hobbs District Office	(505) 393-6161
New Mexico Environmental Improvement Division	
Santa Fe Office	(505) 984-0200
Carlsbad District Office	(505) 887-3436 or (505) 885-9023
New Mexico State Corporation Commission	
Pipeline Division/Santa Fe	(505) 827-4497

<u>Miscellaneous Contacts</u>

Fire Department	(505) 398-5555
Ambulance	(505) 398-5555
Hospital	(505) 396-6616
Police	(505) 398-4444
State Police	(505) 398-5225
Equipment/Disposal Services (Gandy Corporation - Tatum & Lovington)	(505) 398-4960

VADA PLANT

SPILL NOTIFICATION PROCEDURES

Federal, state and local water pollution control agencies require that certain discharges be reported. Discharges exhibiting any of the characteristics described below must be reported to the appropriate government agencies as indicated.

OIL/HAZARDOUS SUBSTANCES

Reportable Spills

1. Any discharge of oil into or adjacent to navigable waters, or
2. Any release of a reportable quantity[1] of a hazardous substance to the environment (water, air, or land).

Report[3]

Immediate, by telephone.

Agencies

State of New Mexico Environmental Improvement Division: (Santa Fe) 505/984-0200, (Carlsbad) 505/887-3436, or 505/885-9023; and US Environmental Protection Agency-Emergency Response (Dallas Regional Office) 214/767-2666; and National Response Center 800/424-8802; and State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 or (Hobbs) 505/393-6161.

MAJOR BREAKS, SPILLS, OR LEAKS

Reportable Spills

1. Discharge of 25 or more barrels of crude oil or condensate or 100 barrels or more of salt water, none of which reaches a body of water, and/or,
2. Discharge of one or more barrels of crude oil or condensate or 25 barrels or more of salt water into a body of water, and/or
3. Endanger health or damage property.

Report[3]

As soon as possible by telephone. Written report within 10 days of incident to district office.

Agencies

State of New Mexico Oil Conservation Division (Santa Fe) 505/827-5800 and (Hobbs) 505/393-6161.

MINOR BREAKS, SPILLS, OR LEAKS

Reportable Spills

Discharges between 5 to 25 barrels of crude oil or condensate or between 25 to 100 barrels of salt water, none of which reaches a body of water.

Report[3]

Written report within 10 days of incident to district office.

Agencies

State of New Mexico Oil Conservation Division-Hobbs District office: 505/393-6161

PIPELINE LEAK

Reportable Spills

1. Caused a death or caused a personal injury requiring hospitalization, and/or
2.[2] Required taking a segment of pipeline out of service, and/or
3.[2] Resulted in gas igniting, and/or
4. Caused an estimated property damage of $5,000 or more, or
5. Was significant although not part of 1. through 4., above.

Report[3]

Immediate by telephone. Written report within 10 days of incident.

Agencies

US Department of Transporation through the National Response Center 800/424-8802; and New Mexico State Corporation Commission (Santa Fe) 505/827-4497.

[1]Reportable quantities of hazardous substances are listed in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations), prepared by Gulf Oil Corporation - pages 40-117-1 through 40-117-4; Hazardous Wastes are listed in the Federal Register, Volume 45-No. 98, May 19, 1980.

[2]Notice is not required if 2. and 3. occurred solely as a result of, or in connection with, a planned or routine maintenance or construction.

[3]Contents of Telephone Report

Described in further detail in Volume II of Plan Preparation Guidelines - Hazardous Materials Release (Regulations) - Prepared by Gulf Oil Corporation, Page 40-112-2 through 40-112-3.

a. Name, title, and telephone number of reporter.
b. Name of facility.
c. Name of owner or operator.
d. Location of facility.
e. Time and type of incident (e.g., fire, explosion, etc.)
f. Location of spill or discharge including name of waters involved.
g. Type and quantity of material spilled.
h. Other information that may be required.
i. Request the name of the person to whom you reported.

Additional information to be included in the written report:

a. Initial startup date of facility.
b. Maximum storage or handling capacity, daily average throughput.
c. Description of facility including process flows, plot plan, and topographic map.
d. Copy of SPCC Plan.
e. Cause of the spill(s).
f. Corrective action(s) taken.
g. Preventive measure(s) taken.
h. Extent of any physical damage and/or personal injuries.

All reported information should be logged and documented for record keeping purposes.

Rule 116-State of New Mexico-Energy and Minerals Department-Oil Conservation Division Rules and Regulations (3-1-82).

RULE 116. NOTIFICATION OF FIRE, BREAKS, LEAKS, SPILLS, AND BLOWOUTS

The Division shall be notified of any fire, break, leak, spill, or blowout occurring at any injection or disposal facility or at any oil or gas drilling, producing, transporting, or processing facility in the State of New Mexico by the person operating or controlling such facility.

"Facility," for the purpose of this rule, shall include any oil or gas well, any injection or disposal well, and any drilling or workover well; any pipe line through which crude oil, condensate, casinghead or natural gas, or injection or disposal fluid (gaseous or liquid) is gathered, piped, or transported (including field flow-lines and lead-lines but not including natural gas distribution systems); any receiving tank, holding tank, or storage tank, or receiving and storing receptacle into which crude oil, condensate, injection or disposal fluid, or casinghead or natural gas is produced, received, or stored; any injection or disposal pumping or compression station including related equipment; any processing or refining plant in which crude oil, condensate, or casinghead or natural gas is processed or refined; and any tank or drilling pit or slush pit associated with oil or gas well or injection or disposal well drilling operations or any tank, storage pit, or pond associated with oil or gas production or processing operations or with injection or disposal operations and containing hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, or other deleterious chemicals or harmful contaminants.

Notification of such fire, break, leak, spill, or blowout shall be in accordance with the provisions set forth below:

1. Well Blowouts. Notification of well blowouts and/or fires shall be "immediate notification" described below. ("Well blowout" is defined as being loss of control over and subsequent eruption of any drilling or workover well, or the rupture of the casing, casinghead, or wellhead of any oil or gas well or injection or disposal well, whether active or inactive, accompanied by the sudden emission of fluids, gaseous or liquid, from the well.)

2. "Major" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 25 or more barrels of crude oil or condensate, or 100 barrels or more of salt water, none of which reaches a watercourse or enters a stream or lake; breaks, spills, or leaks in which one or more barrels of crude oil or condensate or 25 barrels or more of salt water does reach a watercourse or enters a stream or lake; and breaks, spills, or leaks of hydrocarbons or hydrocarbon waste or residue, salt water, strong caustics or strong acids, gases, or other deleterious chemicals or harmful contaminants of any magnitude which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" described below.

3. "Minor" Breaks, Spills, or Leaks. Notification of breaks, spills, or leaks of 5 barrels or more but less than 25 barrels of crude oil or condensate, or 25 barrels or more but less than 100 barrels of salt water, none of which reaches a watercourse or enters a stream or lake, shall be "subsequent notification" described below.

4. Gas Leaks and Gas Line Breaks. Notification of gas leaks from any source or of gas pipe line breaks in which natural or casinghead gas of any quantity has escaped or is escaping which may with reasonable probability endanger human health or result in substantial damage to property shall be "immediate notification" described below. Notification of gas pipe line breaks or leaks in which the loss is estimated to be 1000 or more MCF of natural or casinghead gas but in which there is no danger to human health nor of substantial damage to property shall be "subsequent notification" described below.

5. Tank Fires. Notification of fires in tanks or other receptacles caused by lightning or any other cause, if the loss is, or it appears that the loss will be, 25 or more barrels of crude oil or condensate, or fires which may with reasonable probability endanger human health or result in substantial damage to property, shall be "immediate notification" as described below. If the loss is, or it appears that the loss will be at least 5 barrels but less than 25 barrels, notification shall be "subsequent notification" described below.

6. Drilling Pits, Slush Pits, and Storage Pits and Ponds. Notification of breaks and spills from any drilling pit, slush pit, or storage pit or pond in which any hydrocarbon or hydrocarbon waste or residue, strong caustic or strong acid, or other deleterious chemical or harmful contaminant endangers human health or does substantial surface damage, or reaches a watercourse or enters a stream or lake in such quantity as may with reasonable probability endanger human health or result in substantial damage to such watercourse, stream, or lake, or the contents thereof, shall be "immediate notification" as described below. Notification of breaks or spills of such magnitude as to not endanger human health, cause substantial surface damage, or result in substantial damage to any watercourse, stream, or lake, or the contents thereof, shall be "subsequent notification" described below, provided however, no notification shall be required where there is no threat of any damage resulting from the break or spill.

IMMEDIATE NOTIFICATION. "Immediate Notification" shall be as soon as possible after discovery and shall be either in person or by telephone to the district office of the Division district in which the incident occurs, or if the incident occurs after normal business hours, to the District Supervisor, the Oil and Gas Inspector, or the Deputy Oil and Gas Inspector. A complete written report ("Subsequent Notification") of the incident shall also be submitted in duplicate to the appropriate district office of the Division within ten days after discovery of the incident.

SUBSEQUENT NOTIFICATION. "Subsequent Notification" shall be a complete written report of the incident and shall be submitted in duplicate to the district office of the Division district in which the incident occurred within ten days after discovery of the incident.

CONTENT OF NOTIFICATION. All reports of fires, breaks, leaks, spills, or blowouts, whether verbal or written, shall identify the location of the incident by quarter-quarter, section, township, and range, and by distance and direction from the nearest town or prominent landmark so that the exact site of the incident can be readily located on the ground. The report shall specify the nature and quantity of the loss and also the general conditions prevailing in the area, including precipitation, temperature, and soil conditions. The report shall also detail the measures that have been taken and are being taken to remedy the situation reported.

WATERCOURSE, for the purpose of this rule, is defined as any lake-bed or gully, draw, stream bed, wash, arroyo, or natural or man-made channel through which water flows or has flowed.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART I

GENERAL INFORMATION

PART I

GENERAL INFORMATION
SPILL PREVENTION CONTROL & COUNTERMEASURE PLAN

1. Facility name: Vada Plant

2. Facility type: Onshore Gas Plant

3. Facility location: SW/4 NW/4 Section 23 T10S R33E, Lea County, NM/Gathering System: R35E-R38E, T9S-T13S, Lea County, NM: R33E-R38E, T6S-T8S, Roosevelt County, NM: John H. Gibson, Block D, Yoakum County, Texas School Land A122; Randall County, Texas School Land A128 and A126, Sherman County, Texas School Land, Block Y and W Cochran County, Texas.

4. Owner or operator name and address: Warren Petroleum Company
Box 905
Tatum, NM 88267

5. Name and title of oil spill prevention contact: F. C. Noah
Plant Manager

6. Did facility experience a reportable oil spill event during the twelve months prior to 1-10-74 (effective date of 40 CFR, Part 112)? No
(If yes, complete Attachment 1.)

Management Approval
This SPCC plan will be implemented as herein described:

Signature: Original signed by F.C. Noah

Name: F. C. Noah
Title: Plant Manager

Certification
I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR, Part 112, attest that this SPCC Plan has been prepared in accordance with good engineering practices.

Registered Professional Engineer: Jim R. Bruce
(Print)

Jim R. Bruce
(Signature)

(Seal)

Date: 2-15-85 Registration No. 4946 State: NM

Last Certification: 12-29-82

PART I-GENERAL INFORMATION - Continued

7. Potential spills - prediction and control:

Source	Major Type of Failure	Total Quantity (Bbls)	Rate (Bbls/Hr)	Flow Direction	Secondary Containment
1)Slop Tank	Leak	210	20	SE	Dike
2)Slop Tank	Leak	150	20	SE	Dike
3)Lube Oil Storage	Leak	214	20	SE	None
4)Amine Storage	Leak	214	20	SE	None
5)Heating Oil Storage	Leak	12	2	SE	None
6)Methanol Storage	Leak	36	5	SE	None
7)Glycol Storage	Leak	12	2	SE	None
8)Condensate* Storage	Rupture	746	200	SE	None
9)Condensate* Storage	Rupture	746	200	SE	None
10)Product* Storage	Rupture	746	200	SE	None
11)Product* Storage	Rupture	746	200	SE	None
12)Propane* Storage	Rupture	190	100	SE	None

Comments for Sources:

1&2) Both slop tanks are used to hold the incoming oil and water for the inlet scrubbers. Any spill from these tanks will be contained by an earthen dike. Maximum combined storage is 250 barrels.

3) Lube oil is loaded into the 214 barrel for storage. A maximum of 190 barrels is stored in this tank.

4) The amine storage tank has a capacity of 214 barrels. This tank is used to store a maximum of 70 barrels of amine.

5) The heating oil storage tank is a 12 barrel tank and normally holds 6 barrels of oil.

6) Methanol is loaded into this 36 barrel tank and holds a maximum of 24 barrels of methanol.

7) Glycol storage tank holds a maximum of 6 barrels of glycol.

8&9) There are 2 condensate insulated horizontal storage tanks with a capacity of 746 barrels each. Maximum storage is 671 barrels.

10&11) There are also 2 product insulated horizontal storage tanks with a capacity of 746 barrels each. Maximum storage is 671 barrels.

12) The propane storage tank has a capacity of 190 barrels. Maximum storage is 119 barrels.

*Will vaporize when exposed to the ambient environment.

PART I-GENERAL INFORMATION - Continued

The slop oil and glycol storage tanks are vertical welded steel tanks; the others are horizontal welded steel tanks.

Since the Vada Plant is located in an area where the probability of a spill reaching navigable water is negligible, any leak or spills could be contained by ditching and excavation.

8. Are containment, diversionary structures, or equipment to prevent oil from reaching navigable waters practicable? (If NO, complete Attachment 2.)
   Yes.

9. Inspections and Records:

   a. Do the required inspections follow written procedures as contained in this plan? Not applicable.

   b. Are the written procedures and inspection records signed by the appropriate supervisor or inspector attached? Not applicable.

      Comment: Inspections at the plant do not require written procedures.

10. Personnel, training, and spill prevention procedures:

    a. Are personnel properly instructed in the following?

       1. Operation and maintenance of equipment to prevent oil discharges.
          Yes

       2. Applicable pollution control laws, rules, and regulations?
          Yes

          Describe procedures employed for instruction: All employees at this location have received written and verbal communication that no materials are to be released.

    b. Are scheduled prevention briefings for the operating personnel conducted frequently enough to assure adequate understanding of the SPCC plan? Yes

       Describe briefing program: The avoidance of process leaks or spills is discussed at safety meetings.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE A

DESIGN AND OPERATING INFORMATION

ONSHORE FACILITY (EXCLUDING PRODUCTION)

PART II, ALTERNATE A

DESIGN AND OPERATING INFORMATION
ONSHORE FACILITY (EXCLUDING PRODUCTION)

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) (Note: Flapper-type valves should not be used.) Not applicable.

   Vacuum truck will be used in the event of an oil spill to drain diked areas.

2. Drainage from undiked areas is controlled as follows: (Include description of ponds, lagoons, or catchment basins and methods of retaining and returning oil to facility.) Not applicable.

   The engine room drips drain into a sump which is pumped to slop tanks.

3. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

   Any contained rainwater is vacummed and hauled by Gandy Corporation.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features, and if needed, corrosion protection:

   Tanks meet or exceed Warren Petroleum engineering standards.

2. Describe secondary containment design, construction materials, and volume: An impervious earthen dike surrounds slop oil storage.

3. Describe tank inspection methods, procedures, and record keeping: Operator checks tanks for leaks on every shift; external inspection for rust, corrosion or structural damage.

4. Internal heating coil leakage is controlled by one or more of the following control factors:

   a. Monitoring the steam return or exhaust lines for oil. Describe monitoring procedure: Not applicable.

   b. Passing the steam return or exhaust lines through a settling tank, skimmer, or other separation system. Not applicable.

   c. Installing external heating systems. Not applicable.

5. Disposal facilities for plant effluents discharged into navigable waters are observed frequently for indication of possible upsets which may cause an oil spill event. Not applicable.

   Describe method and frequency of observations: The contents of the two self-contained slop tanks are hauled by truck and disposed in approved injection wells.

C. Facility Transfer Operations, Pumping and Inplant Process

1. Corrosion protection for buried pipelines:
   a. Are pipelines wrapped and coated to reduce corrosion? Yes
   b. Is cathodic protection provided for pipelines if determined necessary by electrolytic testing? Yes
   c. When a pipeline section is exposed, is it examined and corrective action taken as necessary? Yes

2. Are pipeline terminal connections capped or blank-flanged and marked if the pipeline is not in service or on standby service for extended periods? Yes

   Describe criteria for determining when to cap or blank-flange:

   Lines that can be opened to atmosphere are blinded or capped when out of service.

3. Are pipe supports designed to minimize abrasion and corrosion and allow for expansion and contraction? Yes

   Describe pipe support design:

   Piping is put on shoes with angle supports for expansion and contraction.

4. Describe procedures for regularly examining all aboveground valves and pipelines including flange joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces:

   Operator inspects plant piping daily.

5. Describe procedures for warning vehicles entering the facility to avoid damaging aboveground piping:

   All visitors must sign in. Overhead piping driveways are protected by a barrier piping.

D. Facility Tank Car and Tank Truck Loading/Unloading Rack
Does tank car and tank truck loading/unloading occur at the facility? If yes, complete 1 through 5 below. Yes.

1. Does loading/unloading procedures meet the minimum requirement and regulations of the Department of Transportation? Yes.

2. Does the unloading area have a quick drainage system? No.

3. Will the containment system hold the maximum capacity of any single compartment of a tank truck loaded/unloaded in the plant? Not applicable.

   Describe containment system design, construction materials, and volume: Condensate vaporizes upon exposure to atmosphere.

4. Is an interlocked warning light, a physical barrier system, or warning signs provided in loading/unloading areas to prevent vehicular departure before disconnect of transfer lines? Yes.

   Describe methods, procedures, and/or equipment used to prevent premature vehicular departure: All drivers are instructed as to how to properly connect and disconnect to loading system. Trucks blocked when loading.

5. Are drains and outlets on tank trucks and tank cars checked for leakage before loading/unloading or departure? Yes.

E. Security

1. Are plants fenced that are handling, processing, or storing oil? Yes

2. Are entrance gates locked and/or guarded when the plant is unattended or not in production? Yes

3. Are any valves which permit direct outward flow of a tank's contents locked closed when in non-operating or standby status? No

4. Starter controls on all oil pumps in non-operating or standby status are:

   a. locked in the off position. No.
   b. located at site accessible only to authorized personnel. Yes.

5. Discussion of items 1 through 4 as appropriate:

   Valves and pumps are not locked out but are operated by Vada personnel only.

6. Discussion of lighting around the facility:

   Plant lighting is adequate to observe any visitor to the plant. It is also sufficient to observe any spill.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART II

ALTERNATE B

DESIGN AND OPERATING INFORMATION

ONSHORE OIL PRODUCTION FACILITY

PART II, ALTERNATE B

DESIGN AND OPERATING INFORMATION
ONSHORE OIL PRODUCTION FACILITY

A. Facility Drainage

1. Drainage from diked storage areas is controlled as follows. (Include operating description of valves, pumps, ejectors, etc.) Not applicable.

2. The procedure for supervising the drainage of rainwater from secondary containment into a storm drain or an open watercourse is as follows: (Include description of inspection for pollutants and method of valving security. A record of inspection and drainage events is to be maintained on a form similar to Attachment 3.) Not applicable.

3. Field drainage ditches, road ditches, and oil traps, sumps, or skimmers, if such exist, are inspected at regularly scheduled intervals for accumulation of oil. Any accumulated oil is hauled by vacuum truck on a regular basis.

B. Bulk Storage Tanks

1. Describe tank design, materials of construction, fail-safe engineering features: Tanks meet or exceed Warren Petroleum engineering standards.

2. Describe secondary containment design, construction materials, and volume: Not applicable.

3. Describe tank inspection methods, procedures, and recordkeeping: Daily visual inspection by operators.

C. Facility Transfer Operations

1. Describe scheduled basis for examinations of aboveground valves and pipelines and salt water disposal facilities:

   All aboveground equipment is inspected daily. Leaks are reported and repaired.

2. Describe flowline maintenance program to prevent spills:

   Gas gathering system is monitored for leaks. Currently upgrading old steel lines with polyethylene pipe which has a high resistance to corrosion.

D. Oil Drilling and Workover Facilities

1. A blowout preventer (BOP) assembly and well control system is installed before drilling below any casing string and, as required, during workover operations. Not applicable.

2. The BOP assembly is capable of controlling any expected wellhead pressure. Not applicable.

3. Casing and BOP installations conform to state regulations. Not applicable.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART III

SPILL HISTORY

SPILL HISTORY

There have been no spills at the Vada Plant. It is very unlikely that a spill would occur which would leave the property thereby entering a navigable waterway. However, Form S/WPC-SPCC-1, an example of which follows, will be used to record information should a spill occur.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

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**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

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OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

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OIL SPILL REPORT

Date:

1. Location
   a. Unit or Plant:
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   c. Facility involved:

2. Environment
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. Spill
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. Land Areas Endangered

5. Cleanup Procedure
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. Agencies and Persons Notified/Time and Date

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. <u>Location</u>
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. <u>Environment</u>
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. <u>Spill</u>
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. <u>Land Areas Endangered</u>

5. <u>Cleanup Procedure</u>
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. <u>Agencies and Persons Notified/Time and Date</u>

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

OIL SPILL REPORT

Date:

1. <u>Location</u>
   a. Unit or Plant:
   b. Field
   c. Facility involved:

2. <u>Environment</u>
   a. Wind velocity (mph):
   b. Wind direction:
   c. Wave height (feet):
   d. Current direction:

3. <u>Spill</u>
   a. Type of oil:
   b. Estimated volume* (barrels):
   c. Cause:
   d. Action taken**:
   e. Time spill started:
   f. Shutoff:
   g. Movement direction and present location:

4. <u>Land Areas Endangered</u>

5. <u>Cleanup Procedure</u>
   a. Equipment used:
   b. Dispersant used (name type):
   c. Volume (gallons):
   d. Use authorized by (agency/person):
   e. Effectiveness of cleanup (include time required to disperse slick/naturally or with chemicals):
   f. Completed cleanup date:

6. <u>Agencies and Persons Notified/Time and Date</u>

*Describe on the back of this page how the volume was calculated.
**If cause was mechanical, list suggested modifications to prevent future spills on the back of this page.

Signature:

Position:

Date:

Note: Copies of this form are completed and kept as Part III of this plan.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART IV

CONTINGENCY PLAN

(ATTACHMENT #2)

ATTACHMENT 2

OIL SPILL CONTINGENCY PLANS & WRITTEN COMMITMENT OF MANPOWER*

Secondary containment or diversionary structures are impracticable for this facility for the following reasons (attach additional pages, if necessary).

There is little likelihood that a spill could occur at this facility which would reach a waterway. Warren dedicates the commitment of personnel to inspect storage materials at least on a daily basis. Attention to any leaks will be immediate. Warren also dedicates the commitment of personnel to contain and remove any spilled material in an expedient manner.

<u>Yes</u> A strong oil spill contingency plan is intended.

<u>Yes</u> A written commitment of manpower is intended.

General

We are required, by law, to have at this location a "Prevention and Control Plan for Accidental Material Releases." This Plan includes procedures for the reporting, control, containment, and cleanup of any materials released. The term "Hazardous Material" includes any material that could adversely affect the well being of humans, animals, plant life, and/or environment due to its chemical composition, flammability or explosive characteristics. Of utmost importance is the notification and protection of the public. This plan includes the notification of the public when a release is in an area that would present a hazard.

Notification - Internal

1. Any employee detecting a release of hazardous material shall, if practical, take steps to control of contain the release.
2. Call the supervisor on duty giving the location and nature of the release.
3. The supervisor on duty will notify the Plant Manager, Response Team Employees, and if necessary, Equipment, Medical, and Law Enforcement Agencies.

Responsibility Chain

PLANT MANAGER

Employee on Duty — Supervisor on Duty

Response Team — Equipment — Material — Law Enforcement — Medical

Phone numbers for employees and outside sources are available in the Reporting/Notification procedures of this Spill Plan.

*This SPCC plan contains an oil spill contingency plan and includes the commitment of manpower to implement the plan.

Action Plan

The release of various materials can occur at certain locations in the plant process area and in the field gathering system. Primarily, should a release occur, the Operator's function will be to report and control (by closing valves, etc.) the release. The following will be our plan of action for releases at various locations:

1. API Tanks

   a. Operator on duty will manually stop the pumping into the tanks.
   b. The liquid that is contained within the dike will then be removed with a vacuum truck.
   c. The ground surface will then be cleaned up and reclaimed within the dike area.

2. All Other Sources of Spills

   a. The operator will shutdown appropriate pumps, and close valves to tanks at which the spill occurred.
   b. Operator will notify supervisor on duty, who will then call-in additional personnel, if necessary.
   c. If a dike is necessary, our equipment on site can be used to contain the spill or additional equipment can be called in, if needed.
   d. After containment, the spill will be removed by vacuum truck and the spill area cleaned up and reclaimed.

3. Plant Spills Public Safety

   a. Due to the location of the plant, public safety should not normally be effected. However, the Plant Manager will determine if any spills could be detrimental to the public safety and take appropriate preventive action.
   b. The preventive action taken will depend on the amount, type, and location of the spill, and the Plant Manager will use his/her discretion of measures taken. Therefore, no predetermined action can be set.

4. Vada Gathering System

   Since our field gathering system is gas, our main concern regarding a field line rupture is public safety. The majority of the system, where a sudden release of natural gas were present, would not present a definite hazard to home dwellers and/or motorists. If leaks do occur near living areas and roads, personnel living in the area will be notified and roadblocks established to protect motorists. Leaks are normally reported by the public to the plant. Whoever takes calls will notify the supervisor on duty, who will in turn call out field personnel to repair the leak.

5. Summary

   Our basic plan of action upon releases of any materials will be the same:

ATTACHMENT #2 - Continued

a. Detect the release.
b. Control the release, if possible, by shutting off the source.
c. Notify company personnel.
d. Protection of company and non-company personnel.
e. Protection of equipment and the environment.
f. Cleanup and repair.

6. Prevention

Every effort will be made to prevent spills and/or line breaks. Every employee is expected to report any situation that appears to be a potential problem. Constant surveillance by all employees is necessary to prevent Materials Releases.

7. Public Safety

Public Safety was previously discussed for plant and field procedures. The purpose of this section is to create a procedure to notify the public that a hazard exists in their area and to instruct them to evacuate the area. Should a line rupture occur near a public road that would endanger motorists using that road, we must notify the County Sheriff's Department of the exact location. We will then block the road until Law Enforcement Officials arrive. Should a line rupture occur near a public or private dwelling that might endanger human life, our personnel will immediately notify the endangered persons, and notify the County Sherrif's Department for further instructions.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART V

ONSHORE FACILITY BULK STORAGE TANKS
DRAINAGE SYSTEM

(ATTACHMENT #3)

SPCC PLAN, ATTACHMENT #3
ONSHORE FACILITY BULK STORAGE TANKS
DRAINAGE SYSTEM

Inspection Procedure:

Disked areas are drained by use of a vacuum truck.

Record of drainage, bypassing, inspection, and oil removal from secondary containment:

Date of Drainage	Date of Bypassing Open	Date of Bypassing Closed	Date of Inspection	Oil Removal	Supervisor's or Inspector's Signature

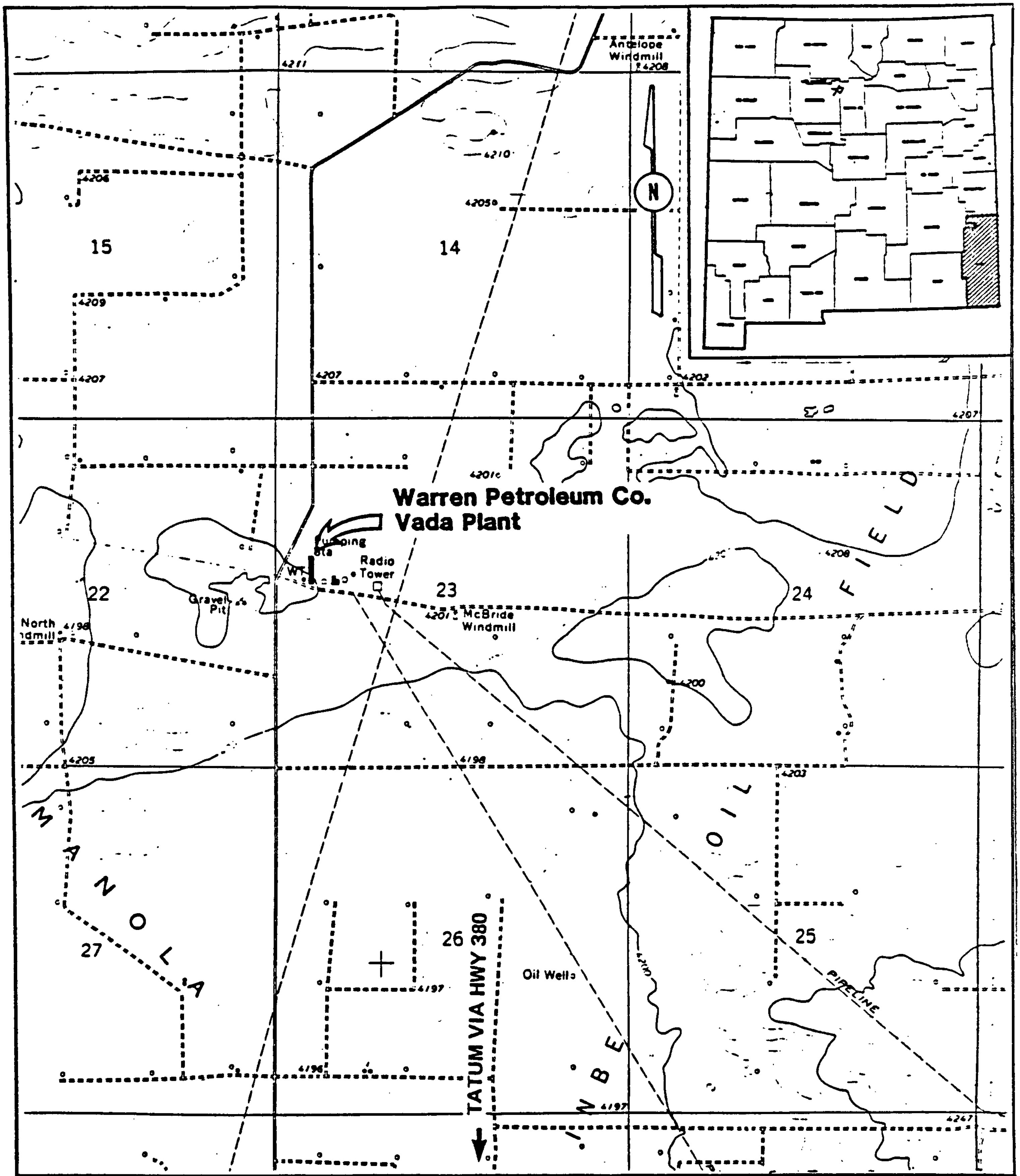
Not applicable.

VADA PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART VI

LOCATION MAPS/PLANS



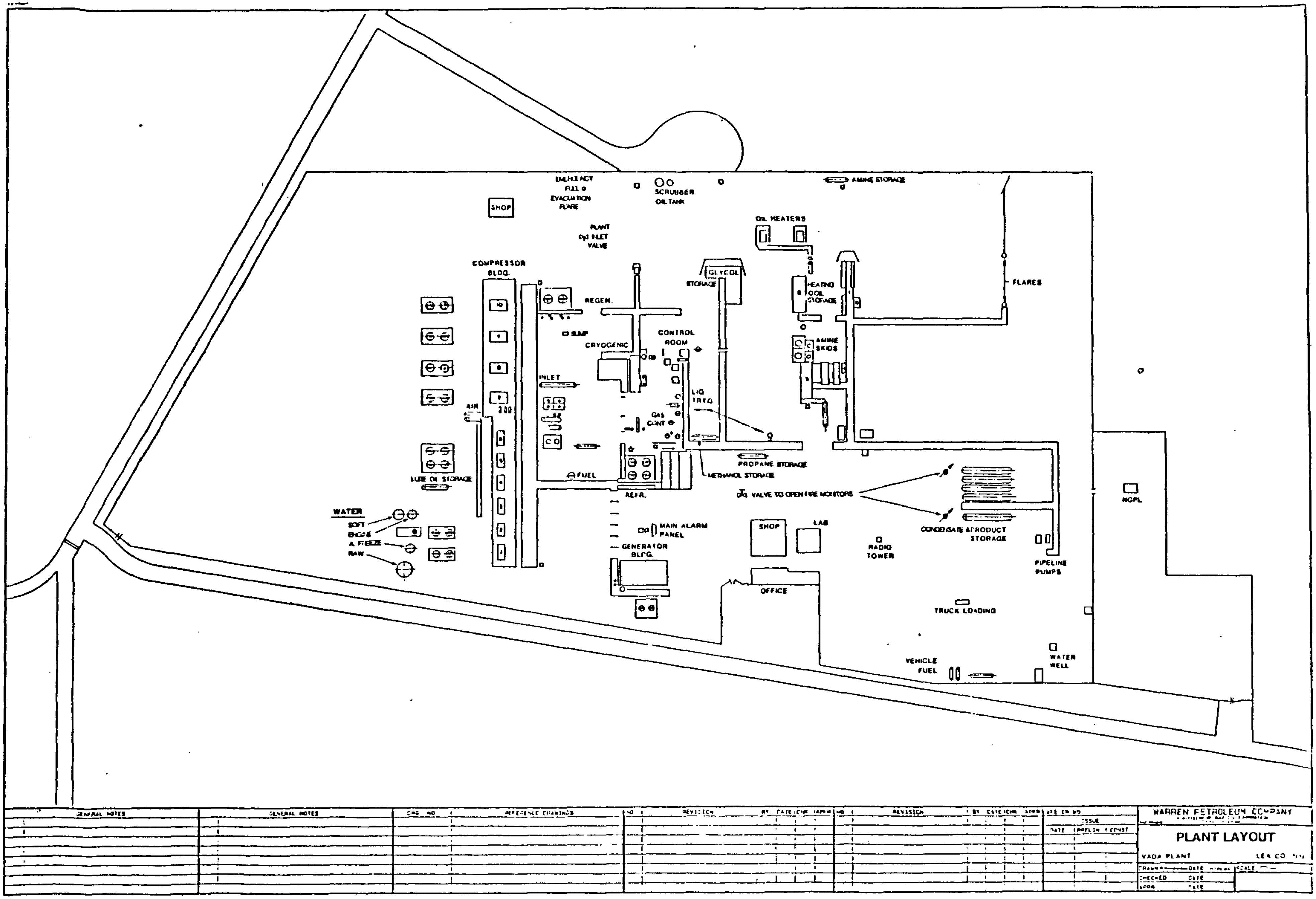
PLANT LOCATION
SEC. 23, T-10-S, R-33-E

APPROX. EL. 4225'
APPROX. LAT. 33°25'00" N
APPROX. LONG. 103°33'30" W

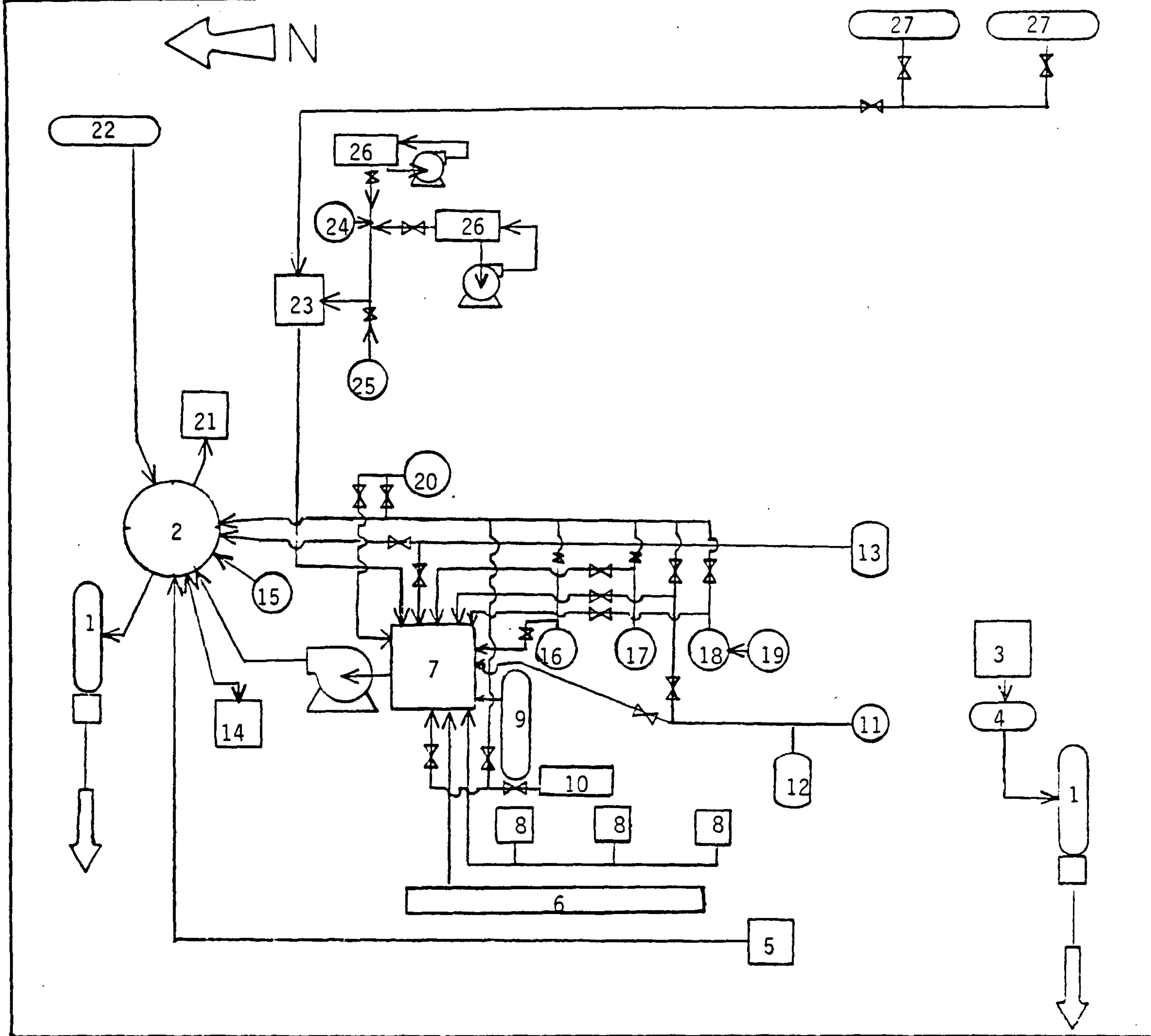
SCALE	DATE
1" = 2000'	7-27-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

VADA
PLANT NO. 139
LEA CO., N.M.



WARREN PETROLEUM COMPANY
VADA PLANT
PLOT PLAN



1. Vacuum Trucks
2. Scrubber Oil Tanks
3. Generator Sump
4. Generator Scrubber Oil Tank
5. Zeolite Water Treater
6. Engine Room Sump
7. Main Plant Sump
8. Open Drains at Scrubbers
9. Inlet Gas Scrubber
10. Compressor Header Drains
11. Fuel Scrubber
12. 2nd Stage Scrubber
13. 3rd Stage Scrubber
14. Vapor Recovery Unit
15. Glycol Skid
16. Residue Inlet Scrubber
17. Recompressor Discharge Scrubber
18. 2nd Stage Recompressor Scrubber
19. Regen Gas Scrubber
20. Regen Gas Heater Scrubber
21. Earthen Dike-Overflow
22. Field Scrubber
23. Portable Tank Trailer
24. Heating Oil Drain
25. Propane Reclaimer
26. Amine Skids
27. Condensate Storage Tanks

NO	REVISIONS	BY	DATE	CHK	APPR	ISSUED CONST DATE / BY

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM

VADA PLANT #139 TATUM, N. M.

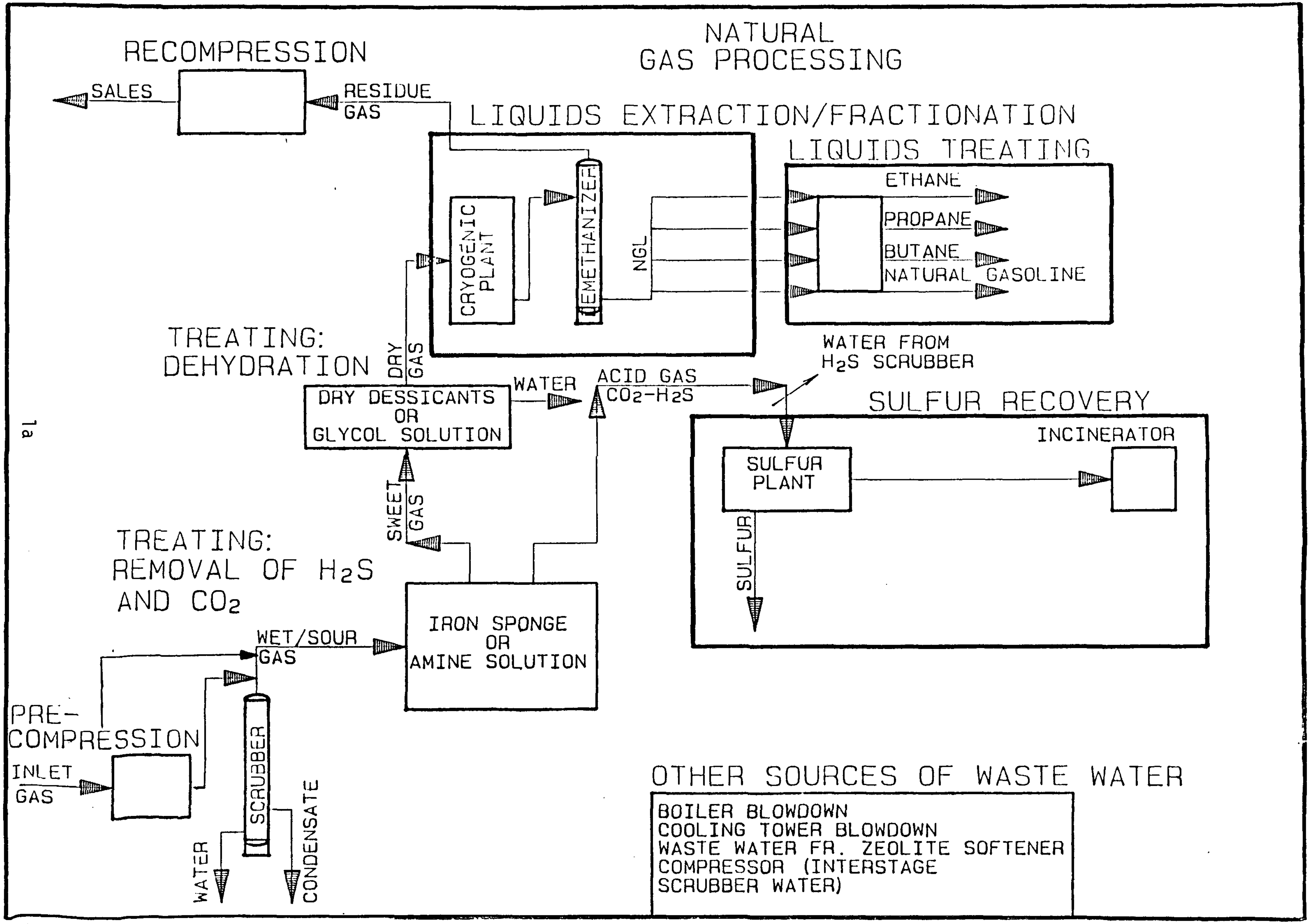
DRAWN BDM	DATE 1-4-85	SCALE
CHECKED	DATE	DRAWING NO
APPROVED	DATE	

APPENDIX D

APPENDIX D

PLANT PROCESS FOR

MONUMENT, SAUNDERS, AND VADA PLANTS


NATURAL
GAS PROCESSING
RECOMPRESSION
SALES
RESIDUE
GAS
LIQUIDS EXTRACTION/FRACTIONATION
LIQUIDS TREATING
CRYOGENIC
PLANT
DEMETHANIZER
NGL
ETHANE
PROPANE
BUTANE
NATURAL GASOLINE
TREATING:
DEHYDRATION
DRY
GAS
DRY DESSICANTS
OR
GLYCOL SOLUTION
WATER
ACID GAS
CO2-H2S
WATER FROM
H2S SCRUBBER
SULFUR RECOVERY
INCINERATOR
SULFUR
PLANT
SULFUR
SWEET
GAS
TREATING:
REMOVAL OF H2S
AND CO2
IRON SPONGE
OR
AMINE SOLUTION
WET/SOUR
GAS
PRE-
COMPRESSION
INLET
GAS
SCRUBBER
WATER
CONDENSATE
OTHER SOURCES OF WASTE WATER
BOILER BLOWDOWN
COOLING TOWER BLOWDOWN
WASTE WATER FR. ZEOLITE SOFTENER
COMPRESSOR (INTERSTAGE
SCRUBBER WATER)

APPENDIX D

(Continued)

Treating for the Removal of Water

The inlet gas, now minus the acid gas components, enters the next phase of gas processing. This is the removal of water from the gas.

The water may be removed by an absorption or an adsorption process. Both processes may be used in tandem.

Triethylene glycol removes water from the gas by absorption. The glycol is then reconcentrated by removal of the water with heat. This is a continuous cycle. Either alone, or in conjunction with the glycol system, a molecular sieve dehydration system may exist. The molecular sieve is a dessicant which adsorbs water from the gas and is regenerated by heat to restore its absorptive capability.

Whether removed by glycol or molecular sieve, the water driven off during regeneration exists in the steam phase, then condenses through exchangers and leaves the process as a liquid.

Natural Gas Processing - Removal of Gas Liquids

The extraction of the gas liquids from the gas stream, which is now sweet and dry, is accomplished in several ways. Warren's New Mexico Plants use the cryogenic method. Basically, the gas stream is cooled and the non-methane hydrocarbons are then condensed and recovered. In some instance, the liquids are also treated to remove water and/or acid gas components.

Natural Gas Processing - Fractionation of Natural Gas Liquids

The natural gas liquids that have been separated out of the inlet stream are fractionated into their individual components. Many of Warren's plants do not fractionate the liquids. These plants remove the gas liquids by pipeline.

Separation of the hydrocarbon components is possible because of the difference in their physical properties, specifically, their boiling points. The distinct gas liquids, along with the purified natural gas, are sold commercially.

The following document, "The Gas Processing Industry: Its Function and Role in Energy Supplies" published by the Gas Processors Association, will provide further details about the industry.

The Gas Processing Industry:

Its Function and Role
in
Energy Supplies

Gas Processors Association
1812 First Place
Tulsa, OK 74103

INTRODUCTION

The gas processing industry is a major segment of the oil and gas industry, distinct from either crude oil or natural gas production, separate from oil refining or gas distribution, yet indispensable to all. As a separate and identifiable function, it is probably the least known and least understood part of the petroleum industry.

In simple terms, the gas processing industry refines raw natural gas from the earth into saleable, useful energy forms for use in a wide variety of applications. Through the gas processing industry's plants flows approximately 60% of the nation's petroleum energy production, which emerges in the form of merchantable natural gas, liquefied petroleum gases, motor fuel components, and raw materials for a myriad of basic petrochemicals.

Natural gas occurs deep below the surface of the earth in two principal forms: associated gas and non-associated gas.

Associated gas is found in crude oil reservoirs, either dissolved in the crude oil, or in conjunction with crude oil deposits. It is produced from oil wells along with the crude. It separates, or is separated from, the oil at the casinghead of the well, which leads to the synonymous term "casinghead gas." It may also be called "oil-well gas" or "dissolved gas." In the industry's beginning, virtually all processed gas was from oil wells.

Non-associated gas occurs in reservoirs separate from crude oil. Its production is not incidental to the production of crude oil. It is commonly called "gas-well gas" or "dry gas." Today about 75% of all natural gas produced is non-associated gas.

In addition, the reservoirs of many oil fields found since 1935 produce neither true gases nor true liquids. The material might properly be called a "two-phase fluid." It is neither a gas because of its high density, nor a liquid because no surface boundary exists between gas and liquid. These reservoirs, called "gas condensate" reservoirs, are usually deeper with higher pressures, which pose special problems in production and processing.

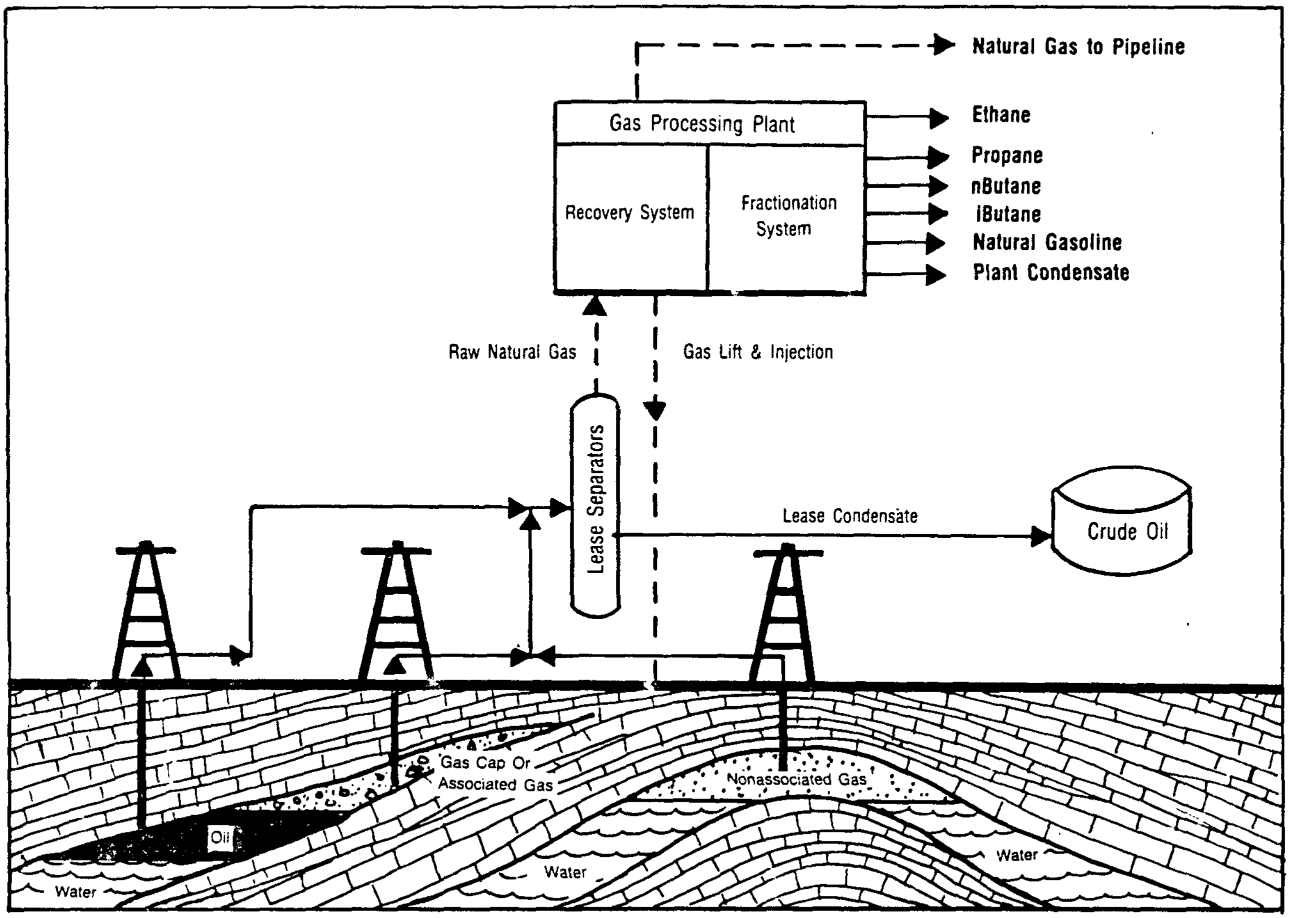
From whatever reservoir, natural gas as produced from the earth has widely varying composition, depending on the field, the formation, or the reservoir from which it is produced. The principal constituents of natural gas are methane and ethane, but most gases contain varying amounts of heavier components, such as propane, butane, pentane, and heavier hydrocarbons that may be removed by any of a number of processing methods.

The removal of individual hydrocarbons by processing is possible because of the differences in physical properties. Each component has a distinctive weight, boiling point, and other physical characteristics, making its separation from other components a relatively simple physical operation.

Gas processors describe gas as "rich" (wet), or "lean" (dry) depending on its content of heavy components. These are relative terms, but as used in the industry, a rich gas may contain five or six gallons or more of recoverable hydrocarbons per thousand cubic feet; a lean gas usually contains less than one gallon of recoverable liquids per thousand cubic feet.

Natural gas may also contain water, hydrogen sulfide, carbon dioxide, nitrogen, helium, or other components that may be diluents and/or contaminants. In any case, natural gas as produced rarely is suitable for pipe line transportation or commercial use. Natural gas in commercial distribution systems is composed almost entirely of methane and ethane, with moisture and other contaminants removed to very low concentrations.

Therefore, all natural gas is processed in some manner to remove unwanted



water vapor, solids and/or other contaminants that would interfere with pipe line transportation or marketing of the gas. In addition, and equally important, most natural gas is processed to separate from the gas those hydrocarbon liquids that have higher value as separate products.

These natural gas liquids (NGL's) are part of a family of saturated hydrocarbons called paraffins. Each compound has a chemical formula C_nH_{2n+2}. The principal natural gas liquids include:

Ethane: Exists as a liquid only under very high pressures (800 psi) or at extremely low temperatures (−135°F). It is recovered and transported in either the liquid or gaseous state principally for use as feedstock for ethylene, the most important basic petrochemical produced today.

Propane: Recovered and handled as a liquid at pressures over 200 pounds, or at temperatures below −44°F. Its principal uses are as feedstock for production of ethylene and propylene, and as LP-gas for heating fuel, engine fuel, and industrial fuel.

Butane: Recovered and handled as a liquid under moderate pressure. Its principal uses are to provide needed volatility to gasoline motor fuel; as domestic LP-gas fuel, either alone or in mixtures with propane; and as a feedstock for the manufacture of butadiene, a key ingredient of synthetic rubber.

Iso-butane: The chemical isomer of butane, it is fractionated and produced as a separate product principally for the manufacture of alkylate, a vital ingredient of high-octane motor gasoline.

Natural Gasoline: A mixture of pentanes and heavier hydrocarbons, with small amounts of butane and iso-butane. Industry specifications define its physical properties in terms of vapor pressure at 100°F (10 to 34 psi), and percentage evaporated at 140°F (25 to 85%). It is recovered as a liquid, principally for use as a motor fuel component.

If the gas contains hydrogen sulfide, a poisonous gas, it is removed and further processed for recovery of elemental sulfur. Most carbon dioxide is removed to prevent destructive corrosion and to inject into crude oil reservoirs for enhanced oil recovery (EOR). Some helium is extracted for its unique properties as an inert gas.

In addition, gas processing performs vital functions, both economically and technically, in the recovery of crude oil through reservoir pressure maintenance, miscible floods, and other secondary recovery methods. Many of these projects would not be economically possible except for the revenues generated by extraction and sale of natural gas liquids.

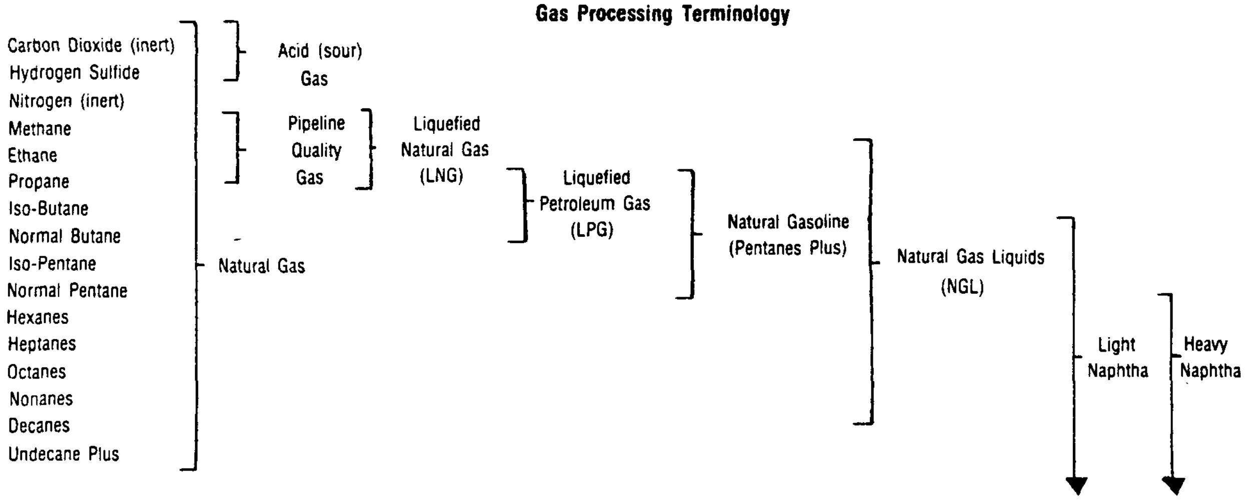
PROCESSING AND MANUFACTURE

Natural gas processing involves two basic operations: (1) extraction of the natural gas liquids from the gas stream; and (2) fractionation of the natural gas liquids into their separate components. Additional processing is usually required to treat and condition both the natural gas and the gas liquids.

Natural gas processing may be as simple as drying the gas by passing it through a fixed bed of a desiccant material, or it may be as complex as complete liquefaction of the total gas stream by cooling to extremely low temperatures. Extraction of heavier gas liquids (pentane and heavier) can be achieved by simple compression and moderate cooling of the natural gas stream.

However, the modern gas processing industry uses a variety of sophisticated processes to treat natural gas and extract natural gas liquids from the gas stream. The two most important extraction processes are the absorption and cryogenic expander processes. Together, these processes account for an estimated 90% of total natural gas liquids production.

Gas Processing Terminology



ABSORPTION PROCESS

The basic step in the absorption process is removal of NGL components from the natural gas by contact with an absorbing oil. Liquid recovery is enhanced by refrigerating the absorption oil. Recovery levels may also be increased by lowering the molecular weight of the absorption oil. Depending on operating conditions, approximately 85% of the propane and essentially all of the heavier natural gas liquids are absorbed in the oil. The lighter fractions – methane, ethane, and some of the propane – are not recovered in the absorbing oil and pass through the absorber tower as merchantable pipeline quality natural gas.

The bottoms effluent from the absorption tower consists of rich absorption oil mixed with absorbed propane, butanes, pentanes, and other heavier natural gas liquids. This stream is then fed to lean oil stills where the absorbed liquids are distilled from the absorber oil by heating the mixture to a temperature above the boiling point of the natural gas liquids, but below that of the absorber oil. The stripped absorber oil is then recirculated to the absorption tower, and the mixed stream of natural gas liquids is piped to the fractionation system for further separation into individual NGL components.

The fractionation system may be an integral part of the gas processing plant, or it may be a "central fractionator" many miles from the primary production. A central fractionator may receive mixed streams of natural gas liquids from many plants.

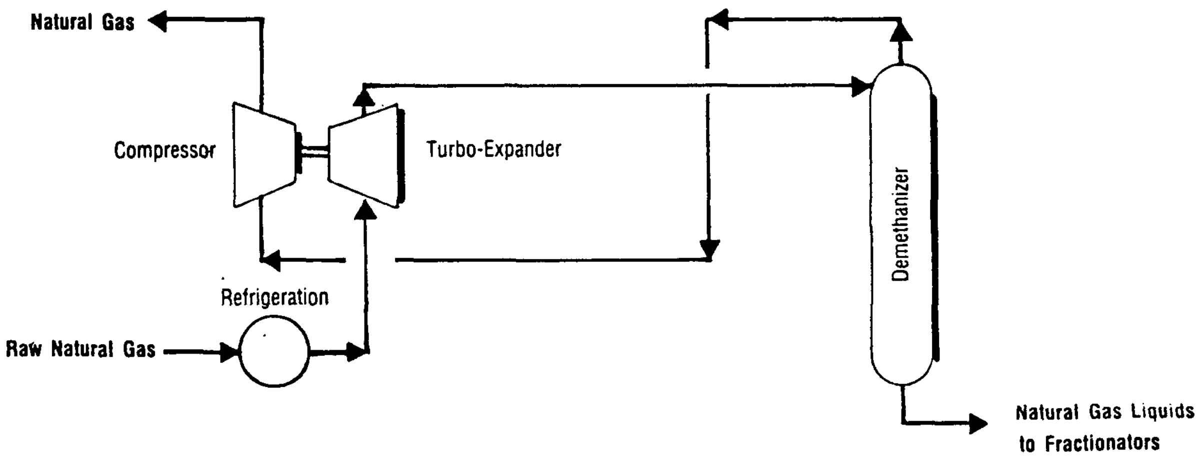
TURBO EXPANDER PROCESS

In recent years, ethane has become increasingly desirable as a petrochemical feedstock. This has resulted in the construction of many plants that recover ethane and heavier hydrocarbons from natural gas at temperatures ranging down to minus 150°F.

Combinations of external refrigeration and liquid flash-expansion refrigeration with gas turbo expansion cycles are employed to attain the low temperatures desired for high ethane recovery.

In the turbo-expander process, the absorber and still facilities are replaced by an expansion turbine, which accomplishes the separation of gas liquids from the natural gas stream by auto-refrigeration to extremely low temperatures.

Simplified Flow Diagram Absorption-Fractionation



Recoveries of 90-95% ethane and all of the heavier hydrocarbons have been achieved with the expander process. The mixed liquid product from the expander plant is then fractionated or may be delivered by pipeline to a central fractionation facility for fractionation into separate NGL components.

FRACTIONATION

Fractionation of a mixed NGL stream into separate components is accomplished by *controlling the temperature of the stream in a fractionator to take* advantage of the difference in boiling points of separate products. Fractionators are usually named for the overhead or top product. Therefore, a deethanizer implies that the top product is ethane; a depropanizer indicates that the top product is propane, etc. Natural gas liquids are normally fractionated by boiling the lighter products from the heavier products in the following order:

Deethanizer: The first step in the fractionating sequence is to separate the ethane and propane, with the ethane going overhead and the propane and heavier components passing from the bottom of the fractionator.

Depropanizer: The next step in the processing sequence is to separate the propane and the isobutane, with the propane going overhead and the isobutane and heavier components passing from the bottom of the depropanizer.

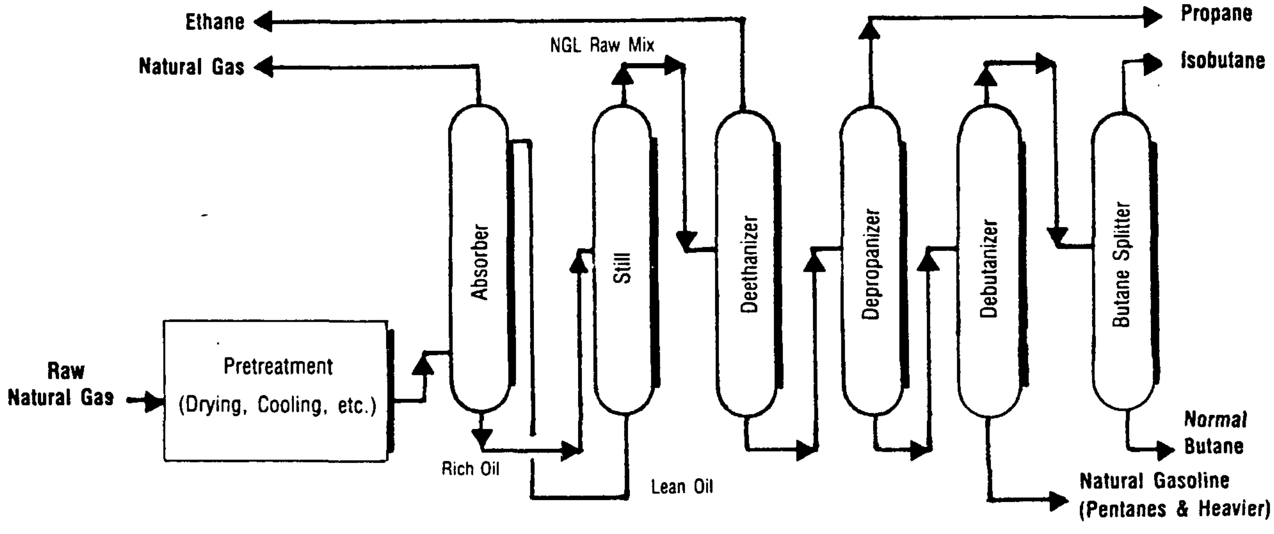
Debutanizer: The next fractionation step is separation of the butanes from the pentanes plus stream. The butanes (both iso and normal) pass overhead and the pentanes plus pass from the bottom of the fractionator.

Butane Splitter or Deisobutanizer: When it is desirable to do so, the butanes which pass overhead from the debutanizer may be separated into iso and normal butanes. The isobutane goes overhead and the normal butane is drawn from the bottom of the tower.

OTHER ROUTINE GAS PROCESSING

As noted earlier, both natural gas and natural gas liquids may require additional treating or processing, either before or after extraction of liquids.

Simplified Flow Diagram Absorption—Fractionation



The most common treatment of natural gas is removal of excess water vapor, which is necessary to prevent formation of hydrates and freezing in pipeline transmission systems. Techniques for dehydrating natural gas include:

–Absorption using liquid desiccants, usually a glycol compound

–Adsorption, using solid desiccants such as silica gel, activated alumina, or molecular sieves

–Dew point depression by injection of anti-freeze compounds such as glycols or alcohols

–Expansion refrigeration which cools the gas stream below the dew point of entrained water vapor.

Removal of excess moisture from some natural gas liquids, principally propane, is also necessary and is accomplished most often with solid desiccants or molecular sieves.

Additional treatment of both natural gas and natural gas liquids is usually required to remove hydrogen sulfide and carbon dioxide. This process in the industry is called "sweetening." Many process methods are used, most of which rely on either chemical reactions, physical solution, or adsorption. Each process has unique advantages, depending on the concentration of hydrogen sulfide, carbon dioxide, and other conditions.

The most common chemical processes are based on contact with amine solutions. These solutions react with unwanted acid gas constituents to form other compounds which can then be removed.

Physical solvent processes include a number of patented chemicals and processing schemes which function much the same as the oil absorption process for removal of liquids from gas.

Adsorption processes involve the removal of unwanted components by passing the gas or liquid through a bed of solid material that has been designed or treated to selectively extract carbon dioxide, hydrogen sulfide, or other contaminants.

SULFUR RECOVERY

The sour gas effluent from a sweetening unit must be further treated, either for disposal or for recovery of sulfur contained in the gas. At plants where hydrogen sulfide concentrations are very low, it is not economical to install sulfur recovery facilities. In these cases, the sour gas is disposed of by incineration.

At higher concentrations, the sour gas is usually processed in a sulfur recovery facility to recover elemental sulfur. The Claus process is the most widely used process for converting hydrogen sulfide into elemental sulfur. The process utilizes thermal and catalytic reactions to achieve conversion of up to 97% of hydrogen sulfide to elemental sulfur. "Tail gas clean up" processes reduce sulfur emissions significantly and boost overall efficiency of sulfur recovery to 98+%.

OTHER SPECIALIZED GAS PROCESSING

Depending on gas composition and other factors, the gas processing function may also include additional processing such as:

– Carbon dioxide removal and transport for enhanced oil recovery

– Helium recovery for commercial sale

– Nitrogen removal to increase heating value of the gas

– Liquefaction of the total gas stream to produce liquefied natural gas.

All of these process functions require specialized processes and additional investment.

PROFILE OF THE U.S. GAS PROCESSING INDUSTRY

PROCESSING PLANTS

There are approximately 859 gas processing plants in the United States, most of which are located in five states: Texas, Louisiana, Oklahoma, Kansas, and New Mexico. These five states account for about 86% of total U.S. gas processing capacity, gas processed, and natural gas liquids production.

Plant sizes range from less than 1 million cubic feet per day up to more than 2.5 billion cubic feet per day. The 200 smallest plants (about 25% of total) are less than 10 million cubic feet per day capacity, and account for only about 1% of total industry capacity.

The 200 largest plants (25% of total) have capacities greater than 80 million cubic feet per day and account for nearly 80% of total industry capacity. Approximately 92% of total gas capacity is in 375 plants (44% of total) with capacities greater than 35 million cubic feet per day. Production of natural gas liquids averages less than 2,000 barrels per day per plant, with maximum production ranging up to 25,000 barrels per day in the largest plants.

Approximately 100 of the 859 U.S. gas processing plants include sulfur recovery facilities, with a total capacity of about 4,500 tons per day of elemental sulfur. Sulfur production from gas plants accounts for about 13% of total U.S. sulfur production.

In addition, there are approximately 20 central fractionating plants operating in the United States. These fractionators may handle the mixed natural gas liquids production of a single separation facility, or may process mixed streams from many plants, some of which may be located hundreds of miles away. These fractionators separate these raw mixed NGL streams from recovery facilities into saleable products such as ethane, propane, butane, or specified mixtures, according to the user's needs.

COMPANIES

The U.S. gas processing industry is composed of an estimated 300 companies, ranging in size from the largest integrated oil companies to the single plant owner-operator.

The 20 largest gas processing companies produce about 70% of total U.S. production of natural gas liquids.

U.S. GAS PROCESSING PLANTS

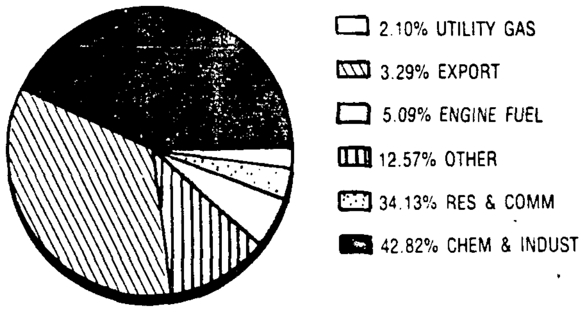
State	No. Plants	Gas Capacity, mmcfd	Gas throughput, mmcfd	NGL Products, m B/D
Texas	411	25,090	13,380	618
Louisiana	100	22,601	14,070	333
Oklahoma	103	4,765	3,110	145
Kansas	23	4,894	2,648	45
New Mexico	41	3,626	2,211	96
	678	60,976	35,419	1,237
Other	181	9,508	5,738	218
U.S. Total	859	70,484	41,157	1,455

NATURAL GAS LIQUIDS SUPPLY/DEMAND

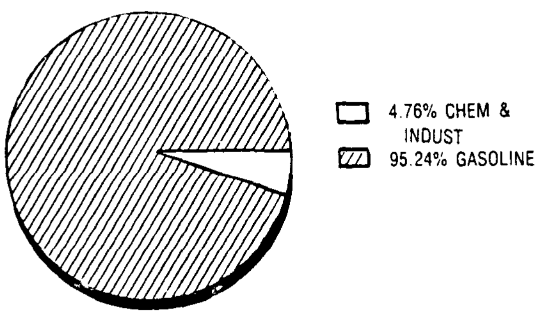
U.S. gas plant production of natural gas liquids totals some 570 million barrels per year, or approximately 1.5 million barrels per day. The distribution of this production during 1984 is as follows:

Ethane	28.7%
Propane	34.2%
Normal and Iso-Butane	19.6%
Pentanes plus, including plant condensate	17.5%

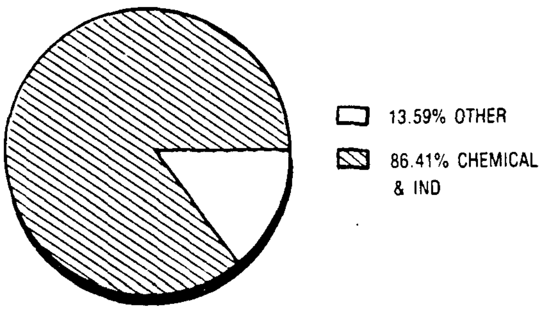
PROPANE CONSUMPTION



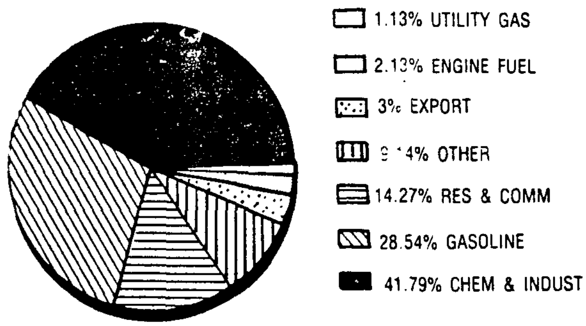
PENTANES + CONSUMPTION



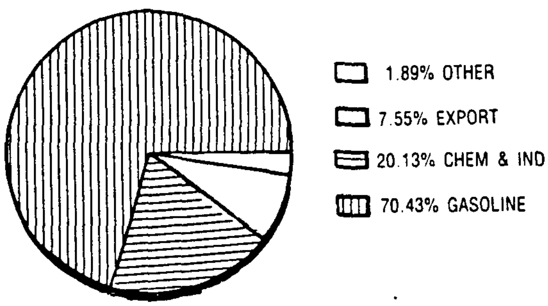
ETHANE CONSUMPTION



NGL CONSUMPTION



BUTANE CONSUMPTION



PHYSICAL PROPERTIES OF NATURAL GAS LIQUIDS COMPONENTS

Component	Vapor Pressure psia @ 100 F.	Boiling Point @ 14.7 psia	Specific Gravity 60 F./60 F.
Methane	(5,000)	−259	0.3
Ethane	(800)	−127	0.356
Propane	190	−43.7	0.508
n-Butane	51.6	31.1	0.584
i-Butane	72.2	10.9	0.536
n-Pentane	15.6	96.9	0.631
i-Pentane	20.4	82.1	0.625
Hexane	5.0	155.7	0.664
Heptane	1.6	209.2	0.688

In addition, field facilities handling natural gas prior to delivery into a gas processing plant produce an estimated 350 thousand barrels per day of lease condensate, which is usually transported to refineries along with crude oil.

Total U.S. supply of natural gas liquids is augmented by refinery production and imports.

Refineries produce and market about 120 million barrels per year, or about 325 thousand barrels per day, of natural gas liquids, mainly propane. Refinery yields of natural gas liquids amount to 2-3% of total crude oil charged to the refinery.

Total imports of natural gas liquids are approximately 70 million barrels per year, or roughly 200 thousand barrels per day. About 80% of these imports are from Canada.

Approximately 80% of total U.S. natural gas liquids production is consumed in three major uses: petrochemical feedstocks; motor gasoline manufacture; and residential and commercial heating fuels. The remainder is used in a wide variety of applications, including engine fuels, industrial fuels, utility peak shaving, crop drying, and other agricultural and process fuel applications.

TRANSPORTATION AND STORAGE

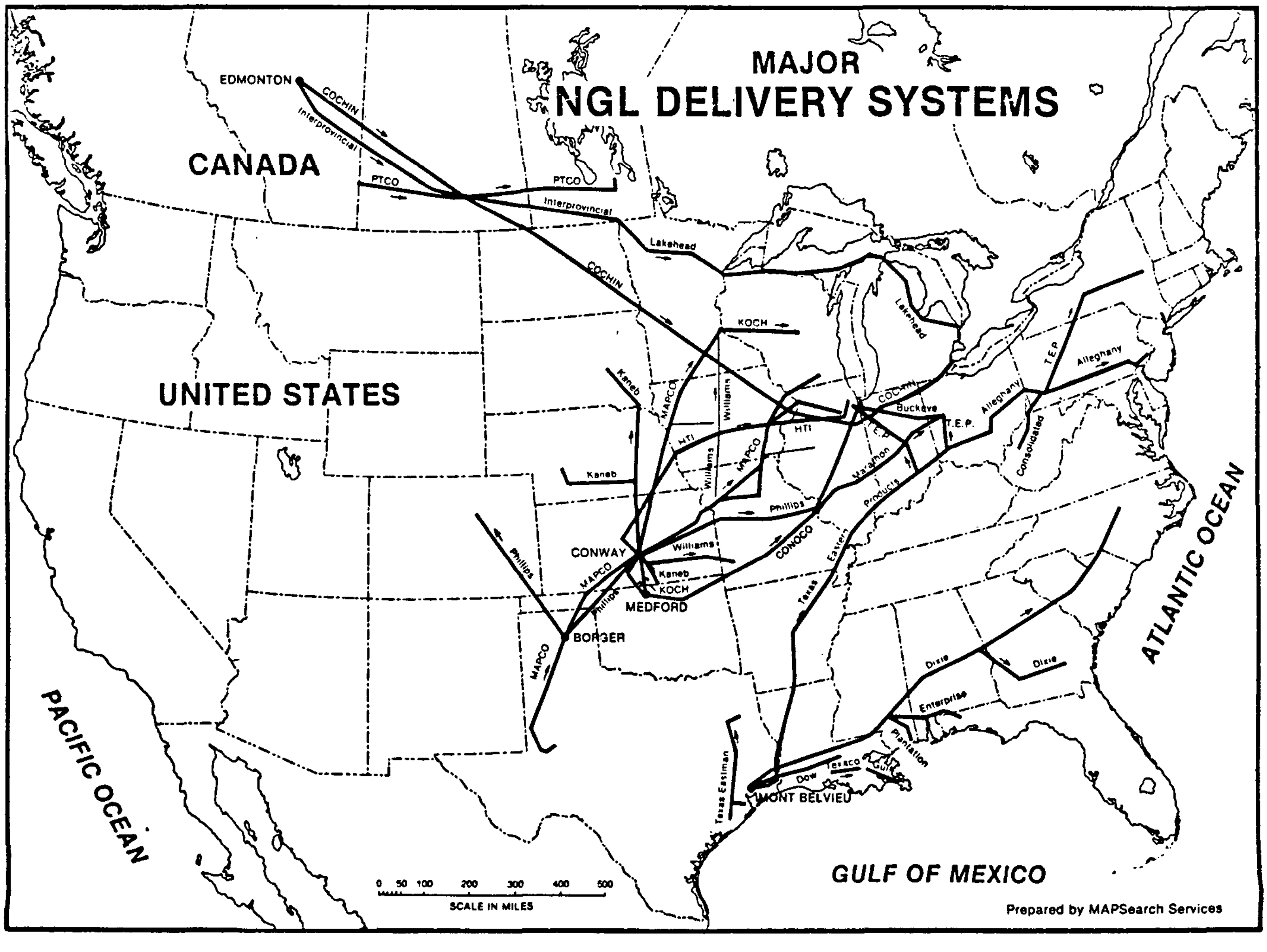
A national network of some 70 thousand miles of high pressure pipelines transport unfractionated NGL streams from production areas to fractionating centers and then transport finished products to major markets.

Four major pipelines extend from the West Texas-New Mexico fields to the major terminal and fractionation center of the U.S. – Mont Belvieu, Texas, located near the petrochemical and refining center of the nation. Other pipeline systems deliver West Texas-New Mexico natural gas liquids to a second major terminal, storage, and fractionation point in central Kansas.

From Mont Belvieu, two major pipeline systems deliver LP-gas fuels to the northeastern and southeastern United States.

Several pipeline systems extend from central Kansas storage and fractionating facilities into west and upper midwest markets.

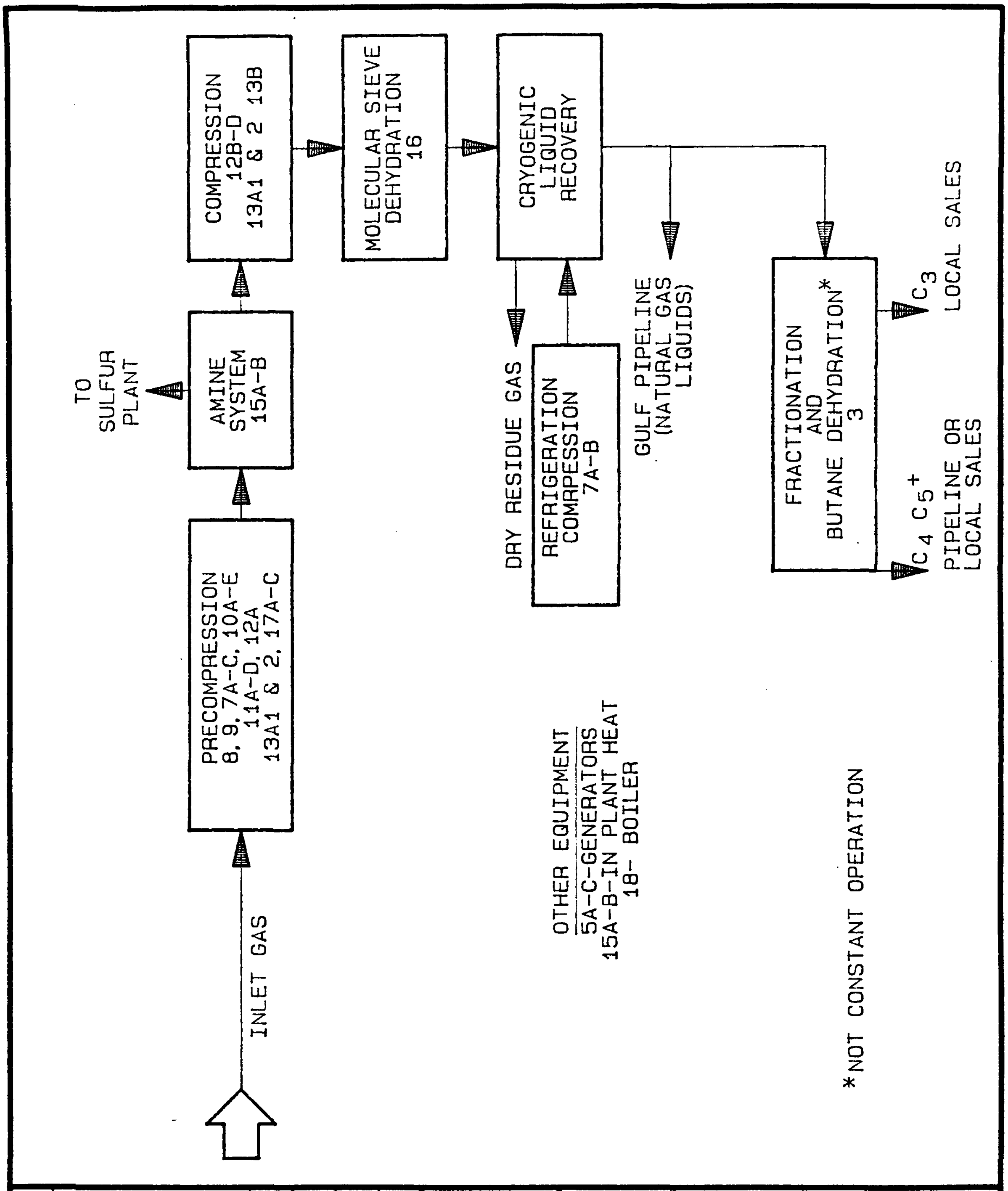
Total natural gas liquids production is relatively constant throughout the year. However, depending on weather and other factors, demand may vary considerably. Therefore the industry has installed and operates underground storage facilities totaling nearly half a billion barrels capacity. The bulk of this capacity is located near the refining and petrochemical complexes of the Texas and Louisiana Gulf Coasts, with a second major installation in the midcontinent hub of central Kansas.



APPENDIX D-1

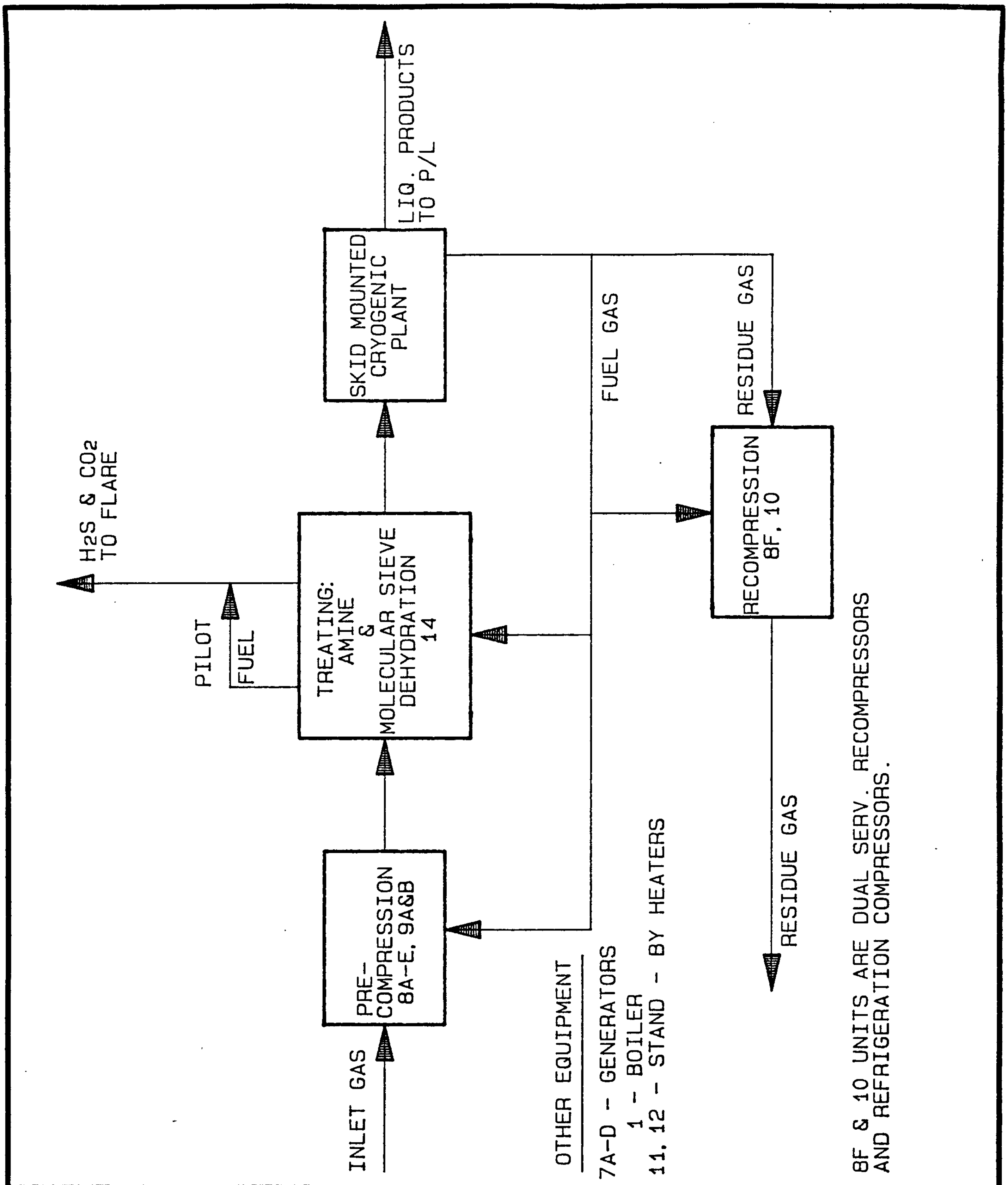
Natural Gas Processing for Monument, Saunders, and Vada Plants

The following diagrams outline gas processing for the Monument, Saunders and Vada Plants. The numbers present for each process represent Warren identifiable unit numbers for individual compressors or heaters needed to complete each phase of the process.



NO.	REVISION	BY	DATE	CHK	APPR	ISSUE CONST.	
						DATE	BY

NO. OF UNITS REQUIRED THUS		WO-AFE NO.
WARREN PETROLEUM COMPANY A DIVISION OF GULF OIL CORPORATION		
PROCESS FLOW DIAGRAM		
PTL. 118 MONUMENT N.M.		
DRAWN LP	DATE 2-11-85	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPR.	DATE	118-2000



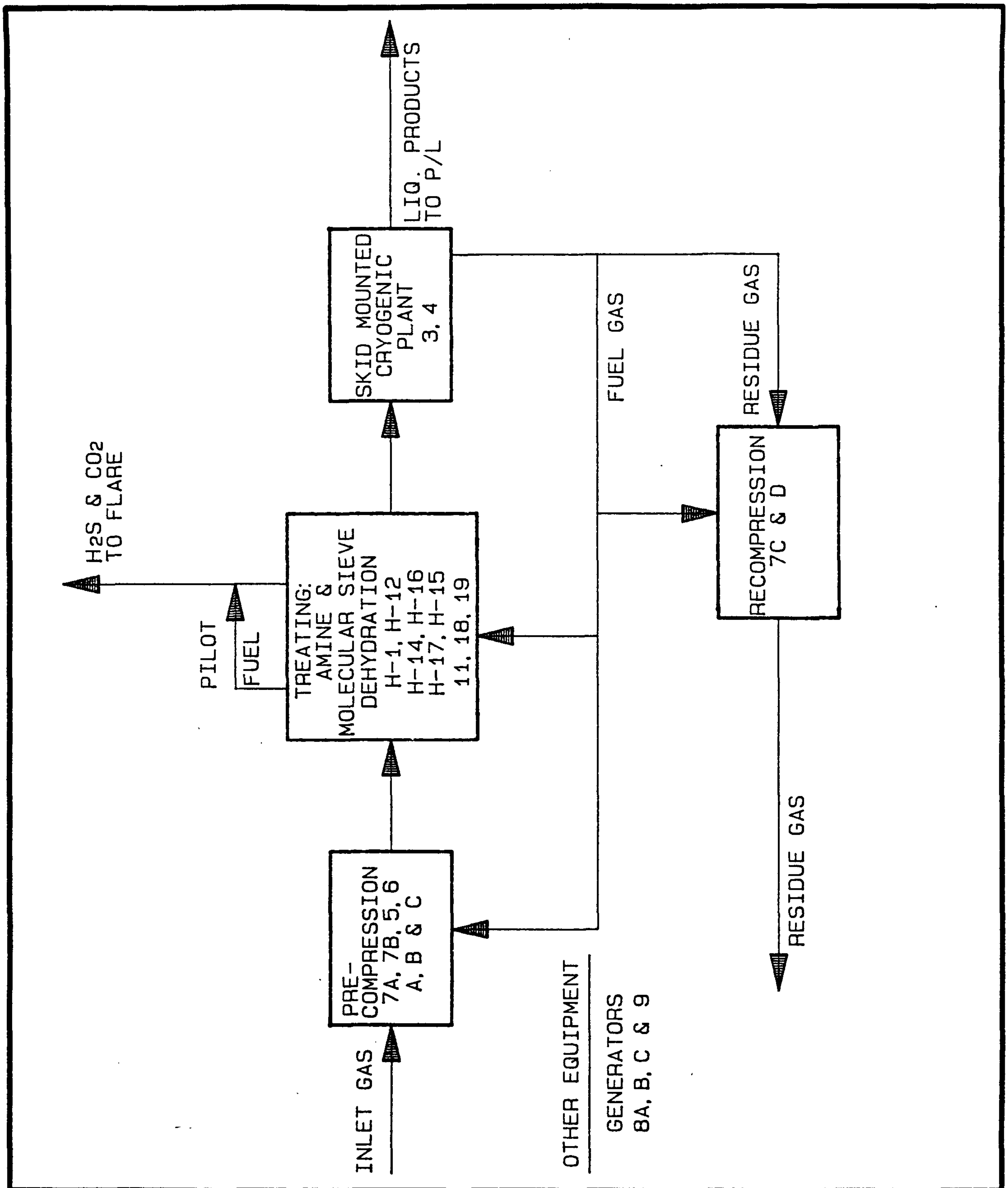
NO.	REVISION	BY	DATE	CHK	APPR	ISSUE CONST. DATE	BY
1	REDRAWN	LP	2/85				

NO. OF UNITS REQUIRED THUS | WO-AFE NO.

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION

PROCESS FLOW DIAGRAM
PLT. 146 SAUNDERS, N.M.

DRAWN LP	DATE 2-6-85	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPR.	DATE	146-2001-1



NO.	REVISION	BY	DATE	CHK	APPR	ISSUE CONST. DATE	ISSUE CONST. BY

NO. OF UNITS REQUIRED THUS — WO-AFE NO.

WARREN PETROLEUM COMPANY

A DIVISION OF GULF OIL CORPORATION

PROCESS FLOW DIAGRAM

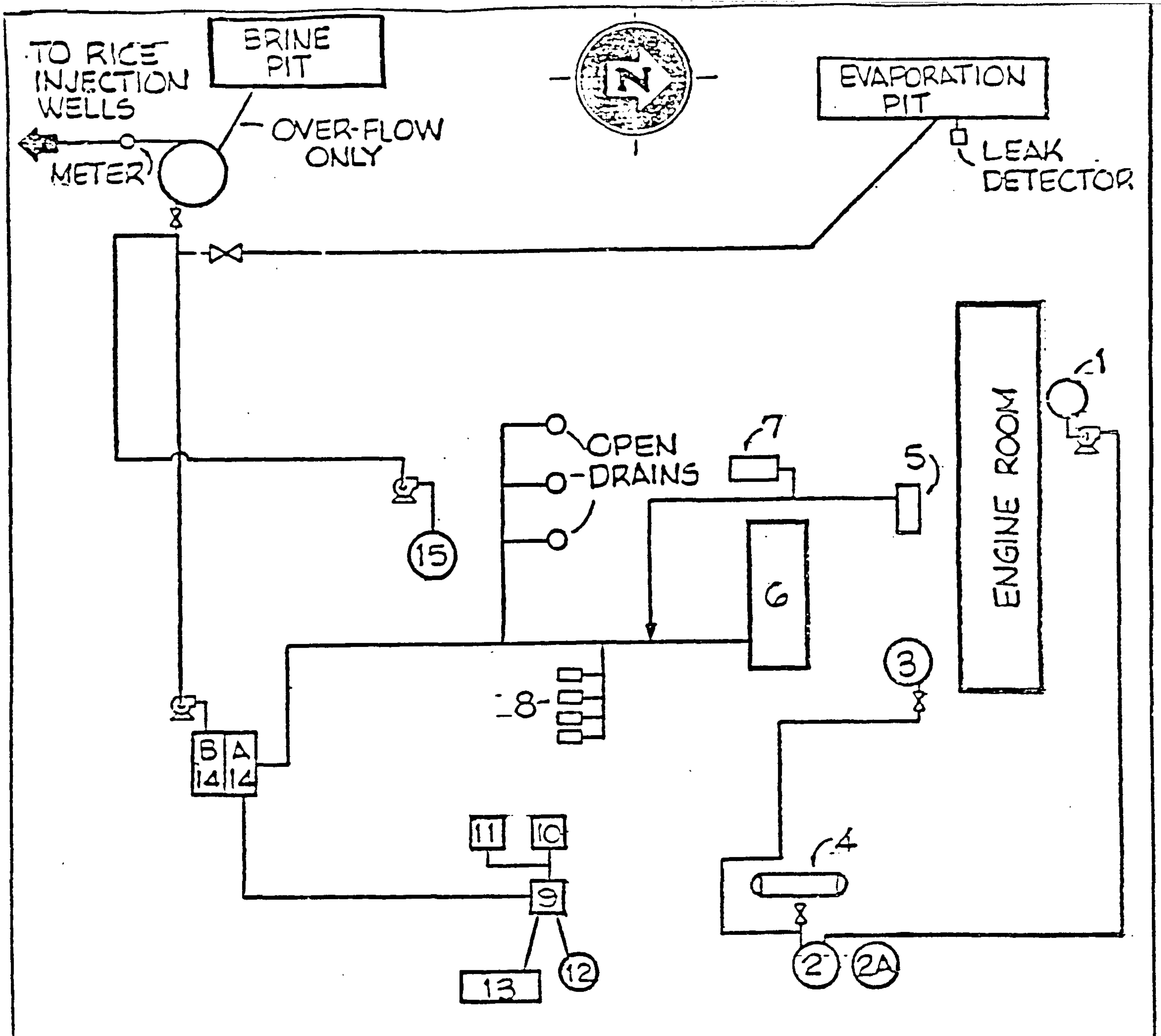
PLT. 139 VADA TATUM, N. MEX.

DRAWN LP	DATE 2-6-85	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPR.	DATE	139-2013

APPENDIX D-2

The generalized block flow diagram presented at the beginning of Appendix D, lists sources of waste water that are in association with gas processing. These discharges, along with inlet gas scrubber (process) water, are the major sources of water for disposal for gas processing plants.

The Waste Water System disposal diagrams for Monument, Saunders, and Vada directly follow. These diagrams also show the final disposition of the water. This is reiterated on the summary pages presented at the end of this Appendix. The Waste Water System disposal diagrams for Saunders and Vada are also presented separately in Appendix H, as referenced in Section I.



LEGEND

1. NORTH ENG. ROOM SUMP
2. SKIMMER TANK
2-A. BLACK OIL TANK
3. 2ND STAGE SCRUBBER
4. 1ST STAGE SCRUBBER
5. SOUTH ENGINE ROOM SUMP
6. COOLING TOWER
7. CONDENSORS
8. CONDENSORS
9. EAST SUMP
10. BOILER
11. BOILER
12. H_2S SCRUBBER
13. BOILER
14.A SKIMMER
14.B. SOUTH SUMP
15. ZEOLITE H_2O TREATERS
16. 3RD STAGE SCRUBBER

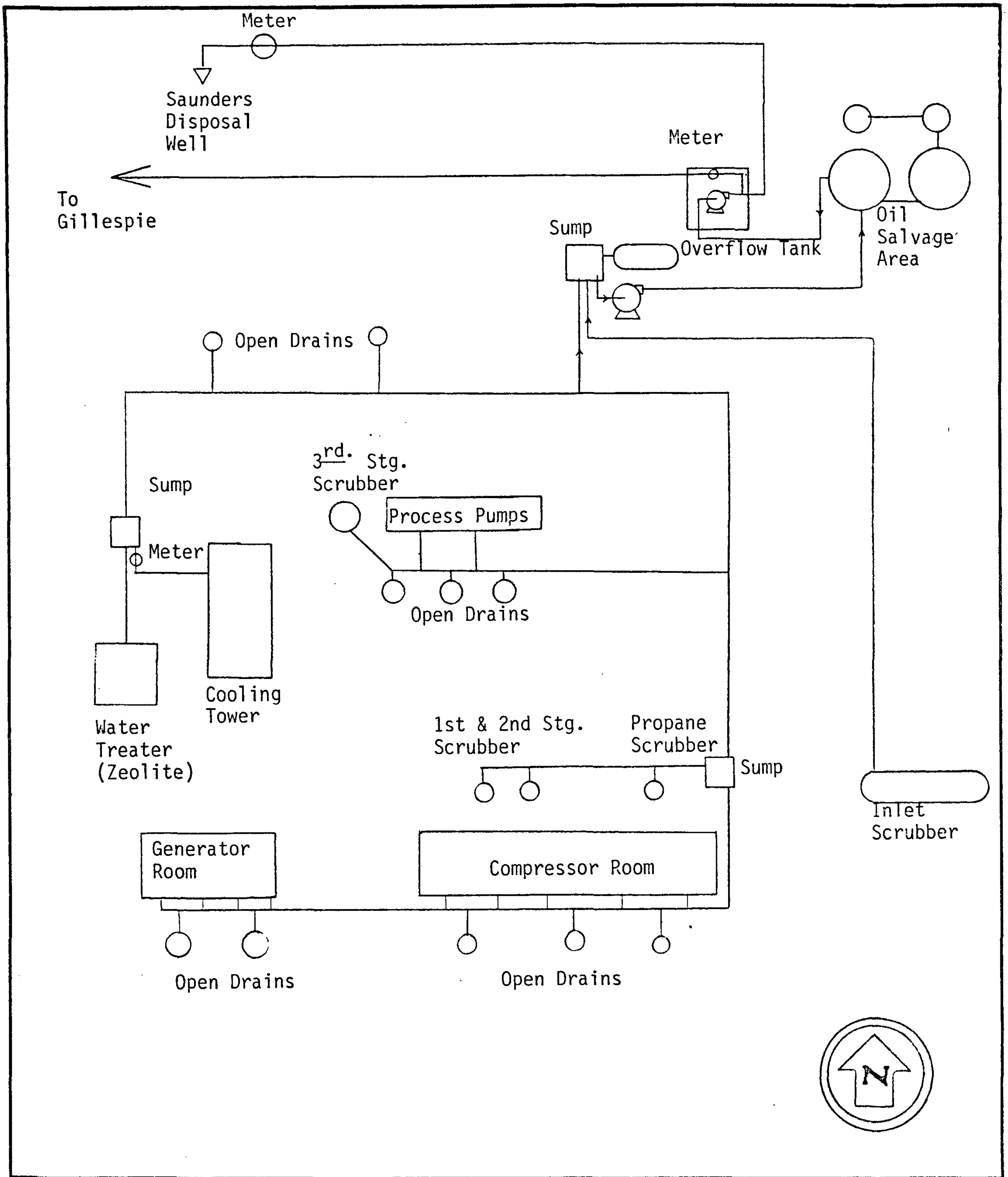
NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY
						2	

NO. OF UNITS REQUIRED, THUS | WO-AFE NO.

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM
MONUMENT PLT. MONUMENT, N.M.

DRAWN WKC | DATE 7-28-81 | SCALE ~
CHECKED | DATE | DRAWING NO.
APPROVED | DATE



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	BY

NO. OF UNITS REQUIRED THUS

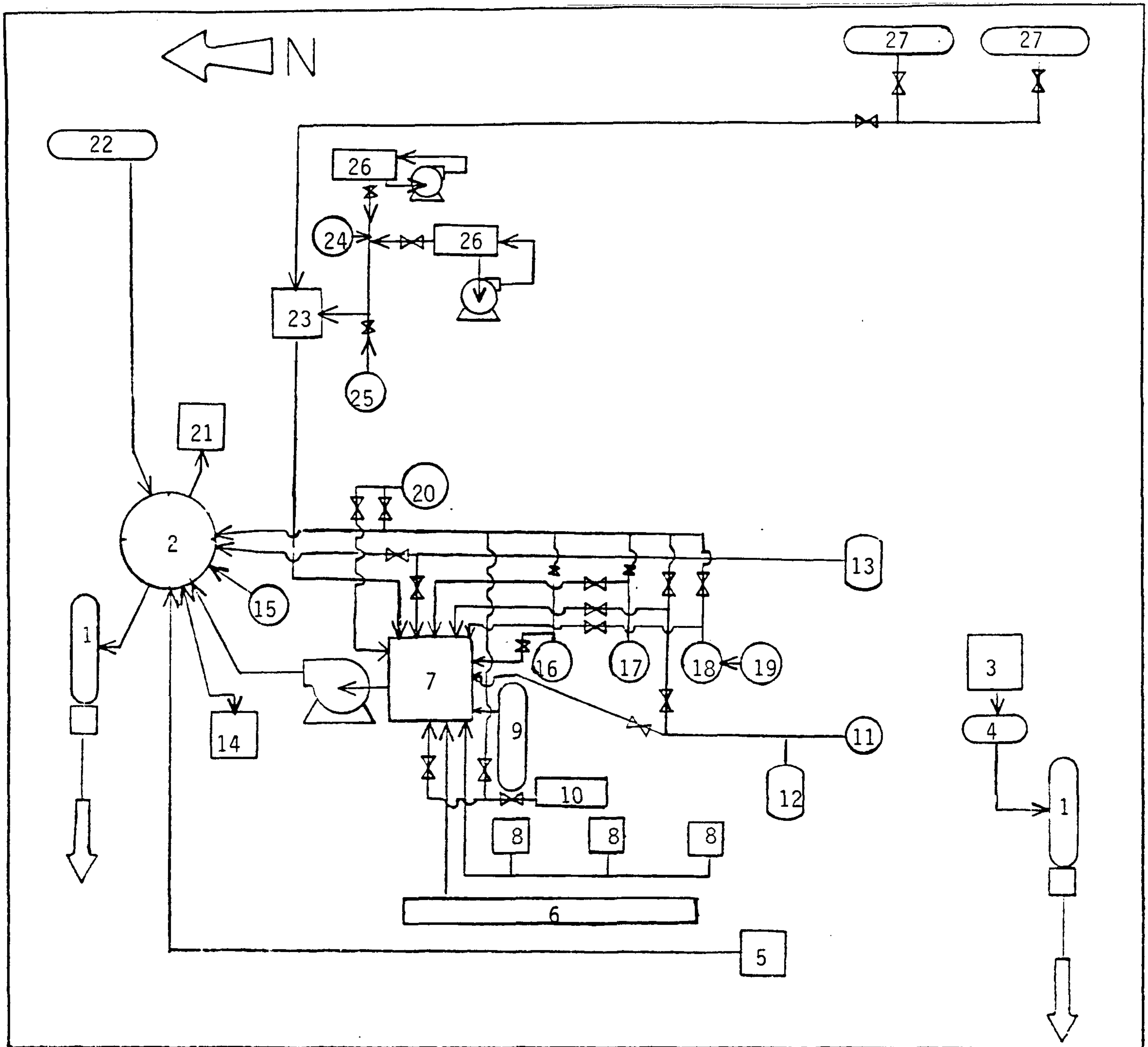
WO-AFE NO.

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA
GULF 82341

Waste Water System

Saunders Plt. Lovington, N. M.

DRAWN RLM	DATE 1-22-85	SCALE NTS
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	



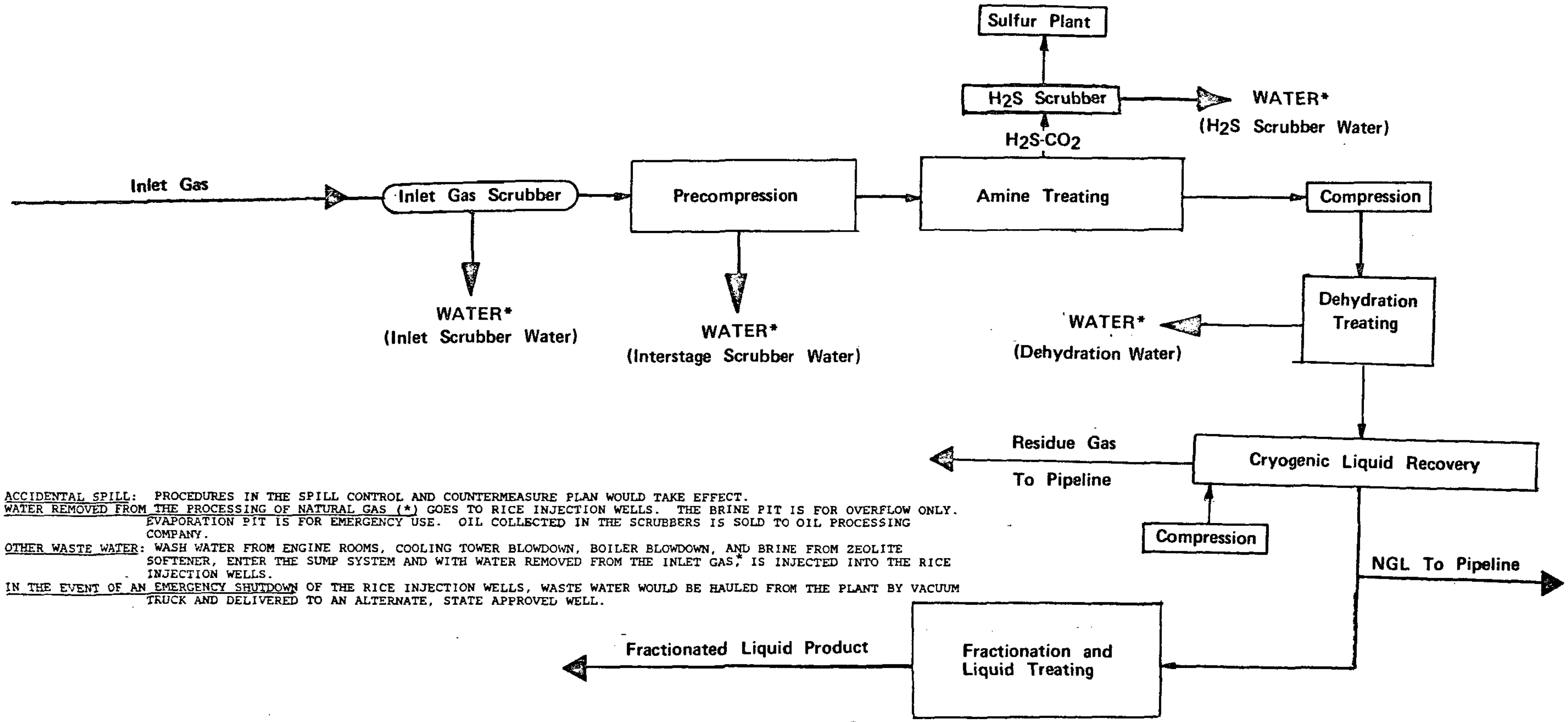
1. Vacuum Trucks
2. Scrubber Oil Tanks
3. Generator Sump
4. Generator Scrubber Oil Tank
5. Zeolite Water Treater
6. Engine Room Sump
7. Main Plant Sump
8. Open Drains at Scrubbers
9. Inlet Gas Scrubber
10. Compressor Header Drains
11. Fuel Scrubber
12. 2nd Stage Scrubber
13. 3rd Stage Scrubber
14. Vapor Recovery Unit
15. Glycol Skid
16. Residue Inlet Scrubber
17. Recompressor Discharge Scrubber
18. 2nd Stage Recompressor Scrubber
19. Regen Gas Scrubber
20. Regen Gas Heater Scrubber
21. Earthen Dike-Overflow
22. Field Scrubber
23. Portable Tank Trailer
24. Heating Oil Drain
25. Propane Reclaimer
26. Amine Skids
27. Condensate Storage Tanks

NO.	REVISIONS	BY	DATE	CHK	APPR	ISSUED CONST		NO. OF UNITS REQUIRED THUS	WORK ORDER NO
						DATE	BY	WARREN PETROLEUM CORPORATION TULSA, OKLAHOMA	
								WASTE WATER SYSTEM	
								VADA PLANT #139	TATUM, N. M.
								DRAWN BDM DATE 1-4-85	SCALE
							4	CHECKED DATE	DRAWING NO
								APPROVED DATE	

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
SUMMARY OF WASTE WATER DISPOSAL METHODS
FOR MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

Facility	Location	Waste Water Disposal Method	Status
Monument	36-T19S, R36E and 1-T20S, R36E Lea County, NM	(1) Evaporation Pond (Approved 9/13/77 by the New Mexico Oil Conservation Commission)	Emergency
		(2) Rice Engineering Injection Well (By Continuing Contract)	Current
		(3) Brine Pond (Approved by NMOCD-Final Construction Modification Specifications of 9/2/83)	Current
Saunders	34-T14S, R33E Lea County, NM	(1) Maud Saunders Well No. 4 (NMOCD Administrative Order SWD-255(Amended) Granted 7/13/83)	Current
		(2) Charles B. Gillespie-Operated Injection Well (By Continuing Contract)	Current
		(a) Gandy Corporation (By Contract) Used in the Event of Well Failure	Current
Vada	23-T10S, R33E Lea County, NM	Stored on Site Prior to Being Hauled for Reclamation or Injection by Contract with Gandy Corporation	Current

SUMMARY OF WASTE WATER DISCHARGE--MONUMENT PLANT



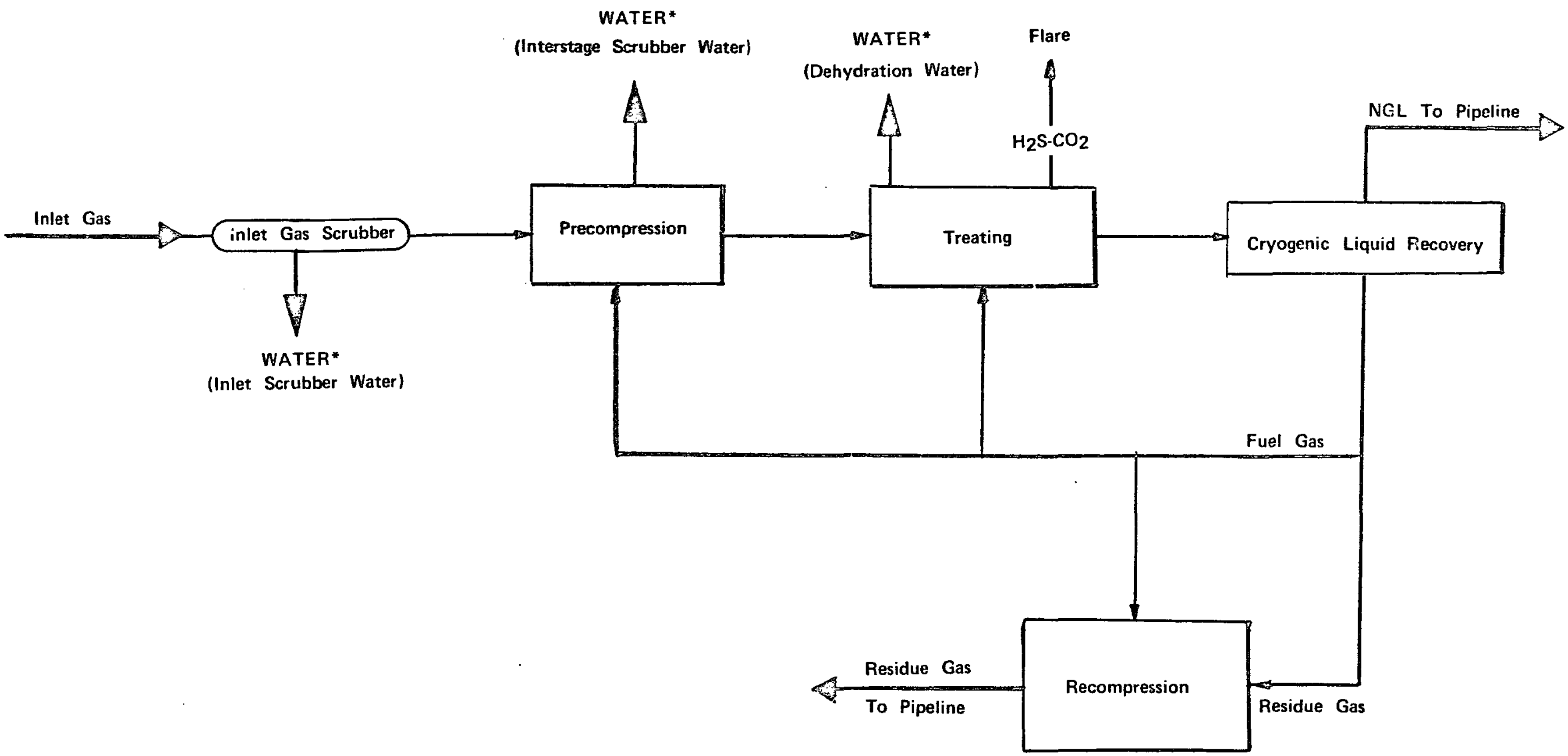
ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.

WATER REMOVED FROM THE PROCESSING OF NATURAL GAS (*) GOES TO RICE INJECTION WELLS. THE BRINE PIT IS FOR OVERFLOW ONLY. EVAPORATION PIT IS FOR EMERGENCY USE. OIL COLLECTED IN THE SCRUBBERS IS SOLD TO OIL PROCESSING COMPANY.

OTHER WASTE WATER: WASH WATER FROM ENGINE ROOMS, COOLING TOWER BLOWDOWN, BOILER BLOWDOWN, AND BRINE FROM ZEOLITE SOFTENER, ENTER THE SUMP SYSTEM AND WITH WATER REMOVED FROM THE INLET GAS,* IS INJECTED INTO THE RICE INJECTION WELLS.

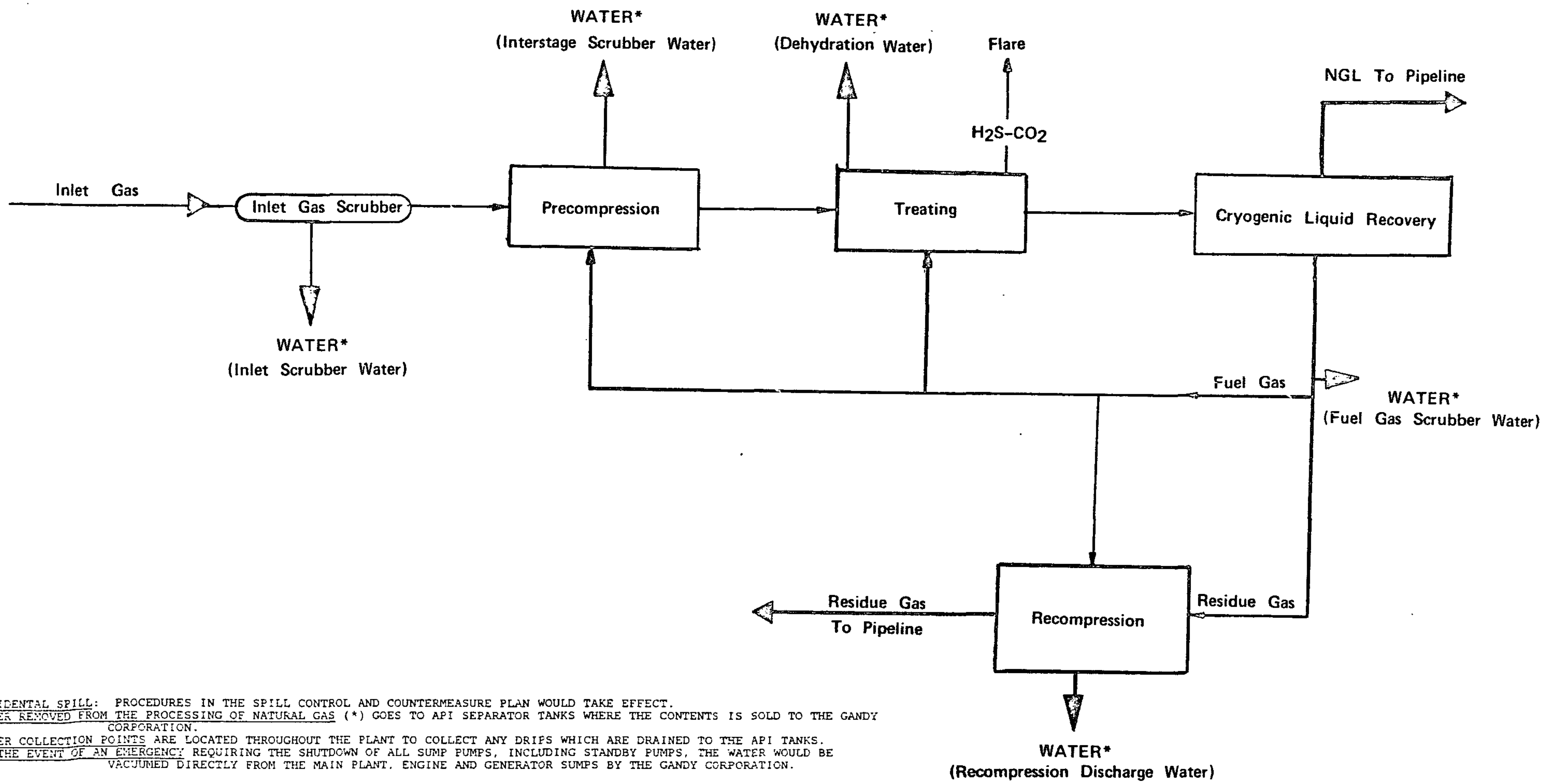
IN THE EVENT OF AN EMERGENCY SHUTDOWN OF THE RICE INJECTION WELLS, WASTE WATER WOULD BE HAULED FROM THE PLANT BY VACUUM TRUCK AND DELIVERED TO AN ALTERNATE, STATE APPROVED WELL.

SUMMARY OF WASTE WATER DISCHARGE—SAUNDERS PLANT



ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.
WATER REMOVED FROM THE PROCESSING OF NATURAL GAS (*) GOES TO SURGE TANKS AND THEN TO THE GILLESPIE OR MAUD SAUNDERS INJECTION WELLS; SCRUBBER OIL IS SEPARATED OUT AND IS SOLD TO THE GANDY CORPORATION.
OTHER WASTE WATER: BRINE FROM THE ZEOLITE TREATER, COOLING TOWER BLOWDOWN, AND WASH WATER FROM COMPRESSORS, GENERATORS PUMPS ALSO ENTER SURGE TANKS AND GO TO THE GILLESPIE OR MAUD SAUNDERS INJECTION WELLS.
IN THE EVENT OF AN EMERGENCY SHUTDOWN OF THE INJECTION WELLS, WATER WOULD BE HAULED TO ANOTHER STATE APPROVED DISPOSAL WELL BY THE GANDY CORPORATION.

SUMMARY OF WASTE WATER DISCHARGE-VADA PLANT



ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.
WATER REMOVED FROM THE PROCESSING OF NATURAL GAS (*) GOES TO API SEPARATOR TANKS WHERE THE CONTENTS IS SOLD TO THE GANDY CORPORATION.
OTHER COLLECTION POINTS ARE LOCATED THROUGHOUT THE PLANT TO COLLECT ANY DRIPS WHICH ARE DRAINED TO THE API TANKS.
IN THE EVENT OF AN EMERGENCY REQUIRING THE SHUTDOWN OF ALL SUMP PUMPS, INCLUDING STANDBY PUMPS, THE WATER WOULD BE VACUUMED DIRECTLY FROM THE MAIN PLANT. ENGINE AND GENERATOR SUMPS BY THE GANDY CORPORATION.

APPENDIX E

APPENDIX E

HYDROLOGIC AND GEOLOGIC DATA FOR MONUMENT, SAUNDERS, AND VADA PLANTS

APPENDIX E
HYDROLOGIC AND GEOLOGIC DATA FOR MONUMENT, SAUNDERS, AND VADA PLANTS

Saunders Plant

A portion of the waste water generated by the Saunders Plant is removed from the facility and injected into the Charles B. Gillespie well.

The remaining effluent also leaves the plant and goes to the Maud Saunders Well No. 4. This well, located 1815 FSL 660 FWL Unit L of Section 34, T14S, R33E, NMPM, Lea County, New Mexico, was approved for disposal by the Oil Conservation Division (OCD) on July 13, 1983 as Amended Order SWD-255. Approval by the OCD-Hobbs District Office was granted May 3, 1983.

Disposal is made into the San Andres, a formation older than Triassic, at approximately 4,280 feet to approximately 5,050 feet.

Research of available geologic and engineering data, as was provided in our initial application of April 7, 1983, found no evidence of open faults or other hydrologic connection between the disposal zone and any underground source of drinking water.

Information also submitted with our application to convert the Maud Saunders Well No. 4 for injection provided a tabulation of all wells within one mile of the well. This study showed that the two currently used wells within this one mile location are the water supply wells for the Saunders Plant. Water analyses for these two wells were submitted with our application of April 7, 1983 as attachments C-108 XI (d) and (e).

The San Andres formation throughout the general area is a limestone-dolomite section of Middle Permian Age underlying the Grayburg formation and overlying the Glorieta formation. The top of the San Andres formation for the Maud Saunders well occurs at 4,278 feet; the base of the formation is found at 5,574 feet for an overall thickness of some 1,296 feet. The San Andres formation is not productive of oil or gas within a two mile radius of the injection well.

Fresh water may be found in the Ogallala formation in the vicinity of the well. This ground water is usually found at depths of less than 300 feet and all oil wells drilled in the area have surface casing set and cemented to a depth of at least 295 feet and deeper in most cases.

The Santa Rosa formation in the vicinity of the Maud Saunders well contains a highly mineralized brackish water which is unfit for domestic, stock, or irrigation use. This water usually occurs at depths of form 900 feet to 1,500 feet in the area of the well.

There are no other known fresh water sands overlying the Maud Saunders well disposal zone, and there is no known fresh water sand underlying the disposal zone anywhere in the vicinity.

Monument and Vada Plants

A description of contingency measures and the Spill Prevention Control and Countermeasure Plan for each plant are provided in Section I and Appendix C, respectively, of this report.

All waste water is removed from each plant as described throughout this document. Warren does not operate any injection wells for removal of waste water from either these plants.

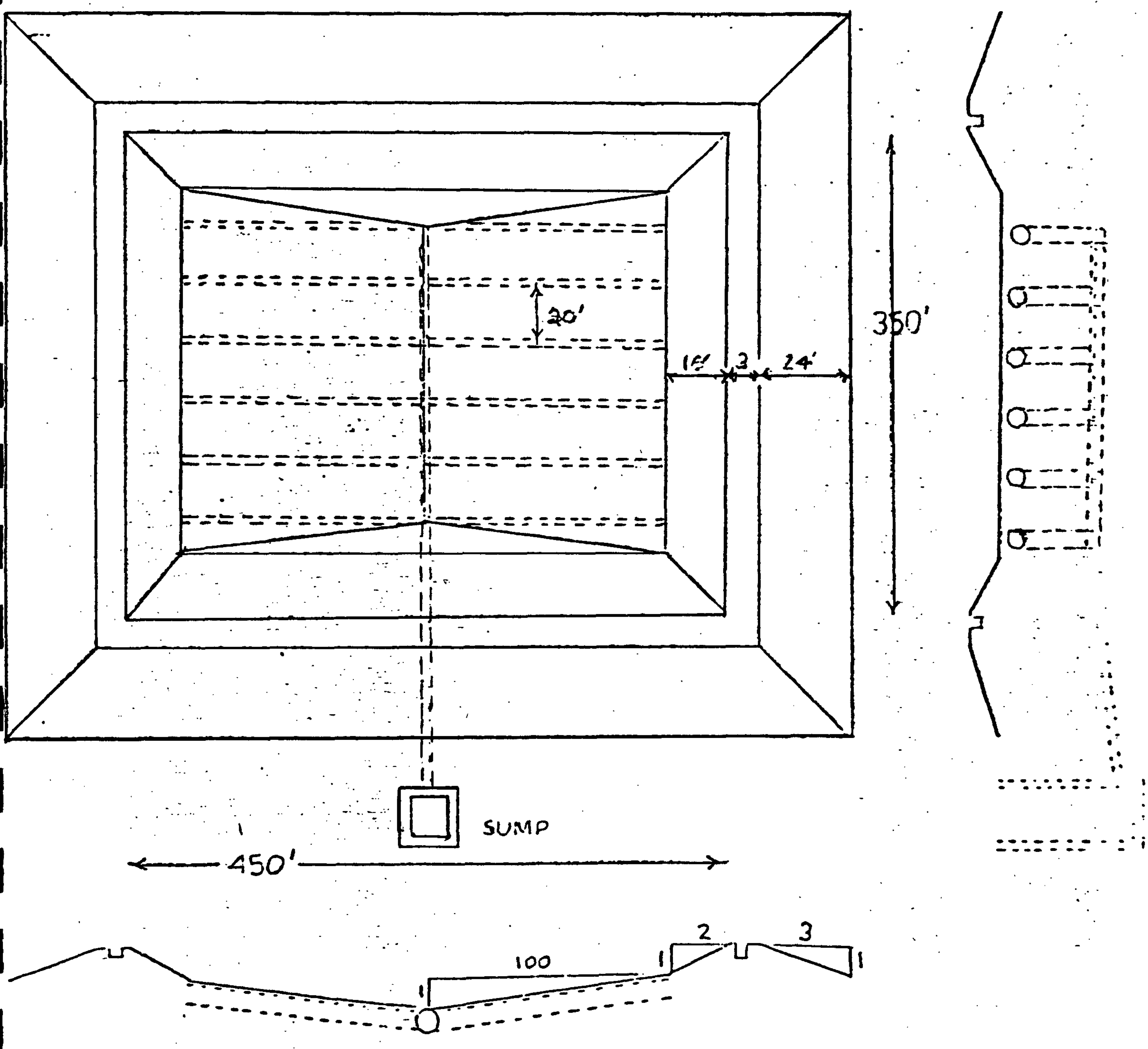
Since no effluent is allowed to reach the ground, there will be no impact on the ground waters of New Mexico. As such, it is our interpretation of requirements for Discharge Plans required by the OCD that a hydrogeologic study will not be appropriate for the Monument and Vada Plants. This information was discussed in our meeting of January 17, 1985 as described in Appendix B of this report.

APPENDIX F

APPENDIX F

MONUMENT PLANT EVAPORATION PIT

JUNE 15, 1977 EVAPORATION PIT

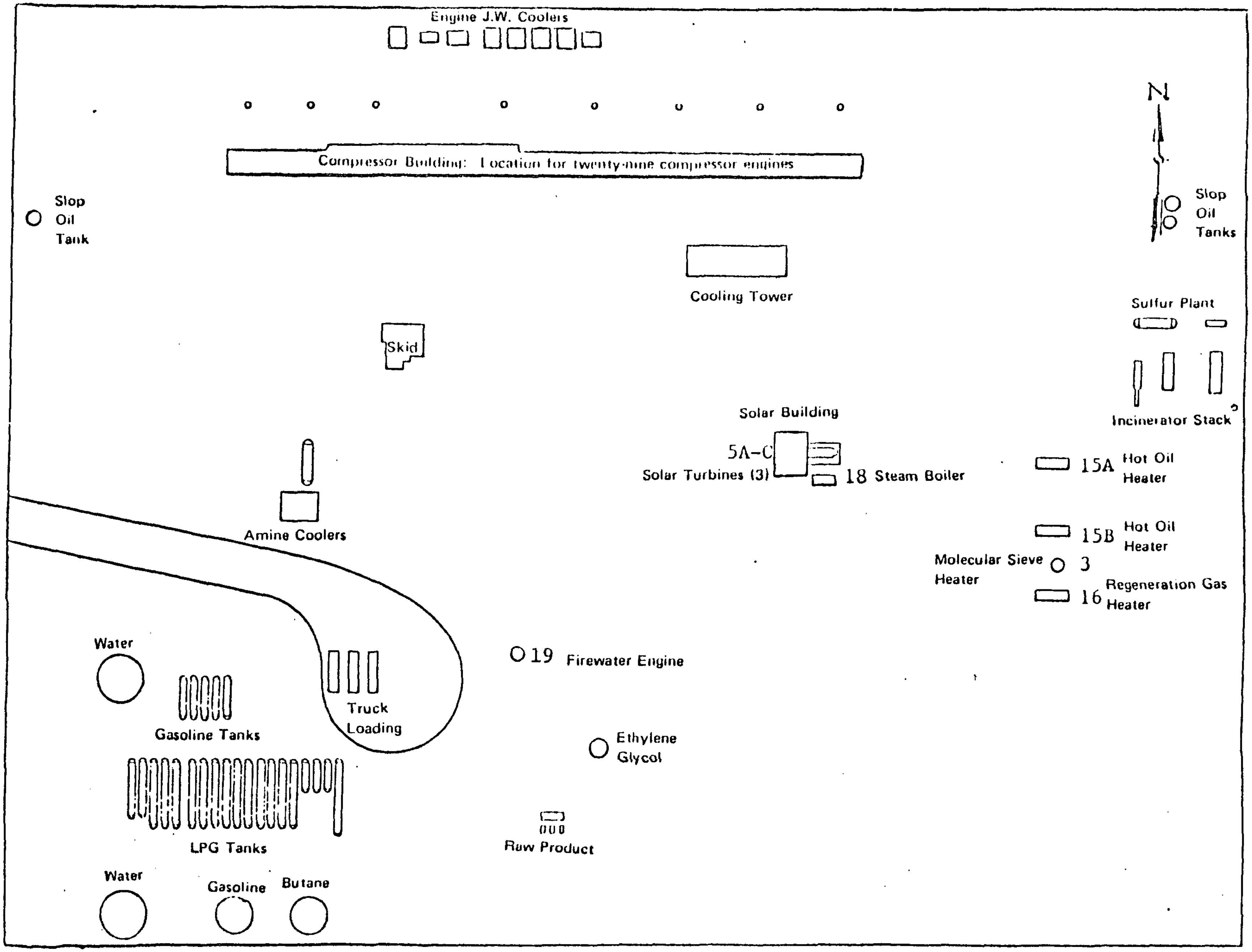


APPENDIX G

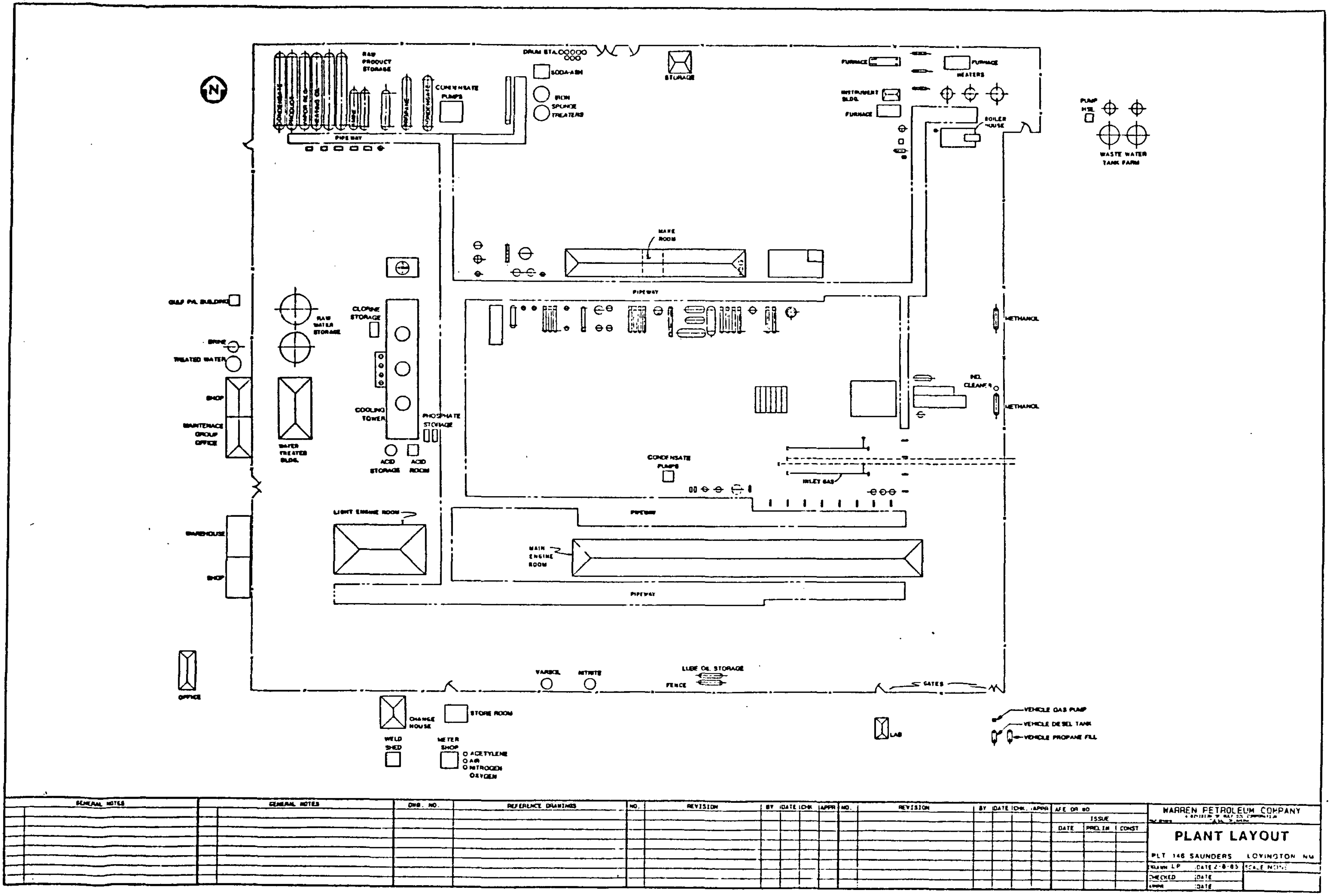
APPENDIX G

PLANT LAYOUT FOR

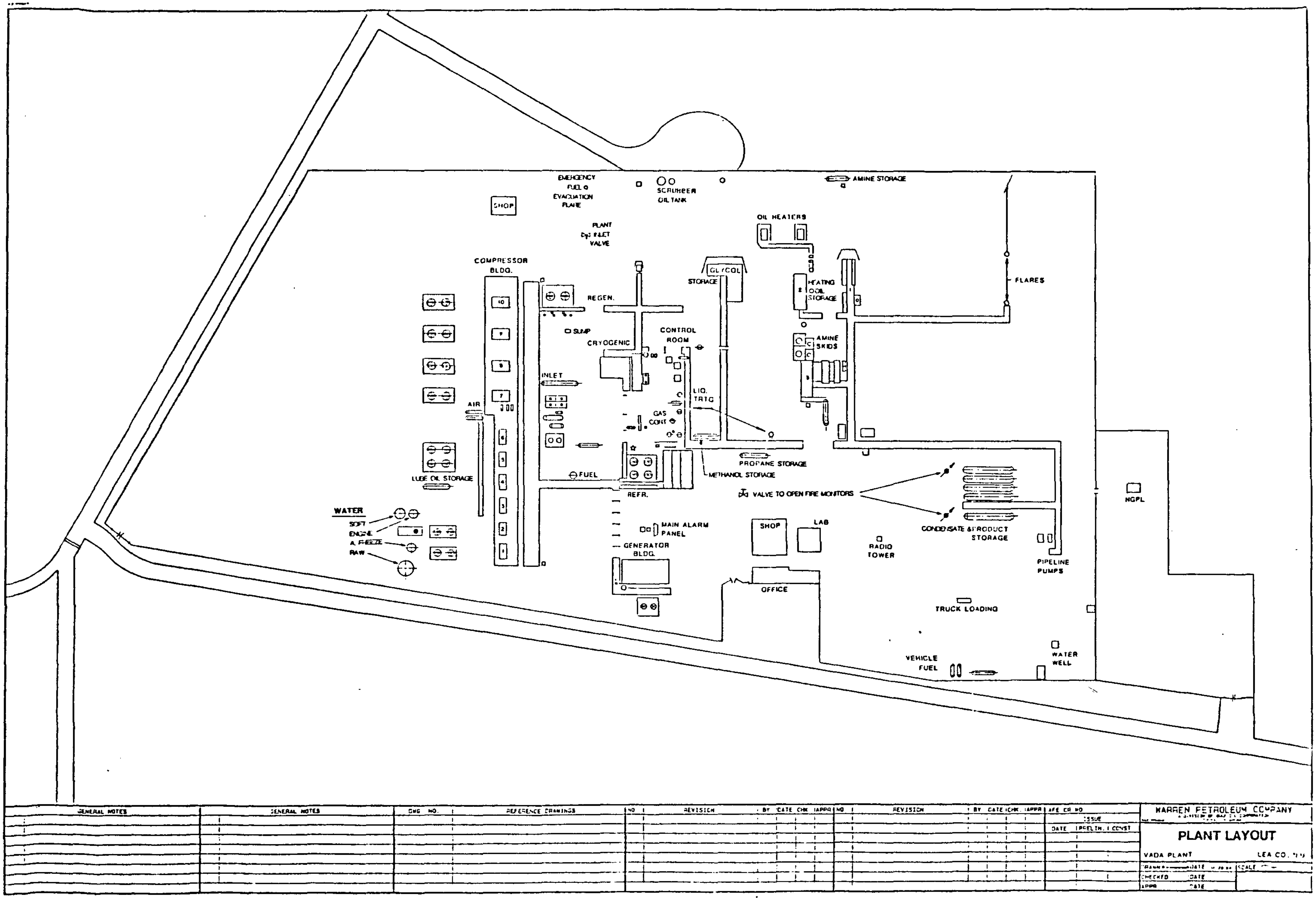
MONUMENT, SAUNDERS, AND VADA PLANTS



WARREN PETROLEUM COMPANY
MONUMENT PLANT
PLOT PLAN



WARREN PETROLEUM COMPANY
SAUNDERS PLANT
PLOT PLAN



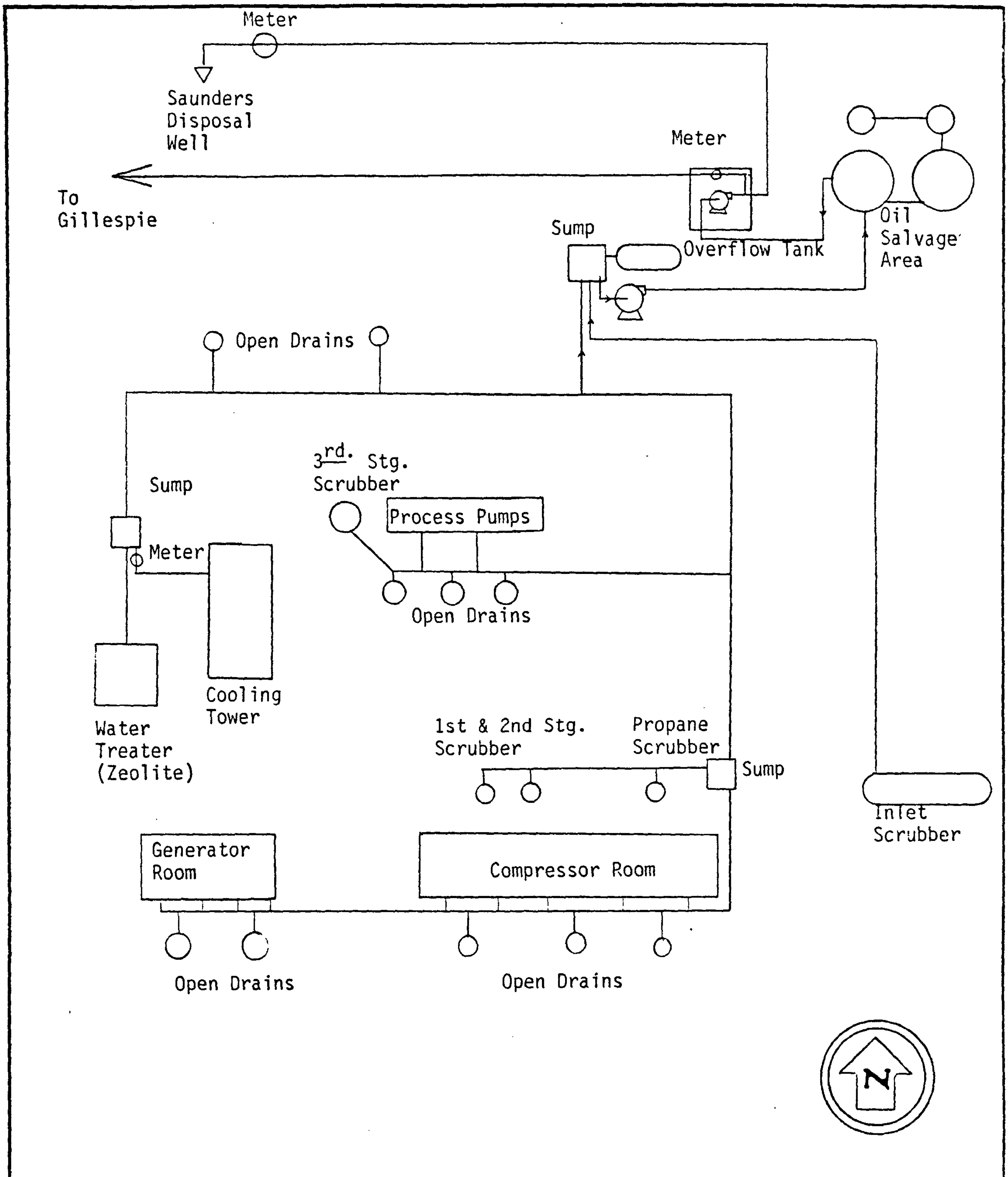
WARREN PETROLEUM COMPANY
VADA PLANT
PLOT PLAN

APPENDIX H

APPENDIX H

WASTE WATER DISPOSAL SYSTEM FOR .

SAUNDERS AND VADA PLANTS



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST.	
						DATE	BY

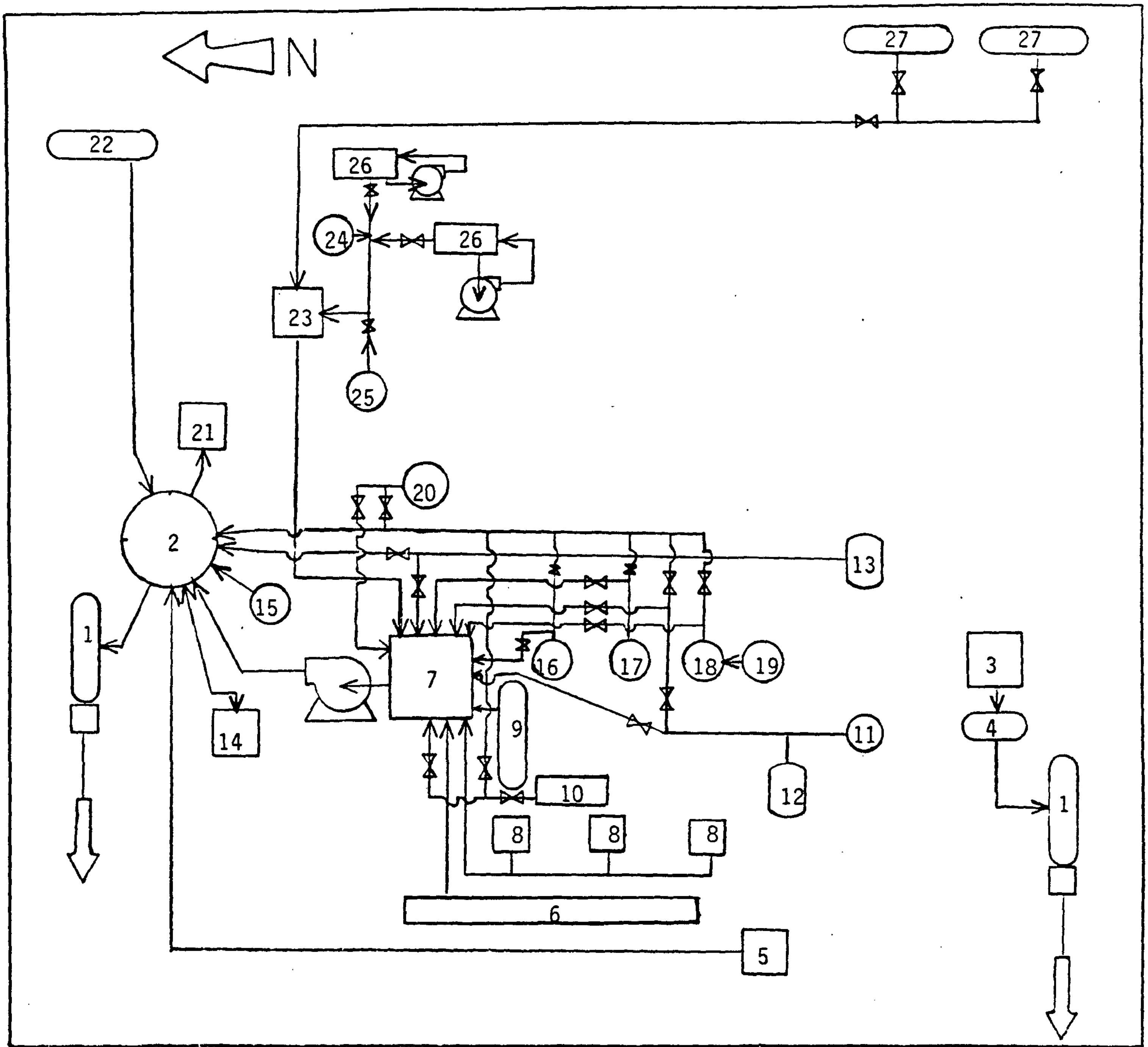
NO. OF UNITS REQUIRED THUS | WO-AFE NO.

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA
GULF 82341

Waste Water System

Saunders Plt. Lovington, N. M.

DRAWN RLM	DATE 1-22-85	SCALE ~~H~~
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	



1. Vacuum Trucks
2. Scrubber Oil Tanks
3. Generator Sump
4. Generator Scrubber Oil Tank
5. Zeolite Water Treater
6. Engine Room Sump
7. Main Plant Sump
8. Open Drains at Scrubbers
9. Inlet Gas Scrubber
10. Compressor Header Drains
11. Fuel Scrubber
12. 2nd Stage Scrubber
13. 3rd Stage Scrubber
14. Vapor Recovery Unit
15. Glycol Skid
16. Residue Inlet Scrubber
17. Recompressor Discharge Scrubber
18. 2nd Stage Recompressor Scrubber
19. Regen Gas Scrubber
20. Regen Gas Heater Scrubber
21. Earthen Dike-Overflow
22. Field Scrubber
23. Portable Tank Trailer
24. Heating Oil Drain
25. Propane Reclaimer
26. Amine Skids
27. Condensate Storage Tanks

NO	REVISIONS	BY	DATE	CHK	APPR	ISSUED CONST DATE	BY

NO. OF UNITS REQUIRED THUS | WO-AFE NO

WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA

WASTE WATER SYSTEM

VADA PLANT #139 TATUM, N. M.

DRAWN BDM DATE 1-4-85 SCALE
CHECKED DATE DRAWING NO
APPROVED DATE

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
UPDATED DISCHARGE PLANS FOR
MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 1589
Tulsa, Oklahoma 74102

September 30, 1984

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
Box 2088
Santa Fe, New Mexico 87501

Attn: Joe D. Ramey

Re: Update to Discharge Plans for Monument, Saunders, and Vada Gas Processing Plants

Dear Mr. Ramey:

The subject material is presented according to your request of February 23 and 24, 1984. As you will recall, your subsequent correspondence of June 7, 1984 provided a September 30, 1984 submittal date for this information.

If you have any questions or need further information, please contact Linda Johnson or me at (918) 560-4119.

Very truly yours,

L. T. Reed, Director
Environmental Affairs

LTR:cm

Attachments

WARREN PETROLEUM COMPANY
A DIVISON OF GULF OIL CORPORATION

UPDATED DISCHARGE PLANS FOR
MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

L. T. Reed, Director
Environmental Affairs
Box 1589
Tulsa, OK 74102
(918) 560-4119

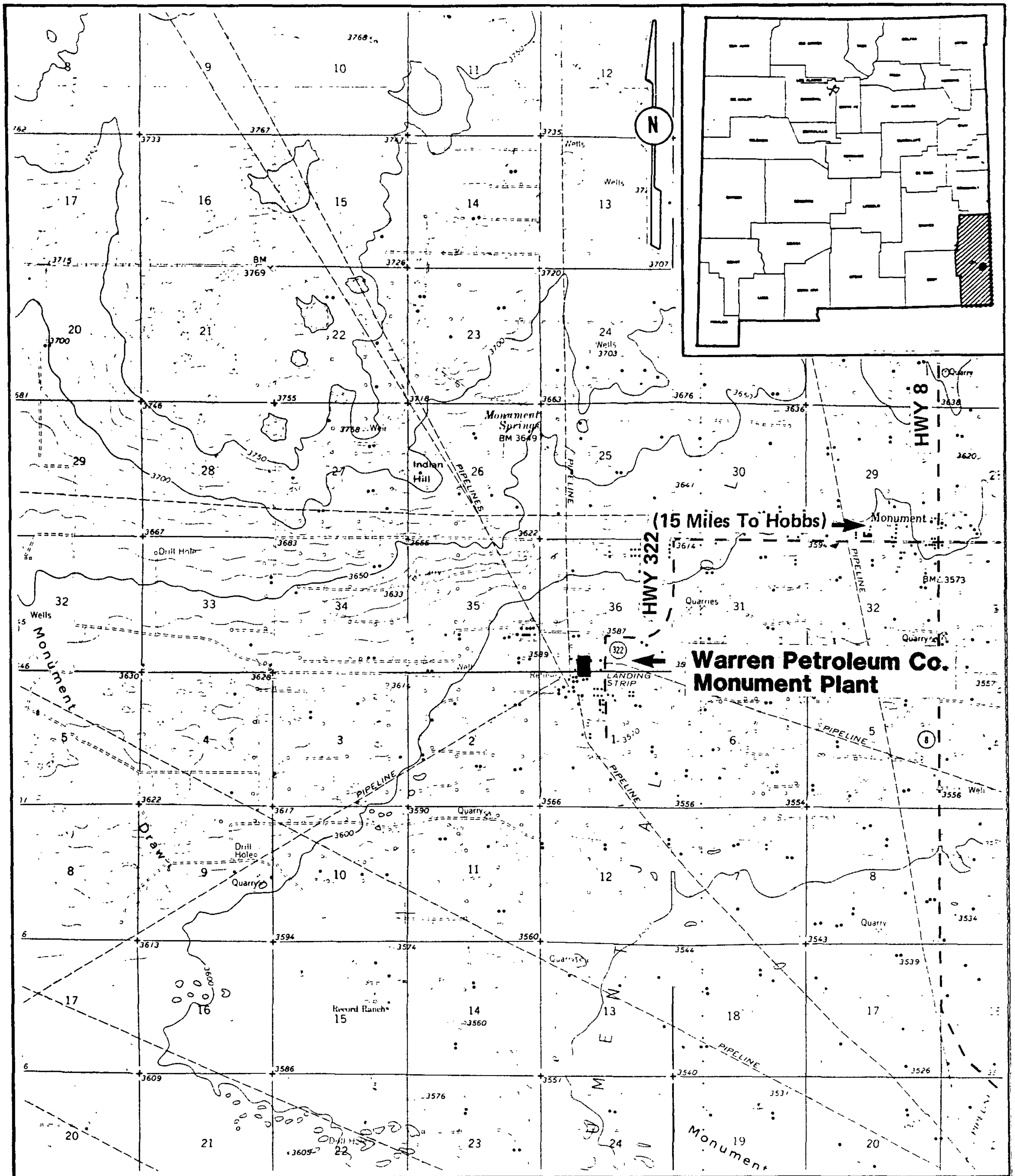
TABLE OF CONTENTS

SECTION I
SUMMARY OF WASTE WATER DISPOSAL METHODS FOR MONUMENT, SAUNDERS, AND VADA GAS PROCESSING PLANTS

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
SUMMARY OF WASTE WATER DISPOSAL METHODS
FOR MONUMENT, SAUNDERS, AND VADA
GAS PROCESSING PLANTS

Facility	Location	Waste Water Disposal Method	Status
Monument	36-T19S, R36E and 1-T20S, R36E Lea County, NM	(1) Evaporation Pond (Approved 9/13/77 by the New Mexico Oil Conservation Commission)	-
		(2) Rice Engineering Injection Well (By Continuing Contract)	Current
		(3) Brine Pond (Approved by NMOCD-Final Construction Modification Specifications of 9/2/83)	Current
Saunders	34-T14S, R33E Lea County, NM	(1) Maud Saunders Well No. 4 (NMOCD Administrative Order SWD-255(Amended) Granted 7/13/83)	Current
		(2) Charles B. Gillespie-Operated Injection Well (By Continuing Contract)	Current
		(a) Gandy Corporation (By Contract) Used in the Event of Well Failure	Current
Vada	23-T10S, R33E Lea County, NM	Stored on Site Prior to Being Hauled for Reclamation or Injection by Contract with Gandy Corporation	Current

SECTION IIA
SITE LOCATION FOR MONUMENT GAS PROCESSING PLANT



PLANT LOCATIONS

SEC. 36, T-19-S, R-36-E and SEC. 1, T-20-S, R-36-E

APPROX. EL. 3585'

APPROX. LAT. 32°35' 40" N

APPROX. LONG 103°15' 44" W

SCALE	DATE
1"=1 MI.	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

MONUMENT PLANT NO.118 LEA CO. N.M.

SECTION IIB

ORIGINAL DISCHARGE PLAN FOR MONUMENT GAS PROCESSING PLANT

JULY 28, 1981

Warren Petroleum Company

MANUFACTURING DEPARTMENT

July 28, 1981

P. O. Box 1589
Tulsa, Oklahoma 74102

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey,
Division Director

Re: Discharge Plans
Monument Plant

Dear Mr. Ramey:

Warren Petroleum Company, a division of Gulf Oil Corporation, is submitting the following formal waste water discharge plan for the Monument Gas Processing Plant, located in Section 1, Township 20S, Range 31E and Section 36, Township 19S, Range 36E, in Lea County, New Mexico.

The liquid waste from the plant includes general plant run-off, cooling tower blowdown, brine from the zeolite softener, boiler blowdown, inlet scrubber water, compressor (interstage scrubbers) condensate water, and water from the H_2S scrubber are disposed of by using a lined evaporation pond, located in the Northwest Corner of the plant.

The evaporation pond was previously approved by the New Mexico Oil Conservation Commission on September 13, 1977 with the condition that it comply with the NMOCC "Specifications for the Design and Construction of lined Evaporation Pits" with the following exceptions:

1. There would be less than 600 square feet of evaporative surface per barrel per day of water placed in the pit.

2. The excavation would be more than six inches deep in some places.

The evaporation pond has a leak detection drainage system which is spaced such that no point in the pond would be more than 20 ft. from the drainage grid.

The amount of waste water generated at the plant is approximately 30,000 barrels per month. Due to the lack of the evaporative surface needed to dispose of this quantity of water, we maintain a disposal contract with an injection well firm to get rid of all excess waste water. The injection well, designated Rice EMEI 1, is located in Section 1, Township 20S, Range 36E in Lea County, New Mexico.

NM Energy and Minerals Department

July 28, 1981

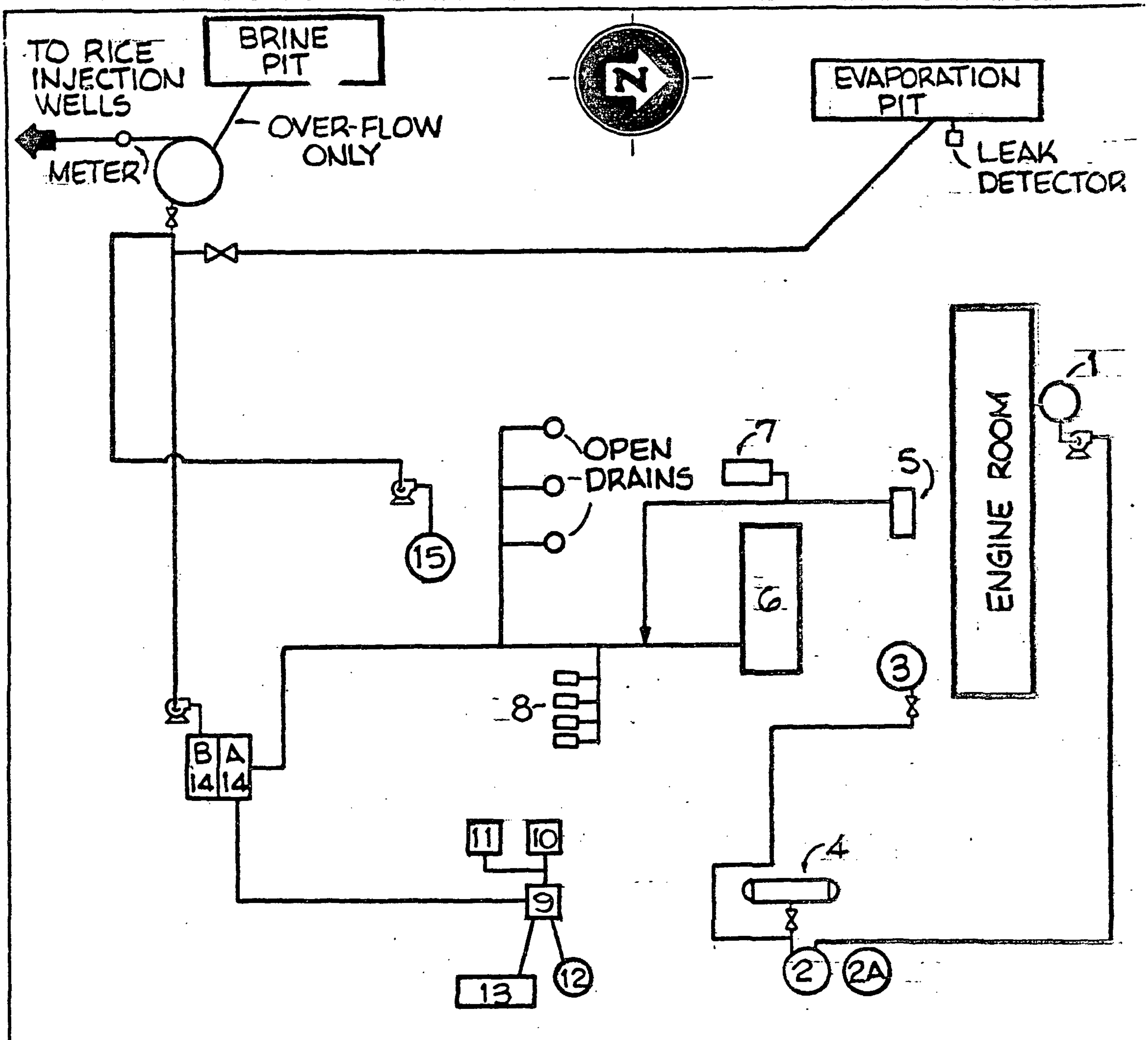
Attached is a map of the waste water system and one of the evaporation pond construction. Should you have any questions or need additional information, please call either Lynn Reed or me at (918) 560-4117.

Very truly yours,

Debra J. Johnson

for J. E. Moody, Manager
Environmental and Services

JEM:DFJ:de
Attachments



LEGEND

1. NORTH ENG. ROOM SUMP
2. SKIMMER TANK
2-A. BLACK OIL TANK
3. 2ND STAGE SCRUBBER
4. 1ST STAGE SCRUBBER
5. SOUTH ENGINE ROOM SUMP
6. COOLING TOWER
7. CONDENSORS
8. CONDENSORS
9. EAST SUMP
10. BOILER
11. BOILER
12. H_2S SCRUBBER
13. BOILER
14-A SKIMMER
14-B. SOUTH SUMP
15. ZEOLITE H_2O TREATERS
16. 3RD STAGE SCRUBBER

NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY

NO. OF UNITS REQUIRED, THUS
WO-AFE NO.

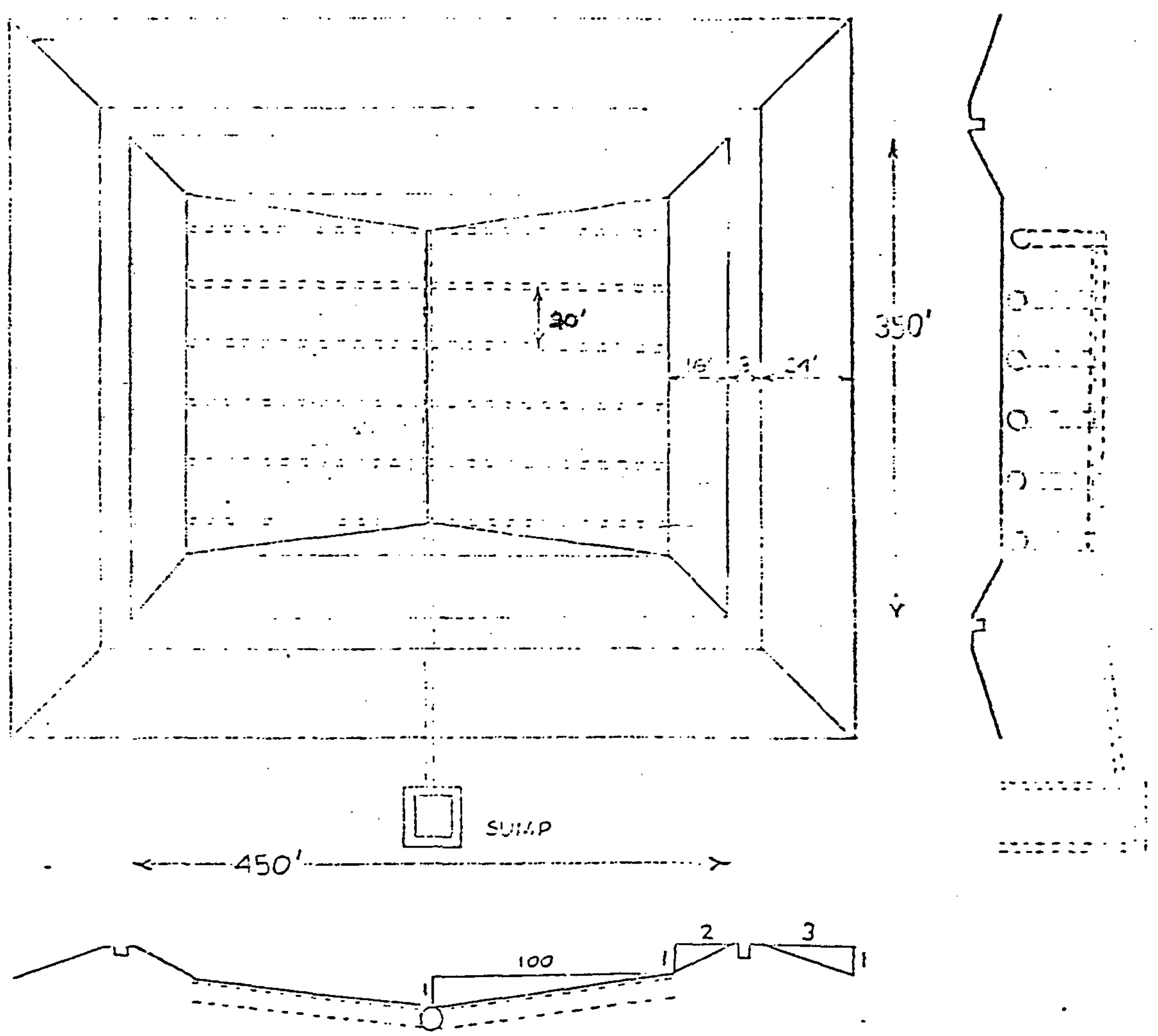
WARREN PETROLEUM CORPORATION
TULSA, OKLAHOMA
R-WPC-34

WASTE WATER SYSTEM

MONUMENT PLT. MONUMENT, N.M.

DRAWN WKC | DATE 7-28-81 | SCALE
CHECKED | DATE | DRAWING NO.
APPROVED | DATE

JUNE 15, 1977 EVAPORATION PIT



SECTION IIC

UPDATE OF ORIGINAL DISCHARGE PLAN FOR

MONUMENT GAS PROCESSING PLANT

SEPTEMBER 30, 1984

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
UPDATE OF ORIGINAL WASTE WATER DISCHARGE PLAN
MONUMENT GAS PROCESSING PLANT
SEPTEMBER 30, 1984

Plant Location
Section 1, Township 20 South, Range 36 East, and Section 36, Township 19 South, Range 36 East, Lea County, New Mexico.

Liquid Waste
The liquid waste from the facility includes general plant run off, cooling tower blowdown, brine from the zeolite softener, boiler blowdown, inlet scrubber water, compressor (interstage scrubbers) condensate water, and water from the H2S scrubber are disposed of by way of the plant sump system and from there to the Rice Engineering disposal well. The amount of waste water generated is approximately 30,000 barrels per month.

Evaporation Pond
The pond is no longer used as an evaporation pond as described in our original discharge plan submitted to the New Mexico Oil Conservation Division (NMOCD) on July 28, 1981.

Brine Pond
The Brine Pond was upgraded in 1983 in accordance with the NMOCD letter of August 6, 1982. The pond stores brine from the storage well. Warren's initial correspondence describing plans and specifications for the storage of approximately 2,000,000 gallons* of ten pound brine was submitted to the NMOCD on August 16, 1982. These specifications were updated with a copy sent to the NMOCD on March 30, 1983. The sieve analysis for the sand and gravel to be used was submitted on May 3, 1983. A letter describing the final modification specifications was sent to the NMOCD on September 2, 1983. Each stage of the construction was inspected and approved by the NMOCD. Copies of Warren's correspondence appears as Section II D which follows.

*Final capacity is 2,283,000 gallons.

SECTION IID

CORRESPONDENCE FROM WARREN AS TO UPGRADING OF BRINE POND AT MONUMENT GAS PROCESSING PLANT

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 67
Monument, New Mexico 88265

August 16, 1982

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Oscar Simpson

Re: BRINE STORAGE POND AT THE MONUMENT PLANT

Dear Mr. Simpson,

This letter is to inform you that Warren Petroleum Company intends to comply with Rule 703 of the Rules and Regulations of the New Mexico Oil Conservation Division and Section 3-104 of the Water Quality Control Commission Regulations. Thus, as per your letter dated August 6, 1982, plans and specifications for re-lining the brine pit are enclosed.

If you have any questions, comments, or recommendations, feel free to call me at (505) 393-2823.

Sincerely,

George W. Finch
G. W. FINCH

GWF/jr

cc: R. H. Brotherton
J. E. Moody

The following is a proposed Scope of Work for the upgrade of the brine pit at the Warren Petroleum Company, Monument Plant. Storage will be rpovided for approximately 2,000,000 Gal. of 10 lb. brine. Please refer to the attached drawings when reviewing this Scope of Work.

SCOPE OF WORK

1. LOCATION
   A. The brine pit is not near any water course, lake-beds, sink-holes, or other depressions, thus the existing pit will be upgraded.

2. DESIGN AND CONSTRUCTION
   A. The pit is approximately 245' X 245' X 7'. The levees are over 4' above ground level. The upper pit liner will be approximately 6' below the ground level.
   B. The levees will be compacted with caliche to make the surface smooth and uniform.
   C. The top of the levees will be flat and level and at least 10' wide. A 4" thick caliche pad will be constructed over the top of the levee and around the entire perimeter of the pit.
   D. The pit will be double lined and in the following sequence: liner, leakage detection system, liner. The bottom liner will extend a minimum of 3' up the side of the levees.
   E. The existing liner will be repaired and used for the bottom liner. The top liner will be fiberglass 75 mil average thickness. Both liners are resistant to hydrocarbons, salt and aqueous acids and alkalis. They are also sun, rot, and fungus resistant.
   F. The bed of the pit and the inside grades of the levee will be smooth and compacted, and free of holes, rocks, stumps, clods, or any other debris which might rupture the liner.
   G. A trench will be dug on the top of the levee the entire perimeter of the pit for the purpose of anchoring the top liner. This trench will be located a minimum of 18" from the slope break and will be a minimum of 18" deep.

3. LEAKAGE DETECTION SYSTEM
   A. The leakage detection system will be built on top of the first liner and will be inspected and approved by the Oil Conservation Commission prior to installation of the final liner. The 4"

3. LEAK DETECTION SYSTEM (Cont'd)

perforated pipe will be 40' on center, so that no point is more than 20' from a drainage canal.

B. The leakage detection system will consist of perforated pipe sloped 1':100' (minimum) connected into a common header located at the outer perimeter of the pit. The header will connect into steel sump located on the outside perimeter of the levees. The perforated pipe will be 4" PVC and the insdie dimensions of the sump are 3' diameter X 18' tall. The header will be 6" PVC pipe.

4. INSTALLATION OF FLEXIBLE MEMBRANE LINERS

A. The liner will be put in place only after the pit-bed leakage detection system, and levee walls have been inspected and approved by an Oil Conservation Commission Representative.

B. The pit liner shall be installed and joints sealed according to the manufacturer's specifications and with the approval of the Oil Conservation Commission Representative.

C. The liner shall be laid as evenly and wrinkle-free as possible and shall rest smoothly on the pit-bed and the inner face of the levees, and shall be of sufficient size to extend down to the bottom of the anchor trench.

D. The fiberglass top liner will anchor past the asphalt liner.

5. FENCES AND SIGNS

A. The existing fence will be repaired where necessary.

B. A sign not less than 12" X 24" with lettering of not less than two inches shall be posted in a conspicuous place on the fence surrounding the brine pit installation. The sign will be maintained in legible condition and will identify the operator (WARREN PETROLEUM CO.) of the brine pit, the location of the system by quarter-quarter section, township and range, and the permit number of the permit authorizing the installation.

WARREN PETROLEUM COMPANY

MANUFACTURING — ENGINEERING

TULSA, OKLAHOMA

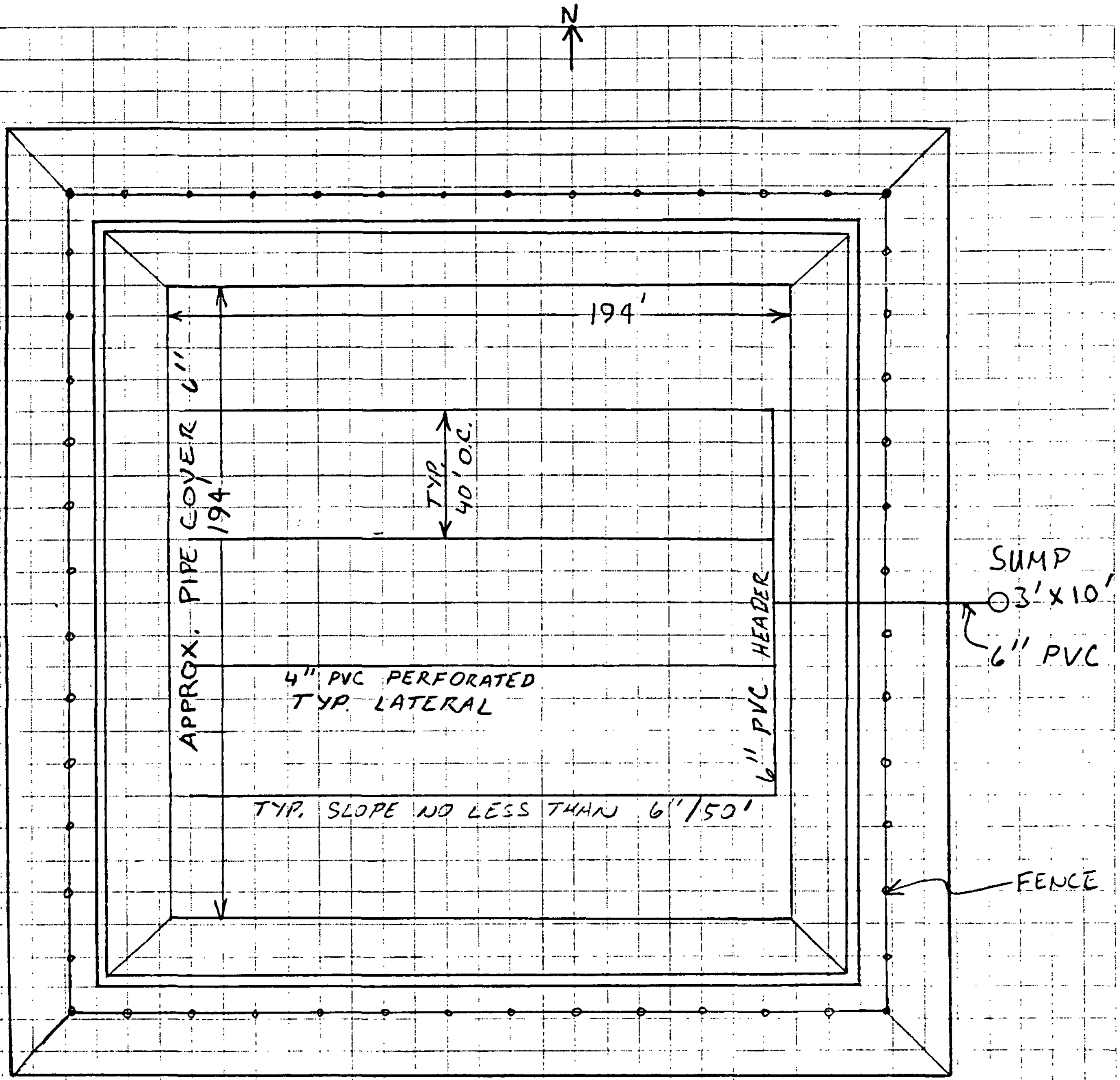
JOB NO. ______

AFE ______

BY [illegible] CHECK ______

DATE Aug. 13, 1982

JOB: TOP VIEW OF BRINE PIT



GULF 60773

SHEET ______ OF ______

WARREN PETROLEUM COMPANY

MANUFACTURING — ENGINEERING

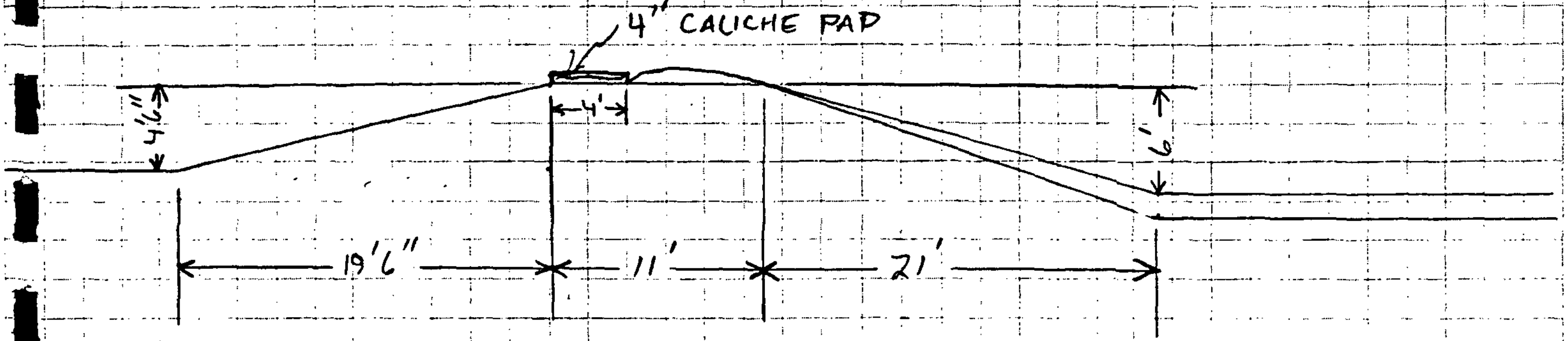
TULSA, OKLAHOMA

JOB NO. ______

AFE ______

BY AMF CHECK ______

DATE Aug 13, 1982 JOB: END VIEW OF LEVEE



Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 67
Monument, New Mexico 88265

November 11, 1982

State of New Mexico
Energy and Minerals Department
Post Office Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

ATTENTION: Mr. Oscar Simpson

Re: Brine Storage Pond at the Monument Plant

Dear Mr. Simpson,

Attached are the revised plans and specifications for the construction of a new brine pond at the Warren Petroleum Company, Monument Plant. Specifications for the fiberglass and PVC liners and the Soil support media are also enclosed.

If you have any questions, comments, or recommendations please contact me.

Sincerely,

George W. Finch

George W. Finch

GWF/jr

Attachments

cc: J. E. Moody, Tulsa

Gulf

"SCOPE OF WORK"

1. LOCATION

   A. The Brine Pit is not near any water course, lake-beds, sink holes, or other depressions, thus the existing pit will be upgraded.

2. DESIGN AND CONSTRUCTION

   A. The existing pit is 255' X 255' X 8'. The levees are 4' 6" above ground level. The pit will be drained by pumping all the brine water to Rice Engineering Company, rinsed with fresh water and again drained by pumping the water to Rice Engineering Company. The liner will then be removed and disposed of in an environmentally acceptable manner.

   B. The pond will be excavated to 9'6" below ground level as depicted in the drawings. The levees will be upgraded and 95% compacted with the excavated material to make the surface smooth and uniform. The existing slopes (1:3 inside and outside) of the levees will be retained. The top of the liners will be 95% compacted with crushed caliche after the liners have been installed.

   C. The pit will be double lined and in the following sequence, 36 mil PVC liner, leakage detection system, 4" sand pad, and 75 mil fiberglass liner. All liners will be anchored in a suitable anchor ditch to be described later. A Mirafi 140N soil support will be used to prevent sand from filtering into the leak system ditches.

3. LEAKAGE DETECTION SYSTEM

   A. The leakage detection system will consist of 4" SCH 40 PVC pipe located in a gravel filled ditch sloping 1':100' (minimum) connected to 6" SCH.40 PVC pipe located in the center of the pit sloping 1':100' (Minimum) to a sump outside of the pit.

   B. The 4" SCH.40 PVC pipe will be perforated with 5/8" O.D. holes 5" on center at a 120° angle. The pipe will be set in the bottom of the ditch so that the holes are facing downward. The ditch will then be backfilled with ½"-1" washed gravel.

C. The 6" SCH.40 PVC pipe will not be perforated. The ditch for the 6" Sch. 40 PVC pipe will be backfilled with the excavated material. Both the 4" and 6" SCH.40 PVC pipe will be joined with solvent welded couplings.

D. The 6" SCH.40 PVC pipe will connect to a steel sump located outside of the pit. The sump will consist of 36" O.D. ERW pipe (.250"W) with a ¼" steel cap welded on the bottom. A 6" steel nipple will be welded to the side for connection to the 6" SCH.40 PVC pipe. A 6" changeover coupling will be used to join the PVC and steel pipe. The watertight cover will be constructed of ¼" steel plate. The entire outside surface of the sump will be coated with pipe dope to prevent corrision.

E. After the leakage detection system is constructed, a 4" sand pad will be spread over the bottom of the pit. A Mirafi 140N soil support will be placed between the gravel and sand to prevent sand from filtering into the ditches. The support will extend a minimum of 2' from the edge of the ditch.

4. POND LINERS

A. An EPA approved 36 mil minimum thickness PVC liner will be used for the bottom liner. This liner is not oil or sun resistant but will not be exposed to either medium.

B. An EPA approved 75 mil thickness fiberglass top liner will be used. This liner is sun and oil resistant.

C. The joints of both liners will be sealed according to the attached drawings.

D. The liners will be laid as evenly and wrinkle-free as possible and shall rest smoothly on the pit-bed and the inner face of the levees,

E. Both liners will anchor into the anchor ditch. The anchor ditch will be 2' from inside edge of the pit and will be 18" deep X 9" wide. The liners will extend to the bottom of the anchor ditch and 6" beyond. The ditch will be backfilled with excavated material.

MIRAFI TYPICAL PROPERTY VALUES*

PROPERTY	UNIT	TEST METHOD	140N
WEIGHT	oz/sy	ASTM D-3776-79	4.5
THICKNESS	mils	ASTM D-1777-64	60
GRAB STRENGTH	lb	ASTM D-1682-64	120
GRAB ELONGATION	%	ASTM D-1682-64	55
MODULUS (10% ELONGATION)	lb	ASTM D-1682-64	N/A
TRAPEZIOD TEAR STRENGTH	lb	ASTM D-1117-80	50
MULLEN BRUST STRENGTH	psi	ASTM D-3786-80[1]	210
PUNCTURE STRENGTH	lb	ASTM D-3787-80[2]	70
ABRASION RESISTANCE	lb	ASTM D-3884-80[3] & D-1682-64	N/A
COEF. OF PERMEABILITY, k	cm/sec	CFMC-GET-2	0.2
WATER FLOW RATE	gal/min/sf	CFMC-GET-2	225
AIR FLOW RATE	cf/min/sf	ASTM D-737	225
EQUIVALENT OPENING SIZE(EOS)	US Std. Sieve	COE CW 02215-77	100+
OPEN AREA	%	COE Method	N/A
RETENTION EFFICIENCY (Suspended Solids)	%	Virginia DOT VTM-51	N/A
SLURRY FLOW RATE	gal/min/sf	Virginia DOT VTM-51	N/A
GRADIENT RATIO	---	COE CW 02215-77	3
ULTRAVIOLET RADIATION STABILITY	%	ASTM G-26/ D-1682-64 [4]	0
ASPHALT RETENTION	oz/sf	Texas DOT Item 3099	N/A
SHRINKAGE FROM ASPHALT	%	Texas DOT Item 3099	N/A

1 Diaphragm Bursting Tester

2 Tension Testing Machine with ring clamp; steel ball replaced with a 5/16" diameter solid steel cylinder(with hemispherical tip) centered within the ring clamp.

[3] ASTM D-1682 as above after abrasion as required by ASTM D-3884 Rotary Platform, Double Head Method; rubber-base abrasive wheels equal to CS-17 "Calibrase" by Taber Instrument Co.;1kg load per wheel; 1,000 revolutions.

[4] ASTM D-1682 as above after 250 cycles in Xenon-arc weathermoeter (Type BH or Type C apparatus as described in ASTM G-26). One cycle consists of 102 minutes of light only followed by 18 minutes of light with water spray.

* The product specifications are average values. For minimum certified values contact your local Mirafi representative or the Mirafi Technical Department at 1-800-438-1855.

713 - 465-7545 9225 Katy Freeway Suite 325 Houston, Texas 77024
915 - 563-0576 12101 East Highway 80 P.O. Box 4595 Odessa, Texas 79760

TYPICAL LAMINATE PHYSICAL PROPERTIES

"KEM-LINE" FRP LINING

PROPERTY	UNITS	VALUE
Tensile Strength	PSI	21,000
Tensile Modulus	PSI X 10^5	17
Elongation	%	5
Flexural Strength	PSI	28,000
Flexural Modulus	PSI X 10^5	10
Heat Distortion Temperature	^oF	210^o
Barcol Hardness	-	35
Normal Temperature Range	^oF	$-20^o/220^o$

713 - 465-7545 9225 Katy Freeway Suite 325 Houston, Texas 77024
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"FIBRE-LINE" FRP pond liners are fabricated with a low viscosity resilient Isophthalic Polyester resin containing Styrene Monomer. Kote-Flex resin is thixotropic and promoted for pond liner sheets where toughness, chemical resistance and flexability are required.

STANDARDS FOR SANITARY LANDFILL LINERS

(a) Permeability - The "FRP" liner is suitable for use as an impermeable barrier with a value of permeability of 1 X 10^{-7} cm/sec. or less.

Note: The Polyester resins are used for the manufacture of fiberglass tanks and lining of steel tanks and vessels.

(b) Resistance to Leachate - The manufacturers warranty states that the membrane is capable of preventing leachate from reaching the soil under the membrane.

(c) TYPICAL LAMINATE PHYSICAL PROPERTIES OF "FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Specific Gravity (Resin)	-	1.1
Factory & Field Seam Strength	-	Exceeds that of parent material
Thickness	Mil - Minimum Mil - Average	65 75
Glass Content	%	31
Tensile Strength ASTM - D-638	PSI	14,800
Compressive Strength ASTM - D-695	PSI	25,000
Flexural Strength ASTM - D-790	PSI	25,000
Flexural Modulus	PSI X 10^6	1.0

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(c) Con't) TYPICAL LAMINATE PHYSICAL PROPERTIES OF

"FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Izod Impact ASTM - D-256	(Ft.-lbs./in). Notched Unnotched	 13.7 16.6
Barcol Harness ASTM - D-785	-	45-50
Water Absorption	24 hr., $25^{o}C$, %	.17
Elongation ASTM - D-638	%	4.0
Normal Temperature Usage Range	^{o}F	$-20^{o}/180^{o}$
Heat Distortion Point	$^{o}C/^{o}F$	$88^{o}/192^{o}$
Ultraviolet Effects With Aging By Weathermeter G-23 ASTM - D-1435	Outdoor Exposure 1 Year	Yellowing & Caulking
Oxygenated Solvents	"FIBRE-LINE" "KEM-LINE"	Poor Good
Aromatic Solvents (100% Level)	"FIBRE-LINE" "KEM-LINE"	Poor Good
Aromatic Solvents (50% or less)	"FIBRE-LINE"	Good
Halogenate Solvents	"FIBRE-LINE" "KEM-LINE"	Poor Good
Petroleum Solvents	"FIBRE-LINE" "KEM-LINE"	Good Good
Methane Gas	"FIBRE-LINE" "KEM-LINE"	Good Good

Note: Used in Waste and Sewage plants.

General	"FIBRE-LINE" Acids (except for concentrate H_2SO_4 and HNO_3)	Good
	"KEM-LINE	Good

KOTE LINE
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(c) Con't TYPICAL LAMINATE PHYSICAL PROPERTIES OF

"FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Burial	"FIBRE-LINE"	Good
	"KEM-LINE	Good

Note: Many uses. Buried Gas Tanks, Fiberglass pipe, Fiberglass Vessels.

I certify the above information to be true and correct to the best of my knowledge.

Eileen Perlsmith
Witness

Hal K. Jarrell
Hal K. Jarrell President

POLYCOR POLYESTER RESINS

939-I-032

939-I-032 is a low viscosity, resilient isophthalic polyester resin containing styrene monomer. This resin is thixotropic and promoted for filament winding and pit liners where toughness, chemical resistance, and flexibility is required.

TYPICAL PROPERTIES OF LIQUID RESIN

Brookfield Viscosity, 25°C., cps. #3 Spindle @ 60 rpm	300-500
Thixotropic Index, Minimum	2
Color	Clear
Stability, uncatalyzed in dark @ 25°C., Minimum, Months	3

TYPICAL CURING PROPERTIES 25°C., 1% MEKP into 100 Gram Mass

Gel Time, Minutes	10
Total Time to Peak, Minutes	17
Peak Exotherm, °C.	177

PROPERTIES OF 1/8" UNFILLED CASTING

Flexural Strength, psi.	16,000
Flexural Modulus, psi.	$.41 \times 10^6$
Tensile Strength, psi.	9,500
Barcol Hardness	40-45
Heat Distortion Temp. °C.	88
Water Absorption, 24 hrs., 25°C.,%	.2
Elongation, %	3.6

PROPERTIES OF 1/8" LAMINATE (3 Plies 1½ oz. Mat 30% glass)

Flexural Strength, psi.	24,800
Flexural Modulus, psi.	$.95 \times 10^6$
Tensile Strength, psi.	13,000
Izod Impact, Unnotched	16.6
Barcol Hardness	45-50
Water Absorption 24 hrs., 25°C.,%	.17
Elongation, %	4.0

Results obained with this data cannot be guaranteed and final determination of the suitability of any information or material for the use contemplated or the manner of use is the sole responsibility of the user.

COOK PAINT AND VARNISH COMPANY

KOTE LINE INC.
713-463-8861 18007 Hollywell Houston Texas 77084
915-563-0576 12101 East Highway 80 P.O. Box 6343 Midland, Texas 79701

STANDARD SPECIFICATIONS

POLYVINYL CHLORIDE PLASTIC LININGS

I. GENERAL REQUIREMENTS

The work covered by these specifications consists of installing polyvinyl chloride (PVC) plastic linings in the water containment structures.

II. PVC MATERIALS

A. General. The materials supplied under these specifications shall be first quality products designed and manufactured specifically for the purpose of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes.

B. Description of PVC Materials. PVC (polyvinyl chloride) plastic lining shall consist of widths of calendered PVC sheeting fabricated into large sections by means of solvent-bonded factory seams into a single piece, or into the minimum number of large pieces required to fit the facility.

1. Physical Characteristics. The PVC materials shall have the physical characteristics.

PROPERTY	SPECIFICATION LIMIT	TEST METHOD
Thickness	Specified ± 10%	
Specific Gravity	1.24 - 1.30	
Tensile Strength, psi, min.	2200	ASTM D882-B
Elongation, % min.	300%	ASTM D882-B
100% Modulus, psi	1000 - 1600	ASTM D882-B
Elmendorfer Tear, gms/mil, min.	160	ASTM 689
Graves Tear, lbs/in. min.	270	ASTM D1004
Water extraction, % max.	0.35	ASTM D1239
Volatility, % max.	0.7	ASTM D1203
Impact Cold Cract, °F	-20	ASTM 1790
Dimensional Stability, max. % (100°C-15 minutes)	5	
Outdoor Exposure, sun hours	1500	
Solvent Bonded Seam Strength, % of Tensile, min.	80%	
Resistance to Burial		Formulation shall have passed USBR Test (specially formulated for resistance to micro-biological attack)
Alkali Resistances		Passes Corps. of Eng. CRD-572-61

Color - Gray (Std.)
Factory Seals - 3/4" solvent bonded

2. PVC Polyvinyl Chloride Materials shall be manufactured from domestic virgin polyvinyl chloride resin and specifically compounded for use in hydraulic facilities. Reprocessed material shall not be used.

III. FACTORY FABRICATION

Individual widths of PVC materials shall be fabricated into large sections by solvent bonding into a single piece, or into the minimum number of pieces, up to 100 feet wide, as required to fit the facility. Lap joints with a minimum joint width of 3/4 inch shall be used. After fabrication, the lining shall be accordion folded in both directions and packaged for minimum handling in the field.

IV. PLACING OF PVC LINING

A. General. The PVC lining shall be placed over the prepared surfaces to be lined in such a manner as to assure minimum handling. It shall be sealed to all concrete structures and other openings through the lining in accordance with details shown on drawings. The lining shall be closely fitted and sealed around inlets, outlets, and other projections through the lining. Any portion of lining damaged during installation by any cause shall be removed or repaired by using an additional piece of lining as specified hereinafter.

1. Field Joints. Lap joints of the same kind as used in the factory shall be used to seal factory-fabricated pieces of PVC together in the field. Lap joints shall be formed by lapping the edges of pieces a minimum of two inches. The contact surfaces of the pieces shall be wiped clean to remove all dirt, dust, moisture, or other foreign materials. Sufficient vinyl-to-vinyl bonding solvent shall be applied to both contact surfaces in the joint area and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

2. Joints to Structures. All curing compounds and coatings shall be completely removed from the joint area. Joining of PVC to concrete shall be made with vinyl-to-concrete adhesive. The minimum width of concrete shelf provided for the cemented joint shall be eight inches, and batten strips shall be used to reinforce the adhesive bond.

3. Repairs to PVC. Any necessary repairs to the PVC shall be patched with the lining material itself and vinyl-to-vinyl bonding solvent.

4. Quality of Workmanship. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects, or distress from rough subgrade shall be replaced or covered and sealed with an additional layer of PVC of the proper size.

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 67
Monument, New Mexico 88265

MARCH 30, 1983

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPT.
P. O. BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

Attention: Mr. Oscar Simpson

Ref: Brine Pond at the Monument Plant #118

Dear Mr. Simpson,

Please find enclosed the revised plans and Scope of Work for the proposed modifications to the brine pond at the Warren Petroleum Company, Monument Plant. Also enclosed are liner samples and specifications. The sieve analysis of gravel and sand will be forwarded at a later date.

If you have any questions, please advise.

G. W. Finch

GWF/jr
Attachments
cc: J. E. Moody - Tulsa

Gulf

"SCOPE OF WORK"

1. LOCATION

A. The Brine Pit is not near any water course, lake beds, sink holes, or other depressions, thus the existing pit will be upgraded.

2. DESIGN AND CONSTRUCTION

A. The existing pit is 225' X 225' X 8'. The levees are 4'6" above ground level. The pit will be drained by pumping all the brine water to Rice Engineering Company, rinsed with fresh water and again drained by pumping the water to Rice Engineering Company. The liner will then be removed and disposed of by burying near the site of the brine pit. If large amounts of salt and debris exist they will be disposed of in an approved sanitary landfill.

B. The pond will be excavated to 9'6" below ground level as depicted in the drawings. The levees will be graded and 95% compacted with the excavated material to make the surface smooth and uniform. The existing slopes (1:3 inside and outside) of the levees will be retained. The top of the liners will be 95% compacted with crushed caliche after the liners have been installed.

C. The pit will be double lined and in the following sequence, 36 mil PVC liner, leakage detection system, 4" (min.) sand pad, and 75 mil fiberglass liner. All liners will be anchored in a suitable anchor ditch to be described later. A Mirafi 140N soil support will be used to prevent sand from filtering into the leak system ditch.

3. LEAKAGE DETECTION SYSTEM

A. The leakage detection system will consist of 6" SCH 40 PVC pipe located in a gravel filled ditch sloping 1':100' (minimum). The ditch will be located down the center of the pit and will drain into a sump outside of the pit.

B. The 6" SCH 40 PVC pipe will be preforated with 5/8" O.D. holes 5" on center at a 120° angle. The pipe will be set in the bottom of the ditch so that the holes are facing downward. The ditch will then be backfilled with ½" - 1" washed gravel.

C. The 6" SCH 40 PVC pipe will connect to a steel sump located outside of the pit. The sump will consist of 36" OD ERW pipe (.250"W) with a ¼" steel cap welded on the bottom. A 6" steel nipple will be welded to the side for connection to the 6" SCH 40 PVC pipe. A 6" changeover coupling will be used to join the PVC and steel pipe. The watertight cover will be constructed of ¼" steel plate. The entire outside surface of the sump will be coated with pipe dope to prevent corrision.

D. After the leakage detection system is constructed, one 4" sand pad will be spread over the bottom of the pit. A Mirafi 140N soil support will be placed between the gravel and sand to prevent sand from filtering into the ditches. The support will extend up the sides of the pond and anchor into the ditch.

4. POND LINERS

A. An EPA approved 36 mil minimum thickness PVC liner will be used for the bottom liner. This liner is not oil or sun resistant but will not be exposed to either medium.

B. An EPA approved 75 mil thickness fibergalss top liner will be used. This liner is sun and oil resistant.

C. The joints of both liners will be sealed according to the attached drawings.

D. The liners will be laid as evenly and wrinkle-free as possible and shall rest smoothly on the pit-bed and the inner face of the levees.

E. Both liners will anchor into the anchor ditch. The anchor ditch will be 2' from inside edge of the pit and will be 18" deep X 9" wide. The liners will extend to the bottom of the anchor ditch and 6" beyond. The ditch will be backfilled with excavated material.

KOTE LINE

713 - 465-7545 9225 Katy Freeway Suite 325 Houston, Texas 77024
915 - 563-0576 12101 East Highway 80 P.O. Box 4595 Odessa, Texas 79760

TYPICAL LAMINATE PHYSICAL PROPERTIES

"KEM-LINE" FRP LINING

PROPERTY	UNITS	VALUE
Tensile Strength	PSI	21,000
Tensile Modulus	PSI X 10^5	17
Elongation	%	5
Flexural Strength	PSI	28,000
Flexural Modulus	PSI X 10^5	10
Heat Distortion Temperature	^oF	210^o
Barcol Hardness	-	35
Normal Temperature Range	^oF	$-20^o/220^o$

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"FIBRE-LINE" FRP pond liners are fabricated with a low viscosity resilient Isophthalic Polyester resin containing Styrene Monomer. Kote-Flex resin is thixotropic and promoted for pond liner sheets where toughness, chemical resistance and flexability are required.

STANDARDS FOR SANITARY LANDFILL LINERS

(a) Permeability - The "FRP" liner is suitable for use as an impermeable barrier with a value of permeability of 1×10^{-7} cm/sec. or less.

Note: The Polyester resins are used for the manufacture of fiberglass tanks and lining of steel tanks and vessels.

(b) Resistance to Leachate - The manufacturers warranty states that the membrane is capable of preventing leachate from reaching the soil under the membrane.

(c) TYPICAL LAMINATE PHYSICAL PROPERTIES OF "FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Specific Gravity (Resin)	-	1.1
Factory & Field Seam Strength	-	Exceeds that of parent material
Thickness	Mil - Minimum Mil - Average	65 75
Glass Content	%	31
Tensile Strength ASTM - D-638	PSI	14,800
Compressive Strength ASTM - D-695	PSI	25,000
Flexural Strength ASTM - D-790	PSI	25,000
Flexural Modulus	PSI X 10^6	1.0

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(c) Con't) TYPICAL LAMINATE PHYSICAL PROPERTIES OF

"FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Izod Impact ASTM - D-256	(Ft.-lbs./in). Notched Unnotched	 13.7 16.6
Barcol Harness ASTM - D-785	-	45-50
Water Absorption	24 hr., 25^{o}C, %	.17
Elongation ASTM - D-638	%	4.0
Normal Temperature Usage Range	^{o}F	-20^{o}/180^{o}
Heat Distortion Point	^{o}C/^{o}F	88^{o}/192^{o}
Ultraviolet Effects With Aging By Weathermeter G-23 ASTM - D-1435	Outdoor Exposure 1 Year	Yellowing & Caulking
Oxygenated Solvents	"FIBRE-LINE" "KEM-LINE"	Poor Good
Aromatic Solvents (100% Level)	"FIBRE-LINE" "KEM-LINE"	Poor Good
Aromatic Solvents (50% or Less)	"FIBRE-LINE"	Good
Halogenate Solvents	"FIBRE-LINE" "KEM-LINE"	Poor Good
Petroleum Solvents	"FIBRE-LINE" "KEM-LINE"	Good Good
Methane Gas	"FIBRE-LINE" "KEM-LINE"	Good Good

Note: Used in Waste and Sewage plants.

General	"FIBRE-LINE" Acids (except for concentrate H_2SO_4 and HNO_3)	Good
	"KEM-LINE	Good

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(c) Con't TYPICAL LAMINATE PHYSICAL PROPERTIES OF

"FIBRE-LINE" FRP LINING

PROPERTY	UNIT	VALUE
Burial	"FIBRE-LINE"	Good
	"KEM-LINE	Good

Note: Many uses. Buried Gas Tanks, Fiberglass pipe, Fiberglass Vessels.

I certify the above information to be true and correct to the best of my knowledge.

Eileen Perlsmith
Witness

Hal K. Jarrell
Hal K. Jarrell President

POLYCOR POLYESTER RESINS

939-I-032

939-I-032 is a low viscosity, resilient isophthalic polyester resin containing styrene monomer. This resin is thixotropic and promoted for filament winding and pit liners where toughness, chemical resistance, and flexibility is required.

TYPICAL PROPERTIES OF LIQUID RESIN

Brookfield Viscosity, 25°C., cps. #3 Spindle @ 60 rpm	300-500
Thixotropic Index, Minimum	2
Color	Clear
Stability, uncatalyzed in dark @ 25°C., Minimum, Months	3

TYPICAL CURING PROPERTIES 25°C., 1% MEKP into 100 Gram Mass

Gel Time, Minutes	10
Total Time to Peak, Minutes	17
Peak Exotherm, °C.	177

PROPERTIES OF 1/8" UNFILLED CASTING

Flexural Strength, psi.	16,000
Flexural Modulus, psi.	$.41 \times 10^6$
Tensile Strength, psi.	9,500
Barcol Hardness	40-45
Heat Distortion Temp. °C.	88
Water Absorption, 24 hrs., 25°C.,%	.2
Elongation, %	3.6

PROPERTIES OF 1/8" LAMINATE (3 Plies 1½ oz. Mat 30% glass)

Flexural Strength, psi.	24,800
Flexural Modulus, psi.	$.95 \times 10^6$
Tensile Strength, psi.	13,000
Izod Impact, Unnotched	16.6
Barcol Hardness	45-50
Water Absorption 24 hrs., 25°C.,%	.17
Elongation, %	4.0

Results obained with this data cannot be guaranteed and final determination of the suitability of any information or material for the use contemplated or the manner of use is the sole responsibility of the user.

COOK PAINT AND VARNISH COMPANY

MIRAFI TYPICAL PROPERTY VALUES*

PROPERTY	UNIT	TEST METHOD	140N
WEIGHT	oz/sy	ASTM D-3776-79	4.5
THICKNESS	mils	ASTM D-1777-64	60
GRAB STRENGTH	lb	ASTM D-1682-64	120
GRAB ELONGATION	%	ASTM D-1682-64	55
MODULUS (10% ELONGATION)	lb	ASTM D-1682-64	N/A
TRAPEZIOD TEAR STRENGTH	lb	ASTM D-1117-80	50
MULLEN BRUST STRENGTH	psi	ASTM D-3786-80[1]	210
PUNCTURE STRENGTH	lb	ASTM D-3787-80[2]	70
ABRASION RESISTANCE	lb	ASTM D-3884-80[3] & D-1682-64	N/A
COEF. OF PERMEABILITY,k	cm/sec	CFMC-GET-2	0.2
WATER FLOW RATE	gal/min/sf	CFMC-GET-2	225
AIR FLOW RATE	cf/min/sf	ASTM D-737	225
EQUIVALENT OPENING SIZE(EOS)	US Std. Sieve	COE CW 02215-77	100+
OPEN AREA	%	COE Method	N/A
RETENTION EFFICIENCY (Suspended Solids)	%	Virginia DOT VTM-51	N/A
SLURRY FLOW RATE	gal/min/sf	Virginia DOT VTM-51	N/A
GRADIENT RATIO	---	COE CW 02215-77	3
ULTRAVIOLET RADIATION STABILITY	%	ASTM G-26/ D-1682-64 [4]	0
ASPHALT RETENTION	oz/sf	Texas DOT Item 3099	N/A
SHRINKAGE FROM ASPHALT	%	Texas DOT Item 3099	N/A

1 Diaphragm Bursting Tester

2 Tension Testing Machine with ring clamp; steel ball replaced with a 5/16" diameter solid steel cylinder(with hemispheric tip) centered within the ring clamp.

3 ASTM D-1682 as above after abrasion as required by ASTM D-3884 Rotary Platform, Double Head Method; rubber-base abrasive wheels equal to CS-17 "Calibrase" by Taber Instrument Co.;1kg load per wheel; 1,000 revolutions.

4 ASTM D-1682 as above after 250 cycles in Xenon-arc weathermoeter (Type BH or Type C apparatus as described in ASTM G-26). One cycle consists of 102 minutes of light only followed by 18 minutes of light with water spray.

* The product specifications are <u>average</u> values. For <u>minimum certified values</u> contact your local Mirafi representative or the Mirafi Technical Department at 1-800-438-1855.

KOTE LINE INC.

713-463-8861 18007 Hollywell Houston Texas 77084
915 - 563-0576 12101 East Highway 80 P.O. Box 6343 Midland, Texas 79701

STANDARD SPECIFICATIONS

POLYVINYL CHLORIDE PLASTIC LININGS

I. GENERAL REQUIREMENTS

The work covered by these specifications consists of installing polyvinyl chloride (PVC) plastic linings in the water containment structures.

II. PVC MATERIALS

A. General. The materials supplied under these specifications shall be first quality products designed and manufactured specifically for the purpose of this work, and which have been satisfactorily demonstrated by prior use to be suitable and durable for such purposes.

B. Description of PVC Materials. PVC (polyvinyl chloride) plastic lining shall consist of widths of calendered PVC sheeting fabricated into large sections by means of solvent-bonded factory seams into a single piece, or into the minimum number of large pieces required to fit the facility.

1. Physical Characteristics. The PVC materials shall have the physical characteristics.

PROPERTY	SPECIFICATION LIMIT	TEST METHOD
Thickness	Specified ± 10%	
Specific Gravity	1.24 - 1.30	
Tensile Strength, psi, min.	2200	ASTM D882-B
Elongation, % min.	300%	ASTM D882-B
100% Modulus, psi	1000 - 1600	ASTM D882-B
Elmendorfer Tear, gms/mil, min.	160	ASTM 689
Graves Tear, lbs/in. min.	270	ASTM D1004
Water extraction, % max.	0.35	ASTM D1239
Volatility, % max.	0.7	ASTM D1203
Impact Cold Cract, °F	-20	ASTM 1790
Dimensional Stability, max. % (100°C-15 minutes)	5	
Outdoor Exposure, sun hours	1500	
Solvent Bonded Seam Strength, % of Tensile, min.	80%	
Resistance to Burial		Formulation shall have passed USBR Test (specially formulated for resistance to micro-biological attack)
Alkali Resistances		Passes Corps. of Eng. CRD-572-61

Color - Gray (Std.)
Factory Seals - 3/4" solvent bonded

2. PVC Polyvinyl Chloride Materials shall be manufactured from domestic virgin polyvinyl chloride resin and specifically compounded for use in hydraulic facilities. Reprocessed material shall not be used.

III. FACTORY FABRICATION

Individual widths of PVC materials shall be fabricated into large sections by solvent bonding into a single piece, or into the minimum number of pieces, up to 100 feet wide, as required to fit the facility. Lap joints with a minimum joint width of 3/4 inch shall be used. After fabrication, the lining shall be accordion folded in both directions and packaged for minimum handling in the field.

IV. PLACING OF PVC LINING

A. General. The PVC lining shall be placed over the prepared surfaces to be lined in such a manner as to assure minimum handling. It shall be sealed to all concrete structures and other openings through the lining in accordance with details shown on drawings. The lining shall be closely fitted and sealed around inlets, outlets, and other projections through the lining. Any portion of lining damaged during installation by any cause shall be removed or repaired by using an additional piece of lining as specified hereinafter.

1. Field Joints. Lap joints of the same kind as used in the factory shall be used to seal factory-fabricated pieces of PVC together in the field. Lap joints shall be formed by lapping the edges of pieces a minimum of two inches. The contact surfaces of the pieces shall be wiped clean to remove all dirt, dust, moisture, or other foreign materials. Sufficient vinyl-to-vinyl bonding solvent shall be applied to both contact surfaces in the joint area and the two surfaces pressed together immediately. Any wrinkles shall be smoothed out.

2. Joints to Structures. All curing compounds and coatings shall be completely removed from the joint area. Joining of PVC to concrete shall be made with vinyl-to-concrete adhesive. The minimum width of concrete shelf provided for the cemented joint shall be eight inches, and batten strips shall be used to reinforce the adhesive bond.

3. Repairs to PVC. Any necessary repairs to the PVC shall be patched with the lining material itself and vinyl-to-vinyl bonding solvent.

4. Quality of Workmanship. All joints, on completion of the work, shall be tightly bonded. Any lining surface showing injury due to scuffing, penetration by foreign objects, or distress from rough subgrade shall be replaced or covered and sealed with an additional layer of PVC of the proper size.

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 67
Monument, New Mexico 88265

May 3rd, 1983

State Of New Mexico
Energy And Minerals Department
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Oscar Simpson

Dear Mr. Simpson:

Please find attached the sieve analysis for the sand and gravel to be used in the construction of a brine pond at the Monument Plant.

If you have any questions please advise.

Sincerely,

George W. Finch

G. W. Finch
Plant Manager,
Monument Plant #118

GWF/th

Attachment

cc: J. E. Moody - Tulsa

ATL ENGINEERING SERVICES

Albuquerque Testing Laboratory, Inc.
532 Jefferson N.E. (87108)
P. O. Box 4101 (87106)
Albuquerque, New Mexico
(505) 268-4537

Caprock Sand and Gravel
P.O. Box 151
Hobbs, New Mexico 88240

ATL Lab No. 5426

Report Date: December 16, 198[illegible]

Attention: Mr. Bill J. Woolley

TEST RESULTS

PROJECT: Plant Use

Source of Material: One (1) sample of sand and one (1) sample of aggregate submitted to our laboratory on December 10, 1981.

SIEVE ANALYSIS TEST: (ASTM C-117 & C-136 - Cumulative % Passing)

Sieve Size	Aggregate	ASTM C-33* Specifications	Sand	ASTM C-33 Specifications
1"	100	95-100		
3/4"	70			
1/2"	19*	25-60		
3/8"	3		100	100
No. 4	1	0-10	94*	95-100
No. 8	1	0-5	76	80-100
No. 16			63	50-85
No. 30			46	25-60
No. 50			20	10-30
No. 100			5	2-10
No. 200			2.5	
Material Finer than No. 200 Sieve by Washing			2.3	

SAND EQUIVALENT TEST: (ASTM C-2418)

	66.7	
	67.2	
	67.9	
Average	67.4	75%, maximum

Respectfully Submitted,

ATL ENGINEERING SERVICES

*Size 57

Dale S. Decker

Dale S. Decker, P.E.

DSD/cc

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 67
Monument, New Mexico 88265

September 02, 1983

State of New Mexico
Energy and Minerals Department
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

ATTENTION: Mr. Joe Ramey

Dear Sir:

The following are modifications to the construction of a brine pond at the Monument Plant No. 118, Lea County, New Mexico.

1. The bottom of the pond will slope 1'/100' to the center of the pit into a leak detection ditch also sloping 1'/100'. In the original proposal the bottom of the pond also sloped 1'/100' toward the outside of the pond.

2. The 6" PVC pipe will be perforated with 3/8" holes in lieu of 5/8".

3. The leak detection sump will be 18' long instead of 16'4", and the base will be set in concrete.

4. The Mirafi 140N material will cover only the leak detection ditch and will be 5' wide.

5. The 4" sand pad will extend up the sides.

6. The PVC liner will be 30 mil in lieu of 36 mil.

7. The anchor ditch will be 2'6" deep.

A drawing with these revisions will be forwarded to you as soon as it is available. I understand that these modifications have already been approved by you in a phone conversation on September 1 between you and John Fulgenzi.

If you have any questions, please contact John at 393-2823.

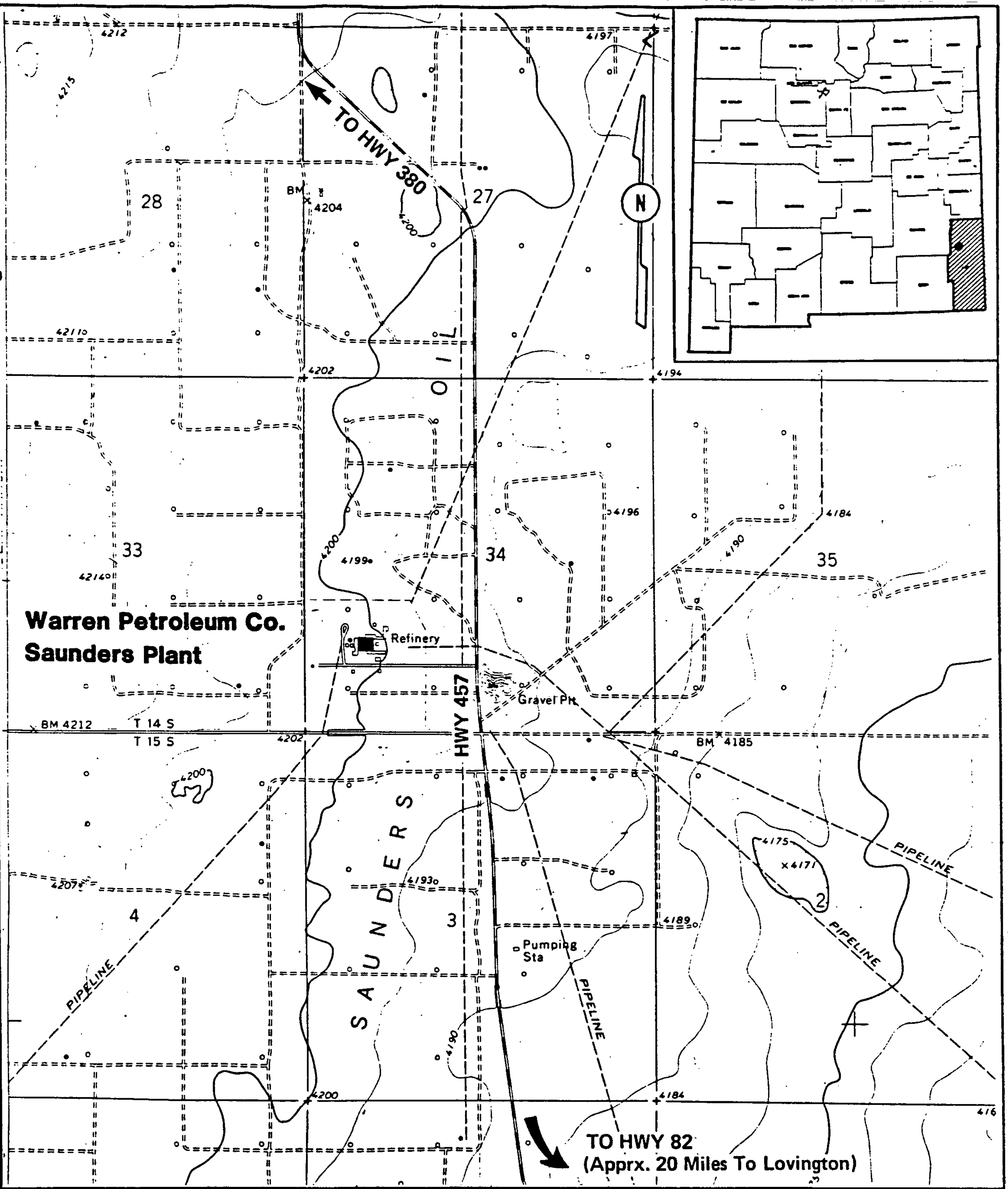
Sincerely,

B. R. Terrell

BRT/vh

cc: J. E. Moody

SECTION IIIA
SITE LOCATION FOR SAUNDERS GAS PROCESSING PLANT



PLANT LOCATION
SEC.34, T-14-S, R-33-E

APPROX. EL. 4200
APPROX. LAT. 33°3' 28" N
APPROX. LONG. 103°36' 29" W

SCALE	DATE
1"= 2000'	7-16-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

SAUNDERS
PLANT No. 146
LEA CO., N.M.

SECTION IIIB

ORIGINAL DISCHARGE PLANS FOR SAUNDERS

GAS PROCESSING PLANT

INITIAL INFORMATION - OCTOBER 23, 1980

REVISED - MAY 4, 1981

REVISED - NOVEMBER 23, 1981

Warren Petroleum Company
MANUFACTURING DEPARTMENT

October 27, 1980

P. O. Box 1589
Tulsa, Oklahoma 74102

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey, Division Director

Gentlemen:

Please find attached the completed discharge plans for the Warren Petroleum Eunice Plant (3-T22S-37E) and Saunders Plant (34-T145-33E) in Lea County, New Mexico.

These plans include the utilization of injection wells for the disposal of waste water from the plants. It has come to our attention very recently that the operators of the injection well at Saunders have not applied for a hazardous waste permit and are exempt from applying. Further study of the plan is therefore needed to evaluate other alternatives.

We would like to request an additional three months to review and develop new plans for the Saunders Plant.

Should you have questions, please feel free to contact Lynn Reed or me.

Sincerely,

J. E. Moody

J. E. Moody, Manager
Environmental and Services

JEM:DFJ:ds

Attachments

Warren Petroleum Company

MANUFACTURING DEPARTMENT

October 23, 1980

P. O. Box 1589
Tulsa, Oklahoma 74102

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey, Division Director

Gentlemen:

In regards to your letter dated June 27, 1980, regarding the Warren Petroleum Saunders Plant (34-T14S-33E), Warren Petroleum is submitting the following wastewater discharge plans.

Presently, all waste water from the plant operations is being piped to two retention pond systems (see attached map). The ponds appear to be naturally lined with the bentonite from oil well formation water. Commercial liquid waste disposal companies remove the water from the ponds on a routine basis. The waste water from the plant includes cooling tower blowdown, plant runoff, brine from the Zeolite softener, boiler blowdown water, inlet scrubber water, compressor (interstate scrubber) condensate, and water from the dehydrator.

Due to economics and the desire for operational improvements, the plant is actively pursuing utilization of a cooperative injection well in the area. The waste water will be piped to a storage tank prior to injection in the well system.

In summary, the present storage pond and truck disposal operation will be replaced with a system that will require the waste water to be disposed of in a cooperative injection well which is already under authority of the Oil Conservation Division of the New Mexico Energy and Minerals Department. The new system is expected to be in operation by summer, 1981.

Should you have questions, please feel free to contact Lynn Reed of this office or myself.

Reviewed by:

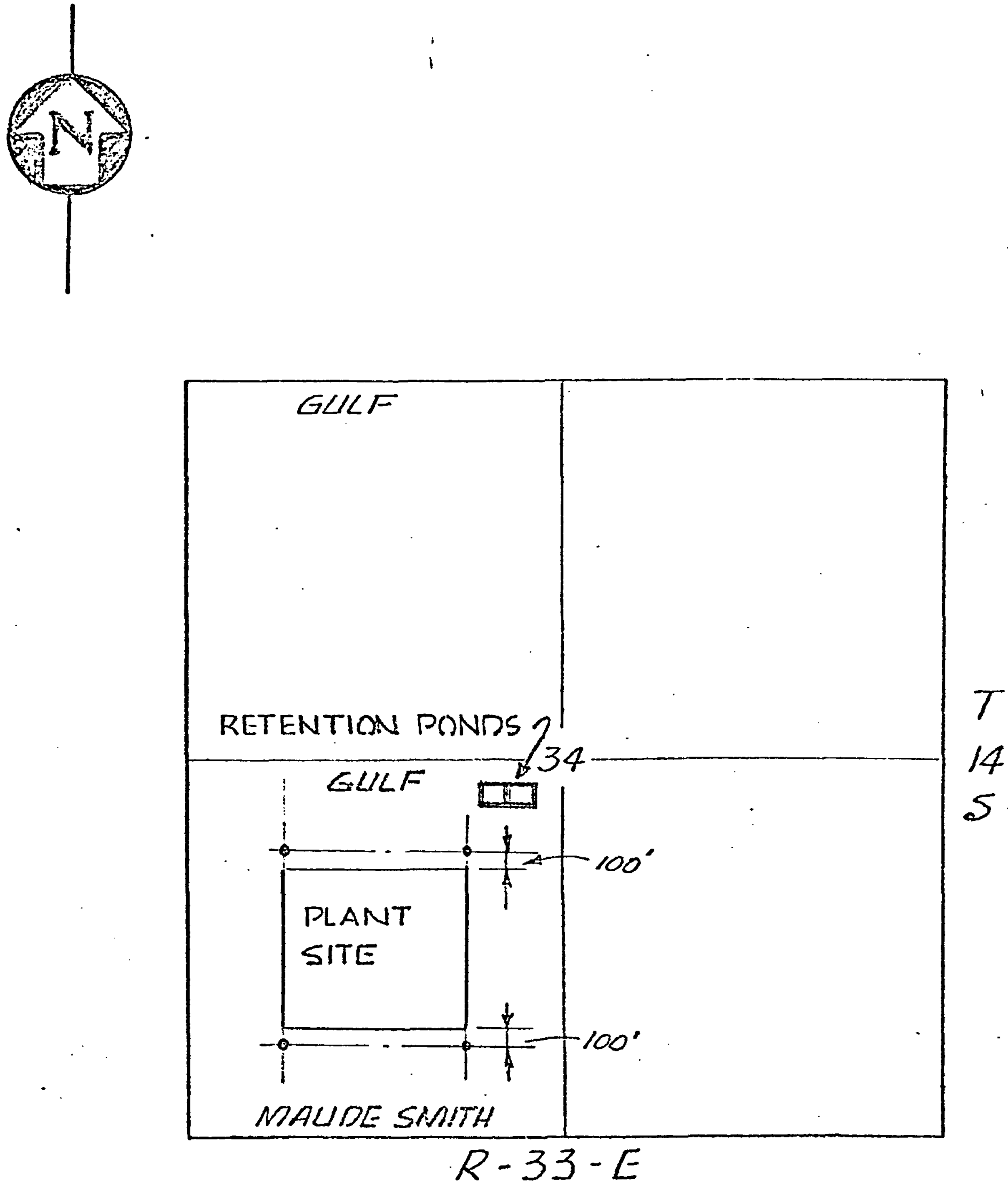
Gerald W. Knudsen, P. E.
F. M. FOX & ASSOCIATES, INC.

Very truly yours,

J. E. Moody

J. E. Moody, Manager
Environmental and Services

JEM:ds



LEA COUNTY, N.M.

NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY	NO. OF UNITS REQUIRED THUS	WO-AFE NO.
								WARREN PETROLEUM COMPANY TULSA, OKLAHOMA GUS 82[illegible]	
								PLOT PLAN	
								PLT. 146 SAUNDERS LOVINGTON, N[illegible]	
								DRAWN P.K. DATE 10-16-80	SCALE [illegible]
								CHECKED DATE	DRAWING NO. 146-1001-[illegible]
								APPROVED DATE	

Warren Petroleum Company

MANUFACTURING DEPARTMENT

May 4, 1981

P. O. Box 1589
Tulsa, Oklahoma 74102

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P.O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey, Division Director

Re: Saunders Plant Discharge Plans

Gentlemen:

Warren Petroleum Company is submitting the following formal waste water discharge plan for its Saunders Plant. The plan consists of two alternatives.

Alternative I

Fox and Associates, Inc. was retained by Warren Petroleum Company to investigate the feasibility of land application of the effluent by means of spray irrigation. Five waste water samples were collected between January 21 and April 1, 1981. The study is based on two samples which were considered "worst case" and will give an added factor of safety to the irrigation system.

All effluent generated at the Saunders Plant could be safely disposed of by spray irrigation on 12.2 acres of land, as supported by the consultants in the attached study. The system will be carefully inspected periodically. Verification of the waste water quality will be done by monitoring the PH and conductivity weekly. Storage or alternate disposal of the effluent during period of excessive rainfall and freezing weather will be provided.

Alternative 2

The effluent water has been tested and found to be non-hazardous which re-opened our plans to utilize an injection

May 1, 1981
State of New Mexico
Energy and Minerals Department

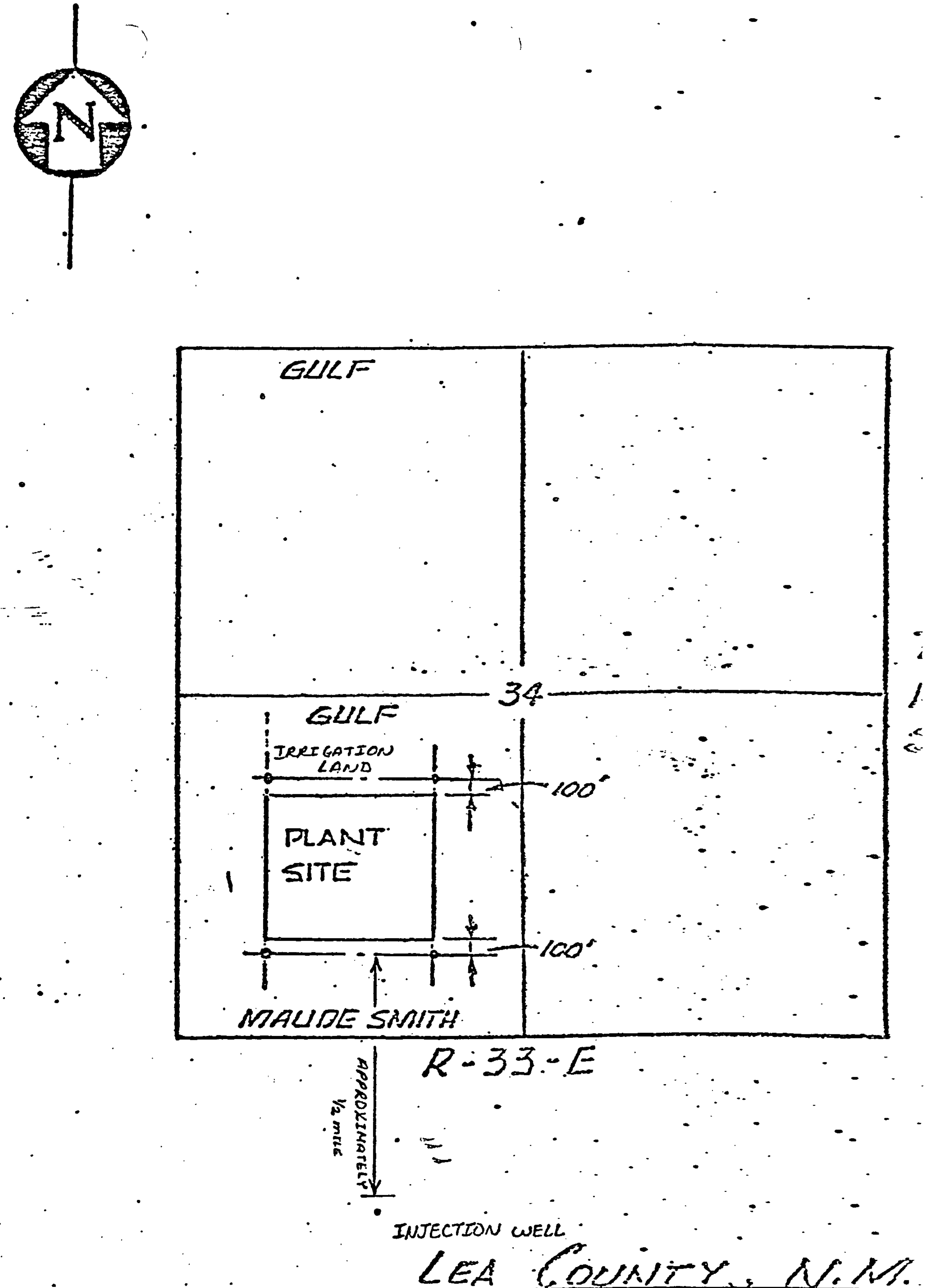
well for disposal. The injection well would be used when conditions for irrigation are not favorable.

Attached is a map showing the plant site, injection well, and a proposed irrigation site. If you have any questions, please do not hesitate to call me at (918) 560-4117.

Sincerely,

J. E. Moody, Manager
Environmental and Services

JEM:DFJ:nh
Encl.



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST.	
						DATE	BY

NO. OF UNITS REQUIRED THUS | WO-AFE N[illegible]

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA

PLOT PLAN

PLT. 146 SAUNDERS LOVINGT[illegible]

DRAWN PK | DATE 10-16-80 SCALE

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 1589
Tulsa, Oklahoma 74102

November 23, 1981

State of New Mexico
Energy and Mineral Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey
Division Director

Re: Saunders Plant Discharge Plans

Gentlemen:

Warren Petroleum Company would like to modify the formal waste water discharge plan submitted May 4, 1981 for its Saunders Plant.

At the time that the plan was submitted, we were having difficulty securing a contract with a disposal located on Section 4, T15S, R32E and operated by Mr. Charles B. Gillespie. The disposal well is approximately 1/2 mile south of the Saunders Plant, which is located in the SW/4 of Section 34, T14S, R33E, Lea County, New Mexico. We have now been granted permission to use the well to dispose of our waste water.

A plot plan has been attached which shows the effluent surge tanks, the pipeline to the injection well, and the injection well location. The pipeline is the responsibility of Warren Petroleum Company until it reaches the main line to the injection well. The pipeline is constructed of polyethylene and the effluent will be pumped to the disposal well. A meter will be installed to measure effluent flow.

The plant will make the following provisions for a contingency plan:

(1) Install a check valve on the pipeline to prevent back flow.
(2) Install a centrifugal pump with limited head capacity.
(3) Have a standby pump for pumping the plant waste water.

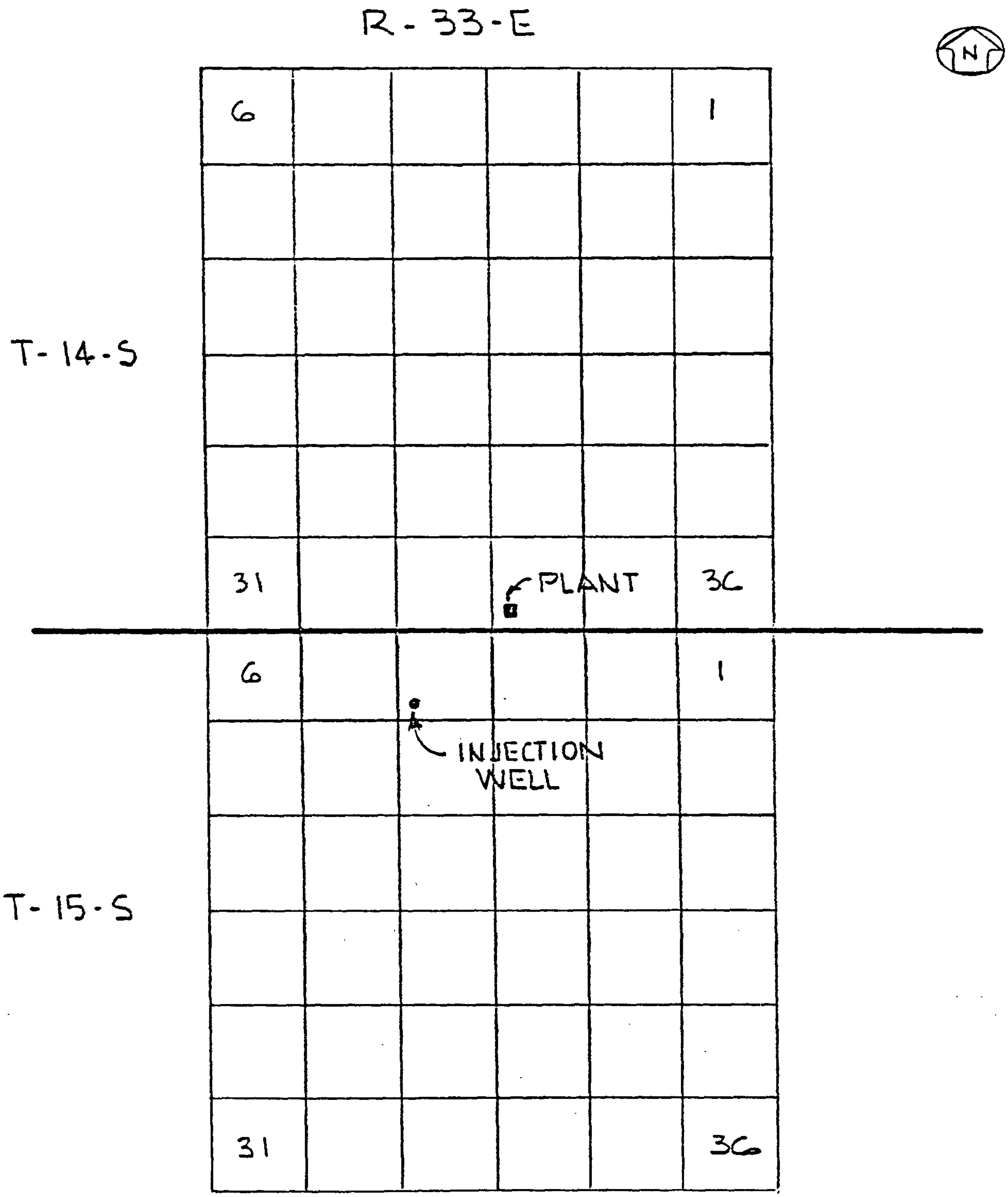
If you have any questions or need additional information, please do not hesitate to call me at (918)560-4117.

Very truly yours,

for J. E. Moody, Manager
Environmental and Services

JEM:DFJ:de
Attachment

Gulf



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

WARREN PETROLEUM COMPANY

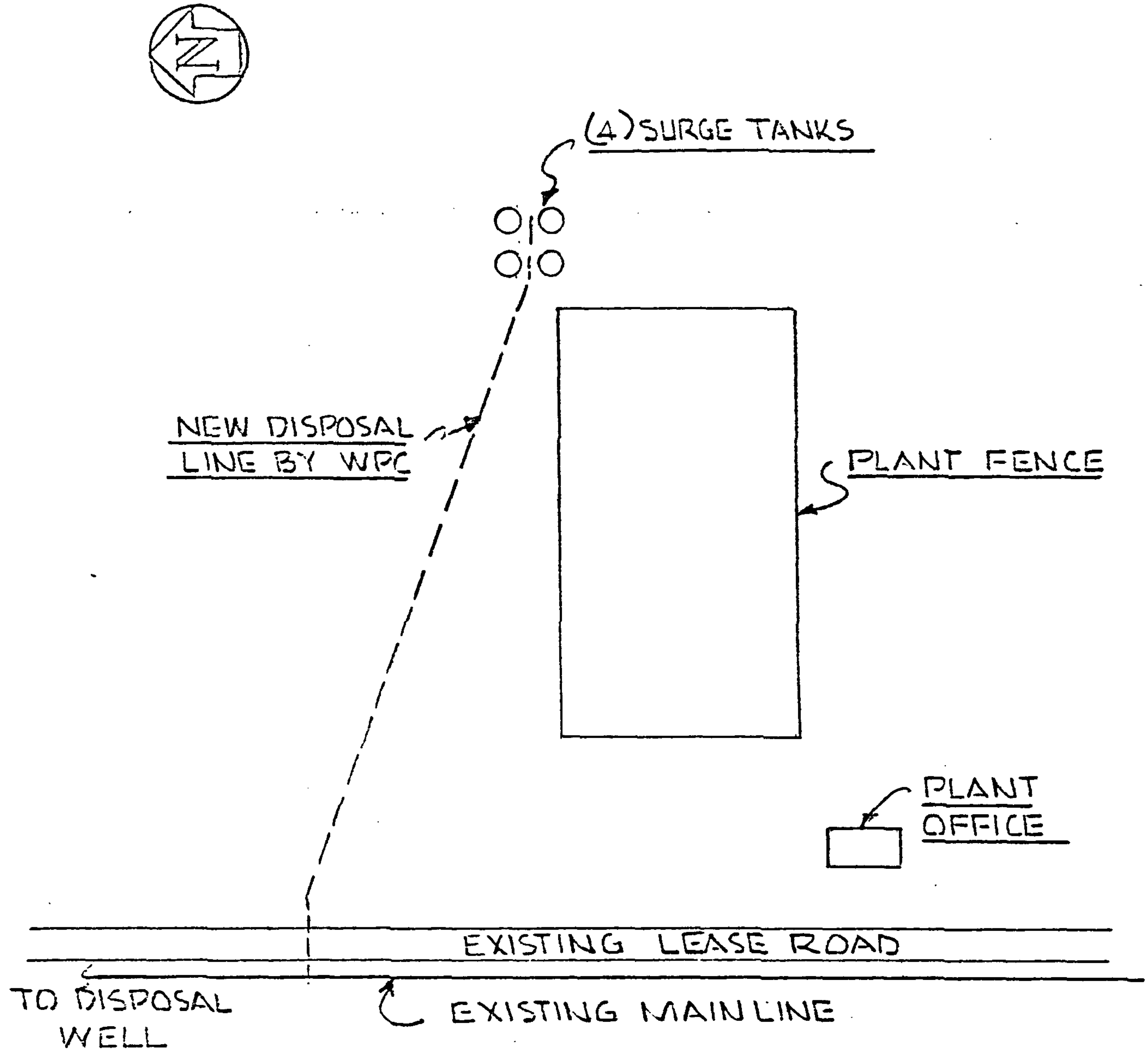
TULSA, OKLAHOMA

GULF 82341

SAUNDER PLANT AND INJECTION WELL LOCATION

PLT. 146 LEA COUNTY, LOVINGTON, NM.

DRAWN P.K.	DATE 11-2-81	SCALE NONE
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	146-1002-C



NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY

NO. OF UNITS REQUIRED THUS	WO-AFE NO.

WARREN PETROLEUM COMPANY

TULSA, OKLAHOMA GULF 82341

SAUNDERS PLANT DISPOSAL LINE TO INJECTION WELL
PLT. 146 LEA CO., LOVINGTON, N

DRAWN P.K	DATE 11-2-81	SCALE NONE
CHECKED	DATE	DRAWING NO. 146-1003-C
APPROVED	DATE	

SECTION IIIC

UPDATE OF ORIGINAL DISCHARGE PLANS FOR

SAUNDERS GAS PROCESSING PLANT

SEPTEMBER 30, 1984

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
UPDATE TO ORIGINAL WASTE WATER DISCHARGE PLAN
SAUNDERS GAS PROCESSING PLANT
SEPTEMBER 30, 1984

Plant Location
Section 34, Township 14 South, Range 33 East, Lea County, New Mexico.

Liquid Waste
The waste water from the facility includes general plant run off, cooling tower blowdown, brine from the zeolite softener, inlet scrubber water, compressor (interstage scrubber) condensate water, and water from the dehydrator.

Current Means of Waste Water Disposal
Waste water from the Saunders Plant is disposed by injection. The two wells are:

1. Maud Saunders well no. 4 located in 34-T14S, R33E - Approval for disposal was granted by NMOCD as Administrative Order SWD-255 (amended) on July 13, 1983. An inspection was made by a representative of the NMOCD-Hobbs District Office on March 14, 1984. Injection is at the rate of approximately 450 bbls/day (average) or 600 bbls/day (maximum). In the event of any possible failure of the Maud Saunders well, Gandy Corporation will be used to haul waste water from the plant for reclamation or injection into a certified well.

2. Charles B. Gillespie - operated injection well located in 4-T15S, R33E - By continuing contract, waste water is injected into the Gillespie well at a rate of approximately 70 bbls/day.

Background Waste Water Disposal Information
Original Discharge Plan
On October 23, 1980 when Warren submitted the initial Discharge Plan to the NMOCD for the Saunders Plant, all waste water from the facility was piped to two retention pond systems. Commercial liquid waste disposal companies then removed the water by truck from the ponds on a routine basis. Due to the excessive cost of this removal and the desire for operational improvements, plans were studied so as to divert the plant waste water to a storage tank prior to injection into a cooperative well system.

Study of Alternate Methods of Disposal
Spray Irrigation
Warren retained the services of F. M. Fox and Associates, Inc. (FOX), Wheat Ridge, Colorado, to investigate the feasibility of land application of the plant effluent by spray irrigation. FOX recommended irrigation management practices for the 12.2 acres of rangeland adjacent to the Saunders Plant. This plan was partially based upon analyses of the process water from the plant. The entire study titled "Irrigation Plan for Saunders Gas Plant, Lee (sic) County, New Mexico" was completed on April 29, 1981 and submitted to the NMOCD on May 4, 1981.

Injection Well

Based upon the analyses of the plant effluent by FOX, reconsideration was addressed as to disposal into an injection well. This method of disposal was also described in our May 4, 1981 correspondence. As outlined in Warren's letter of November 23, 1981, an agreement was obtained to inject the plant waste water into a well operated by Charles B. Gillespie and located in Section 4, T15S, R33E.

Modification to Discharge Plan

During the latter part of 1982, the amount of waste water injected into the Gillespie well had been curtailed. That portion of the effluent not accepted for the Gillespie well was hauled from the plant and injected into another certified well. This information was relayed to the NMOCD in Warren's letter of March 11, 1983. A copy of this letter appears at the end of this section. The contents of that letter also described plans to permit and work over an abandoned dry-hole well for use as an injection well for the waste water which at that time was being hauled from the plant.

On February 18, 1983, Warren retained the services of Daniel S. Nutter, Registered Petroleum Engineer, Santa Fe, New Mexico, to prepare the permit applications needed to convert, for injection, the Maud Saunders well no. 4 located in Section 34, T14S, R33E, Lea County, New Mexico. The following is a list of dates and actions taken towards ultimate approval for the well conversion and injection:

Date	Action
4/7/83	Application for Authorization to NMOCD (Santa Fe) to inject (Form C-108); supplemental information also provided in the application.
4/26/83	April 7, 1983 application approved by NMOCD (Santa Fe) as Administrative Order SWD-255.
4/28/83	Application for permit to re-enter well (Forms C-101 and C-102) filed with NMOCD-Hobbs District Office.
5/3/83	April 28, 1983 application approved by District Office.
6/13/83	Request to amend Administrative Order SWD-255 as to perforated interval and injection pressure.
6/17/83	Letter to Hobbs District Office in accordance with SWD-255 as to date and time of installation of disposal equipment and initial injection.
7/13/83	Administrative Order SWD-255 (amended) approved for perforated interval.
3/14/84	Inspection by Mr. David Catanach, Field Representative Engineer-NMOCD.

Copies of administrative orders SWD-255 and SWD-255 (amended) directly follow this page.

ORDER SWD-255

THE APPLICATION OF WARREN PETROLEUM COMPANY, DIVISION OF GULF OIL CORPORATION, FOR A SALT WATER DISPOSAL WELL.

ADMINISTRATIVE ORDER
OF THE OIL CONSERVATION DIVISION

Under the provisions of Rule 701(B), Warren Petroleum Company, a Division of Gulf Oil Corporation, made application to the New Mexico Oil Conservation Division on April 7, 1983, for permission to complete for salt water disposal its Maud Saunders Well No. 4, located in Unit L of Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico.

The Division Director finds:

(1) That application has been duly filed under the provisions of Rule 701(B) of the Division Rules and Regulations;

(2) That satisfactory information has been provided that all offset operators and surface owners have been duly notified; and

(3) That the applicant has presented satisfactory evidence that all requirements prescribed in Rule 701 will be met.

(4) That no objections have been received within the waiting period prescribed by said rule.

IT IS THEREFORE ORDERED:

That the applicant herein, Warren Petroleum Company is hereby authorized to complete its Maud Saunders Well No. 4, located in Unit L of Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico, in such a manner as to permit the injection of salt water for disposal purposes into the San Andres formation at approximately 4280 feet to approximately 4597 feet through 2 3/8 inch plastic lined tubing set in a packer located at approximately 4180 feet.

IT IS FURTHER ORDERED:

That the operator shall take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.

That the casing-tubing annulus shall be loaded with an inert fluid and equipped with a pressure gauge at the surface or left open to the atmosphere to facilitate detection of leakage in the casing, tubing, or packer.

That the injection well or system shall be equipped with a pressure limiting device which will limit the wellhead pressure on the injection well to no more than 856 psi.

That the Director of the Division may authorize an increase in injection pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the injected fluid from the San Andres formation. Such showing shall consist of a valid step-rate test run in accordance and acceptable to this office.

That the operator shall notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.

That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing, casing, or packer, in said well or the leakage of water from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

PROVIDED FURTHER, That jurisdiction of this cause is hereby retained by the Division for such further order or orders as may seem necessary or convenient for the prevention of waste and/or protection of correlative rights; upon failure of applicant to comply with any requirement of this order after notice and hearing, the Division may terminate the authority hereby granted in the interest of conservation. That applicant shall submit monthly reports of the disposal operations in accordance with Rule 706 and 1120 of the Division Rules and Regulations.

Approved at Santa Fe, New Mexico, on this 26th day of April, 1983.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Joe D. Ramey

JOE D. RAMEY,
Division Director

S E A L

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

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

AMENDED
ORDER SWD-255

THE APPLICATION OF WARREN PETROLEUM
COMPANY

ADMINISTRATIVE ORDER
OF THE OIL CONSERVATION DIVISION

Under the provisions of Rule 701(B), Warren Petroleum Company made application to the New Mexico Oil Conservation Division on June 13, 1983, for permission to amend its application for salt water disposal for its Maud Saunders Well No. 4 located in Unit L of Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico.

The Division Director finds:

(1) That application has been duly filed under the provisions of Rule 701(B) of the Division Rules and Regulations;

(2) That satisfactory information has been provided that all offset operators and surface owners have been duly notified; and

(3) That the applicant has presented satisfactory evidence that all requirements prescribed in Rule 701 will be met.

(4) That no objections have been received within the waiting period prescribed by said rule.

IT IS THEREFORE ORDERED:

That the applicant herein, Warren Petroleum Company is hereby authorized to complete its Maud Saunders Well No. 4, located in Unit L of Section 34, Township 14 South, Range 33 East, NMPM, Lea County, New Mexico, in such a manner as to permit the injection of salt water for disposal purposes into the San Andres formation at approximately 4280 feet to approximately 5050 feet through 2 3/8 inch plastic lined tubing set in a packer located at approximately 4180 feet.

IT IS FURTHER ORDERED:

That the operator shall take all steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface.

That the casing-tubing annulus shall be loaded with an inert fluid and equipped with a pressure gauge at the surface or left open to the atmosphere to facilitate detection of leakage in the casing, tubing, or packer.

That the injection well or system shall be equipped with a pressure limiting device which will limit the wellhead pressure on the injection well to no more than 856 psi.

That the Director of the Division may authorize an increase in injection pressure upon a proper showing by the operator of said well that such higher pressure will not result in migration of the injected fluid from the San Andres formation. That such proper showing shall consist of a valid step-rate test run in accordance with and acceptable to this office.

That the operator shall notify the supervisor of the Hobbs district office of the Division of the date and time of the installation of disposal equipment so that the same may be inspected.

That the operator shall immediately notify the supervisor of the Division's Hobbs district office of the failure of the tubing, casing, or packer, in said well or the leakage of water from or around said well and shall take such steps as may be timely and necessary to correct such failure or leakage.

<u>PROVIDED FURTHER</u>, That jurisdiction of this cause is hereby retained by the Division for such further order or orders as may seem necessary or convenient for the prevention of waste and/or protection of correlative rights; upon failure of applicant to comply with any requirement of this order after notice and hearing, the Division may terminate the authority hereby granted in the interest of conservation. That applicant shall submit monthly reports of the disposal operations in accordance with Rule 706 and 1120 of the Division Rules and Regulations.

Approved at Santa Fe, New Mexico, on this 13th day of July, 1983.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

Joe D. Ramey

JOE D. RAMEY,
Director

Warren Petroleum Company

MANUFACTURING DEPARTMENT

March 11, 1983

P. O Box 1589
Tulsa Oklahoma 74102

Mr. Joe D. Ramey
Division Director
State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501

Attention: Mr. Oscar A. Simpson III
Hydrogeologist

Re: Modification to Saunders Plant Discharge Plan

Dear Mr. Simpson:

Warren Petroleum Company, a division of Gulf Oil Corporation, would like to modify the formal waste water Discharge Plan submitted November 23, 1981, for the Saunders Gas Processing Plant. This plant is located in the SW/4 of Section 34, T14S, R33E, Lea County, New Mexico.

The disposal well used by the plant is located in the SW/4 of Section 4, T15S, R33E. This location is approximately 1.5 miles southwest of the Saunders Plant. The operator of the well is Mr. Charles B. Gillespie. Warren will continue using this well, however, the amount of water of which we can dispose has been curtailed. The remainder of the waste water is now being hauled from the plant and injected into a certified well.

Currently, Warren is finalizing permit and work-over plans for use of a Warren-owned oil well to dispose of the waste water that is currently being hauled from the plant. This well is located at the plant site. Please refer to the enclosed section plat. This well is scheduled for completion in June, 1983. This is based upon receipt of applicable permits and no problems developing in working over the well for injection. Once the well is completed, no effluent will be injected into fresh waters bearing strata or formations containing oil and/or gas in commercial quantities. Further details will be provided with our permit application.

If you have any questions or need further information, please call Linda Johnson or me at (918)560-4119.

Very truly yours,

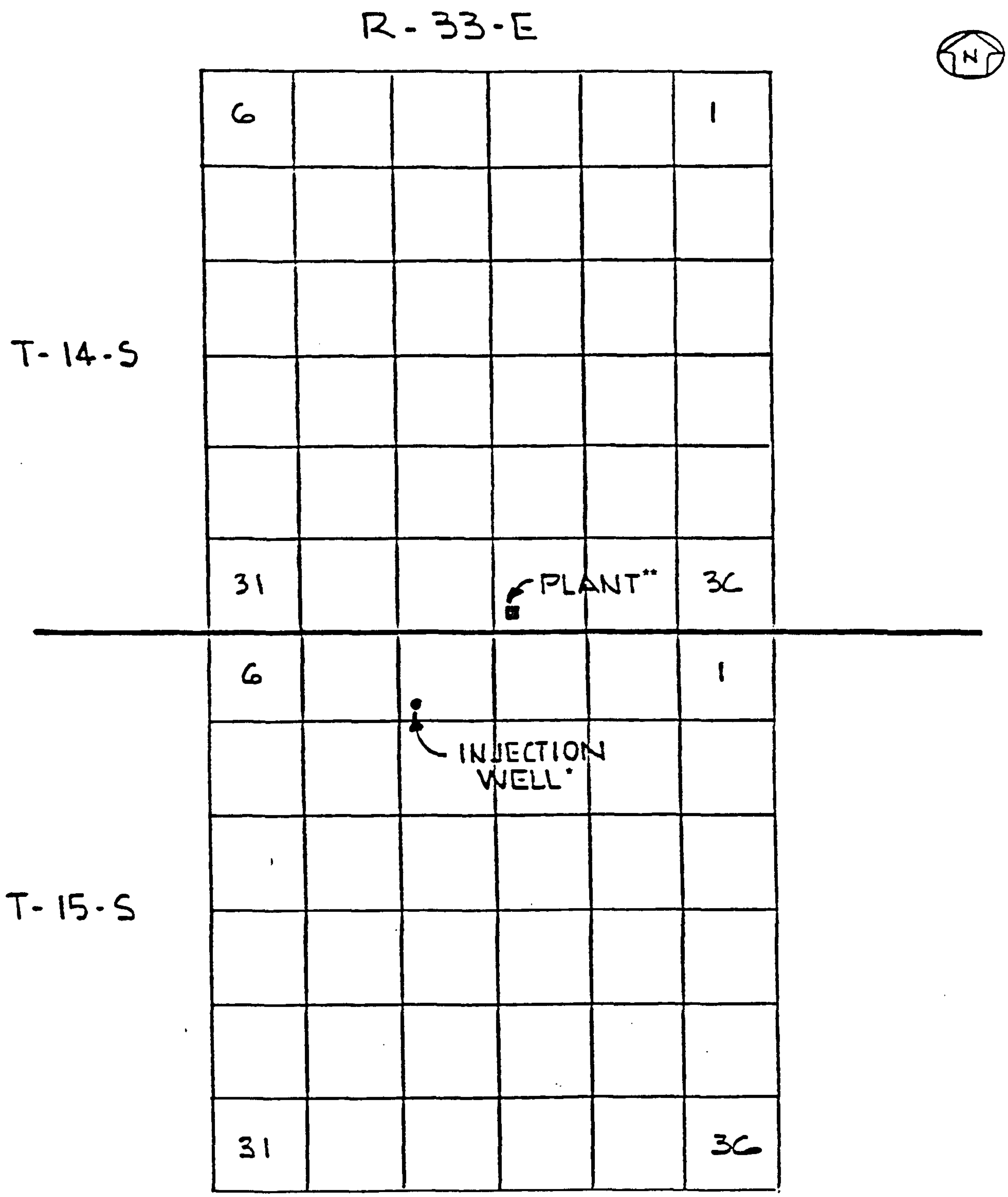
LTReed

L. T. Reed, Director
Environmental Affairs

LTR:LLJ:de
Attachment

Gulf

A Division of Gulf Oil Corporation



*LOCATION OF DISPOSAL WELL OPERATED BY CHARLES B. GILLESPIE

**LOCATION OF THE PLANT SITE. THE PROPOSED DISPOSAL WELL WILL BE LOCATED AT THE PLANT SITE.

NO.	REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST.
1	WARREN WELL	LLJ	3-83			

NO. OF UNITS REQUIRED THUS	WO-AFE NO.

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA
GULF 82341

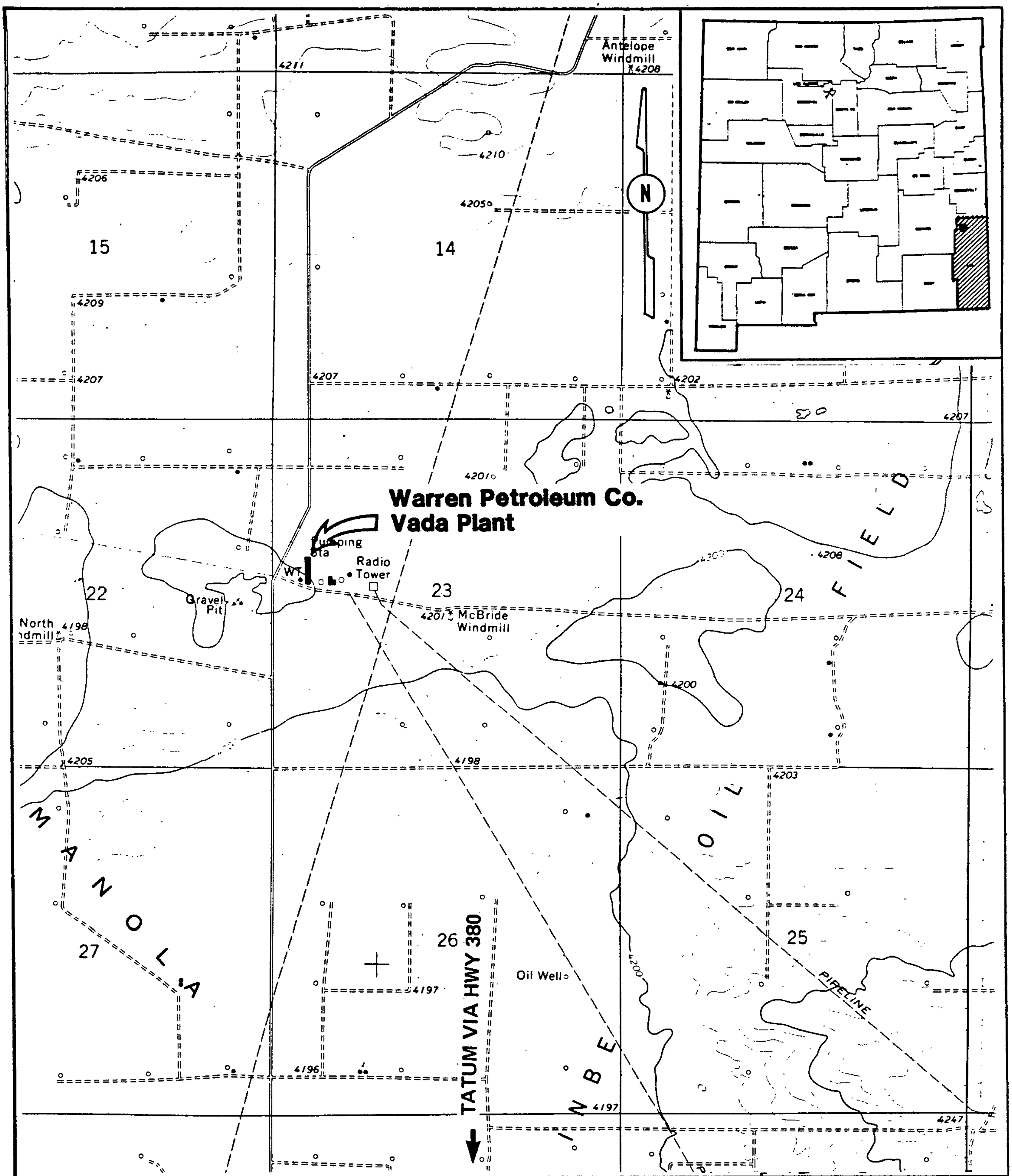
SAUNDER PLANT AND INJECTION WELL LOCATION
PLT. 146 LEA COUNTY, LOVINGTON, NM

DRAWN P.K.	DATE 11-2-81	SCALE NONE
CHECKED	DATE	DRAWING NO. 146-1002-C
APPROVED	DATE	

SECTION IVA

SITE LOCATION FOR VADA

GAS PROCESSING PLANT



PLANT LOCATION
SEC. 23, T-10-S, R-33-E

APPROX. EL. 4225'
APPROX. LAT. 33°25'00" N
APPROX. LONG. 103°33'30" W

SCALE	DATE
1"= 2000'	7-27-82

Warren Petroleum Company
A Division of Gulf Oil Corporation
TULSA, OKLAHOMA

VADA
PLANT NO. 139
LEA CO., N.M.

SECTION IVB

ORIGINAL DISCHARGE PLAN FOR

VADA GAS PROCESSING PLANT

JULY 27, 1981

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION
ORIGINAL DISCHARGE PLAN FOR
VADA GAS PROCESSING PLANT
JULY 27, 1981

The method of disposal for liquid waste has not changed from that described in the original plan. A copy of this plan submitted to the NMOCD on July 27, 1981 directly follows.

Warren Petroleum Company

MANUFACTURING DEPARTMENT

P. O. Box 1589
Tulsa, Oklahoma 74102

July 27, 1981

State of New Mexico
Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office Building
Santa Fe, New Mexico 87501

Attention: Mr. Joe D. Ramey
Division Director

Re: Discharge Plans
Vada Plant

Gentlemen:

Warren Petroleum Company, a division of Gulf Oil Corporation, is submitting the following formal waste water discharge plan for the Vada Gas Processing Plant located in Section 23, Township 10S and Range 33E, Lea County, New Mexico.

The liquid waste from the plant consists of general plant run-off into 2 different sumps and water from the inlet scrubber. This liquid waste is pumped into 2 metal API tanks located on the surface within the plant perimeter. A vapor recovery system is also included in each tank. The liquid waste is then accumulated and trucked out for separation by an independent firm. The firm sells the oil and disposes of the water in an injection well.

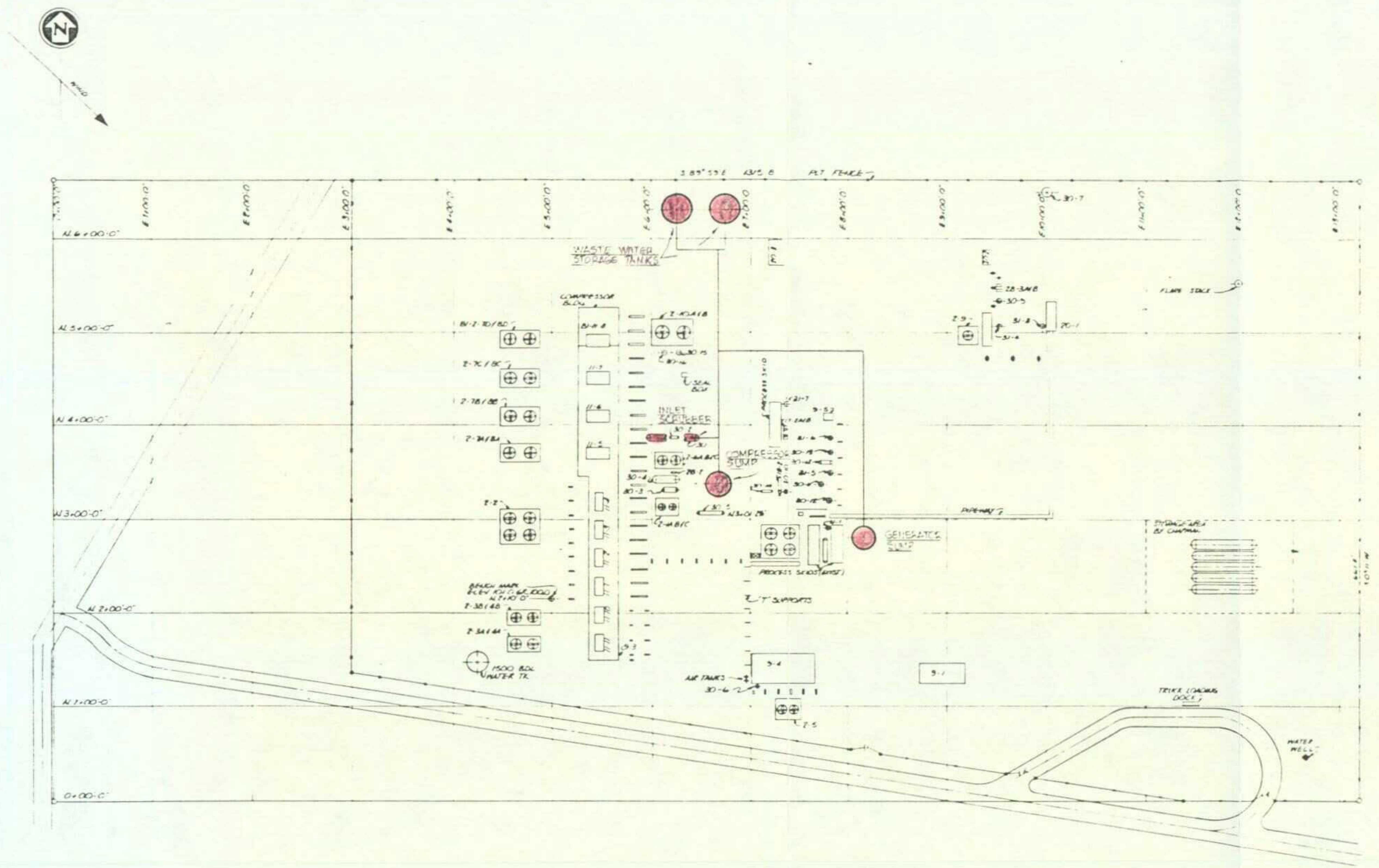
We hope this plan, with attached map, meets your approval. Should you have any questions or desire additional information, please call either Lynn Reed or me at (918) 560-4117.

Very truly yours,

Debra J. Johnson

for J. E. Moody, Manager
Environmental and Services

JEM:KCC:de
Attachment



MAJOR EQUIPMENT

AIR COMPRESSOR:
1-1 STARTING AIR COMP
1-2 INST AIR COMP

COOLERS:
2-1 A,B,C GAS COOLERS (FOR BA-6)
2-2 JW COOLERS (FOR GAS COMP)
2-3 A&B JW COOLERS (FOR REFRIG COMP)
2-4 A&B LO COOLERS (FOR REFRIG COMP)
2-5 JW COOLER (FOR GEN ENGINE)
2-6 A,B,C GAS COOLERS (FOR GMW-8)
2-7 A,B,C,D JW COOLERS (FOR GMW-8)
2-8 A,B,C,D LO COOLERS (FOR GMW-8)
2-9 AMINE COOLER
2-10 A&B REGEN COOLERS

BUILDINGS:
9-1 OFFICE / WAREHOUSE
9-2 GAS COMP BLDG
9-3 REFRIG COMP BLDG
9-4 GENERATOR BLDG
9-5 CONTROL BLDG

COMPRESSOR:
11-1-4 BA-6 GAS COMPRESSORS
11-5-8 GMW-8 TF GAS COMPRESSORS
11-10/11 REFRIG COMPRESSORS

DEHYDRATOR:
17-1 GLYCOL DEHYDRATOR UNIT (TEMPORARY)
17-2 A&B DEHYDRATOR

EXCHANGERS - SHELL / TUBE
18-1 LO COOLERS
18-2 CHILLER

HEATERS & FURNACES:
20-1 DIRECT FIRED HEATER (BY CHAPMAN)
20-2 HOT OIL HEATER
20-3 REGEN GAS HEATER

GENERATORS:
21-1-4 GENERATOR

PUMPS:
28-1 JW CIR PUMP
28-2 COND PUMP
28-3 A&B HOT OIL PUMPS

TANKS & SCRUBBERS:
30-1 1ST STAGE GAS SUC SCRUB
30-2 BLOWCASE - SKID UNIT
30-3 2ND STAGE GAS SUC SCRUB
30-4 3RD STAGE GAS SUC SCRUB
30-5 3RD STAGE GAS DISCH SCRUB
30-6 GEN JW SURGE TANK
30-7 COND STORAGE 250 BBL
30-8 GLYCOL SEP (TEMPORARY)
30-9 HOT OIL SURGE
30-10 INLET SCRUBBER
30-11 OUTLET SCRUBBER
30-12 AMINE SETTLER
30-13 FLASH TANK
30-14 FILTER
30-15 REGEN GAS SCRUB
30-16 RES SUC SCRUB

TOWERS:
31-1 DEETHANIZER
31-2 GAS CONTACTOR
31-3 AMINE TREATER
31-4 AMINE TREATER
31-5 LIQUID CONTACTOR
31-6 GLYCOL CONTACTOR
31-7 DEMETHANIZER

GENERAL NOTES	GENERAL NOTES	DWG. NO.	REFERENCE DRAWINGS	NO.	REVISION	BY	DATE	CHK	APPR	NO.	REVISION	BY	DATE	CHK	APPR
										1	REVISED & REDRAWN AS BUILT		6-1		

WARREN PETROLEUM COMPANY

TULSA, OKLAHOMA

PLANT LAYOUT

PLT 139 VADA — TATUM, N. MEX

DRAWN | DATE

CHECKED | DATE

APPROVED | DATE

SCALE

139-101-0

MECHANICAL INTEGRITY TEST REPORT

WARREN PETROLEUM COMPANY

WELL NO. 1

MONUMENT, NEW MEXICO

JUNE 18 - 24, 1996

PROJECT NO. 781

PB-KBB
FENIX & SCISSON
ENGINEERING CONSTRUCTION OPERATIONS

TABLE OF CONTENTS

781\CS\3744

PB-KBB
FENIX & SCISSON
ENGINEERING CONSTRUCTION OPERATIONS

SECTION 1
SUMMARY

On June 18, 1996, a wireline unit was rigged up on Well No. 1 and base temperature and density logs were run. Results of all the temperature logs are represented graphically in Section 5. The 7" cemented casing seat was located at 1570' and the top of a large washout behind the 7" casing was located at 1560'. A maximum temperature of 75.3 was measured at 1500'.

A nitrogen pumping unit was connected to the wellhead and nitrogen injection commenced into the 4-1/2" x 7" annulus at 1310 hours at an injection rate of 500 standard cubic feet per minute (SCFM) and 75° F. At 1340 hours, nitrogen injection was stopped to check the wellhead and cemented casing for leaks. After a period of 32 minutes, wellhead pressures and the nitrogen/brine interface remained static. Nitrogen injection resumed at 1424 hours at 500 SCFM and was increased to 1300 SCFM at 1435 hours. Nitrogen injection was completed at 1700 hours, when the nitrogen/brine interface reached 1572'. A total of 122,400 SCF* of nitrogen was injected. A volume of 8,800 SCF* of nitrogen was required to fill the 4-1/2" x 7" annulus to the 7" casing seat. A volume of 44,600 SCF* of nitrogen was needed to fill the borehole from the top of the washout (1560') to 1570'. A volume of 69,000 SCF* was required to displace the interface 2.0 feet below the 7" casing shoe (1572'). This is illustrated by a schematic drawing and Table 1, at the end of this section.

On June 19, 1996, temperature and density logs were run to start the mechanical integrity test. The nitrogen/brine interface was logged at 1572'. At 1030 hours, test begin, the nitrogen pressure was 969 psig and the brine pressure was 265 psig. Both pressures were measured using a dead weight balance.

On June 24, 1996, after a test period of 127 hours, temperature and density logs were run on Well No. 1 and wellhead pressures were measured. The nitrogen/brine interface was logged at 1572'. Using a dead weight balance, the nitrogen pressure was 946 psig and the brine pressure was 240 psig. The overlay technique of the interface logs showed no interface movement.

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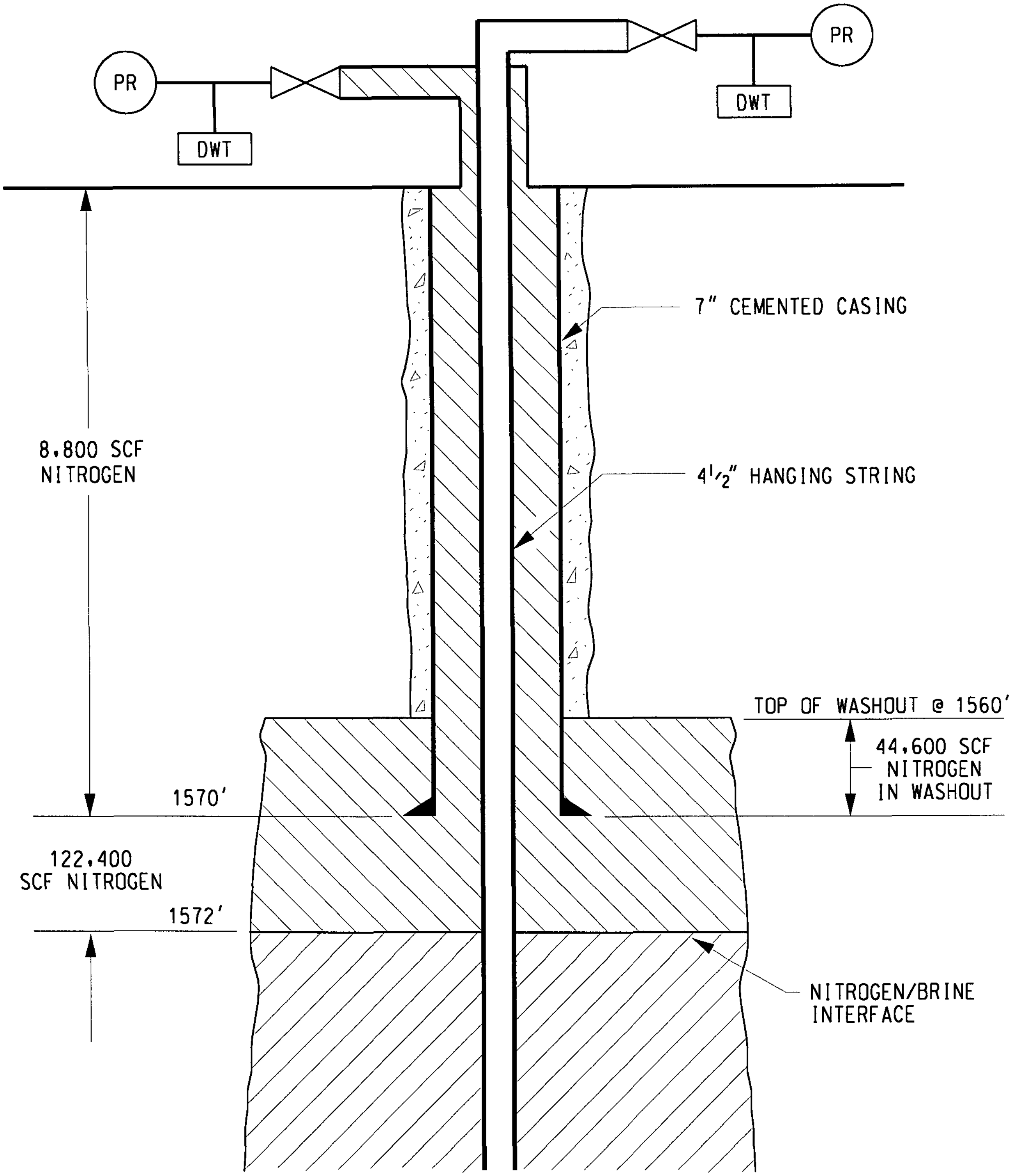
* Corrected volume.

Test Participants

Warren Petroleum Company	Mike Hicks
Test Supervision from PB-KBB	Mark Cartwright
Nitrogen Services	NOWSCO
Wireline Surveys	Cav-Tech, Inc.
Dead Weight Balance Readings	Mark Cartwright



PB-KBB Inc. Engineering Construction Operations 11757 KATY FREEWAY #600 HOUSTON, TEXAS 77079	WARREN PETROLEUM COMPANY	
WELL #1 MONUMENT, NEW MEXICO		JOB No. 781
DESIGN: MC · DRAWN: RCR · CHECKED: MC · DATE: 7/11/96 · SCALE: NONE		DRAWING No. 781-LW-001

Table 1. Borehole Diameters

Operator	WARREN PETROLEUM		
Well No.	1		
Location	MONUMENT, NM.		
Vol.to CS	30.9 Bbls	Correction	
OD Tubing	4.5 inches	Factor	0.590
OD Casing	7 inches		
N2 Temp.	75 Deg.F.		

Depth	N2 Measured SCF	N2 Corrected SCF	N2 Press. psia	N2 Press. psig	Cum. Bbls.	Incr. Bbls.	Bbls/ ft.	Ave. Diam. (ft.)
1570.0	15,000	8,800	746	731	30.90	30.90	0.020	0.53
1560.0	15,000	8,800	746	731	30.90	0.00	0.000	0.38
1570.0	90,500	53,400	863	848	161.36	130.46	13.046	9.70
1572.0	207,500	122,400	1000	985	319.57	158.21	79.106	23.84

* Top of washout behind 7" cemented casing at 1560'.

SECTION 2
CONCLUSION

Based on data gathered during the test period, the calculated nitrogen leak rate of Well No. 1 was 515.3 barrels of nitrogen per year. The Minimum Detectable Leak Rate (MDLR) for this test was 2723.7 barrels of nitrogen per year. Using a total nitrogen to product leak ratio of 10:1, the calculated product leak rate was 52 barrels/year and the MDLR for product was 272 barrels/year.

Well No. 1 was tested to a pressure gradient of 0.67 psi/ft. There was a pressure drop of 23 psi in the nitrogen and 25 psi in the brine during the test. There was no apparent interface movement during the 127 hour test period.

The pressure decrease can be attributed to the effects of cavern and temperature stabilization. It is therefore concluded that at the time of the test, Well No. 1 had mechanical integrity as required for product storage.

SECTION 3
CALCULATIONS

A. EVALUATION OF CAVERN INTEGRITY TEST

The evaluation of the Cavern Integrity Test using nitrogen consist of comparing the interface depth at a reference time to a second interface measurement, at least 24 hours later. Knowing the mean diameter of the cavern or cavern neck at the interface depth (see Section 1, Table 1), the volume change can be calculated.

The shut-in nitrogen volume is effected by pressure changes in the cavern due to temperature, leaching, and creep effects. In order to distinguish between these effects and volume losses due to leaks, the nitrogen pressure has to be considered. The following equation allows for calculating the leak rate due to leakage:

$$V_{leak} = V_1 - \frac{P_2 V_2}{P_1}$$

Where

P_1 = nitrogen head pressure at start of test (psia)
P_2 = nitrogen head pressure at end of test (psia)
V_1 = initial volume occupied by nitrogen (bbls)
V_2 = final volume occupied by nitrogen (bbls)
V_{leak} = leak volume related to pressure near interface (bbls)

For Well No. 1

$$V_{leak} = 319.57\ bbls - \frac{(946 + 14.7)\ (319.57)}{(969 + 14.7)}$$

V_{leak} = 7.47 bbls of nitrogen

To determine a leak rate, V_{leak} is divided by the length of the test. For this well, the test was 127 hours. Therefore:

Leak Rate = 7.47 bbl divided by 127 hours x 24 hours/day x 365 days/year = 515.25 bbls of nitrogen per year.

B. **MINIMUM DETECTABLE LEAK RATE**

The minimum detectable leak rate was calculated using the following formula:

$$\text{MDLR} = \frac{V \times r \times 365}{T}$$

Where:

MDLR = Minimum Detectable Leak Rate (bbls/year)

V = Unit Volume of Borehole (bbls/ft)

r = Resolution of Interface Detection (ft)

T = Duration of Test (days)

Resolution of interface detection for this tool and log scale has been determined to be 0.5'.

For Well No. 1

$$\text{MDLR} = \frac{79.1 \times 0.5 \times 365}{5.3}$$

= 2,723.7 bbls of nitrogen per year

SECTION 4
CHRONOLOGY

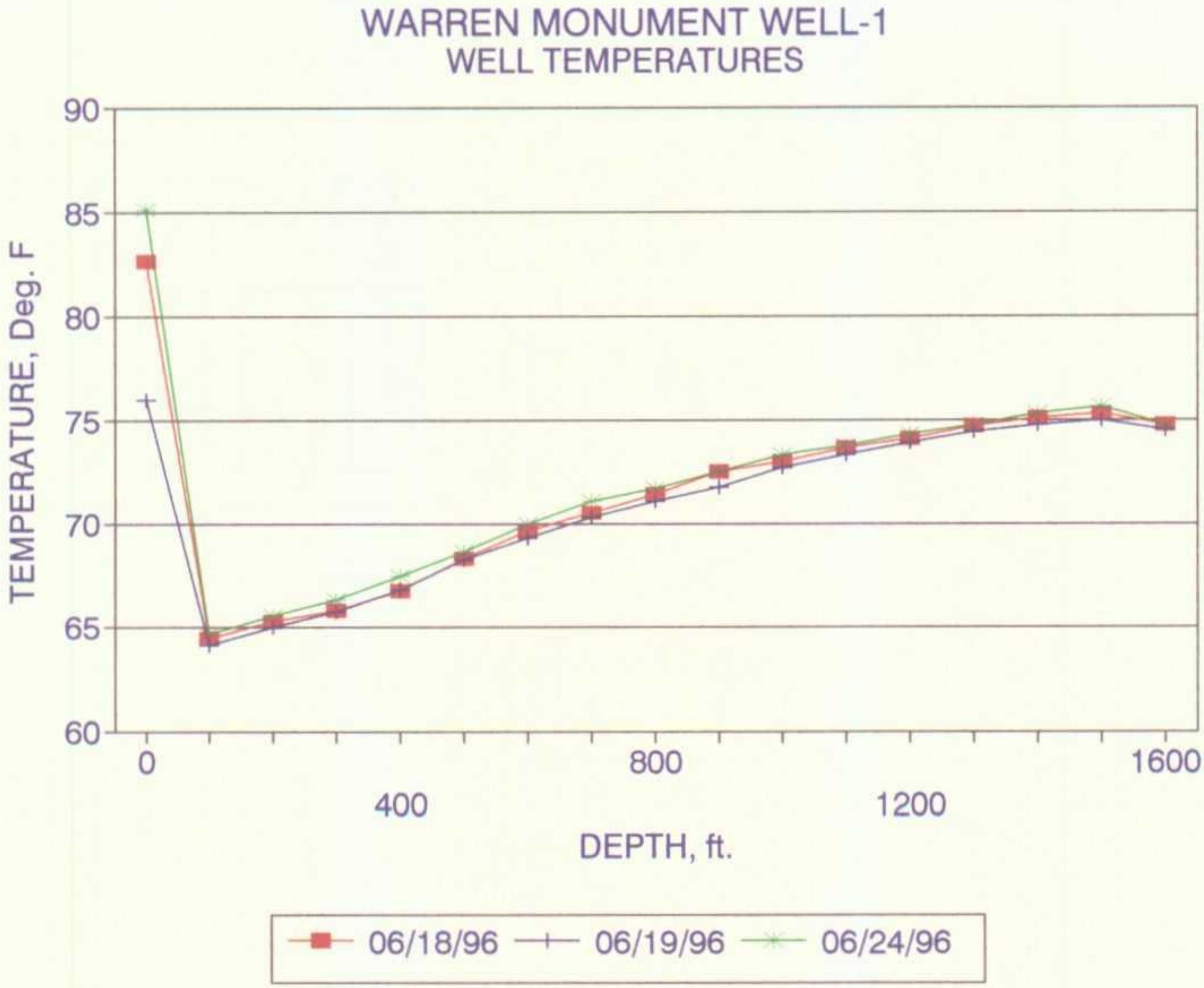
Operator: Warren Petroleum Company
Well: No. 1
Field: Monument
County: Lea
State: New Mexico

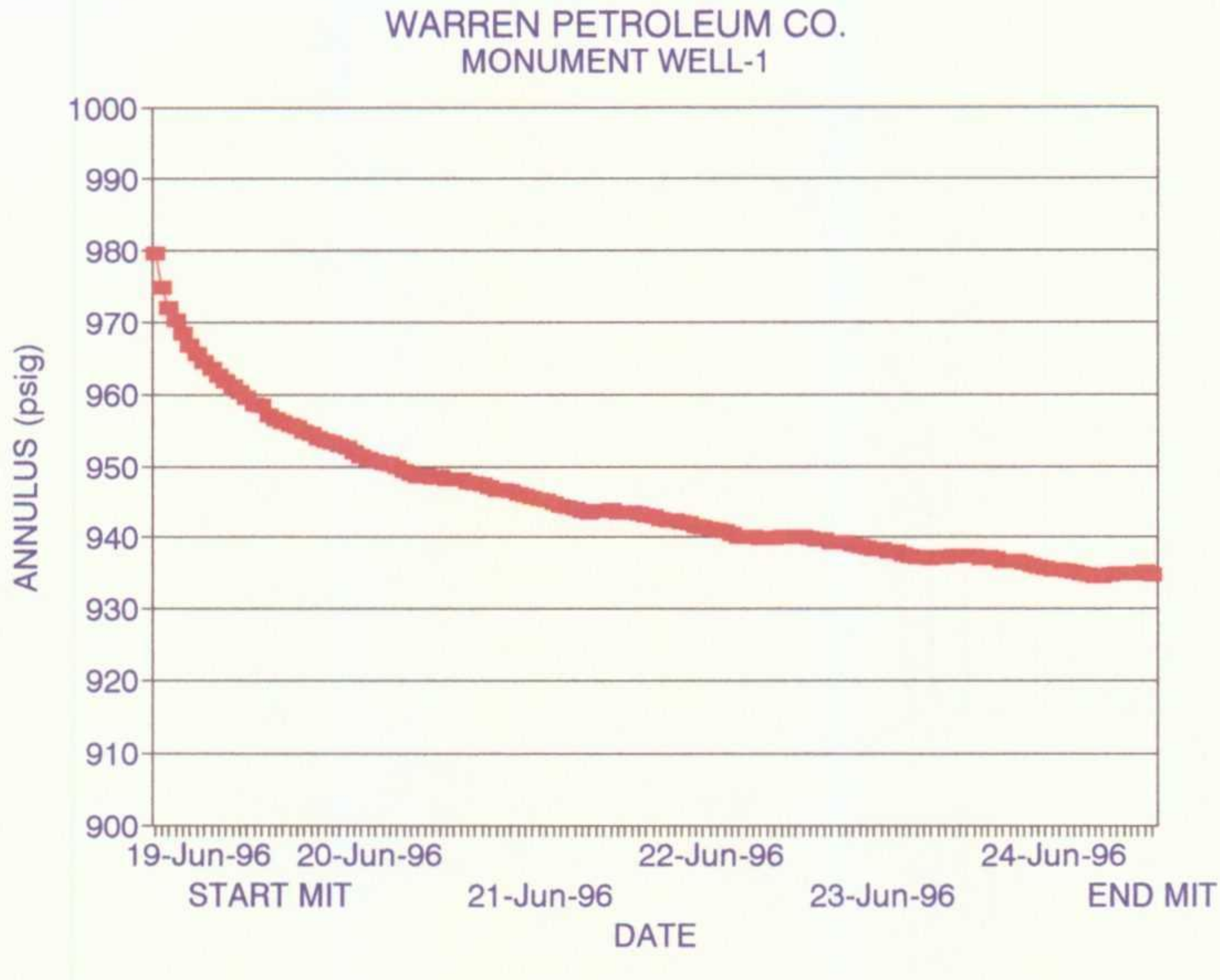
Time	4½" Hanging Casing Pressure (psia)	4½" x 7" Annulus Pressure (psia)	N_2/Brine Interface Depth	Comments
			06/18/96	
1200	--	--	--	Ran base temperature and density logs
1310	17	27	0'	Started the nitrogen injection into the 4-1/2" x 7" annulus; approximately 500 SCFM
1340	35	717	1510'	Stopped the nitrogen injection to check for leaks
1424	35	717	1510'	Resumed nitrogen injection; approximately 500 SCFM
1427	36	746	1570'	Nitrogen/brine interface at the 7" casing seat, total nitrogen: 8,800 SCF (corrected)
1435	38	748	--	Increased injection rate to approximately 1300 SCFM
1700	300	1000	1572'	Stopped the nitrogen injection; ran a control log
1710	291*	994*	1572'	Logged the well; rigged down the nitrogen and wireline units. Secured the well for the stabilization period
			06/19/96	
1030	265*	969*	1572'	Ran a temperature and a density log to start the test

* Dead weight balance readings (psig).

Time	4½" Hanging Casing Pressure (psia)	4½" × 7" Annulus Pressure (psia)	N_2/Brine Interface Depth	Comments
			06/24/96	
1730	240*	945*	1572'	Ran a temperature and a density log to end the test

SECTION 5
GRAPHS


WARREN MONUMENT WELL-1
WELL TEMPERATURES
TEMPERATURE, Deg. F
90
85
80
75
70
65
60
0
400
800
1200
1600
DEPTH, ft.
06/18/96
06/19/96
06/24/96



WARREN PETROLEUM CO.
MONUMENT WELL-1
ANNULUS (psig)
1000
990
980
970
960
950
940
930
920
910
900
19-Jun-96
20-Jun-96
22-Jun-96
24-Jun-96
START MIT
21-Jun-96
23-Jun-96
END MIT
DATE

WARREN PETROLEUM CO.
MONUMENT WELL-1
310
300
290
280
270
260
250
240
230
220
210
TUBING (psig)
19-Jun-96
START MIT
20-Jun-96
21-Jun-96
22-Jun-96
23-Jun-96
24-Jun-96
END MIT
DATE

SECTION 6

WELL DATA SHEET

1.0	**WELL DESCRIPTION**				
	1.1	Name	Well No.	1	
	1.2	Operator		Warren Petroleum Company	
	1.3	Location	Field	Monument	
			County	Lea	
			State	New Mexico	
	1.4	Cemented Casing	Size	7	inches
			Depth	1570	feet
			Weight	23.0	lbs/ft
	1.5	Hanging Pipe Strings	Size	4½	inches
			Depth	1877	feet
			Weight	11.35	lbs/ft
	1.6	Total Cavern Depth		1902	feet
2.0	**TEST PRESSURES**				
	2.1	Casing Seat Depth (Top of Washout)		1560	feet
	2.2	Test Gradient		0.67	psi/ft
	2.3	Brine Density (Assumed)		1.2	S.G.
	2.4	Nitrogen Temperature		75	°F
	2.5	Nitrogen Interface Depth		1572	feet
	2.6	Casing Seat Pressure		1048	psig
	2.7	Surface Brine Pressure		291	psig
	2.8	Surface Nitrogen Pressure		994	psig
3.0	**NITROGEN VOLUME**				
	3.1	Total Volume to Casing Shoe		30.9	bbls
	3.2	Nitrogen Volume to Casing Shoe		8,800	SCF
	3.3	Total Nitrogen Volume		122,400	SCF
4.0	**COMPRESSIBILITY RESPONSE**				
	4.1	Cavern Volume		168,141	bbls 7.06 MMgal
	4.2	Displacement to Interface		319.6	bbls
	4.3	Cavern Compressibility		1.1	bbls/psi
	4.4	Cavern Pressure Increase due to N_2 Injection		283	psi
	4.5	Cavern Pressure with Brine		0	psi

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SECTION 7

FIELD NOTES

781\CS\3744

PB-KBB
FENIX & SCISSON
ENGINEERING CONSTRUCTION OPERATIONS

OPERATOR WARREN PET. CO. REPORT BY MC
WELL 1 NITROGEN TEMP.F ~~90°~~ 75°
FIELD MONUMENT MAX P 1100 PSI
7" @ 1570' W/OUT @ 1560'

DATE	TIME	INTERFACE DEPTH	WELLHEAD (psia) ANNULUS	TUBING	NITROGEN DATA RATE	ACCUM.	REMARKS
5/18/96	1200		24	17	SCFM		GH & LOG & TEMP LOG
	1310				500		START N_2
	1322	1000	470	~~93~~		6K	STOP N_2
	1325	1000					START N_2
	1340	1500	717	~~188~~		13.5K	STOP N_2
	1348	1510	717	35			START CASING CHECK
	1420	1510	717	35			STOP CASING CHECK
	1424	1570	717	35			START N_2
	1427	1570	746	36		15K	@ 7" CS.
	1435		748	38	1,300 ~~1,000~~	19K	INCREASE N_2 RATE
	1530	1570	863	164		90.5K	WASHOUT FILL
	1700	1572	1000	300		207.5K	STOP N_2
	1710	1572	994 DW	291 DW			
5/19/96	1030	1572	972	285			START MIT
			969 DW	265 DW			
5/24/96	1730	1572	946 DW	240 DW			STOP MIT W241 W1242 > DUMP SMP
			949				

SECTION 8

DIGITAL PRESSURE RECORDER READINGS

WARREN PETROLEUM CO. **MECHANICAL INTEGRITY TEST**
MONUMENT WELL-1 **DIGITAL PRESSURE READINGS**

DATE	TIME	ELAPSED HOURS	AMBIENT TEMP. F	TUBING (psig)	ANNULUS (psig)
	18:00	0.00	110.97	284.32	979.55
	19:00	1.00	106.91	277.17	974.82
	20:00	2.00	98.34	274.40	972.15
	21:00	3.00	88.00	272.32	970.28
	22:00	4.00	80.05	270.62	968.41
	23:00	5.00	76.19	269.18	966.79
19-Jun-96	00:00	6.00	75.36	268.02	965.69
	01:00	7.00	73.43	266.97	964.53
	02:00	8.00	71.17	266.00	963.47
	03:00	9.00	72.95	265.04	962.59
	04:00	10.00	74.26	264.21	961.88
	05:00	11.00	73.30	263.44	961.11
	06:00	12.00	70.96	262.71	960.29
	07:00	13.00	68.83	262.00	959.49
	08:00	14.00	70.96	261.18	958.71
	09:00	15.00	79.29	260.60	958.41
START MIT					
	10:00	16.00	94.52	0.79	957.19
	11:00	17.00	104.47	257.80	956.56
	12:00	18.00	113.84	257.22	956.15
	13:00	19.00	118.26	256.73	955.70
	14:00	20.00	121.56	256.21	955.36
	15:00	21.00	123.18	255.69	954.86
	16:00	22.00	120.79	255.35	954.38
	17:00	23.00	115.24	255.08	953.90
	18:00	24.00	109.71	254.71	953.43
	19:00	25.00	99.18	254.43	953.27
	20:00	26.00	90.42	254.09	952.94
	21:00	27.00	82.53	253.72	952.57
	22:00	28.00	76.60	253.37	952.00
	23:00	29.00	73.85	252.95	951.42
20-Jun-96	00:00	30.00	74.05	252.58	951.05
	01:00	31.00	75.71	252.25	950.67
	02:00	32.00	74.88	251.94	950.51
	03:00	33.00	73.02	251.65	950.22
	04:00	34.00	70.34	251.36	949.82
	05:00	35.00	66.84	251.09	949.36
	06:00	36.00	64.24	250.77	948.89
	07:00	37.00	69.93	250.31	948.51
	08:00	38.00	87.37	249.99	948.70
	09:00	39.00	103.77	249.67	948.39
	10:00	40.00	102.80	249.58	948.60
	11:00	41.00	109.50	248.96	948.27

WARREN PETROLEUM CO. **MECHANICAL INTEGRITY TEST**
MONUMENT WELL-1 **DIGITAL PRESSURE READINGS**

DATE	TIME	ELAPSED HOURS	AMBIENT TEMP. F	TUBING (psig)	ANNULUS (psig)
	12:00	42.00	122.97	248.65	948.20
	13:00	43.00	130.01	248.33	948.19
	14:00	44.00	122.76	248.40	947.83
	15:00	45.00	126.70	247.95	947.63
	16:00	46.00	128.18	247.72	947.38
	17:00	47.00	122.76	247.71	947.12
	18:00	48.00	112.79	247.56	946.77
	19:00	49.00	101.68	247.48	946.61
	20:00	50.00	92.43	247.28	946.49
	21:00	51.00	85.85	247.08	946.19
	22:00	52.00	81.36	246.89	945.89
	23:00	53.00	78.81	246.70	945.55
21-Jun-96	00:00	54.00	77.91	246.48	945.36
	01:00	55.00	76.12	246.32	945.10
	02:00	56.00	73.30	246.14	944.88
	03:00	57.00	71.03	245.96	944.45
	04:00	58.00	69.72	245.81	944.22
	05:00	59.00	67.80	245.63	943.99
	06:00	60.00	67.73	245.44	943.72
	07:00	61.00	71.92	245.14	943.51
	08:00	62.00	89.38	244.95	943.69
	09:00	63.00	102.10	244.80	943.63
	10:00	64.00	100.22	244.75	943.82
	11:00	65.00	106.22	244.38	943.49
	12:00	66.00	112.72	244.21	943.49
	13:00	67.00	116.64	243.99	943.49
	14:00	68.00	121.21	243.80	943.26
	15:00	69.00	123.88	243.58	943.09
	16:00	70.00	121.49	243.61	942.89
	17:00	71.00	112.65	243.46	942.61
	18:00	72.00	105.73	243.41	942.39
	19:00	73.00	97.37	243.35	942.34
	20:00	74.00	89.73	243.20	942.19
	21:00	75.00	85.02	243.06	941.92
	22:00	76.00	82.19	242.89	941.63
	23:00	77.00	79.84	242.75	941.38
22-Jun-96	00:00	78.00	77.77	242.60	941.20
	01:00	79.00	75.29	242.50	941.02
	02:00	80.00	72.68	242.37	940.83
	03:00	81.00	69.79	242.20	940.53
	04:00	82.00	67.94	242.05	940.13
	05:00	83.00	67.53	241.92	939.99
	06:00	84.00	67.73	241.70	940.03
	07:00	85.00	72.95	241.41	939.89
	08:00	86.00	84.68	241.18	939.94

WARREN PETROLEUM CO. MONUMENT WELL-1			MECHANICAL INTEGRITY TEST DIGITAL PRESSURE READINGS		
DATE	**TIME**	**ELAPSED HOURS**	**AMBIENT TEMP. F**	**TUBING (psig)**	**ANNULUS (psig)**
	09:00	87.00	98.41	240.97	939.92
	10:00	88.00	97.02	240.87	940.14
	11:00	89.00	103.15	240.44	940.09
	12:00	90.00	113.14	240.20	940.14
	13:00	91.00	116.64	240.03	939.99
	14:00	92.00	117.14	239.84	939.94
	15:00	93.00	117.63	239.68	939.75
	16:00	94.00	115.24	239.55	939.64
	17:00	95.00	110.34	239.50	939.31
	18:00	96.00	103.22	239.46	939.23
	19:00	97.00	92.16	239.44	939.21
	20:00	98.00	86.47	239.32	938.92
	21:00	99.00	83.16	239.16	938.80
	22:00	100.00	80.81	239.05	938.56
	23:00	101.00	79.15	238.92	938.44
23-Jun-96	00:00	102.00	74.74	238.78	938.27
	01:00	103.00	73.16	238.69	937.98
	02:00	104.00	71.23	238.58	937.91
	03:00	105.00	70.13	238.36	937.58
	04:00	106.00	70.41	238.24	937.38
	05:00	107.00	70.68	238.08	937.28
	06:00	108.00	70.48	237.93	937.21
	07:00	109.00	73.71	237.67	937.07
	08:00	110.00	81.98	237.48	937.17
	09:00	111.00	91.39	237.28	937.27
	10:00	112.00	92.09	237.27	937.47
	11:00	113.00	96.74	236.86	937.37
	12:00	114.00	105.52	236.71	937.32
	13:00	115.00	109.43	236.61	937.38
	14:00	116.00	116.08	236.40	937.11
	15:00	117.00	116.43	236.32	937.15
	16:00	118.00	116.86	236.22	936.96
	17:00	119.00	112.51	236.14	936.65
	18:00	120.00	103.22	236.21	936.59
	19:00	121.00	94.59	236.12	936.63
	20:00	122.00	87.10	236.02	936.40
	21:00	123.00	81.98	235.94	936.17
	22:00	124.00	78.39	235.86	935.93
	23:00	125.00	76.88	235.75	935.64
24-Jun-96	00:00	126.00	76.39	235.61	935.58
	01:00	127.00	75.36	235.55	935.45
	02:00	128.00	73.37	235.45	935.29
	03:00	129.00	70.55	235.37	935.06
	04:00	130.00	68.76	235.27	934.86
	05:00	131.00	67.66	235.17	934.73

WARREN PETROLEUM CO. **MONUMENT WELL-1**

MECHANICAL INTEGRITY TEST **DIGITAL PRESSURE READINGS**

DATE	TIME	ELAPSED HOURS	AMBIENT TEMP. F	TUBING (psig)	ANNULUS (psig)
	06:00	132.00	68.76	235.07	934.63
	07:00	133.00	73.09	234.87	934.55
	08:00	134.00	83.71	234.73	934.70
	09:00	135.00	92.36	234.72	934.92
	10:00	136.00	92.78	234.60	935.02
	11:00	137.00	101.54	234.24	934.89
	12:00	138.00	113.91	234.22	935.03
	13:00	139.00	116.64	234.04	935.07
	14:00	140.00	117.70	234.04	934.76
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SECTION 9

PRESSURE RECORDER CHART

781\CS\3744

PB-KBB

FENIX & SCISSON

ENGINEERING CONSTRUCTION OPERATIONS

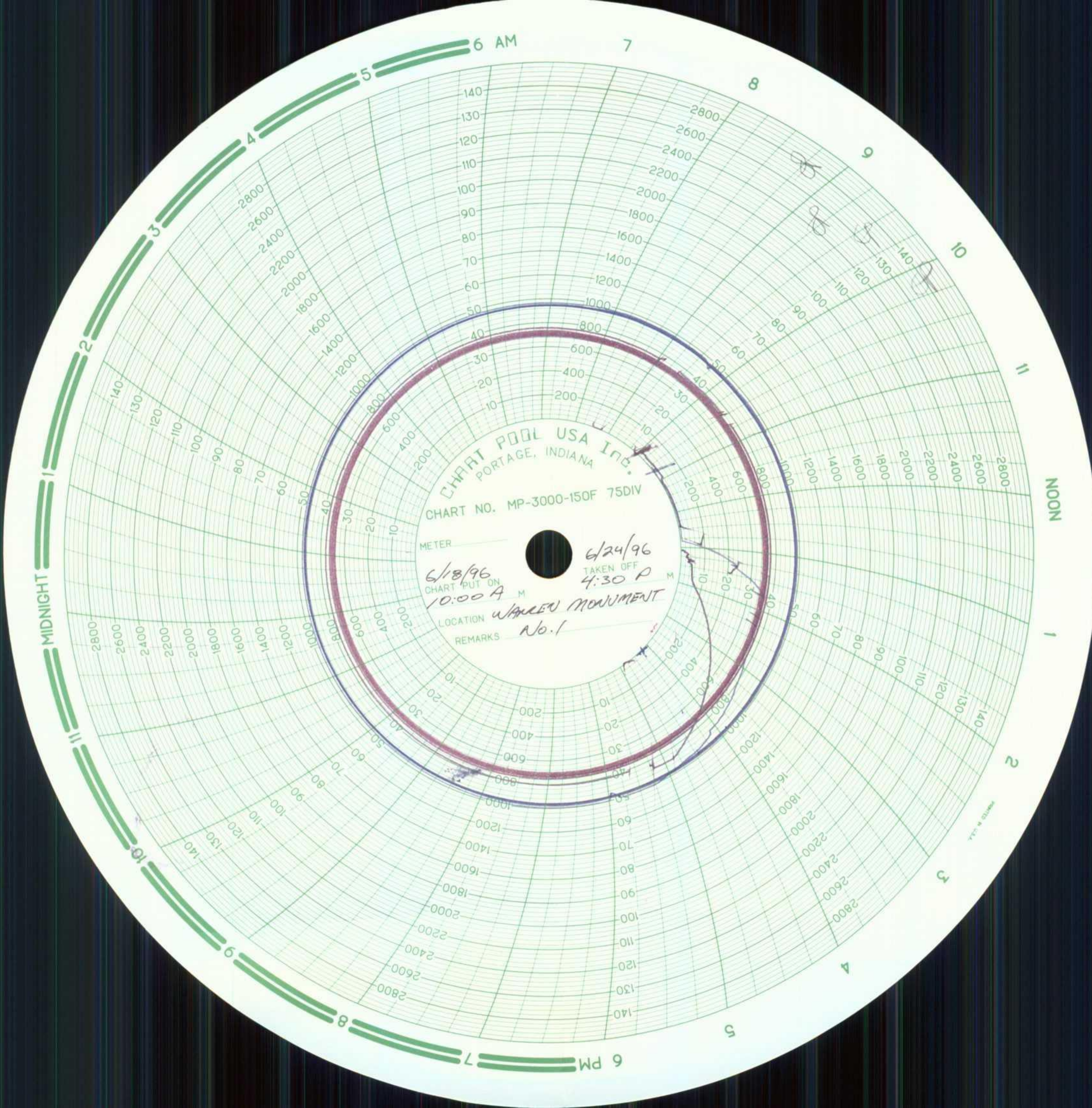

CHART POOL USA Inc.
PORTAGE, INDIANA
CHART NO. MP-3000-150F 75DIV
METER
6/18/96
CHART PUT ON
10:00 A M
6/24/96
TAKEN OFF
4:30 P M
LOCATION WARREN MONUMENT
REMARKS No. 1
6 AM
7
8
9
10
11
NOON
1
2
3
4
5
6 PM
7
8
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11
MIDNIGHT
1
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SECTION 10

DENSITY & TEMPERATURE LOGS

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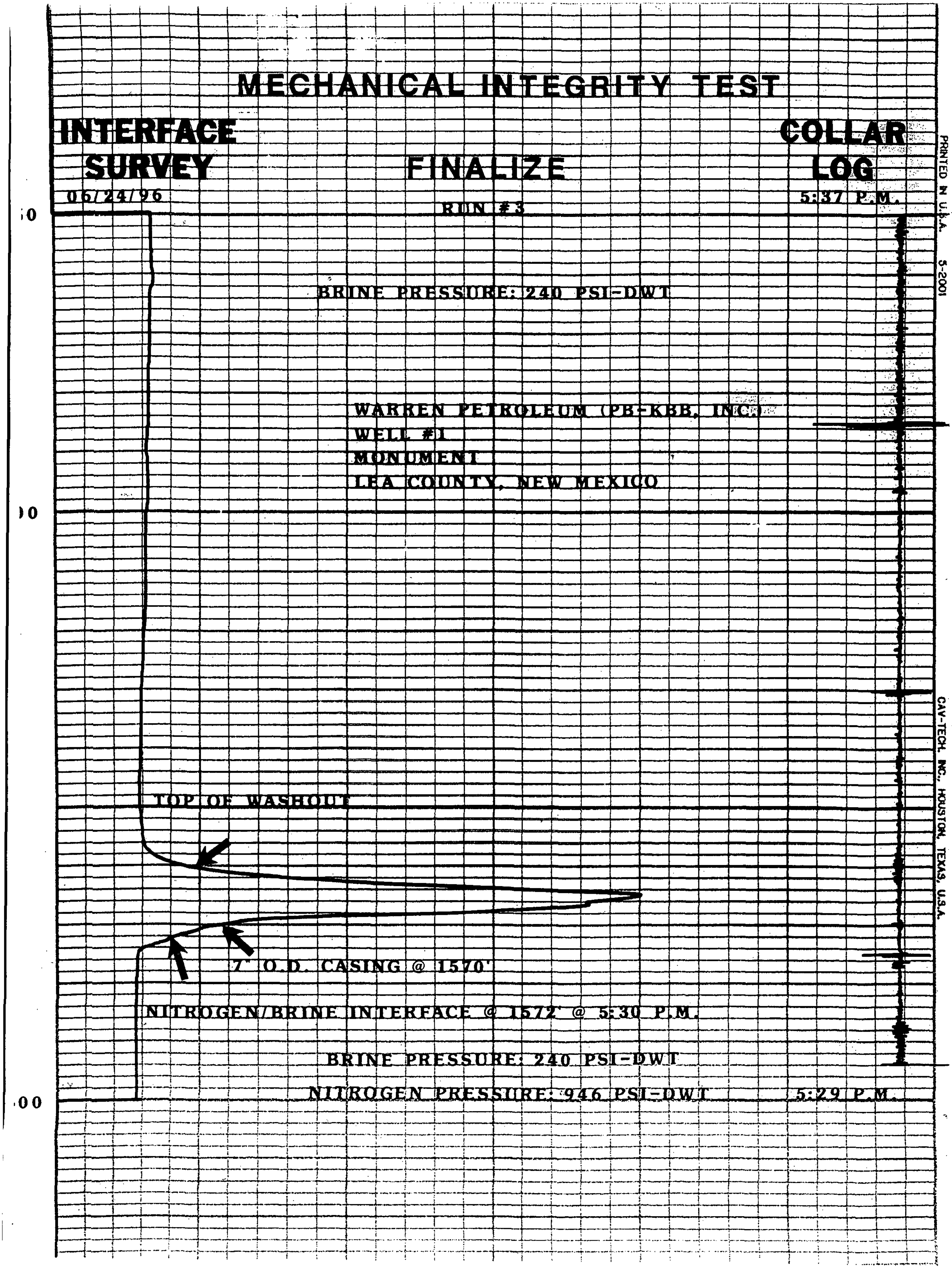
PB-KBB FENIX & SCISSON ENGINEERING CONSTRUCTION OPERATIONS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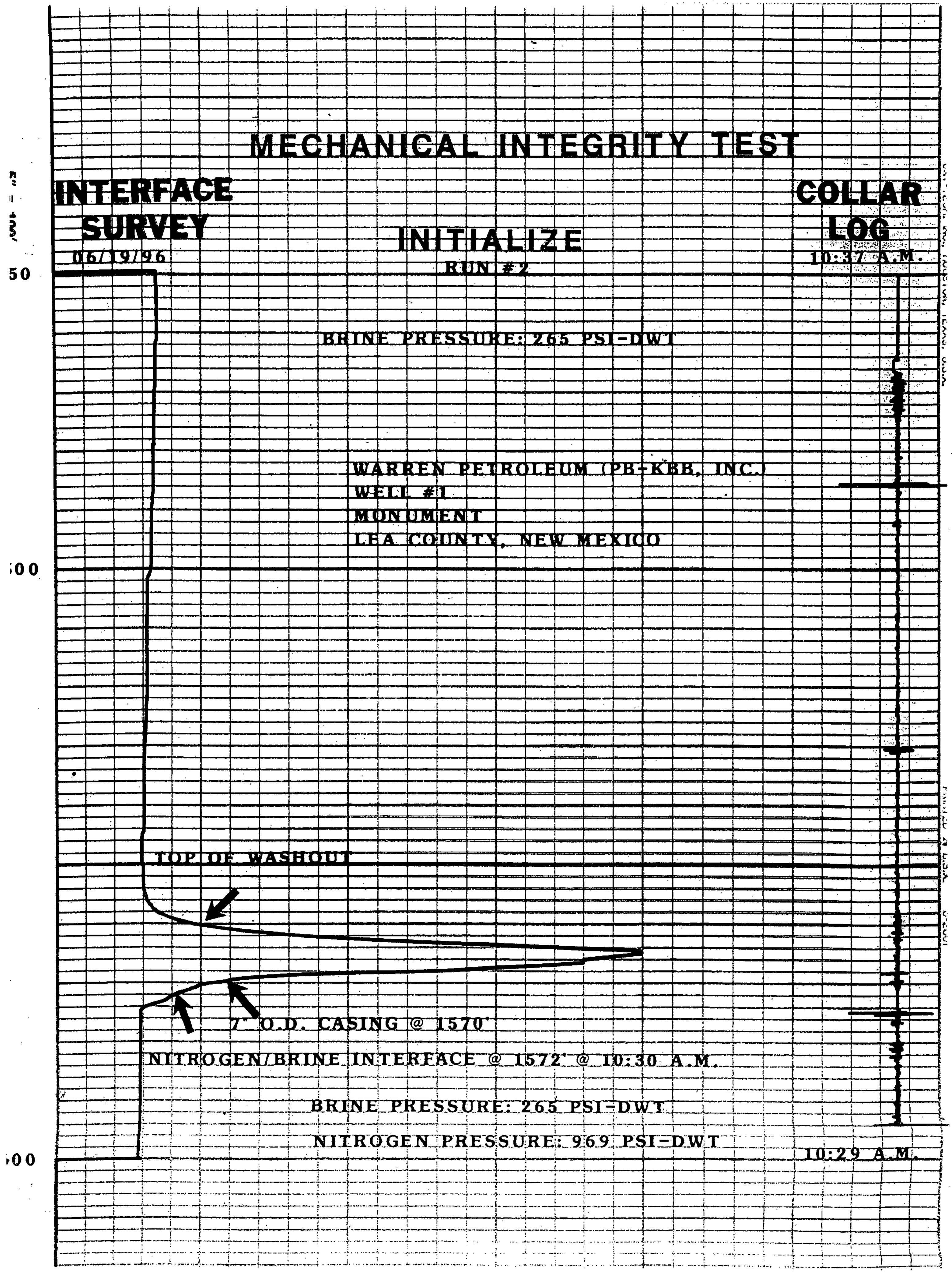
INTERFACE SURVEY
FINALIZE
COLLAR LOG
06/24/96
5:37 P.M.
RUN #3
BRINE PRESSURE: 240 PSI-DWT
WARREN PETROLEUM (PB-KBB, INC.)
WELL #1
MONUMENT
LEA COUNTY, NEW MEXICO
TOP OF WASHOUT
7" O.D. CASING @ 1570'
NITROGEN/BRINE INTERFACE @ 1572' @ 5:30 P.M.
BRINE PRESSURE: 240 PSI-DWT
NITROGEN PRESSURE: 946 PSI-DWT
5:29 P.M.
PRINTED IN U.S.A. 5-2001
CAV-TECH, INC., HOUSTON, TEXAS, U.S.A.


MECHANICAL INTEGRITY TEST
INTERFACE SURVEY
06/19/96
INITIALIZE
RUN #2
COLLAR LOG
10:37 A.M.
50
BRINE PRESSURE: 265 PSI-DWT
WARREN PETROLEUM (PB-KBB, INC.)
WELL #1
MONUMENT
LEA COUNTY, NEW MEXICO
TOP OF WASHOUT
7" O.D. CASING @ 1570'
NITROGEN/BRINE INTERFACE @ 1572' @ 10:30 A.M.
BRINE PRESSURE: 265 PSI-DWT
NITROGEN PRESSURE: 969 PSI-DWT
10:29 A.M.

NM OIL CONSERVATION DEPT

WELL LOG # 1

REMOVED FROM FILE

CIJ-025 **. BOX**

NUMBER 58

RETURNED TO CUSTOMER

RECEIVED

APR 25 1995

Environmental Bureau
Oil Conservation Division

LIQUID HYDROCARBON ASSESSMENT
WARREN PETROLEUM COMPANY
MONUMENT GAS PLANT
MONUMENT, NEW MEXICO

April 1995

Prepared for

Warren Petroleum Company
P.O. Box 1589
Tulsa, Oklahoma 74102

Prepared by

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LIQUID HYDROCARBON ASSESSMENT
WARREN PETROLEUM COMPANY
MONUMENT GAS PLANT
MONUMENT, NEW MEXICO

April 21, 1995

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LIQUID HYDROCARBON ASSESSMENT
WARREN PETROLEUM COMPANY
MONUMENT GAS PLANT
MONUMENT, NEW MEXICO

1.0 INTRODUCTION

Warren Petroleum Company (Warren) retained Geraghty & Miller, Inc. to conduct a liquid hydrocarbon assessment at the Monument Gas Plant located near Monument, New Mexico. The hydrocarbon assessment consisted of drilling and installing four soil borings and seven observation wells to assess subsurface conditions related to the occurrence and nature of liquid hydrocarbons detected at the site. The primary objectives of the hydrocarbon assessment included the following: 1) determine the nature and extent of liquid hydrocarbons at the site; 2) determine if liquid hydrocarbons or hydrocarbon impacts are present upgradient of the site; and 3) determine the general water quality of the shallow groundwater beneath the site.

This report summarizes the field activities and methods used during the hydrocarbon assessment, describes the hydrogeologic conditions beneath the site, presents the analytical laboratory results, and details the nature and extent of liquid hydrocarbons. Relevant documentation such as geologic logs, well construction diagrams, survey data, and analytical laboratory data sheets are provided as appendices.

1.1 SITE LOCATION

The Monument Gas Plant is located three miles southwest of Monument, New Mexico in Lea County. Monument is a rural community located approximately eight miles southwest of Hobbs, New Mexico.

1.2 SURROUNDING LAND USE

The Monument Plant is located in a sparsely populated rural area within an active oil and gas field. Adjacent land uses, includes various industrial activities associated with oil and gas production and transportation and livestock ranching. Adjacent industrial facilities include the former Climax Chemical Company to the northwest and a natural gas compressor station owned by El Paso Gas Company to the southeast. Historical industrial operations in the vicinity of the Warren site included a small oil refinery located along the southern property boundary of the plant.

2.0 FIELD ACTIVITIES AND METHODS

2.1 SOIL BORING AND OBSERVATION WELL INSTALLATION

Four soil borings (SB-3, SB-4, SB-6 and SB-7) and seven groundwater observation wells (WP-4, WP-5, WP-6, WP-7, WP-8, WP-9, and WP-10) were installed from February 22 through February 24, 1995. Soil boring and observation well locations are shown on Figure 1. Well construction logs and lithologic logs are presented in Appendix A.

All soil borings and wells were installed using the air rotary drilling technique. The formation was logged by catching cuttings which were circulated to the surface during the installation of a 6.5-inch borehole. The wells were completed "open hole" with 10 to 15 ft of four inch schedule 40 PVC flush-threaded, 0.020-inch mill slotted screen bracketing the water table. The remainder of the well was constructed of 4-inch flush threaded schedule 40 PVC casing. Filter pack material (No. 20-40 sand) was added to the borehole annulus to a height of approximately 2 ft above the top of the screened interval. Approximately 3 ft of hydrated bentonite seal was installed above the filter pack. A bentonite/cement grout was placed on top of the bentonite to a height of 3 to 5 ft below ground surface (bgs). Final completion details included placing Type I Portland cement in the remaining annular space, constructing a 2 ft surface pad around the well and installing a lockable metal protective casing over the PVC well head. Schematic well construction details are provided in Appendix A.

The wells were developed by surging with a bailer until the majority of the fines were removed from the well. All fluids were containerized and disposed on site at the plant wastewater system. Cuttings from the soil borings and observation wells were field screened with a photoionization detector (PID) during drilling. Cuttings were containerized in Ziploc™ baggies, allowed to equilibrate to ambient temperature, and analyzed for the presence of volatile organic compounds (VOCs). Field headspace results are included on the Geologic Logs presented in Appendix A.

Subsequent to sampling, Wells WP-8 and WP-9 were converted to electrical grounding wells. The conversion process entailed placing a copper grounding rod inside the well casing and driving the rods several feet into the natural material at the base of the well (i.e. no bottom plugs were installed). This may eliminate these wells from any future groundwater sampling events; however, these wells may still be suitable for fluid level gauging.

2.2 FLUID LEVEL GAUGING

Fluid-levels were measured in each of the groundwater observation wells at the site prior to sampling using an ORS Oil/Water interface probe. Fluid-level elevations relative to mean sea level are presented in Table 1.

2.3 GROUNDWATER SAMPLING

Groundwater quality samples were collected from each of the newly installed observation wells which did not contain measurable amounts of liquid hydrocarbons. Prior to sampling, each well was purged by bailing a minimum of three well volumes from the well to ensure the collection of representative groundwater samples. The groundwater samples were collected using a disposable polyethylene bailer to minimize the potential for cross-contamination between wells. All groundwater samples were containerized in the appropriate laboratory supplied container, packed on ice, and shipped to the Inchcape/NDRC Laboratory in Richardson, Texas. Groundwater samples were analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX), and the inorganic constituents chloride, sulfate and total dissolved solids (TDS) by USEPA Methods 8020, 9252, 9038, and 160.1, respectively. Water quality sampling procedures were performed in accordance with Geraghty & Miller quality assurance/quality control protocols.

2.4 LIQUID HYDROCARBON SAMPLING

Liquid hydrocarbon samples were collected from existing Observation Well WP-2 and from the newly installed Observation Well WP-10. Observation Wells WP-3, WP-4, WP-8, and the Climax Well also had detectable levels of liquid hydrocarbon present in the wells; however, a sufficient volume of product was not available for sampling. The liquid hydrocarbon samples were collected using a disposable polyethylene bailer and placed in their appropriate laboratory supplied containers. The liquid hydrocarbon samples were labeled, placed on ice, and shipped to SPL Laboratory in Houston, Texas for fingerprint analysis using capillary column gas chromatography.

2.5 SURVEYING

Upon completion of field activities, Basin Surveying of Hobbs, New Mexico was contracted to perform a site survey that included all newly installed observation wells (WP-4 through WP-10) and soil borings (SB-3, SB-4, SB-6 and SB-7). Wells were surveyed to the nearest 0.01 ft on the vertical axis and to the nearest 0.1 ft horizontally. Wells were tied in to a site specific benchmark (3580.22 ft) located at a pole 40 ft North of the North 1/4 corner.

3.0 SITE CONDITIONS

3.1 GEOLOGY

The upper most bedrock unit encountered beneath the site is the Chinle Redbeds. Based on soil borings completed during the site investigations, the soil in the area consists of silty clays, silty sands, and silty sands with caliche layers. These soils are identified as alluvial deposits derived from erosion of fringe areas of the Ogallala Formation, which overlies the Chinle Redbeds in northern Lea County (USEPA, 1987). The Chinle Redbeds encountered below the alluvial deposits at the site generally consisted of weathered shale and shale with sandstone lenses. The upper surface of these redbeds is somewhat irregular, but has a general slope toward the southeast (Figure 2). A bedrock high in the form of a nose extends from the vicinity of the Climax facility toward the east-southeast and beneath the site. The surface of the redbed has undergone two or more episodes of erosion, depending on the locality. Closed depressions on the surface of the redbeds are common. These features have probably formed by the collapse of the Chinle rocks into cavities in the underlying salt beds by gradual subsidence as the salt has been removed by solution by groundwater (Climax Chemical Company, 1983). Soil boring data indicates a subsurface trough extends in a north-south direction along the eastern portion of the site. Figure 2 depicts a topographic low in the bedrock surface the east side of the site. This topographical low is also indicated in the hydrogeologic cross-sections presented in Figures 3 and 4.

North of the site the redbeds are overlain by the Ogallala Formation. These deposits form the High Plains of northern Lea County, and the west boundary are marked by an escarpment known as Mescalero Ridge. However in the vicinity of the site the relief is more subdued and less clearly defined. Following deposition of the Ogallala deposits, a prolonged period of erosion reworked the fringe areas of the Ogallala and created the Mescalero Ridge. The reworked Ogallala deposits now form the bulk of the alluvial material that has accumulated in the Laguna Valley (Climax Chemical Company, 1983). The site is located on the edge of the Laguna Valley where a relatively thin sequence of alluvial material is present. These deposits are generally fine grained and poorly sorted.

During this investigation, three soil borings drilled into bedrock located on the north side of the site (SB-6, SB-4 and SB-3) and were left open for 24 hours (Figure 1). Two borings SB-3 and SB-4 were dry and SB-6 yielded approximately 2-3 inches of water. A fourth soil boring (SB-7) was drilled to a total depth of 35 ft bgs and did not encounter bedrock. Soil boring SB-7 was located on the west side of the site and contained approximately 3 feet of water. The water in this borehole was very silty and was unsuitable for laboratory analysis.

3.2 HYDROGEOLOGY

The Ogallala is a major aquifer in parts of Lea County where it has sufficient thickness to provide usable quantities of water. Springs act as natural discharge points of groundwater from the Ogallala deposits. Most of these springs are located along the contact of the permeable Ogallala and the less permeable Chinle Redbeds below. Monument Springs discharges groundwater from the Ogallala-Chinle contact in Section 26, T 19 S, R 36 E approximately 3.5 miles northwest of the site.

The saturated thickness of the alluvial deposits varies from 5 to 15 feet in the general vicinity of site. The Chinle Redbeds are generally assumed to form an impermeable base for the shallow groundwater in these alluvial deposits.

Groundwater at the site was encountered under unconfined conditions at approximately 20 to 30 ft bgs. The saturated thickness of the alluvial deposits beneath the site ranged from being dry in Borings SB-3 and SB-4 to 14.56 ft in Well WP-7. The saturated thickness was less than 6.5 ft in eight of the 10 wells at the site. Based on static water-levels from the observation wells measured on February 25, 1995, groundwater flow is generally toward the southeast flowing at a gradient of

0.010 ft/ft (Figure 5). Groundwater was not encountered in Borings SB-3 and SB-4. Both soil borings are located on the northeast portion of the site and were completed into the Chinle Redbeds.

4.0 ANALYTICAL RESULTS

4.1 GROUNDWATER

Groundwater samples were collected from Observation Wells WP-5, WP-6, and WP-7 and were analyzed for BTEX. A summary of analytical results is presented in Table 2. Concentrations of benzene above the laboratory quantification limit were detected in two (WP-5 and WP-6) of the three samples. Benzene concentrations of 30.1 μg/L and 393 μg/L, were detected in Wells WP-5 and WP-6, respectively. No other BTEX constituents were detected in the sample from Well WP-5. In addition, detectable concentrations of toluene (12.8 μg/L), ethylbenzene (481 μg/L), and xylenes (134 μg/L) were detected in Observation Well WP-6. Ethylbenzene and xylenes were detected at concentrations of 2.7 μg/L and 2.4 μg/L, respectively in the sample obtained from Well WP-7. Total BTEX concentrations ranged from 5.1 μg/L to 1,020 μg/L in Wells WP-7 and WP-6, respectively (Table 2). Laboratory analytical data sheets are attached as Appendix C.

Groundwater samples were collected from Observation Wells WP-4, WP-6, WP-7, WP-8 and WP-10 and analyzed for the following inorganics: chloride; TDS; and sulfate. A summary of analytical results is presented in Table 2. Concentrations of chloride ranged from 396 mg/L in Well WP-4 to 10,100 mg/L in Well WP-7. Concentrations of TDS ranged from 1,820 mg/L in Well WP-4 to 26,200 mg/L in Well WP-7. Concentrations of sulfate ranged from below detection limits in Well WP-4 to 6,750 mg/L in Well WP-7. Laboratory analytical data sheets are attached as Appendix C.

4.1.1. Groundwater Quality Conditions

Based on the limited organic groundwater quality data, organic constituents (i.e. BTEX) are most prevalent upgradient of the gas processing area and in the vicinity of Well WP-6. Well WP-6 is located downgradient of active oil wells operated by Amerada.

Inorganic groundwater quality data indicates elevated concentrations of chlorides, sulfates, and TDS are present across the site. The highest concentrations of chlorides, sulfates and TDS were detected in the northwest (upgradient) portion of the site The elevated concentrations of inorganics do not appear to be related to current plant operations but are likely related to former operations at the Climax Chemical Company located approximately one-half mile northwest (up gradient) of the Warren site.

Based on the TDS concentrations, shallow groundwater beneath the site is considered brackish and generally not suitable for drinking water. Chloride concentrations in all five groundwater samples exceeded the USEPA secondary maximum contaminant level (MCL) for chloride of 250 mg/L. Sulfate concentrations exceeded the USEPA secondary MCL for sulfate of 250 mg/L in three of the five groundwater samples collected at the site. TDS concentrations exceeded the USEPA secondary MCL for TDS of 500 mg/L by at least one order of magnitude in all five groundwater samples. In addition, TDS values in shallow groundwater exceeds the recommended concentration limits for crop irrigation and some livestock uses (Freeze and Cherry, 1979).

4.2 LIQUID HYDROCARBONS

Liquid hydrocarbon samples were collected from Observation Wells WP-2 and WP-10. The product samples were analyzed by SPL Laboratory to determine the physical and chemical characteristics of the liquid hydrocarbon. The analytical results indicate that both samples collected from Wells WP-2 and WP-10 are a light condensate. Based on the presence of butane in the sample from Well WP-2 and pentanes in the sample from Well WP-10, the product does not appear to be highly weathered. Both samples have a relatively low percentage (%) of BTEX constituents with 1.28 weight % and 1.8 weight % in samples WP-2 and WP-10, respectively.

The absence of 2,2,4-trimethylpentane suggests the liquid hydrocarbon is not gasoline. The samples are likely retrograde condensate from natural gas. The presence of butanes in the sample from WP-2 would indicate it has been in the environment for a shorter time than the sample from WP-10. The samples do not seem to be refined products and are likely highly naphthenic condensates (SPL correspondence). Laboratory analytical data sheets are attached as Appendix D.

5.0 DISTRIBUTION OF LIQUID HYDROCARBONS

Liquid hydrocarbon was detected in Observation Wells WP-2, WP-3, WP-4, WP-8, WP-10 and the Climax Well. Liquid hydrocarbon thickness in the observation wells ranged from 0.04 ft in Well WP-4 to 0.71 ft in Well WP-2 (Table 1). Liquid hydrocarbon was not detected in Well WP-1 which historically has contained detectable levels of liquid hydrocarbons. Liquid hydrocarbons were not detected in Well WP-6 prior to development and sampling; however, liquid hydrocarbons were detected during the development process. A liquid hydrocarbon film was present on the produced water (18 gallons) generated during the development of Well WP-6. The well was developed dry on two occassions and a liquid hydrocarbon film was noted on the produced water during both development sessions. The approximate extent of liquid hydrocarbons at the site is shown on Figure 6. The eastern extent of the liquid hydrocarbons has not been defined east of Well WP-10. The northern extent of liquid hydrocarbons is not fully defined based on the occurrence of product in Well WP-6 during development.

6.0 SUMMARY AND CONCLUSIONS

- The upper most bedrock unit beneath the facility is the Triassic Chinle Redbeds, consisting of shale and interbedded sandstone. The Chinle Redbeds are generally assumed to form an impermeable base for the shallow groundwater in the alluvial deposits.

- Groundwater was encountered at approximately 20 to 30 ft bgs and flows towards the southeast at a gradient of approximately 0.010 ft/ft under static conditions. Groundwater is present under water table conditions across the site and groundwater migration appears to be effected by the presence of a bedrock low extending across the eastern portion of the site. No groundwater was encountered in Borings SB-3 and SB-4 located along the northeastern edge of the site.

- BTEX constituents were detected in all three groundwater samples collected for BTEX analysis. Total BTEX concentrations ranged from 5.1 μg/L to 1,020 μg/L in Wells WP-7 and WP-6, respectively. Benzene concentrations of 30.1 μg/L and 393 μg/L were detected in Wells WP-5 and WP-6, respectively.

- Elevated concentrations of chlorides, sulfates, and TDS were detected in all five wells sampled for inorganics. Chloride concentrations ranged from 396 mg/L in Well WP-4 to 10,100 mg/L in Well WP-7. Concentrations of sulfate ranged from below detection limits in Well WP-4 to 6,750 mg/L in Well WP-7. TDS concentrations ranged from 1,820 mg/L in Well WP-4 to 26,200 mg/L in Well WP-7.

- Based on the limited organic groundwater quality data, organic constituents (i.e. BTEX) are most prevalent upgradient of the gas processing area and in the vicinity of Well WP-6. Well WP-6 is located downgradient of active oil wells operated by Amerada.

- Inorganic groundwater quality data indicate elevated concentrations of chlorides, sulfates, and TDS are present across the site. The highest concentrations of chlorides, sulfates and TDS were detected in the northwest (upgradient) portion of the site The elevated concentrations of inorganics do not appear to be related to plant operations but are likely related to former operations at the Climax Chemical Company located approximately one-half mile northwest (upgradient) of the Warren site.

- Based on the TDS concentrations, shallow groundwater beneath the site is considered brackish and generally not suitable for drinking water. Chloride concentrations in all five groundwater samples exceeded the USEPA secondary maximum contaminant level (MCL) of 250 mg/L. Sulfate concentrations exceeded the USEPA secondary MCL for sulfate of 250 mg/L in three of the five groundwater samples collected at the site. TDS concentrations exceeded the USEPA secondary MCL for TDS of 500 mg/L by at least one order of magnitude in all five groundwater samples. In addition, TDS values in shallow groundwater exceeds the recommended concentration limits for crop irrigation and some livestock uses (Freeze and Cherry, 1979).

- Based on chemical analysis, liquid hydrocarbon samples collected from Observation Wells WP-2 and WP-10 appear to be an unrefined light condensate.

- Liquid hydrocarbons were detected in six of the 11 observation wells located across the site. The occurrence of liquid hydrocarbons is limited to the eastern half of the plant. The eastern extent of liquid hydrocarbons has not been fully defined.

The northern extent of liquid hydrocarbons is not fully defined based on the occurrence of product in Well WP-6 during development. The occurrence of product in Well WP-6 indicates several source areas may be present including a source upgradient of plant operations.

7.0 REFERENCES

Climax Chemical Company, Justification for No Discharge Plan and Alternative Application for Discharge Plan, prepared by Geohydrology Associates, Inc., 1983.

USEPA, Preliminary Review Report, Climax Chemical Company, Monument, New Mexico EPA ID No. NMD990753931, EPA Contract No. 68-01-7251, Work Assignment No. 92-61-20.0 Project No. W68445, June 15, 1987.

Freeze, R.A. and J.A. Cherry, 1979. Groundwater, Prentice Hall, Inc., Englewoods Cliffs, New Jersey, 604 pp.

SPL Laboratory, Correspondence to John Shonfelt, Geraghty & Miller, Inc., March 17,1995.

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APPENDIX A

GEOLOGIC LOGS AND WELL CONSTRUCTION DIAGRAMS

APPENDIX B

SURVEY DATA

APPENDIX C

LABORATORY ANALYTICAL DATA SHEETS
FOR GROUNDWATER SAMPLES

APPENDIX D

LABORATORY ANALYSIS OF LIQUID HYDROCARBONS

TABLES

Table 1. Fluid-Level Measurements from Observation Wells, Warren Petroleum Company, Monument Gas Plant, New Mexico, February 1995.

Well Identification	Date	Measuring Point Elevation (ft MSL)	Liquid Hydrocarbon Thickness (ft)	Measured (Corrected) Depth to Water (ft)	Depth to Liquid Hydrocarbon (ft)	Corrected Water level Elevation (ft MSL)
WP-1	2/25/95	3578.01	—	30.35	ND	3547.66
WP-2	2/25/95	3577.73	0.71	30.38 (29.81)	29.67	3547.92
WP-3	2/25/95	3581.36	0.22	29.79 (29.61)	29.57	3551.75
WP-4	2/25/95	3577.17	0.04	32.77 (32.73)	32.73	3544.43
WP-5	2/25/95	3579.44	—	30.68	ND	3548.76
WP-6[3]	2/25/95	3585.34	—	28.61	ND	3556.73
WP-7	2/25/95	3583.05	—	20.44	ND	3562.61
WP-8	2/25/95	3581.51	0.12	27.46 (27.36)	27.34	3554.15
WP-9	2/25/95	3581.64	—	—	—	—
WP-10	2/25/95	3580.18	0.57	29.04 (28.53)	28.47	3551.60
Climax	2/25/95	3577.78	0.63	29.08 (28.57)	28.45	3549.20

ft feet
1 Measuring point for groundwater observation wells equals top of well casings.
2 Specific gravity of 0.80 assumed for product to correct water elevations.
3 Hydrocarbons were detected in Well WP-6 during development.

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Table 2. Summary of Analytical Results for Groundwater Samples, Warren Petroleum Company, Monument Gas Plant, Monument, New Mexico, February 1995.

	WP-4 (µg/L)	WP-5 (µg/L)	WP-6 (µg/L)	WP-7 (µg/L)	WP-8 (µg/L)	WP-10 (µg/L)
Benzene	NA	**30.1**	**393**	<1.0	NA	NA
Toluene	NA	<1.0	**12.8**	<1.0	NA	NA
Ethylbenzene	NA	<1.0	**481**	**2.7**	NA	NA
Xylenes	NA	<1.0	**134**	**2.4**	NA	NA
Total BTEX	NA	**30.1**	**1,020**	**5.1**	NA	NA
Chloride	**396**[1]	NA	**1,610**[1]	**10,100**[1]	**1,910**[1]	**3,790**[1]
Total Dissolved Solids	**1,820**[1]	NA	**4,660**[1]	**26,200**[1]	**5,240**[1]	**7,810**[1]
Sulfate	**<1.0**[1]	NA	**298**[1]	**6,750**[1]	**19.9**[1]	**431**[1]

µg/L Micrograms per liter.
NA Not Analyzed
1 Milligrams per liter.
< Below Reported Detection Limit.

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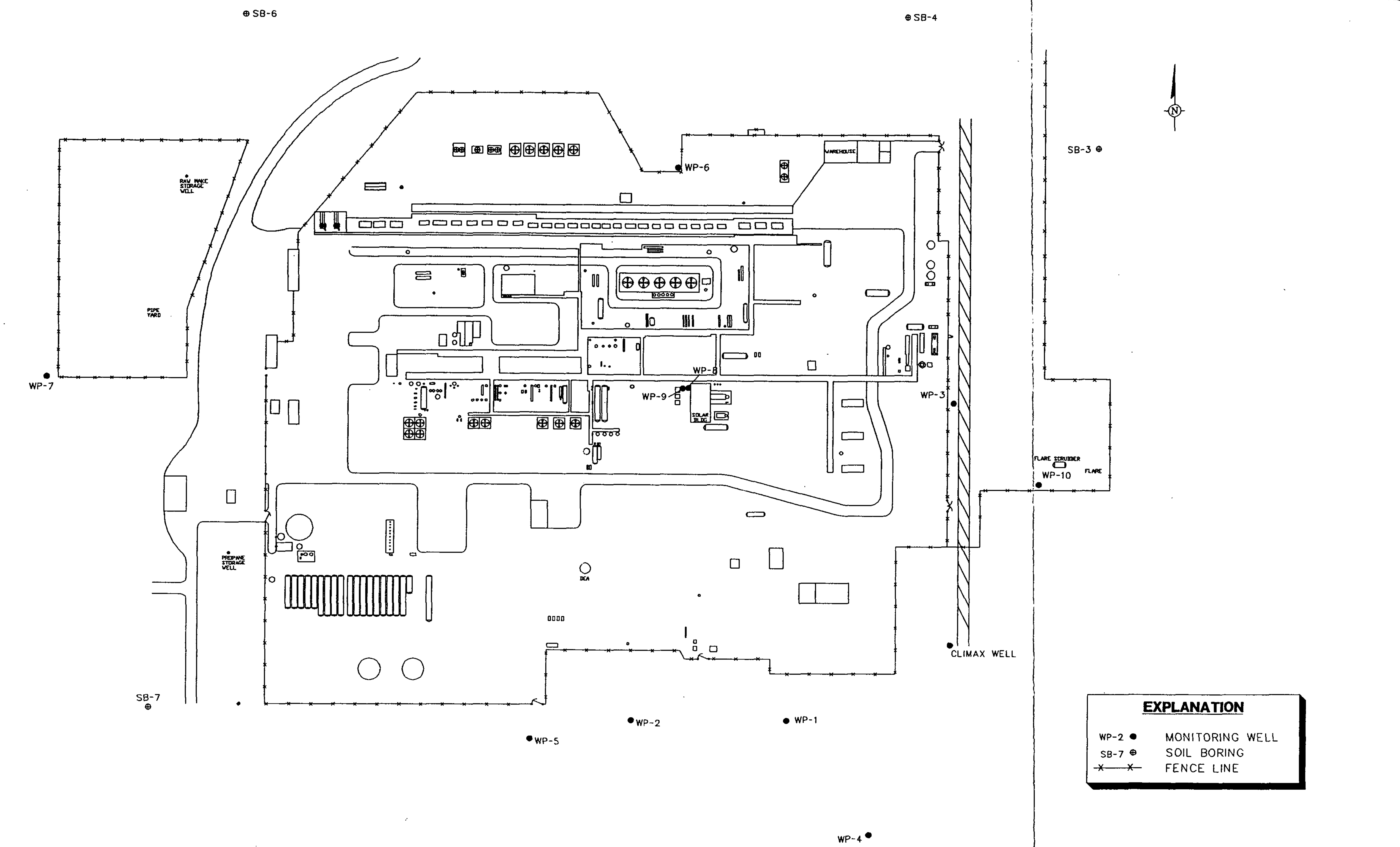
FIGURES



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Environmental Services
A Heidemij Company

0 180 FT.

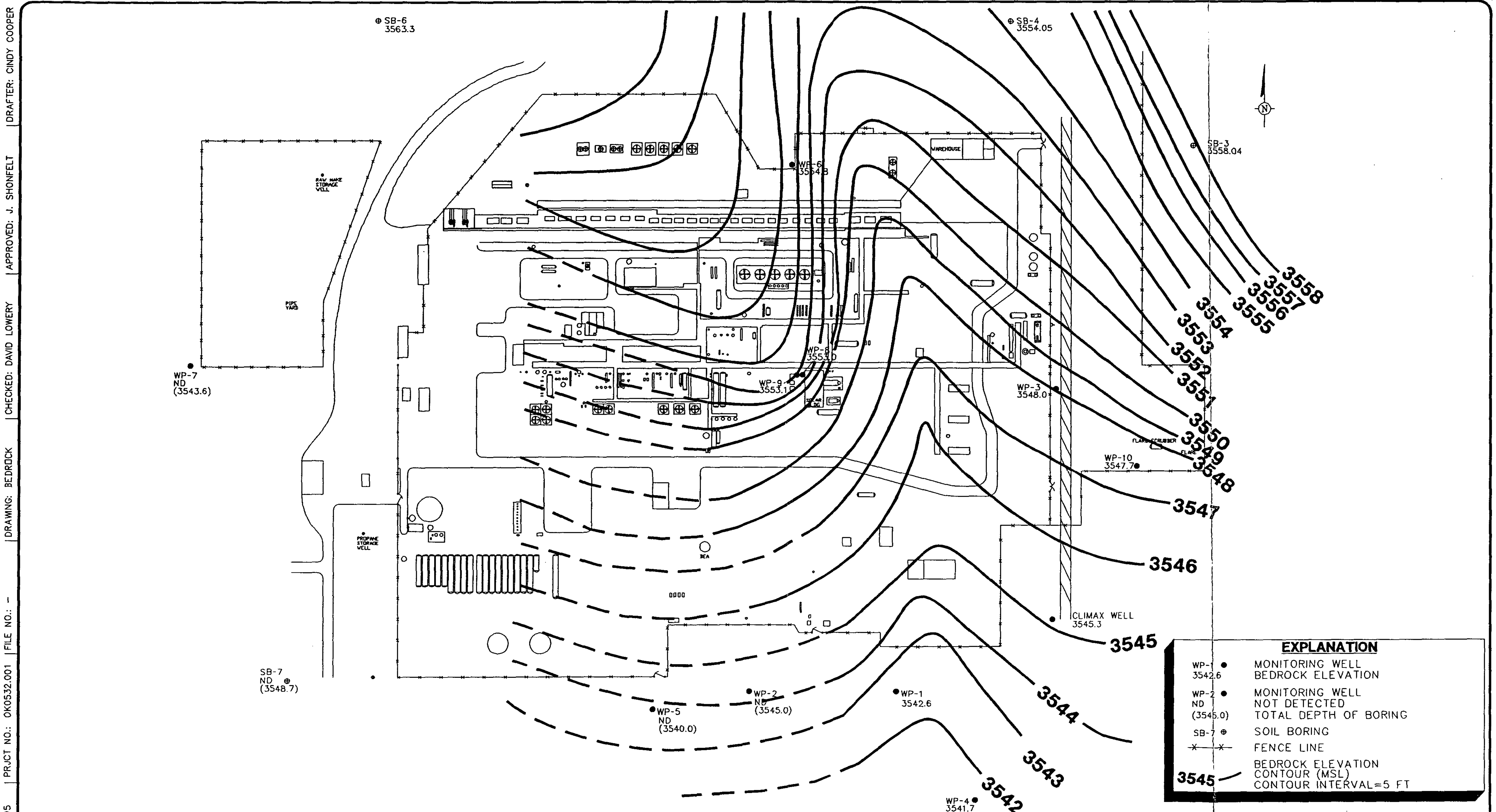
SITE MAP WITH SOIL BORINGS AND OBSERVATION WELL LOCATIONS

WARREN PETROLEUM
MONUMENT, NEW MEXICO

FIGURE 1

DRAFTER: CINDY COOPER | APPROVED: J. SHONFELT | CHECKED: DAVID LOWERY | DRAWING: SITE-2 | FILE NO.: - | PRJCT NO.: OK0532.001 | DWG DATE: 04APR195

DRAFTER: CINDY COOPER | APPROVED: J. SHONFELT | CHECKED: DAVID LOWERY | DRAWING: BEDROCK | FILE NO.: - | PRJCT NO.: OK0532.001 | DWG DATE: 21APR95



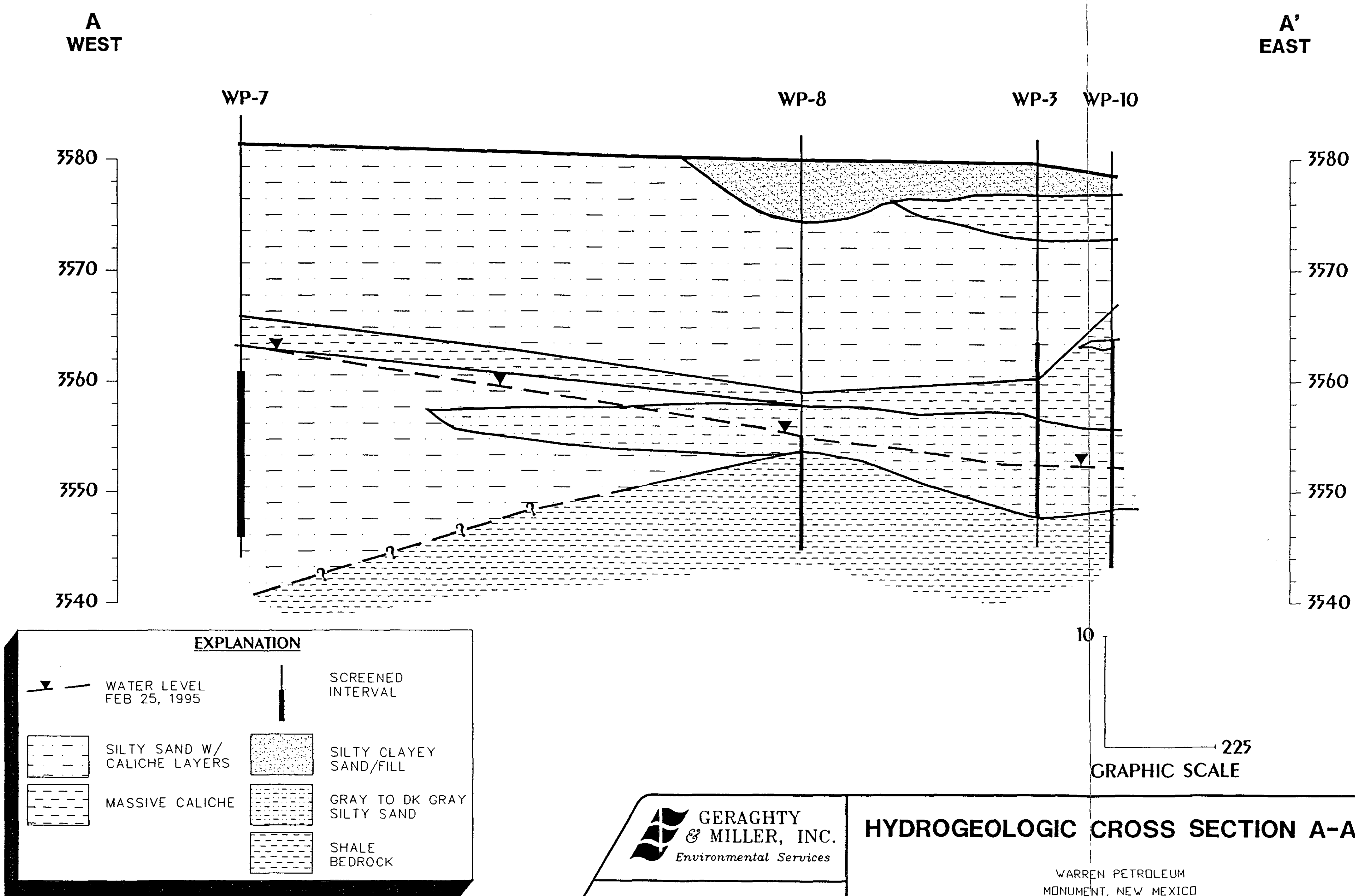
GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

0 180 FT.

BEDROCK STRUCTURE MAP

WARREN PETROLEUM
MONUMENT, NEW MEXICO

FIGURE
2



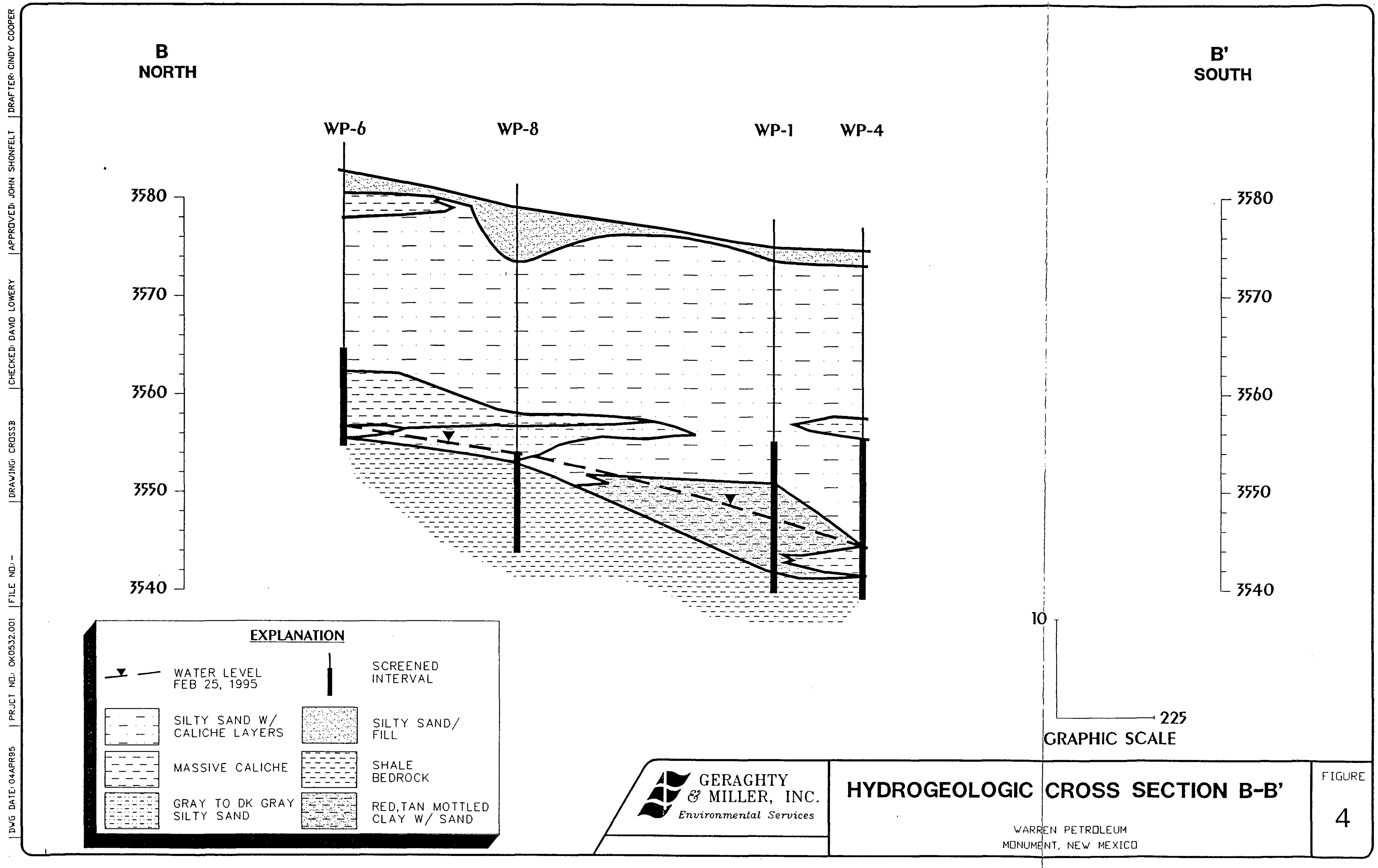
GERAGHTY & MILLER, INC.
Environmental Services

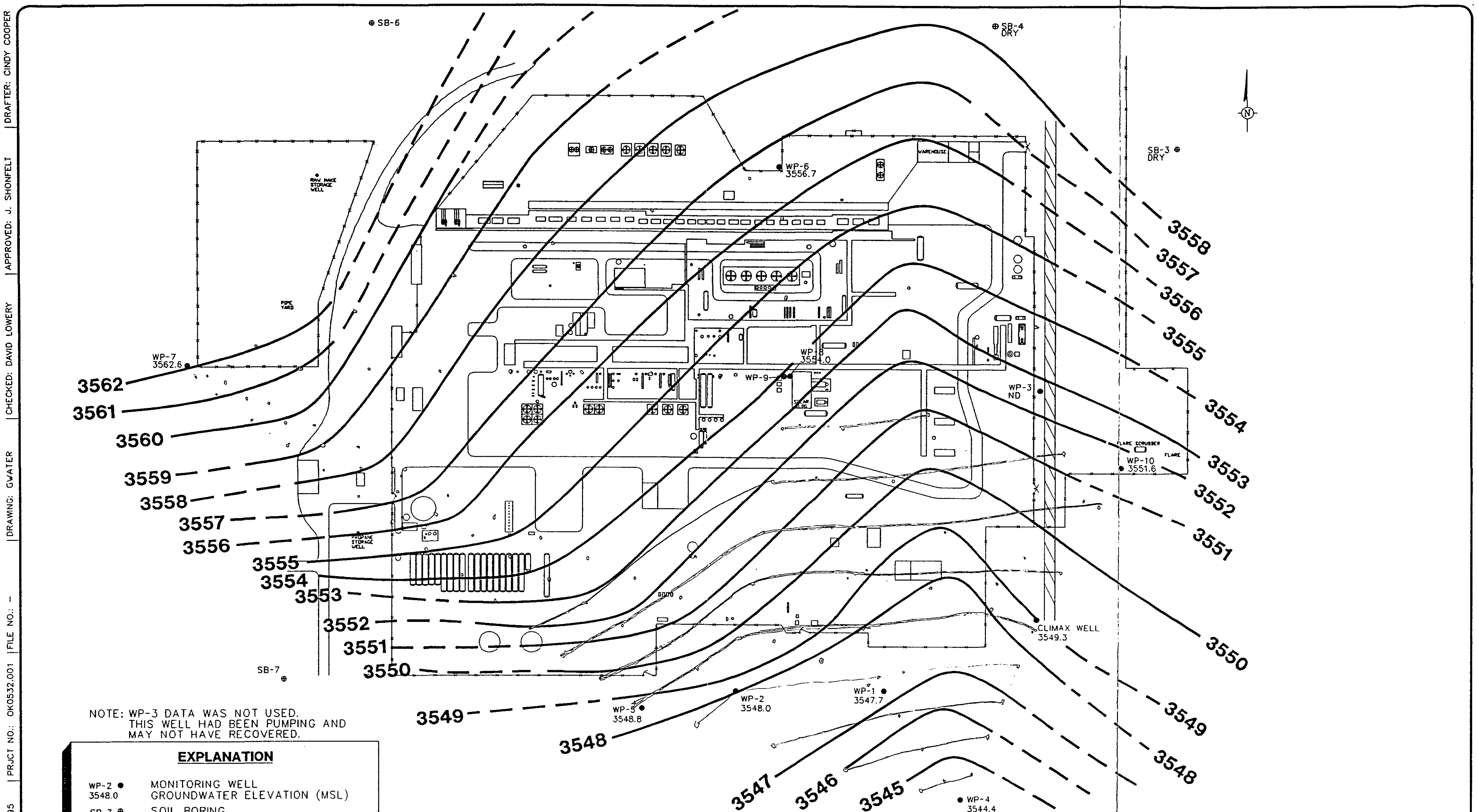
HYDROGEOLOGIC CROSS SECTION A-A'

WARREN PETROLEUM
MONUMENT, NEW MEXICO

FIGURE
3

DWG DATE: 04APR95 | PRJCT NO: OK0532.001 | FILE NO.: - | DRAWING: CROSSA | CHECKED: DAVID LOWERY | APPROVED: JOHN SHONFELT | DRAFTER: CINDY COOPER


B
NORTH
B'
SOUTH
WP-6
WP-8
WP-1
WP-4
3580
3570
3560
3550
3540
3580
3570
3560
3550
3540
10
225
GRAPHIC SCALE
EXPLANATION
WATER LEVEL
FEB 25, 1995
SCREENED
INTERVAL
SILTY SAND W/
CALICHE LAYERS
SILTY SAND/
FILL
MASSIVE CALICHE
SHALE
BEDROCK
GRAY TO DK GRAY
SILTY SAND
RED,TAN MOTTLED
CLAY W/ SAND
GERAGHTY
& MILLER, INC.
Environmental Services
HYDROGEOLOGIC CROSS SECTION B-B'
WARREN PETROLEUM
MONUMENT, NEW MEXICO
FIGURE
4
DRAFTER: CINDY COOPER
APPROVED: JOHN SHONFELT
CHECKED: DAVID LOWERY
DRAWING: CROSSB
FILE NO.: -
PRJCT NO.: OK0532.001
DWG DATE: 04APR95



NOTE: WP-3 DATA WAS NOT USED. THIS WELL HAD BEEN PUMPING AND MAY NOT HAVE RECOVERED.

EXPLANATION

WP-2 ● 3548.0	MONITORING WELL GROUNDWATER ELEVATION (MSL)
SB-7 ⊕	SOIL BORING
—x—x—	FENCE LINE
3545	GROUNDWATER ELEVATION CONTOUR (MSL) CONTOUR INTERVAL=1 FT DASHED WHERE INFERRED

GERAGHTY & MILLER, INC.
Environmental Services
A Heidemij Company

0 180 FT.

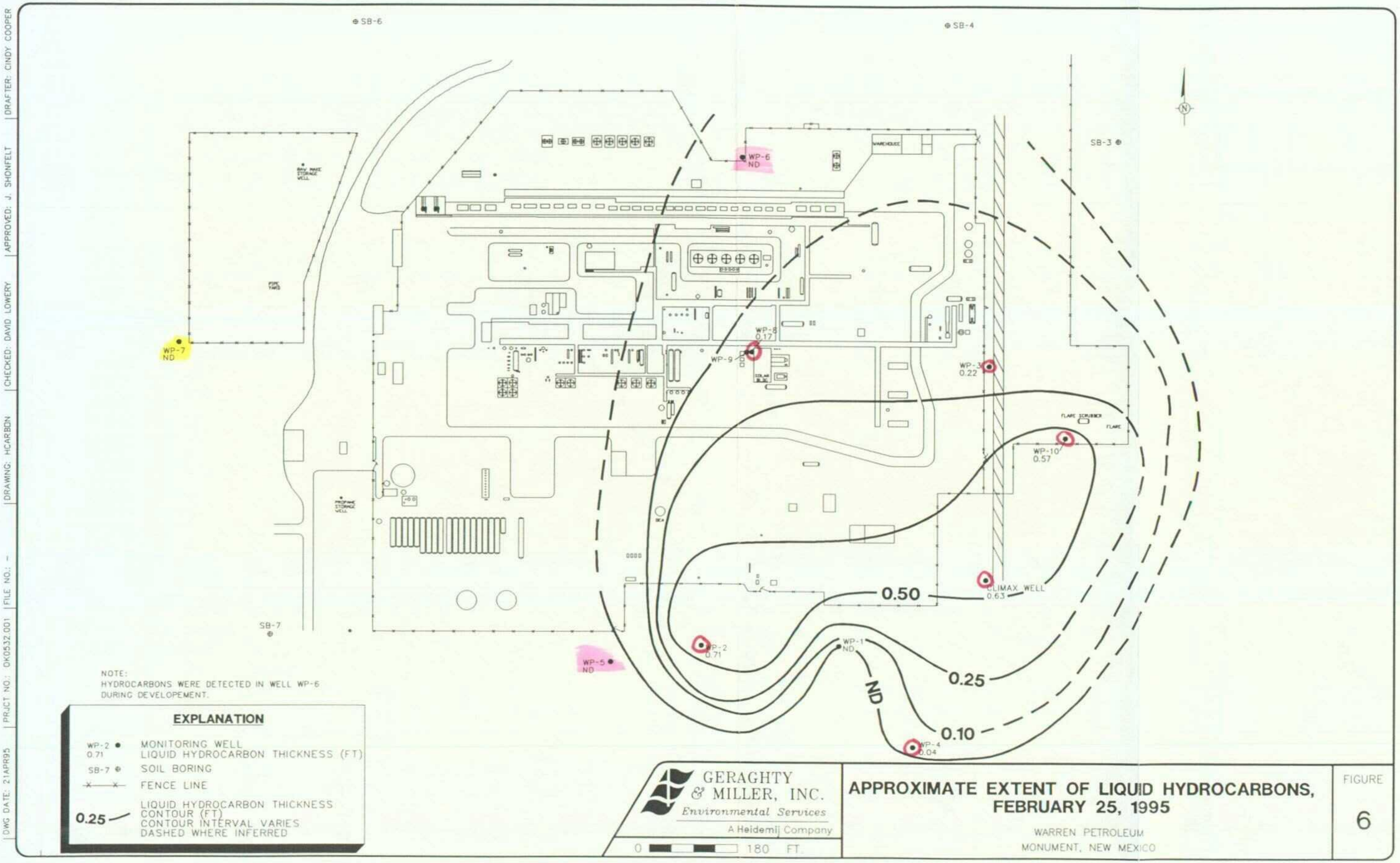
GROUNDWATER ELEVATION MAP
FEBRUARY 25, 1995

WARREN PETROLEUM
MONUMENT, NEW MEXICO

FIGURE
5

DRAFTER: CINDY COOPER | APPROVED: J. SHONFELT | CHECKED: DAVID LOWERY | DRAWING: GWATER | FILE NO.: - | PRJCT NO.: OK0532.001 | DWG DATE: 04APR95

DWG DATE: 21APR95 | PRJCT NO.: OK0532.001 | FILE NO.: - | DRAWING: HCARBON | CHECKED: DAVID LOWERY | APPROVED: J. SHONFELT | DRAFTER: CINDY COOPER



APPROXIMATE EXTENT OF LIQUID HYDROCARBONS, FEBRUARY 25, 1995

WARREN PETROLEUM
MONUMENT, NEW MEXICO

FIGURE 6

APPENDIX A

APPENDIX A

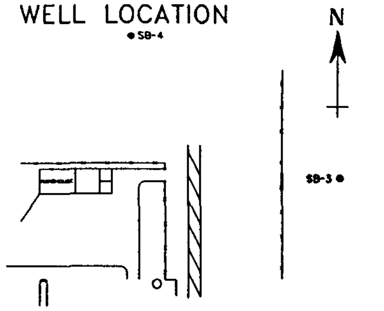
GEOLOGIC LOGS AND WELL CONSTRUCTION DIAGRAMS

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-3	1 OF 2

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/22/95 FINISH 2/22/95	DEVEL. START FINISH 2/24/95
STATIC DTW DRY DTO TIME 9:03 DATE 2/24/95	DRILLED BY: EADES DRILLING
ELEVATION TOC GL 3580.04	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		CL	SILTY CLAY	BR	STIFF SILTY CLAY W/ ROOT HAIRS	D						
	1				TOPSOIL							
		SM	SILTY SAND	LT BR	FG SILTY SAND W/ CALICHE, VERY	D						
	2				HARD MASSIVE W/SANDSTONE							
					STRINGERS							
	3											
	4				SAME AS ABOVE							
	5											
		SM	SILTY SAND	LT BR	FG SILTY SAND W/ CALICHE,	D						
	6				SANDSTONE STRINGERS							
	7	SM	SILTY SAND	LT BR	SILTY SAND W/ CALICHE LAYERS	D						
					INTERBEDDED							
	8											
	9											
	10				SAME AS ABOVE							
	11											
	12				SAME AS ABOVE							
	13											
	14											
	15				SAME AS ABOVE							
	16				BECOMING SANDY LESS CALICHE							
	17				LAYERS, W/ SANDSTONE							
	18											
	19											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
OK0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-3	

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 DTO TIME DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION N

SEE PAGE ONE

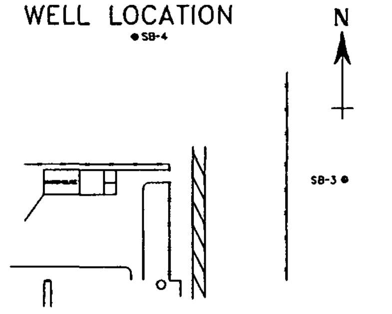
WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		SM	SILTY SAND	TN	SILTY SAND W/ CALICHE LAYERS	D						
	21											
	22	CL	CLAY		RED CLAY, SILTY W/ GRAY MOTTLING	M					90	SS
	23				W/ SOME FG SAND							
	24											
	25				W/ WEATHERED SHALE							
					SAME AS ABOVE							
	26											
	27											
	28											
	29											
	30				SAME AS ABOVE							
	31											
	32											
	33											
	34				SAME AS ABOVE							
	35				TD = 35 FT							
	36											
	37											
	38											
	39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-4	PAGE 1 OF 2

DRILLING METHOD AIR ROTARY	SAMPLING METHOD GRAB
DRILLING START 2/22/95 FINISH 2/22/95	DEVEL. START FINISH 2/24/95
STATIC DTW DRY DTO TIME 09:07 DATE 2/29/95	DRILLED BY EADES DRILLING
ELEVATION TOC GL 3581.55	LOGGED BY D. LOWERY

WELL LOCATION



WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		ML	SILT	BR	TOPSOIL-SILT LOAM, ROOT HAIRS,	D						
	1				BROWN CLAYEY SILT							
	2	SM	SILTY SAND	TN	SILTY SAND INTERBEDDED WITH	D						
	3				CALICHE LAYERS							
	4											
	5											
	6	SM	SILTY SAND	RD TN	SILTY SAND W/ OCCASIONAL	D						
					CALICHE LAYERS							
	7											
	8											
	9											
	10				SAME AS ABOVE	D						
	11											
	12											
	13											
	14											
	15	SM	SILTY SAND	TN	CALICHE LAYER (HARD) 6" LAYER	D						
					INTERBEDDED IN TN SILTY SAND							
	16				WITH FREQUENT CALICHE LAYERS							
	17	SM	SILTY SAND	GY	BECOMING GRAY SILTY SAND	D						
					W/GRAVEL AND COARSE SAND							
	18											
	19											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-4	PAGE 2 OF 2

DRILLING METHOD: SEE PAGE 1	SAMPLING METHOD: SEE PAGE 1
DRILLING START: SEE PAGE 1 FINISH	DEVEL. START: SEE PAGE 1 FINISH
STATIC DTW: SEE PAGE 1 TIME DTO DATE	DRILLED BY: SEE PAGE 1
ELEVATION TOC: SEE PAGE 1 GL	LOGGED BY: D. LOWERY

WELL LOCATION N

SEE PAGE ONE

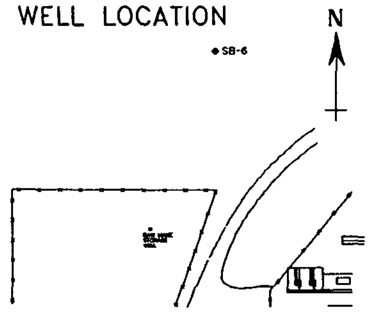
WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		SW	SAND	GY	FG-CG SAND W/ GRAVEL, WELL	M					80	SS
	21				ROUNDED, SOME SILT BECOMING							
					CEMENTED W/ CALCITE W/ LIMONITE							
	22				STAINING 6" THICK							
	23				SAME AS ABOVE, GRAY ROUNDED							
					SAND & GRAVEL							
	24											
					W/ SLIGHT ODOR?							
	25											
	26											
		CL	SILTY CLAY	RD TN	BECOMING RED SILTY CLAY							
	27											
					RED BED							
	28											
	29											
	30											
	31				SAME AS ABOVE							
	32											
	33				SAME AS ABOVE							
	34											
	35				TD = 35 FT							
	36											
	37											
	38											
	39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
OK0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-6	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/22/95 FINISH 2/22/95	DEVEL. START FINISH 2/24/95
STATIC DTW 22.0 TIME 9:11 DTO DATE 2/24/95	DRILLED BY: EADES DRILLING
ELEVATION TOC GL 3582.84	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		CL	SILTY CLAY	BR	TOPSOIL SILT LOAM, ROOTS,							
					GRAVELLY, CALICHE LAYERS							
	1	SM	SILTY SAND		SILTY FG W/ CALICHE	D						
	2											
	3	SM	SILTY SAND	TN	SILTY SAND W/ CALICHE LAYERS	D						
	4											
	5				SAME AS ABOVE							
	6											
					CALICHE HARD MASSIVE							
	7											
	8	SM	SILTY SAND	TN	SILTY SAND W/ CALICHE LAYERS							
						D	110				85	SS
	9											
	10				SAME AS ABOVE							
	11											
	12											
	13											
	14											
	15											
	16											
					HARD CALICHE LAYER							
	17											
	18											
	19											
		CL	CLAY		RED SILTY CLAY W/ FG SAND	M	401				90	SS

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-6	

DRILLING METHOD: SEE PAGE 1	SAMPLING METHOD: SEE PAGE 1
DRILLING START: SEE PAGE 1 FINISH	DEVEL. START: SEE PAGE 1 FINISH
STATIC DTW: SEE PAGE 1 DTO; TIME; DATE	DRILLED BY: SEE PAGE 1
ELEVATION TOC: SEE PAGE 1 GL	LOGGED BY: D. LOWERY

WELL LOCATION N

SEE PAGE ONE

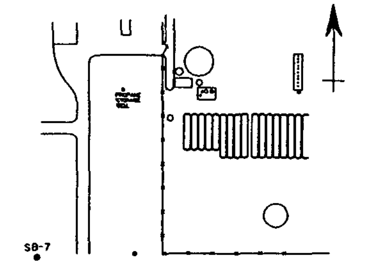
WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		CL	CLAY	RD	RED SILTY CLAY W/ GRAY MOTTLING	M					90	SB
	21											
	22											
					TD = 22.5 FT RED BED							
	23											
	24											
	25											
	26											
	27											
	28											
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											
	37											
	38											
	39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-7	

DRILLING METHOD AIR ROTARY	SAMPLING METHOD GRAB
DRILLING START 2/22/95 FINISH 2/22/95	DEVEL. START FINISH 2/24/95
STATIC DTW 27.5 TIME 09:14 DTO DATE 2/24/95	DRILLED BY EADES DRILLING
ELEVATION TOC GL 3578.71	LOGGED BY D. LOWERY

WELL LOCATION



WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		CL	SILTY CLAY	BR	SILTY CLAY LOAM TOPSOIL	D						
	1											
		SM	SILTY SAND	TN	SILTY SAND FG WITH CALICHE LAYERS							
	2											
	3	SM	SILTY SAND	TN	SILTY SAND W/ CALICHE LAYERS	D						
	4											
					OCCASIONAL CALICHE LAYERS							
	5											
	6											
	7											
	8											
	9											
	10	SM	SILTY SAND	RD/TN	FG SAND W/ CALICHE							
					CALICHE LAYER 8" HARD	D	10				80	SS
	11											
	12											
	13											
	14											
	15											
	16	SM	SILTY SAND	RD BR	SAME AS ABOVE	D						
	17											
		SM	SILTY SAND	RD BR		D						
	18				CALICHE LAYER HARD							
	19											
					SAME AS ABOVE							

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2	WELL LOCATION
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	SB-7		N SEE PAGE ONE

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 TIME DTO DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

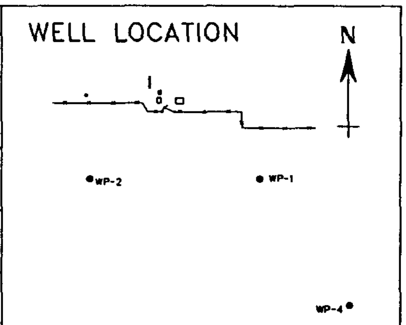
WELL CONSTRUCTION	DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		SM	SILTY SAND	RD TN	SILTY SAND W/ CALICHE LAYERS							
	21											
	22											
	23				SAME AS ABOVE	M	15				80	SB
	24											
	25											
	26											
	27				W/ SANDSTONE STRINGERS	M						
	28											
	29	SM	SILTY SAND		SAME AS ABOVE	M						
					W/ CALICHE STRINGERS							
	30				TD = 30 FT							
	31											
	32											
	33											
	34											
	35											
	36											
	37											
	38											
	39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

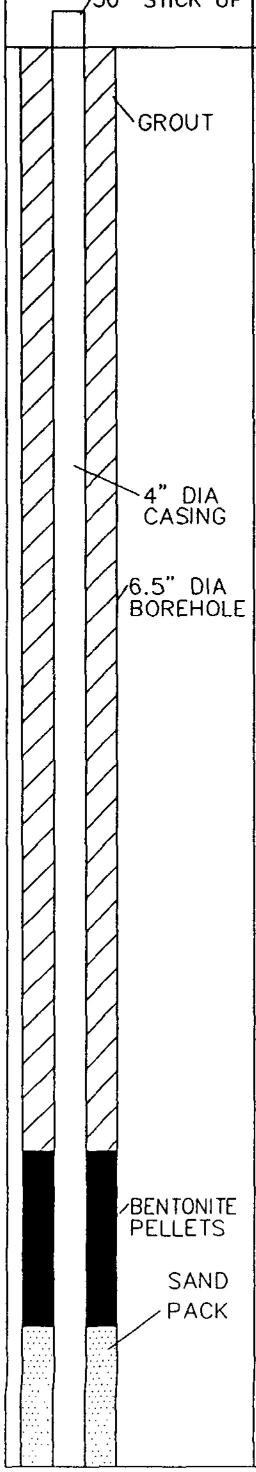
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-4	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/21/95 FINISH 2/21/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW 32.77 TIME 08:18 DTO 32.73 DATE 2/25/95	DRILLED BY: EADES DRILLING
ELEVATION TOC 3577.17 GL 3574.67	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
0	CL	SILTY CLAY	BR	BROWN CLAYEY SILT	D						
1	SM	SILTY SAND	LT BR	FG POORLY SORTED, SILTY SAND	D						
				W/GRAY CALICHE LAYERS							
2–3				BECOMING TAN							
9	SM	SILTY SAND		BECOMING RED	D						
10				W/ CALICHE LAYER							
13–14	SM	SILTY SAND		BECOMING RED-TAN	M						
14				NO CALICHE LAYER PRESENT							
17				CALICHE LAYER PRESENT							
18				CALICHE LAYER PRESENT	M						

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-4	

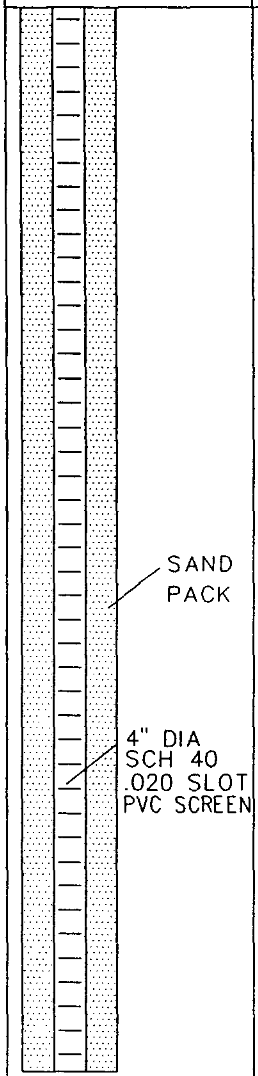
DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 DTO TIME DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION

N

SEE PAGE ONE

WELL CONSTRUCTION



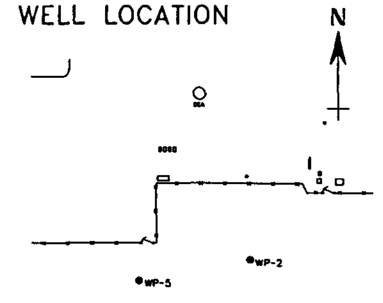
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
				SAME AS ABOVE	M						
21											
22											
23				BECOMING BROWN							
24											
25	SM	SILTY SAND	TN	PETROLEUM ODOR, TN BR, SILTY	M						
				MOTTLED GRAY W/ CALICHE LAYERS						70	SS
26											
27											
28											
29			RD BR	BECOMING RED BROWN, CLAYEY SAND							
30	SM	SILTY SAND	GRAY	GRAY CALICHE LAYER W/ NUMEROUS	M					60	SS
31				FRACTURES W/ MOIST STAINS							
				ALONG HORIZONTAL FRACTURE							
32											
33	CL	CLAY		RED CLAY	S					80	SS
34				BECOMING WEATHERED SHALE							
	SH	SHALE		SHALE SLIGHTLY WEATHERED							
35				NO PETROLEUM ODOR							
				RED BED							
36				TD = 35 FT							
37											
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

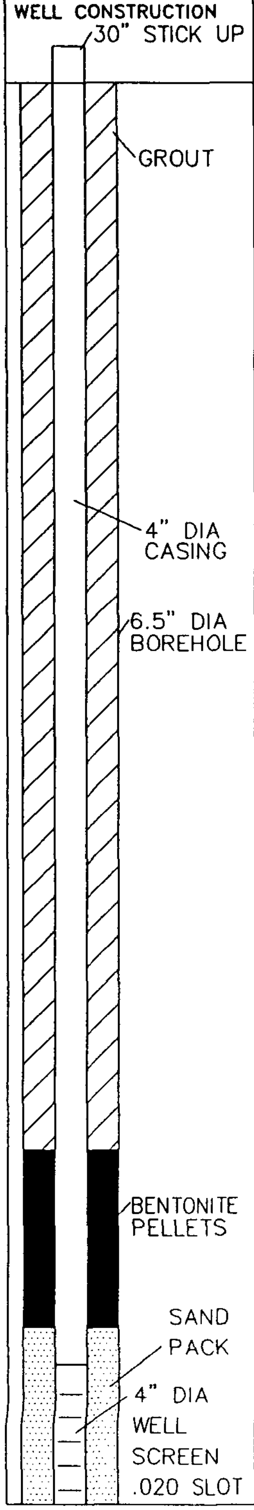
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-5	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/21/95 FINISH 2/21/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW 30.68 TIME 07:35 DTO ND DATE 2/25/95	DRILLED BY: EADES DRILLING
ELEVATION TOC 3579.44 GL 3576.94	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	ML	SILT	BR	SILT W/SOME CLAY, CALICHE NODULES	D						
1											
	CL	SILTY CLAY	BR	SILTY CLAY W/ CALICHE NODULES	D						
2											
3											
4											
				SAME AS ABOVE W/ CALICHE							
5				BECOMING TAN							
	SM	SILTY SAND	TN	SILTY CLAYEY SAND, FG, NO ODOR	D						
6											
				W/ OCCASIONAL CALICHE LAYERS							
7											
8											
9											
	SM			SAME AS ABOVE							
10											
11											
12											
13											
14											
15											
16											
17											
18											
				CALICHE LAYER, 2 FT THICK							
19											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

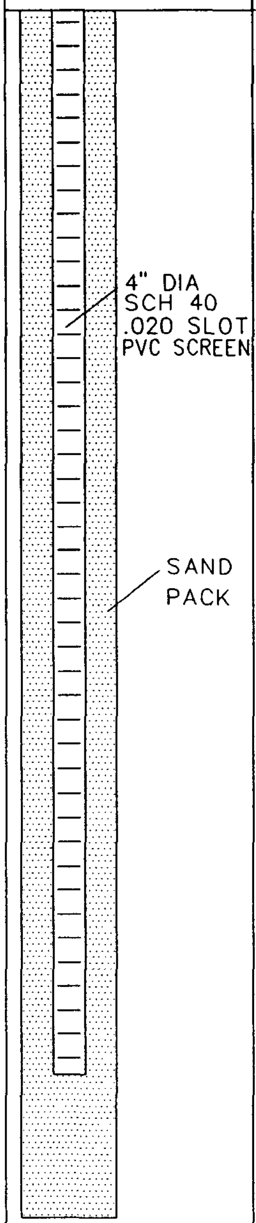
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-5	

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 TIME DTO DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION N

SEE PAGE ONE

WELL CONSTRUCTION



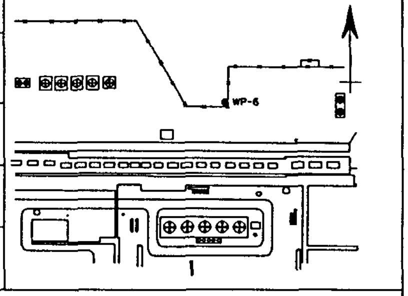
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
				SAME AS ABOVE	D						
21											
22											
23											
24											
25											
26											
27											
				BECOMING GRAVELY							
28											
29											
30	CL	CLAY	GRAY	SILTY CLAY W/ GRAVEL	M						
31											
				SAME AS ABOVE							
32	CL	CLAY	GRAY	CLAY W/ SAND	M						
33											
34				BECOMING SANDY							
35	SM	SILTY SAND	GRAY	FG-MG SILTY/CLAYEY SAND	M					80	SS
36											
				TD = 37 FT							
37											
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

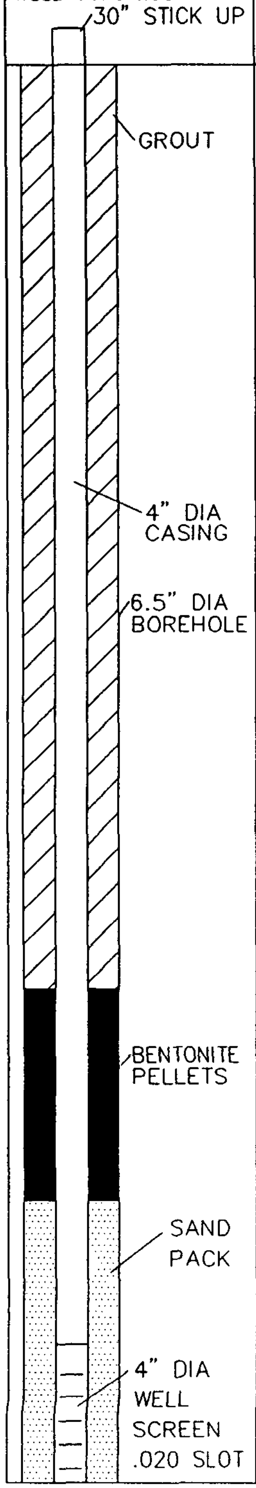
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
OK0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-6	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/22/95 FINISH 2/22/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW 28.61 TIME 09:25 DTO ND DATE 2/25/95	DRILLED BY: EADES DRILLING
ELEVATION TOC 3585.34 GL 3582.84	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		FILL		ASPHALTIC MATERIAL MIXED WITH	D						
1				SILTY CLAY							
				FINE GRAINED W/SILT							
2	SM	SAND		CALICHE LAYER							
				VERY HARD MASSIVE CALICHE LAYER	D						
3											
	SM	SAND	LT TN	FINE GRAINED W/ SILT AND							
4				CALICHE LAYERS							
5											
				SAME AS ABOVE							
6				BECOMING TAN (REDDISH)							
7											
8				W/ SANDSTONE STRINGERS							
9											
10				SAME AS ABOVE							
11											
12				W/ SANDSTONE STRINGERS	D						
13											
14											
15				SAME AS ABOVE							
16											
17											
18				BECOMING LT TAN	D						
19											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

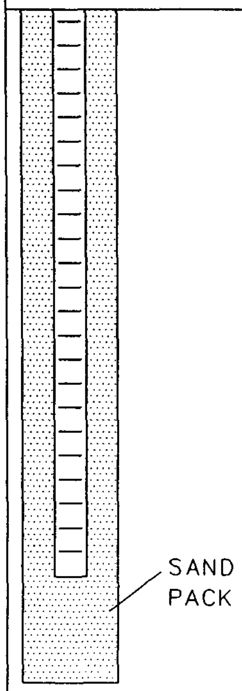
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-6	

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 TIME DTO DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 CL	LOGGED BY D. LOWERY

WELL LOCATION N

SEE PAGE ONE

WELL CONSTRUCTION



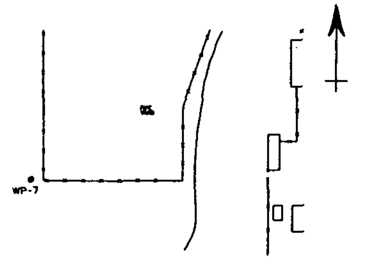
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SAND	LT BR	SILTY SAND, FINE GRAINED W/							
21				CALICHE LAYER (HARD) MASSIVE							
22											
23				4" THICK LAYER SILT/SAND							
24											
25				6" THICK LAYER SILT/SAND	D	5					
26				CALICHE							
27	CL	SILTY CLAY	RD BR	SILTY CLAY W/ CALICHE, GRAVEL	M	>2000				80	SS
				STRONG PETROLEUM ODOR							
28				RED BED							
29				TD = 29.5 FT							
30											
31											
32											
33											
34											
35											
36											
37											
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

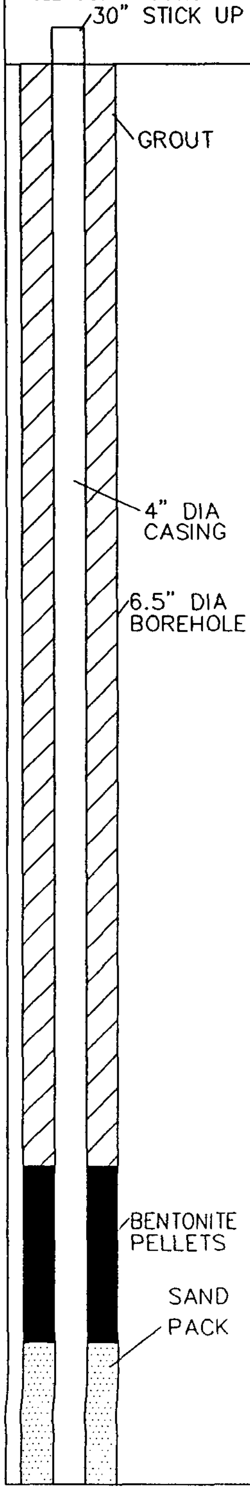
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE
OK0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-7	1 OF 2

DRILLING METHOD	AIR ROTARY	SAMPLING METHOD	GRAB
DRILLING START	2/23/95	DEVEL. START	2/24/95
FINISH	2/23/95	FINISH	2/24/95
STATIC DTW 20.44 / DTO ND	TIME 07:00 / DATE 2/25/95	DRILLED BY	EADES DRILLING
ELEVATION TOC	3583.05 / GL 3580.55	LOGGED BY	D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SILTY SAND	LT BR	SILTY SAND, METAL FRAG., STICKS	D						
1											
	SM	SILTY SAND	LT BR	SILTY SAND W/ CALICHE LAYER	D						
2											
3											
				SAME AS ABOVE							
4											
5			LT BR	SILTY SAND W/ CALICHE LAYER	D						
6											
7											
8											
	SM	SILTY SAND	LT BR	SILTY SAND W/ OCCASIONAL CALICHE	M						
9											
10	SM	SILTY SAND	DK TN	FG SAND W/ SOME SILT							
				OCCASIONAL CALICHE	D	30				80	SS
11											
12				CALICHE LAYER W/ SANDSTONE	D						
				STRINGERS 1" THICK							
13											
14											
15	SM	SAND	TN	FG SILTY SAND W/ MASSIVE	D						
				CALICHE LAYER							
16											
17											
18											
19											
				SAME AS ABOVE							

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
OK0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-7	

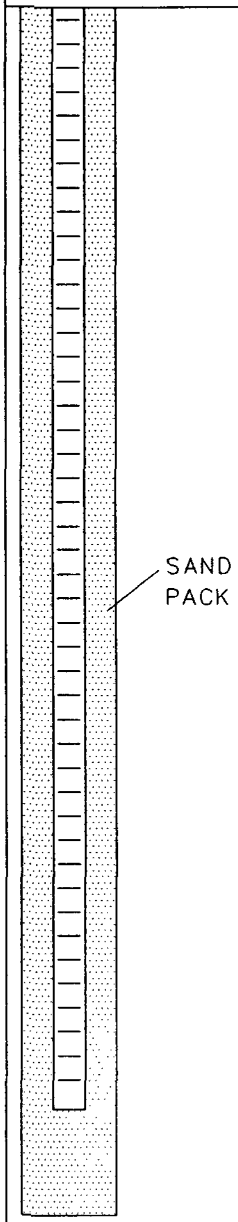
DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 DTO TIME DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION

N

SEE PAGE ONE

WELL CONSTRUCTION



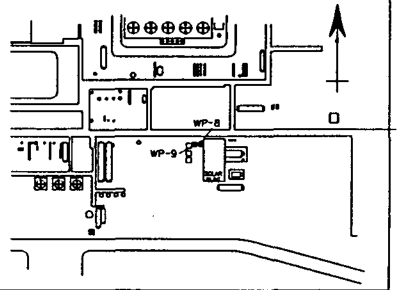
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION,SECONDARY CHARACTERISTICS, ODOR,REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SILTY SAND	TN	FG SILTY SAND W/MASSIVE CALICHE	D						
21				LAYER W/SANDSTONE STRINGERS							
	SM	SILTY SAND		W/ SANDSTONE STRINGERS							
22			TN	FG SILTY SAND W/SANDSTONE							
				STRINGERS	M	300				70	SS
23				LIMONITE STAINING W/ MINOR CALCITE							
				DEPOSITS							
24				INCREASING CLAY CONTENT							
25	SM	SILTY SAND	TN	FG SAND, SOME SILT W/ CALICHE	M						
				AND SANDSTONE STRINGERS W/							
26				INCREASING CLAY CONTENT							
27											
28											
	SM	SILTY SAND	RD TN	FG-CG SILTY SAND W/ GRAVEL	M						
29				CLAY CONTENT INCREASING							
				BECOMING GRAVELLY							
30	SM	SILTY SAND	RD TN	FG-CG SAND W/ SOME SILT	M						
				ROUNDED COARSE SAND							
31											
32											
				SAME AS ABOVE	M						
33											
34											
35											
	SW	SILTY SAND	RD	FG-CG SAND W/ GRAVEL	S	600				70	SS
36											
				TD = 37 FT							
37											
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

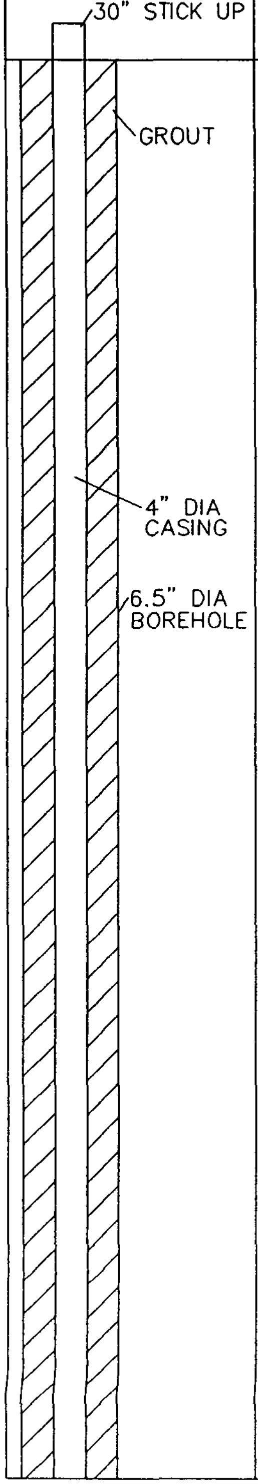
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-8	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/23/95 FINISH 2/23/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW 27.46 TIME 09:50 DTO 27.34 DATE 2/25/95	DRILLED BY: EADES DRILLING
ELEVATION TOC 3581.51 GL 3579.01	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		FILL		GRAVEL							
1	CL	CLAY	TN	SILTY CLAY W/ GRAVEL							
2											
3											
4	CL	CLAY	BR	SILTY CLAY W/ GRAVEL	M	1300				80	SS
				SLIGHT PETROLEUM ODOR							
5											
6	SM	SILTY SAND	GY	FG SILTY SAND W/ PETROLEUM ODOR	M						
7			GY	FG SAND-HARD CALICHE LAYER							
8	SM		LT TN	FG SAND W/ OCCASIONAL CALICHE							
9											
10	SM	SILTY SAND	LT TN	FG SILTY SAND W/ OCCASIONAL		1000				80	SS
11				CALICHE & SLIGHT LIMONITE STAINING							
12				BECOMING GRAY IN COLOR							
13				W/ SANDSTONE STRINGERS							
14											
15	SM	SILTY SAND	GY	FG SILTY SAND W/ CALICHE LAYER							
				AND SANDSTONE STRINGERS							
16											
17											
18											
19											
	SM	SILTY SAND	RD TN	FG W/ SILTY CLAY & CALICHE							

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

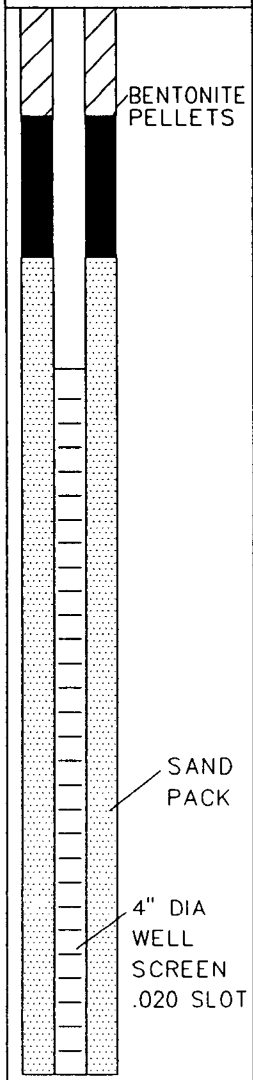
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-8	

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 DTO TIME DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION N

SEE PAGE ONE

WELL CONSTRUCTION



NO BUTTON PLUG WELL IS USED AS GROUND SOURCE FOR ELECTRICAL BUILDING

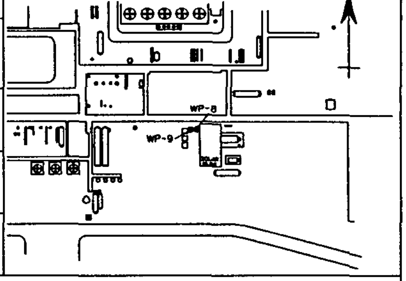
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SILTY SAND	DK TN	FG SILTY SAND W/ CALICHE							
21				AND SANDSTONE STRINGERS							
				VERY HARD MASSIVE CALICHE LAYER							
22	SM	SILTY SAND	DK TN	FG SILTY SAND W/ LIMONITE STAINING	D	500				70	SS
				PETROLEUM STAINED W/ GRAVEL							
23											
24											
25				SAME AS ABOVE							
26	CL	CLAY	RD	SILTY CLAY W/ SAND							
27											
28											
29											
30	CL	CLAY	RD	RED BEDS WEATHERED SHALE							
31				RED BED							
32											
33											
34											
35				TD = 35 FT							
					D	550				80	SS
36											
37											
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

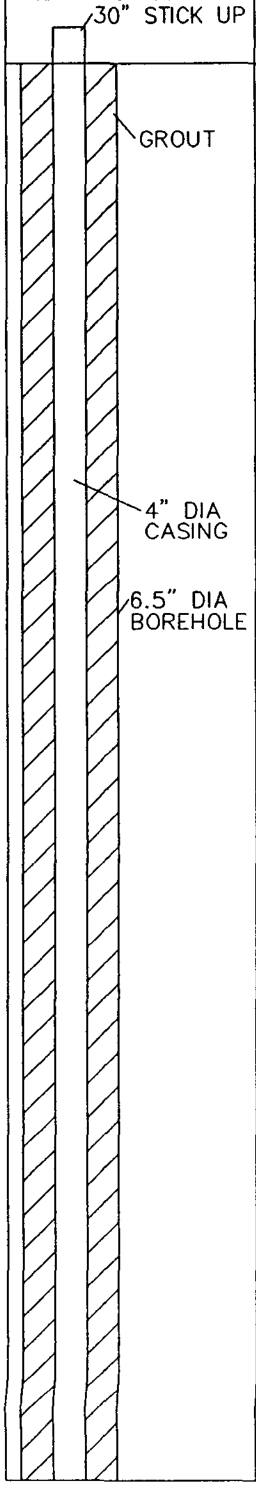
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-9	

DRILLING METHOD AIR ROTARY	SAMPLING METHOD GRAB
DRILLING START 2/23/95 FINISH 2/23/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW DTO TIME DATE	DRILLED BY EADES DRILLING
ELEVATION TOC 3581.64 GL 3579.14	LOGGED BY D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



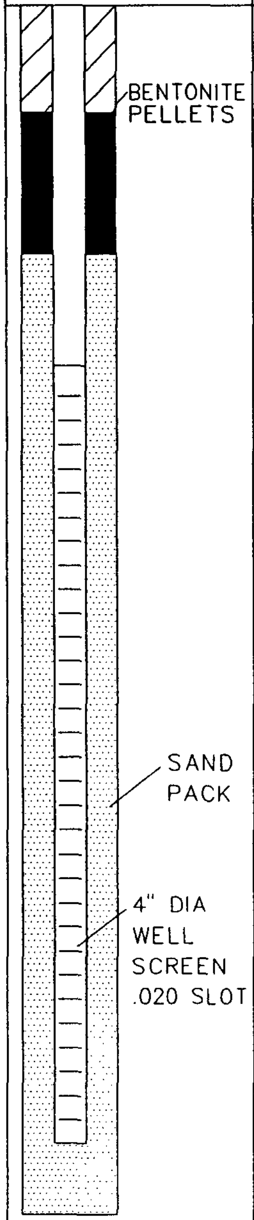
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
		FILL		GRAVEL AND ASPHALT							
1	CL	CLAY	TN	SILTY CLAY W/ GRAVEL	M						
2											
3											
4	CL	CLAY	BR	SILTY CLAY W/ GRAVEL	M						
				SLIGHT PETROLEUM ODOR							
5											
6	SM	SILTY SAND	GY	FG SILTY SAND, PETROLEUM ODOR							
7				W/ CALICHE LAYER							
8				BECOMING LT TAN							
9											
10	SM	SILTY SAND	LT TN	FG SILTY SAND W/OCCASIONAL							
11				CALICHE							
12				BECOMING GRAY IN COLOR							
13				SANDSTONE STRINGERS							
14											
15	SM	SILTY SAND	GR	FG SILTY SAND W/CALICHE							
16											
17											
18											
19											
				BECOMING REDDISH TAN							

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2	WELL LOCATION
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-9		N SEE PAGE ONE

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 TIME DTO DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL CONSTRUCTION



NO BUTTON PLUG WELL IS USED AS GROUND SOURCE FOR ELECTRICAL BUILDING

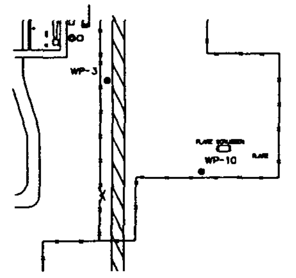
DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SILTY SAND	DK TN	FG SILTY SAND W/ CALICHE	D						
21				AND SANDSTONE STRINGERS							
22	SM	SILTY SAND	DK TN	FG SILTY SAND W/ PETROLEUM ODOR	D						
23											
24											
25				SAME AS ABOVE							
26	CL	CLAY	RD	SILTY CLAY W/ SAND	M						
27											
28											
29											
30	CL	CLAY	RD	SILTY CLAY W/ WEATHERED SHALE							
				RED BED							
31											
32											
33											
34											
35				SAME AS ABOVE	M	450				90	SS
36											
37				TD = 37 FT							
38											
39											

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

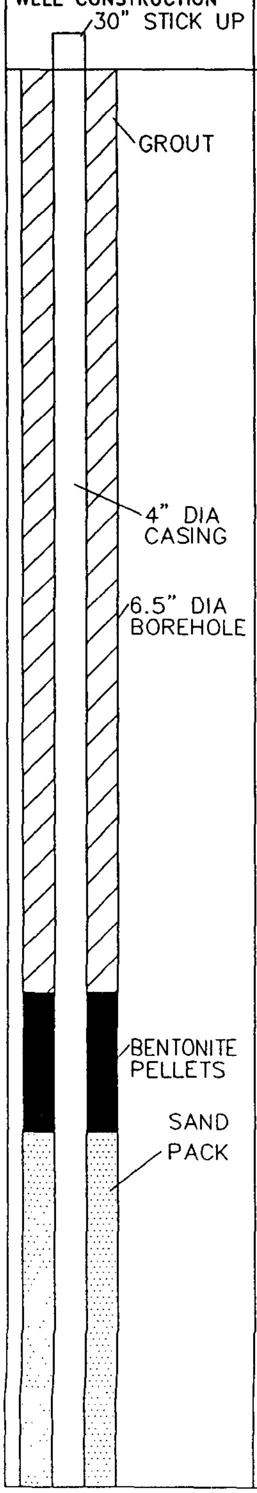
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 1 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-10	

DRILLING METHOD: AIR ROTARY	SAMPLING METHOD: GRAB
DRILLING START 2/23/95 FINISH 2/23/95	DEVEL. START 2/24/95 FINISH 2/24/95
STATIC DTW 29.04 TIME 08:50 DTO 28.47 DATE 2/25/95	DRILLED BY: EADES DRILLING
ELEVATION TOC 3580.18 GL 3577.68	LOGGED BY: D. LOWERY

WELL LOCATION



WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	ML	SILTY CLAY	LT TN	LOOSE, CLAYEY SILT W/ GRAVEL,	D						
				TOPSOIL							
1	SM	SILTY SAND	LT GY	VERY HARD MASSIVE CALICHE	D						
				FG SAND W/ SILT							
2											
3											
4											
				SAME AS ABOVE							
5	SM	SILTY SAND	LT GY	FG SAND W/ CALICHE	D						
6											
7			LT TN	FG SAND							
8											
9											
10	SM	SILTY SAND	LT TN	FG SAND W/ CALICHE							
				W/LIMONITE STAINING W/ H_2S ODOR	D	45				70	SS
11				VERY MASSIVE CALICHE							
12					D						
13											
14											
15	SM	SILTY SAND	LT TN	FG SILTY SAND W/ CALICHE	D						
				VERY HARD MASSIVE							
16											
17											
18											
19											
				SAME AS ABOVE							

GERAGHTY & MILLER INC.
ENVIRONMENTAL SERVICES

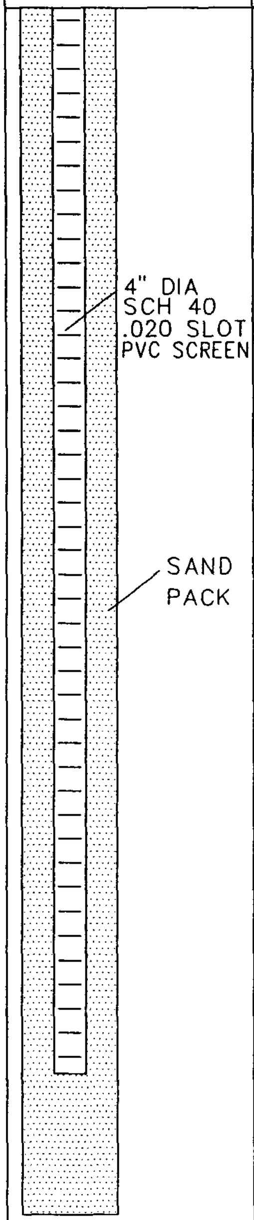
JOB NUMBER	CLIENT	LOCATION	WELL NO.	PAGE 2 OF 2
0K0532.001	WARREN PETROLEUM	MONUMENT, NM	WP-10	

DRILLING METHOD SEE PAGE 1	SAMPLING METHOD SEE PAGE 1
DRILLING START SEE PAGE 1 FINISH	DEVEL. START SEE PAGE 1 FINISH
STATIC DTW SEE PAGE 1 TIME DTO DATE	DRILLED BY SEE PAGE 1
ELEVATION TOC SEE PAGE 1 GL	LOGGED BY D. LOWERY

WELL LOCATION N

SEE PAGE ONE

WELL CONSTRUCTION



DEPTH FEET	CLASS	NAME	COLOR	DESCRIPTION: GRADATION, SECONDARY CHARACTERISTICS, ODOR, REMARKS.	M.C.	HNU (PPM)	SAMPLE NO.	SAMPLE DEPTH	BLOWS	RECOV.%	TYPE
	SM	SILTY SAND	LT TN	FG SILTY SAND W/VERY HARD	D						
21				MASSIVE CALICHE W/ SANDSTONE							
				STRINGERS							
22											
23											
				LESS MASSIVE (EASIER DRILLING)							
24	SM	SILTY SAND	LT GY	FG SILTY SAND W/VERY HARD							
25				MASSIVE							
				STRONG PETROLEUM ODOR							
26											
27											
28	SM	SILTY SAND	GY	FG SILTY SAND W/CALICHE LAYERS	D						
29					50					70	SS
30	CL	SILTY CLAY	RD	SILTY CLAY W/ PETROLEUM ODOR	M						
31				STRONG ODOR							
32											
33											
34											
35	CL	SILTY CLAY	RD	SAME AS ABOVE	M						
				STRONG PETROLEUM ODOR	400					80	SS
36				W/ WEATHERED SHALE							
37				TD = 37 FT RED BED							
38											
39											

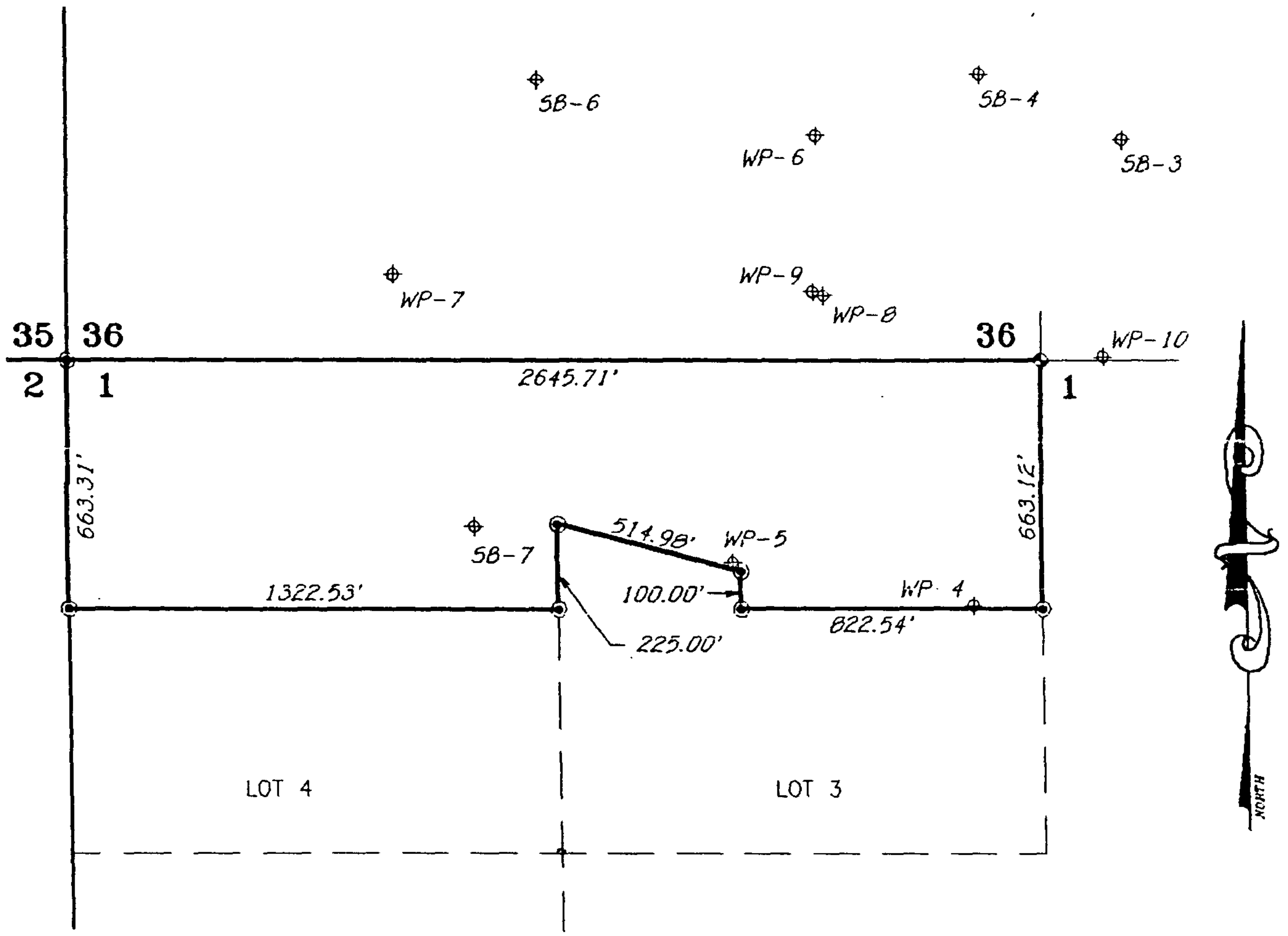
APPENDIX B

APPENDIX B

SURVEY DATA

SECTION 36, TOWNSHIP 19 SOUTH, RANGE 36 EAST, N.M.P.M., SECTION 1, TOWNSHIP 20 SOUTH, RANGE 36 EAST, N.M.P.M.,

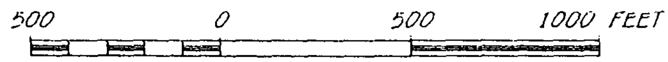
LEA COUNTY, NEW MEXICO.



ELEVATION ON WP-* WELLS ON TOP OF NORTH SIDE OF CASING.
ELEVATION ON SB-* WELLS ON 1/2" REBAR

MONITOR WELLS	ELEVATION	MONITOR WELLS	ELEVATION
WP-4	3577.17'	SB-3	3580.04'
WP-5	3579.44'	SB-4	3581.55'
WP-6	3585.34'	SB-6	3582.84'
WP-7	3583.05	SB-7	3578.71'
WP-8	3581.51'		
WP-9	3581.64'		
WP-10	3580.18		

⌖ - DENOTES MONITOR WELL
◉ - DENOTES FOUND 1/2" REBAR
◈ - DENOTES FOUND G.L.O. MONUMENT



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

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

GARY L. JONES NEW MEXICO 7977 PROFESSIONAL LAND SURVEYOR

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

W.O. Number: 5062	Drawn By: S.C. NICHOLS
Disk: SCN #10 - WAR5062.DWG	Survey Date: 02-25-05

WARREN PETROLEUM COMPANY

REF: MONUMENT PLANT - MONITOR WELLS

LOCATION OF MONITOR WELLS IN SECTION 1, TOWNSHIP 20 RANGE 36 EAST, & SECTION 36, TOWNSHIP 19 SOUTH, RANGE 36 EAST, N.M.P.M., LEA COUNTY, NEW MEXICO.

Sheet

APPENDIX C

APPENDIX C

LABORATORY ANALYTICAL DATA SHEETS FOR GROUNDWATER SAMPLES

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

JOB ID : D95-1781
CUSTOMER : Geraghty and Miller
PROJECT : OK0532.001 Monument NMX

SAMPLE ID : D95-1781-1 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-4

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
CHLORIDE /1			KOB	1-MAR-1995	343039
SOLIDS_T_D /1			RJS	3-MAR-1995	26279A
SULFATE_L /1			P_F	2-MAR-1995	356016A

SAMPLE ID : D95-1781-2 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-6

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	2-MAR-1995	34-030295
CHLORIDE /1			KOB	1-MAR-1995	343039
SOLIDS_T_D /1			RJS	3-MAR-1995	26279A
SULFATE_L /1			P_F	2-MAR-1995	356016A

SAMPLE ID : D95-1781-3 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-7

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	2-MAR-1995	34-030295
CHLORIDE /1			KOB	1-MAR-1995	343039
SOLIDS_T_D /1			RJS	3-MAR-1995	26279A
SULFATE_L /1			P_F	2-MAR-1995	356016A

SAMPLE ID : D95-1781-4 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-8

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
CHLORIDE /1			KOB	1-MAR-1995	343039
SOLIDS_T_D /1			RJS	3-MAR-1995	26279A

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SAMPLE ID : D95-1781-4 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-8

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
SULFATE_L /1			P_F	2-MAR-1995	356016A

SAMPLE ID : D95-1781-5 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-5

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	2-MAR-1995	34-030295

SAMPLE ID : D95-1781-6 DATE SAMPLED : 25-FEB-1995
ID MARKS : WP-10

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
CHLORIDE /1			KOB	1-MAR-1995	343039
SOLIDS_T_D /1			RJS	3-MAR-1995	26279A
SULFATE_L /1			P_F	2-MAR-1995	356016A

SAMPLE ID : D95-1781-7 DATE SAMPLED : 25-FEB-1995
ID MARKS : Trip Blank

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	2-MAR-1995	34-030195A

SAMPLE ID : D95-1781-8 DATE SAMPLED : 28-FEB-1995
ID MARKS : MS

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	1-MAR-1995	34-030195A
BTX_8020UL /2			CNA	2-MAR-1995	34-030295

SAMPLE ID : D95-1781-9 DATE SAMPLED : 28-FEB-1995
ID MARKS : MSD

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	1-MAR-1995	34-030195A

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SAMPLE ID : D95-1781-9 DATE SAMPLED : 28-FEB-1995 ID MARKS : MSD					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /2			CNA	2-MAR-1995	34-030295

SAMPLE ID : D95-1781-10 DATE SAMPLED : 28-FEB-1995 ID MARKS : Method Blank					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	1-MAR-1995	34-030195A
BTX_8020UL /2			CNA	2-MAR-1995	34-030295

SAMPLE ID : D95-1781-11 DATE SAMPLED : 28-FEB-1995 ID MARKS : LCS					
ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
BTX_8020UL /1			CNA	1-MAR-1995	34-030195A
BTX_8020UL /2			CNA	2-MAR-1995	34-030295

ANALYSIS	DESCRIPTION
CHLORIDE	Chloride, Liquid Matrix, Titration
SOLIDS_T_D	Total Dissolved Solids (TDS)
SULFATE_L	Sulfate, Liquid Matrix
BTX_8020UL	BTEX, Liquid in µg/L

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-1
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-4
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT	RESULTS
Chloride	/1	1.0 mg/L	396 mg/L
Dilution Factor : 1 Analyzed using EPA 9252 on 1-MAR-1995 by KOB QC Batch No : 343039			
Total Dissolved Solids	/1	10.0 mg/L	1820 mg/L
Analyzed using EPA 160.1 on 3-MAR-1995 by RJS QC Batch No : 26279A			
Sulfate	/1	1.0 mg/L	< 1.0 mg/L
Dilution Factor : 1 Analyzed using EPA 9038 on 2-MAR-1995 by P_F QC Batch No : 356016A			

Martin Jeffus

Martin Jeffus
General Manager

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-2
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-6
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS

TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	393 µg/L
Toluene	1.0 µg/L	12.8 µg/L
Ethyl benzene	1.0 µg/L	481 µg/L
Xylenes	1.0 µg/L	134 µg/L
BTEX (total)		1020 µg/L #

QUALITY CONTROL DATA

SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	77.3 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

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General Manager

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-2
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-6
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloride /1	10 mg/L	1610 mg/L
Dilution Factor : 10 Analyzed using EPA 9252 on 1-MAR-1995 by KOB QC Batch No : 343039		
Total Dissolved Solids /1	10.0 mg/L	4660 mg/L
Analyzed using EPA 160.1 on 3-MAR-1995 by RJS QC Batch No : 26279A		
Sulfate /1	20 mg/L	298 mg/L
Dilution Factor : 20 Analyzed using EPA 9038 on 2-MAR-1995 by P_F QC Batch No : 356016A		

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-3
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-7
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	2.7 µg/L
Xylenes	1.0 µg/L	2.4 µg/L
BTEX (total)		5.1 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	106 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-3
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-7
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT		RESULTS	
Chloride	/1	50	mg/L	10100	mg/L
Dilution Factor : 50 Analyzed using EPA 9252 on 1-MAR-1995 by KOB QC Batch No : 343039					
Total Dissolved Solids	/1	10.0	mg/L	26200	mg/L
Analyzed using EPA 160.1 on 3-MAR-1995 by RJS QC Batch No : 26279A					
Sulfate	/1	100	mg/L	6750	mg/L
Dilution Factor : 100 Analyzed using EPA 9038 on 2-MAR-1995 by P_F QC Batch No : 356016A					

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-4
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-8
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloride /1	10 mg/L	1910 mg/L
Dilution Factor : 10 Analyzed using EPA 9252 on 1-MAR-1995 by KOB QC Batch No : 343039		
Total Dissolved Solids /1	10.0 mg/L	5240 mg/L
Analyzed using EPA 160.1 on 3-MAR-1995 by RJS QC Batch No : 26279A		
Sulfate /1	1.0 mg/L	19.9 mg/L
Dilution Factor : 1 Analyzed using EPA 9038 on 2-MAR-1995 by P_F QC Batch No : 356016A		

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-5
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-5
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	30.1 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		30.1 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	100 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-6
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : WP-10
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995

MISCELLANEOUS ANALYSES

TEST REQUESTED	DETECTION LIMIT	RESULTS
Chloride /1	10 mg/L	3790 mg/L
Dilution Factor : 10 Analyzed using EPA 9252 on 1-MAR-1995 by KOB QC Batch No : 343039		
Total Dissolved Solids /1	10.0 mg/L	7810 mg/L
Analyzed using EPA 160.1 on 3-MAR-1995 by RJS QC Batch No : 26279A		
Sulfate /1	20 mg/L	431 mg/L
Dilution Factor : 20 Analyzed using EPA 9038 on 2-MAR-1995 by P_F QC Batch No : 356016A		

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-7
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : Trip Blank
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 25-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030195A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	103 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-8
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : MS
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 1-MAR-1995
DILUTION FACTOR : 10
METHOD FACTOR : 1
QC BATCH NO : 34-030195A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	10 µg/L	471 µg/L
Ethyl benzene	10 µg/L	504 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	96.6 %

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-8
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : MS
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /2
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 10
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	10 µg/L	420 µg/L
Ethyl benzene	10 µg/L	451 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	99.5 %

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DATE RECEIVED : 27-FEB-1995 REPORT NUMBER : D95-1781-9
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : MSD
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 1-MAR-1995
DILUTION FACTOR : 10
METHOD FACTOR : 1
QC BATCH NO : 34-030195A

BTEX ANALYSIS

TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	10 µg/L	492 µg/L
Ethyl benzene	10 µg/L	532 µg/L

QUALITY CONTROL DATA

SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	95.9 %

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-9
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : MSD
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /2
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 10
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	10 µg/L	409 µg/L
Ethyl benzene	10 µg/L	442 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	105 %

Martin Jeffus

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General Manager

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-10
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : Method Blank
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 1-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030195A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	103 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

Martin Jeffus
General Manager

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Environmental Laboratories

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DATE RECEIVED : 27-FEB-1995

REPORT NUMBER : D95-1781-10
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : Method Blank
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /2
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS

TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	< 1.0 µg/L
Toluene	1.0 µg/L	< 1.0 µg/L
Ethyl benzene	1.0 µg/L	< 1.0 µg/L
Xylenes	1.0 µg/L	< 1.0 µg/L
BTEX (total)		< 1.0 µg/L #

QUALITY CONTROL DATA

SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	103 %

Based upon Good Laboratory Practice, the result is rounded to the appropriate number of significant figures.

Martin Jeffus

Martin Jeffus
General Manager

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

DATE RECEIVED : 27-FEB-1995   REPORT NUMBER : D95-1781-11
REPORT DATE : 7-MAR-1995

SAMPLE SUBMITTED BY : Geraghty and Miller
ADDRESS : 11020 King Street #215
: Overland Park, KS 66210
ATTENTION : Mr. John Shanfelt

SAMPLE MATRIX : Liquid
ID MARKS : LCS
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /1
ANALYZED BY : CNA
ANALYZED ON : 1-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030195A

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	48.4 µg/L
Ethyl benzene	1.0 µg/L	53.2 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	97.6 %

Martin Jeffus
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General Manager

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SAMPLE MATRIX : Liquid
ID MARKS : LCS
PROJECT : OK0532.001 Monument NMX
PURCHASE ORDER NO : Task Order No.1182
DATE SAMPLED : 28-FEB-1995
ANALYSIS METHOD : EPA 8020 /2
ANALYZED BY : CNA
ANALYZED ON : 2-MAR-1995
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 34-030295

BTEX ANALYSIS		
TEST REQUESTED	DETECTION LIMIT	RESULTS
Benzene	1.0 µg/L	51.8 µg/L
Ethyl benzene	1.0 µg/L	56.3 µg/L

QUALITY CONTROL DATA		
SURROGATE COMPOUND	SPIKE LEVEL	SPIKE RECOVERED
Bromofluorobenzene	50.0 µg/L	95.7 %

Martin Jeffus
Martin Jeffus
General Manager

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

REPORT DATE : 7-MAR-1995 REPORT NUMBER : D95-1781

SAMPLE SUBMITTED BY : Geraghty and Miller
ATTENTION : Mr. John Shanfelt
PROJECT : OK0532.001 Monument NMX

LABORATORY QUALITY CONTROL REPORT

ANALYTE	Benzene	Ethylbenzene	Benzene	Ethylbenzene	Chloride
BATCH NO.	34-030195A	34-030195A	34-030295	34-030295	343039
LCS LOT NO.	020795A	020795A	020795A	020795A	ERA9963
PREP METHOD	---	---	---	---	---
PREPARED BY	---	---	---	---	---
ANALYSIS METHOD	EPA 8020	EPA 8020	EPA 8020	EPA 8020	EPA 9252
ANALYZED BY	CNA	CNA	CNA	CNA	KOB
UNITS	µg/L	µg/L	µg/L	µg/L	mg/L
METHOD BLANK	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
MS RECOVERY %	94.2	101	84.0	90.2	100
MSD RECOVERY %	98.4	106	81.8	88.4	99.7
MS/MSD RPD %	4.36	5.41	2.65	2.02	0.56
BS RECOVERY %	NA	NA	NA	NA	NA
BSD RECOVERY %	NA	NA	NA	NA	NA
BS/BSD RPD %	NA	NA	NA	NA	NA
DUPLICATE RPD %	NA	NA	NA	NA	0.00
LCS RECOVERY %	96.8	106	104	113	100
SPIKE SAMPLE ID	1781-7	1781-7	1788-1	1788-1	1746-1
DUP SAMPLE ID	---	---	---	---	1746-1

NA Not applicable

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

REPORT DATE : 7-MAR-1995 REPORT NUMBER : D95-1781

SAMPLE SUBMITTED BY : Geraghty and Miller
ATTENTION : Mr. John Shanfelt
PROJECT : OK0532.001 Monument NMX

LABORATORY QUALITY CONTROL REPORT

ANALYTE	Total Dissolved Solids	Sulfate
BATCH NO.	26279A	356016A
LCS LOT NO.	ERA9963	386026C
PREP METHOD	---	---
PREPARED BY	---	---
ANALYSIS METHOD	EPA 160.1	EPA 9038
ANALYZED BY	RJS	P_F
UNITS	mg/L	mg/L
METHOD BLANK	< 10.0	< 1.00
MS RECOVERY %	NA	96.0
MSD RECOVERY %	NA	93.8
MS/MSD RPD %	NA	2.29
BS RECOVERY %	NA	NA
BSD RECOVERY %	NA	NA
BS/BSD RPD %	NA	NA
DUPLICATE RPD %	0.32	NC
LCS RECOVERY %	96.8	95.5
SPIKE SAMPLE ID	---	1781-1
DUP SAMPLE ID	1781-3	1781-1

NA Not applicable
NC Not calculable

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No.______

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number 0K0532.001
Project Location Monument NMx
Laboratory INCHCAPE TESTING
Sampler(s)/Affiliation O. DeLeon-Warren
D. Lowery - G&M

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	BTEX Method 8015	Chloride, Sulfate TDS				Due 3/10/95				TOTAL
WP-4	L	2-25-95 8:18			1						1781	1	
WP-26 KWM 2/28/95	L	2-25-95 9:25		2	1							2	
WP-7	L	2-25-95 7:00		2	1							3	
WP-8	L	2-25-95 9:50			1							4	
WP-5	L	2-25-95 7:35		2								5	
WP-10	L	2-25-95 8:50			1							6	
TRIP BLANK	L			2								7	
MS												8	
MSD												9	
MB												10	
LCS												11	

ORIGINAL

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers

Relinquished by: D. E. Lowery Received by: B. Wilson	Organization: G&M Organization: ITS	Date 2/25/95 Time 1200 Date 2/27/95 Time 9:50	Seal Intact? Yes No N/A
Relinquished by: ______ Received by: ______	Organization: ______ Organization: ______	Date __/__/__ Time ______ Date __/__/__ Time ______	Seal Intact? Yes No N/A

Special Instructions/Remarks:

SCREENED FOR RADIOACTIVITY

COOLER TEMPERATURE WHEN RECEIVED 16 °C

KWM 2/28/95

Delivery Method: ☐ In Person ☐ Common Carrier ______ IFY ☐ Lab Courier ☐ Other ______ PECIFY

02/24/95 13:37 ☎393 4780 WARREN PET MOUNM 1781 ☑002
FEB-16-'95 THU 10:01 ID: TEL NO: #029 P02
B-13 95 08:49 FROM:GERAGHTY&MILLER 913-451-9156 TO:214 238 5592 PAGE:02

GERAGHTY & MILLER, INC.
Environmental Services

LABORATORY TASK ORDER

Task Order No.: 1182

Geraghty & Miller Office: Kansas City Phone: 913-451-9010 Date: 2/3/95
Address: 11020 King Street, Suite 215 Project Number: OK0532.001
Overland Park, Kansas 66210 Laboratory Reporting Level: ☐ I ☒ II ☐ III ☐ IV
Project Name: Warren Petroleum Location: Monument, New Mexico
Laboratory: NDRC - INCHCAPE SERVICES Phone (214) 238-5591 Contact: Janice McKittrick
Lab Provides Sample Containers? ☒ Yes ☐ No Date Required: ______ Ship To: David Lowery
Estimated Date Of Sample Receipt By Laboratory: ______ Report Due: Standard turnaround
Reports Delivered To: John Shoafelt Number Of Reports: 3
Work Description: Ground water Samples
Send Invoice To: John Shoafelt - 5100 East Skelly Dr. Suite 1000 Tulsa OK. 74135

PHYSICAL PROPERTIES	# Water	Method	Det. Limit	# Soil	Method	Det. Limit	NON-METALLICS	# Water	Method	Det. Limit	# Soil	Method	Det. Limit
pH							Acidity						
Spec. Cond.							Alkalinity (Total)						
Hardness (total)							Carbonate						
TDS	6						Bicarbonate						
TSS							Bromide						
Temperature							Chloride	6					
Turbidity							Cyanide						
Ignitability							Fluoride						
Corrosivity							Ammonia						
Reactivity							Nitrate						
E.P. Tox. Extraction							TKN						
TCLP Extraction							Nitrite						
E.P. Tox. Complete							Phosphorus						
TCLP Complete							Silica						
METALS[1]							Sulfate	6					
Aluminum							Sulfide						
Antimony							Surfactants (MBAS)						
Arsenic							ORGANICS						
Barium							BOD						
Beryllium							COD						
Cadmium							Oil & Grease						
Calcium							TOC						
Chromium							TOX						
Hex Chromium							~~TPH See note~~	~~18~~	~~8015~~	OMIT			
Copper							Purg. Halocarbons[2]						
Iron							Non-Halogenated VOCs[2]						
Lead							Purgeable Arom.[2]						
Magnesium							Phenols[2]						
Manganese							Pesticides/PCBs[2]						
Mercury							PNAs[2]						
Nickel							Org. Phos. Pest.[2]						
Potassium							Dioxins						
Selenium							Chlor. Herb.[2]						
Silver							Volatile Organics[2]	18	8020				
Sodium							Semi Volatile Organics[2]						
Thallium							APPENDIX IX[3]						
Tin							RADIONUCLIDES						
Vanadium							Gross Alpha						
Zinc							Gross Beta						
Priority Pollutant Metals[2]							Radium 226						
TCL (HSL) Metals[2]							Radium 228						

[1] Metals are Total Metals Unless Specified as Dissolved Under Special Instructions. [2] Attach Table of Elements or Compounds to be Analyzed. [3] Includes All Organic and Inorganic Compounds.

Special Instructions Or Other: 2/ Volatile organics - Method 8020 Analyze for Benzene, toluene, ethylbenzene, xylenes (BTEX). ~~TPH - Method 8015 DIESEL~~
ALSO Analyze for TDS, Chlorides & Sulfates

INCHCAPE TESTING SERVICES
NDRC Laboratories

SAMPLE PRESERVATION INFORMATION SHEET

Preserved By	KRH	JOB NUMBER	1781
Date	2-27-95		
Time	0950	Client Name	GeR & Miller

Sample No.	Container Type	Apparent Volume (mLs)	Initial pH* (20± 2°C)	Final pH	Preservative Added	Filtration	Comments
1781-1	1AG	1L	7.2	7.2	8		NP
-2	〃	〃	7.1	7.1	〃		〃
-3	〃	〃	6.9	6.9	〃		〃
-4	〃	〃	7.3	7.3	〃		〃
-6	〃	〃	〃	〃	〃		〃

KRH

pH Duplicate (maximum difference = 0.2):

Sample No. 1781-1 — 7.2

pH LCS (pH = 7.0 ± 0.2):

Number: 5059 — 7.0

PRESERVATIVE / FILTRATION KEY

1 = Pre-preserved
2 = H_2SO_4 to pH<2
3 = HNO_3 to pH<2
4 = HCl to pH<2
5 = NaOH to pH>12
6 = $Na_2S_2O_3$ (0.008%)
7 = 2 mL ZnOAc/NaOH to pH>12
8 = No Preservative Required

F = Chain-of-Custody indicates sample was filtered in the field
L = Sample filtered (0.45 pm) in the laboratory before preservation

* The initial pH is determined in accordance with EPA methods 150.1 / SW-846 9040 using a sample aliquot which has been adjusted to 20 ± 2°C

APPENDIX D

APPENDIX D

LABORATORY ANALYSIS OF LIQUID HYDROCARBONS

March 17, 1995

Geraghty & Miller, Inc.
5100 E. Skelly Drive, Suite 1000
Tulsa, OK 74135
Attn: Mr. John Shonfelt

Ref: Proj #0K0532.001
Sample WP-2 & WP-10

Dear Mr. Shonfelt

We have analyzed by CAP GC the two subject samples. Both samples WP-2 and WP-10 are rather simular they both seem to be a light condensate. They have not weathered heavily based upon butane in WP-2 and WP-10 has high pentanes. Although the butane is gone. The samples have low BETX (WP-2 has 1.28 wt.%) with benzene and ethyl benzene representing 0.968 wt. % of the total. Sample WP-10 has benzenes and ethyl benzenes representing 75.62 % of the total.

The absence of 2,2,4-trimethylpentane suggest the samples are not gasoline.

The materials are likely retrograde condensate from natural gas and the source is likely from dry locations.

The materials may be from different locations or samples. WP-2 has been in the environment for a shorter time (butanes present).

The rather high olefins content (WP-2 and WP-10) could mean a comingling of an alkylate stream with the condensate.

In any case the samples do not seem to be refined products and are likely highly naphthenic condensates.

Sincerely,

J. C. Winfrey
Consultant

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234740 G&M WP-2
File: CAP21
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 257 Peaks

Composite Report

Hydrocarbon Totals by Group Type

Type	Wt %	Vol %	Mol %
Total Paraffins:	18.642	20.363	21.918
Total Iso-paraffins:	39.308	41.498	40.514
Total Naphthenes:	27.033	24.898	27.423
Total Aromatics:	4.010	3.146	3.120
Total Olefins:	3.566	3.523	3.223
Total C26	0.000	0.000	0.000
Total Unknowns:	7.441	6.572	3.803
Total:	100.000	100.000	100.000

Totals by Carbon Number

Group	Wt %	Vol %	Mol %	Ave. Mw.	Ave. Sp Gr.
Methane	0.000	0.000	0.000	0.000	0.000
Ethane	0.000	0.000	0.000	0.000	0.000
Propane	0.000	0.000	0.000	0.000	0.000
Butanes:	0.332	0.405	0.533	58.124	0.576
Pentanes:	19.379	21.551	25.137	71.983	0.632
Hexanes:	35.009	35.453	38.317	85.311	0.694
Heptanes:	20.285	19.837	19.067	99.340	0.719
Octanes:	8.870	8.426	7.351	112.667	0.740
Nonanes:	3.955	3.740	2.906	127.089	0.744
Decanes:	1.541	1.380	1.034	139.168	0.785
C11's:	1.405	1.110	0.886	148.106	0.890
C12's:	1.314	1.094	0.746	164.460	0.844
C13's:	0.148	0.138	0.075	184.470	0.756
C14's:	0.202	0.186	0.095	198.390	0.763
C15's:	0.075	0.069	0.033	212.420	0.769
C16's:	0.023	0.021	0.010	226.448	0.773
C17's:	0.021	0.019	0.008	240.475	0.777
C18's:	0.000	0.000	0.000	0.000	0.000
C19's:	0.000	0.000	0.000	0.000	0.000
C20's:	0.000	0.000	0.000	0.000	0.000
C21's:	0.000	0.000	0.000	0.000	0.000
C22's:	0.000	0.000	0.000	0.000	0.000
C23's:	0.000	0.000	0.000	0.000	0.000
C24's:	0.000	0.000	0.000	0.000	0.000
C25's:	0.000	0.000	0.000	0.000	0.000
C26's:	0.000	0.000	0.000	0.000	0.000
C26	0.000	0.000	0.000		
Unknowns:	7.441	6.572	3.803		

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234740 G&M WP-2
File: CAP21
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 257 Peaks

Types by Carbon Number

Paraffins:	C1	0.000	0.000	0.000
	C2	0.000	0.000	0.000
	C3	0.000	0.000	0.000
	C4	0.294	0.357	0.472
	C5	11.502	12.914	14.884
	C6	3.960	4.223	4.291
	C7	1.347	1.385	1.255
	C8	0.567	0.567	0.463
	C9	0.221	0.216	0.161
	C10	0.106	0.102	0.069
	C11	0.092	0.087	0.055
	C12	0.085	0.080	0.047
	C13	0.148	0.138	0.075
	C14	0.202	0.186	0.095
	C15	0.075	0.069	0.033
	C16	0.023	0.021	0.010
	C17	0.021	0.019	0.008
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Iso-paraffins:	C4	0.038	0.048	0.061
	C5	6.300	7.150	8.154
	C6	18.495	19.751	20.039
	C7	7.600	7.792	7.083
	C8	3.356	3.350	2.743
	C9	2.332	2.281	1.698
	C10	0.687	0.659	0.451
	C11	0.238	0.224	0.143
	C12	0.261	0.244	0.143
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Aromatics:	C6	0.697	0.557	0.833
	C7	0.075	0.061	0.076
	C8	0.533	0.432	0.469
	C9	0.274	0.223	0.213
	C10	0.505	0.406	0.352
	C11	1.028	0.758	0.660
	C12	0.898	0.709	0.517
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000

	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Naphthenes:	C5	1.577	1.488	2.100
	C6	11.857	10.922	13.154
	C7	8.646	7.994	8.222
	C8	3.465	3.158	2.883
	C9	1.128	1.020	0.834
	C10	0.243	0.213	0.161
	C11	0.047	0.041	0.029
	C12	0.070	0.061	0.039
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Olefins:	C4	0.000	0.000	0.000
	C5	0.000	0.000	0.000
	C6	0.000	0.000	0.000
	C7	2.616	2.605	2.430
	C8	0.950	0.918	0.793
	C9	0.000	0.000	0.000

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234740 G&M WP-2
File: CAP21
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 257 Peaks

Boiling Point Distribution Data

Wt. Percent Off	deg.C.	Vol. Percent Off	deg.C.
IBP (0.5%)	27.84	IBP (0.5%)	27.84
10.0	36.06	10.0	36.06
20.0	49.73	20.0	36.06
30.0	60.26	30.0	60.26
40.0	68.73	40.0	63.27
50.0	80.72	50.0	71.80
60.0	90.77	60.0	89.78
70.0	100.93	70.0	93.64
80.0	118.54	80.0	117.50
90.0	199.00	90.0	167.80
FBP (99.5%)	>215.00	FBP (99.5%)	>215.00

Research Octane Number = 75.01

(Calculated from Individual Component Values)

Contribution to Total by:

Paraffins:	8.97
Iso-paraffins:	30.79
Aromatics:	3.91
Naphthenes:	21.75
Olefins:	2.89

WT% Hydrogen = Not Calculated

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234740 G&M WP-2
File: CAP21
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 257 Peaks

Components Listed in Chromatographic Order

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
1	9.07	366.3	i-Butane	732	0.038	0.048	0.061	1.45
2	9.48	400.0	n-Butane	5682	0.294	0.357	0.472	0.00
3	11.02	474.6	i-Pentane	121151	6.300	7.150	8.154	0.06
4	11.85	500.0	n-Pentane	217713	11.502	12.914	14.884	0.00
5	13.42	536.5	2,2-Dimethylbutane	10717	0.540	0.585	0.585	0.45
6	15.07	564.8	Cyclopentane	30094	1.577	1.488	2.100	0.25
7	15.17	566.2	2,3-Dimethylbutane	39327	1.917	2.037	2.077	0.04
8	15.43	570.1	2-Methylpentane	166990	8.446	9.093	9.151	0.02
9	16.47	583.9	3-Methylpentane	147853	7.593	8.036	8.226	0.14
10	17.85	600.0	n-Hexane	78504	3.960	4.223	4.291	0.00
11	20.13	626.7	2,2-Dimethylpentane	5123	0.256	0.267	0.238	0.06
12	20.38	629.3	Methylcyclopentane	115229	5.923	5.563	6.571	0.07
13	20.77	633.2	2,4-Dimethylpentane	11623	0.574	0.600	0.535	0.14
14	21.33	638.7	2,2,3-Trimethylbutane	1106	0.056	0.055	0.053	0.41
15	22.88	652.8	Benzene	15409	0.697	0.557	0.833	0.04
16	23.57	658.5	3,3-Dimethylpentane	3061	0.154	0.156	0.143	0.09
17	24.03	662.3	Cyclohexane	121732	5.934	5.359	6.583	0.26
18	25.13	670.7	2-Methylhexane	37204	1.873	1.941	1.745	0.13
19	25.35	672.3	2,3-Dimethylpentane	30086	1.465	1.482	1.365	0.24
20	25.68	674.8	1,1-Dimethylcyclopentane	15804	0.767	0.715	0.729	0.07
21	26.25	678.8	3-Methylhexane	55312	2.799	2.864	2.608	0.19
22	27.07	684.4	1c,3-Dimethylcyclopentane	29659	1.422	1.342	1.352	0.12
23	27.43	686.8	1t,3-Dimethylcyclopentane	26970	1.373	1.289	1.305	0.21
24	27.60	687.9	3-Ethylpentane	8259	0.425	0.428	0.396	0.20
25	27.80	689.2	Heptene-1	37852	1.902	1.919	1.809	0.11
26	29.55	700.0	n-Heptane	26806	1.347	1.385	1.255	0.00
27	32.43	721.2	Methylcyclohexane	99029	4.802	4.388	4.566	0.12
28	32.87	724.2	2,2-Dimethylhexane	14187	0.706	0.714	0.577	0.49
29	34.13	732.6	036	7899	0.397	0.381	0.377	0.29
30	34.32	733.8	Ethylcyclopentane	5858	0.283	0.260	0.269	0.47
31	34.62	735.7	2,2,3-Trimethylpentane	6999	0.345	0.338	0.282	0.18
32	35.47	741.0	2,4-Dimethylhexane	13993	0.688	0.691	0.563	0.10
33	35.68	742.3	1c,2t,4-Trimethylcyclopentane	1740	0.084	0.077	0.070	0.02
34	36.63	748.0	1t,2c,3-Trimethylcyclopentane	14755	0.723	0.660	0.601	0.42
35	37.10	750.8	040	573	0.029	0.028	0.027	0.34
36	37.68	754.1	Toluene	1667	0.075	0.061	0.076	0.69
37	38.97	761.3	2,3-Dimethylhexane	2572	0.135	0.133	0.110	0.46
38	39.08	761.9	1,1,2-Trimethylcyclopentane	984	0.049	0.045	0.041	0.21
39	40.05	767.1	2-Methylheptane	11944	0.603	0.607	0.493	0.17
40	40.32	768.5	3,4-Dimethylhexane	6334	0.318	0.311	0.260	0.17

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
41	40.63	770.1	4-Methylheptane	3401	0.171	0.171	0.140	0.31
42	41.08	772.4	1c,2c,3-Trimethylcyclopentane	1318	0.066	0.061	0.055	0.43
43	41.45	774.3	1t,3-Dimethylcyclohexane	10847	0.545	0.503	0.454	0.21
44	41.75	775.8	1c,2t,4-Trimethylcyclopentane	24360	1.224	1.117	1.018	0.20
45	42.12	777.6	3-Ethylhexane	7775	0.391	0.385	0.319	0.32
46	43.18	782.8	1,3-Octadiene	3636	0.183	0.168	0.155	0.22
47	43.90	786.2	2,2,5-Trimethylhexane	3012	0.151	0.150	0.110	0.43
48	44.33	788.3	3t-Ethylmethylcyclopentane	2550	0.128	0.117	0.107	0.05
49	44.60	789.5	2,3,5-Trimethylhexane	5541	0.278	0.271	0.203	0.29
50	45.03	791.5	2t-Ethylmethylcyclopentane	710	0.036	0.033	0.030	0.03
51	45.65	794.3	t-Octene-4	10730	0.539	0.528	0.449	0.14
52	46.95	800.0	n-Octane	11484	0.567	0.567	0.463	0.00
53	47.22	801.5	049	4534	0.228	0.223	0.190	0.41
54	50.27	818.0	c-Octene-2	620	0.031	0.030	0.026	0.25
55	52.73	830.4	1c,2-Dimethylcyclohexane	2436	0.122	0.108	0.102	0.42
56	54.13	837.2	2,5-Dimethylheptane	13838	0.695	0.682	0.506	0.19
57	54.47	838.8	2,4-Dimethylheptane	7419	0.373	0.366	0.271	0.37
58	55.52	843.7	Ethylcyclohexane	8238	0.414	0.371	0.344	0.48
59	56.10	846.4	3,3-Dimethylheptane	4292	0.216	0.209	0.157	0.36
60	56.75	849.3	2,6-Dimethylheptane	723	0.036	0.036	0.026	0.09
61	57.05	850.7	N5	818	0.041	0.037	0.034	0.56
62	57.42	852.3	N6	650	0.033	0.029	0.027	0.20
63	58.42	856.7	Ethylbenzene	5712	0.271	0.220	0.238	0.20
64	58.70	857.9	1,1,4-Trimethylcyclohexane	2850	0.143	0.130	0.106	0.23
65	59.10	859.7	1c,2t,4t-Trimethylcyclohexane	3282	0.165	0.147	0.122	0.46
66	60.37	865.0	N8	2013	0.101	0.091	0.075	0.06
67	60.62	866.1	m-Xylene	1817	0.087	0.071	0.076	0.18
68	60.85	867.0	p-Xylene	2478	0.118	0.097	0.104	0.25
69	61.63	870.3	4-Ethylheptane	674	0.034	0.033	0.025	0.49
70	61.90	871.4	N9	878	0.044	0.040	0.033	0.18
71	62.53	873.9	4-Methyloctane	2611	0.131	0.128	0.096	0.34
72	62.75	874.8	2-Methyloctane	2087	0.105	0.103	0.076	0.21
73	63.37	877.3	3-Ethylheptane	525	0.026	0.026	0.019	0.37
74	63.90	879.4	3-Methyloctane	1785	0.090	0.088	0.065	0.18
75	64.10	880.2	1c,2c,4c-Trimethylcyclohexane	3310	0.166	0.149	0.123	0.06
76	65.00	883.7	o-Xylene	1182	0.057	0.046	0.050	0.16
77	65.20	884.4	1,1,2-Trimethylcyclohexane	562	0.028	0.025	0.021	0.27
78	66.27	888.5	N13	2080	0.105	0.094	0.077	0.01
79	66.48	889.3	I8	3900	0.196	0.189	0.143	0.00
80	66.92	890.9	1-Nonene	2387	0.120	0.116	0.089	0.17
81	69.40	900.0	n-Nonane	4505	0.221	0.216	0.161	0.00
82	69.92	903.8	1,1-Methylethylcyclohexane	2511	0.126	0.120	0.093	0.04
83	70.38	907.3	t-Nonene-2	703	0.035	0.034	0.026	0.49
84	71.12	912.7	i-Propylbenzene	1411	0.061	0.050	0.048	0.15
85	71.73	917.1	c-Nonene-2	2032	0.102	0.097	0.076	0.01
86	72.08	919.6	N19	1138	0.057	0.051	0.042	0.07
87	73.53	929.9	2,6-Dimethyloctane	613	0.031	0.030	0.020	0.31
88	73.85	932.1	2,5-Dimethyloctane	3258	0.164	0.158	0.107	0.31
89	74.50	936.6	I12	695	0.035	0.034	0.023	0.01
90	75.23	941.7	n-Butylcyclopentane	3831	0.192	0.173	0.142	0.35

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
91	75.92	946.3	I14	810	0.041	0.039	0.027	0.11
92	76.35	949.2	3,3-Dimethyloctane	1725	0.087	0.082	0.057	0.10
93	77.08	954.1	N25	730	0.037	0.032	0.024	0.40
94	77.38	956.1	1-Methyl-4-ethylbenzene	1477	0.065	0.053	0.050	0.09
95	78.05	960.5	1,3,5-Trimethylbenzene	1662	0.073	0.060	0.057	0.52
96	78.25	961.8	N27	1174	0.059	0.052	0.039	0.11
97	79.07	967.1	1-Methyl-2-ethylbenzene	536	0.024	0.019	0.018	0.01
98	79.32	968.7	2-Methylnonane	1806	0.091	0.088	0.060	0.10
99	79.68	971.0	3-Ethyloctane	1385	0.070	0.066	0.046	0.05
100	80.58	976.8	3-Methylnonane	1833	0.092	0.088	0.060	0.28
101	80.97	979.2	N29	476	0.024	0.021	0.016	0.00
102	81.72	983.9	t-Butylbenzene	2339	0.103	0.084	0.072	0.01
103	81.97	985.4	1,2,4-Trimethylbenzene	1162	0.051	0.041	0.040	0.04
104	82.23	987.1	I20	749	0.038	0.036	0.025	0.09
105	82.35	987.8	i-Butylcyclohexane	1337	0.067	0.059	0.045	0.02
106	82.97	991.6	I23	388	0.019	0.018	0.013	0.01
107	83.52	995.0	I24	412	0.021	0.020	0.014	0.26
108	83.77	996.5	1t-Methyl-2-n-propylcyclohexane	820	0.041	0.036	0.027	0.28
109	84.17	998.9	sec-Butylbenzene	603	0.026	0.021	0.018	0.39
110	84.35	1000.0	n-Decane	✓ 2157	0.106	0.102	0.069	0.00
111	85.48	1010.6	1-Methyl-4-i-propylbenzene	377	0.017	0.014	0.012	0.61
112	85.90	1014.5	I27	347	0.017	0.017	0.010	0.18
113	87.05	1025.0	sec-Butylcyclohexane	290	0.015	0.013	0.010	0.74
114	87.38	1028.1	1-Methyl-2-i-propylbenzene	2551	0.112	0.090	0.078	0.37
115	88.10	1034.5	N33	938	0.047	0.041	0.029	0.04
116	88.75	1040.4	I32	705	0.035	0.031	0.021	0.03
117	89.07	1043.2	1,3-Diethylbenzene	591	0.026	0.021	0.018	0.01
118	89.25	1044.8	1-Methyl-3-n-propylbenzene	875	0.039	0.032	0.027	0.42
119	89.52	1047.2	I33	537	0.027	0.026	0.016	0.48
120	89.85	1050.1	1-Methyl-4-n-propylbenzene	874	0.040	0.032	0.027	0.38
121	90.68	1057.4	1,2-Diethylbenzene	1506	0.061	0.048	0.042	0.22
122	91.28	1062.6	I35	927	0.047	0.044	0.028	0.07
123	91.62	1065.5	I38	745	0.037	0.036	0.022	0.30
124	92.02	1068.9	s-C5Bz / 1,3-DM-4-EtBz	1009	0.046	0.037	0.029	0.24
125	92.20	1070.5	I39	337	0.017	0.016	0.010	0.01
126	92.72	1074.9	1,2-Dimethyl-4-ethylbenzene	686	0.030	0.024	0.021	0.18
127	92.87	1076.2	I41	1145	0.058	0.055	0.034	0.20
128	93.32	1080.0	?	386	0.019	0.018	0.012	UNK
129	94.17	1087.2	1-Methyl-4-t-butylbenzene	317	0.014	0.012	0.009	0.15
130	94.58	1090.6	1,2-Dimethyl-3-ethylbenzene	385	0.017	0.014	0.012	0.13
131	94.82	1092.6	?	327	0.016	0.013	0.011	UNK
132	95.50	1098.2	1-Ethyl-2-i-propylbenzene	775	0.035	0.028	0.022	0.31
133	95.72	1100.0	n-Undecane	✓ 1897	0.092	0.087	0.055	0.00
134	96.33	1106.8	1,2,3,5-Tetramethylbenzene	470	0.021	0.016	0.014	0.35
135	96.55	1109.3	(2-Methylbutyl)benzene	389	0.016	0.013	0.010	0.05
136	97.02	1114.4	1-t-Butyl-2-methylbenzene	1727	0.076	0.060	0.048	0.20
137	97.57	1120.4	A2	278	0.013	0.010	0.008	0.13
138	98.63	1132.0	I43	3505	0.169	0.158	0.093	0.72
139	98.97	1135.6	A3	655	0.029	0.023	0.018	0.71
140	99.27	1138.8	1-Ethyl-2-n-propylbenzene	1805	0.080	0.063	0.050	0.14

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
141	99.43	1140.6	A4	404	0.018	0.014	0.011	0.52
142	99.85	1145.1	1-Methyl-3-n-butylbenzene	1316	0.058	0.046	0.037	0.17
143	100.22	1149.0	1,3-Di-i-propylbenzene	956	0.042	0.033	0.024	0.77
144	100.40	1150.9	n-Pentylbenzene	963	0.043	0.034	0.027	0.52
145	100.72	1154.3	1t-M-2-(4-MP)cyclopentane	1387	0.070	0.061	0.039	0.67
146	101.12	1158.5	1-Methyl-2-n-butylbenzene	972	0.043	0.034	0.027	0.32
147	101.60	1163.6	?	868	0.044	0.034	0.027	UNK
148	101.98	1167.6	1-t-Butyl-3,5-dimethylbenzene	1090	0.048	0.038	0.027	0.75
149	102.20	1169.8	Naphthalene	296	0.013	0.009	0.010	0.69
150	102.62	1174.1	I44	1394	0.067	0.063	0.037	0.03
151	102.80	1176.0	I45	503	0.024	0.023	0.013	0.02
152	103.37	1181.9	?	415	0.021	0.019	0.011	UNK
153	103.67	1184.9	?	433	0.022	0.020	0.012	UNK
154	103.85	1186.8	?	330	0.017	0.015	0.009	UNK
155	104.20	1190.4	1,3-Di-n-propylbenzene	4904	0.217	0.171	0.125	0.03
156	104.53	1193.8	A5	847	0.037	0.030	0.022	0.34
157	104.65	1194.9	?	1474	0.074	0.059	0.043	UNK
158	105.15	1200.0	n-Dodecane	√1769	0.085	0.080	0.047	0.00
159	105.62	1205.8	?	911	0.046	0.043	0.025	UNK
160	105.78	1207.9	?	624	0.031	0.029	0.017	UNK
161	106.07	1211.4	?	649	0.033	0.030	0.018	UNK
162	106.28	1214.1	?	507	0.025	0.024	0.014	UNK
163	106.57	1217.6	1,3,5-Triethylbenzene	8389	0.373	0.295	0.215	0.79
164	106.87	1221.3	1t-Butyl-4-ethylbenzene	474	0.021	0.017	0.012	0.18
165	107.10	1224.1	?	383	0.019	0.015	0.011	UNK
166	107.23	1225.8	1,2,4-Triethylbenzene	1166	0.053	0.042	0.030	0.48
167	107.40	1227.8	?	468	0.024	0.019	0.014	UNK
168	107.67	1231.1	?	557	0.028	0.022	0.016	UNK
169	107.82	1232.9	?	754	0.038	0.030	0.022	UNK
170	107.95	1234.5	?	1439	0.072	0.057	0.042	UNK
171	108.65	1243.0	1-Methyl-4-n-pentylbenzene	547	0.025	0.020	0.014	0.60
172	108.78	1244.6	?	3241	0.163	0.129	0.094	UNK
173	108.93	1246.4	?	2079	0.104	0.083	0.060	UNK
174	109.42	1252.2	?	1297	0.065	0.052	0.038	UNK
175	109.70	1255.6	n-Hexylbenzene	1800	0.081	0.064	0.047	0.01
176	109.87	1257.6	?	2171	0.109	0.086	0.063	UNK
177	110.05	1259.8	?	1028	0.052	0.041	0.030	UNK
178	110.27	1262.4	?	2222	0.112	0.088	0.064	UNK
179	110.65	1266.9	2-Methylnaphthalene	972	0.049	0.034	0.032	0.31
180	110.82	1268.9	?	1445	0.073	0.050	0.047	UNK
181	110.98	1270.8	?	1660	0.083	0.057	0.054	UNK
182	111.20	1273.4	?	3209	0.161	0.111	0.105	UNK
183	111.40	1275.8	?	882	0.044	0.031	0.029	UNK
184	111.57	1277.7	1-Methylnaphthalene	10128	0.509	0.351	0.332	0.19
185	111.98	1282.6	?	303	0.015	0.010	0.010	UNK
186	112.28	1286.1	?	2277	0.114	0.079	0.075	UNK
187	112.52	1288.8	?	998	0.050	0.035	0.033	UNK
188	112.78	1291.9	?	2234	0.112	0.077	0.073	UNK
189	112.92	1293.4	?	736	0.037	0.025	0.024	UNK
190	113.32	1298.1	?	1538	0.077	0.053	0.050	UNK

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
191	113.48	1300.0	n-Tridecane	✓ 2944	0.148	0.138	0.075	0.00
192	113.63	1302.1	?	2836	0.142	0.133	0.072	UNK
193	113.97	1306.9	?	1744	0.088	0.081	0.044	UNK
194	114.32	1311.9	?	940	0.047	0.044	0.024	UNK
195	114.55	1315.2	?	2702	0.136	0.126	0.069	UNK
196	114.77	1318.2	?	2996	0.151	0.140	0.076	UNK
197	114.92	1320.3	?	647	0.033	0.030	0.016	UNK
198	115.07	1322.5	?	3660	0.184	0.171	0.093	UNK
199	115.48	1328.3	?	796	0.040	0.037	0.020	UNK
200	115.72	1331.6	?	1618	0.081	0.076	0.041	UNK
201	115.95	1334.8	?	1121	0.056	0.052	0.029	UNK
202	116.30	1339.7	?	3064	0.154	0.143	0.078	UNK
203	116.60	1343.9	?	989	0.050	0.046	0.025	UNK
204	117.08	1350.6	?	4519	0.227	0.211	0.115	UNK
205	117.33	1354.1	?	1305	0.066	0.061	0.033	UNK
206	117.53	1356.8	?	826	0.042	0.039	0.021	UNK
207	117.88	1361.6	?	1037	0.052	0.048	0.026	UNK
208	118.10	1364.6	?	456	0.023	0.021	0.012	UNK
209	118.22	1366.2	?	518	0.026	0.024	0.013	UNK
210	118.38	1368.5	?	880	0.044	0.041	0.022	UNK
211	118.52	1370.3	?	924	0.046	0.043	0.023	UNK
212	118.72	1373.0	?	2322	0.117	0.109	0.059	UNK
213	119.28	1380.7	?	10268	0.516	0.480	0.261	UNK
214	119.78	1387.5	?	1240	0.062	0.058	0.032	UNK
215	119.98	1390.2	?	761	0.038	0.036	0.019	UNK
216	120.33	1394.9	?	1693	0.085	0.079	0.043	UNK
217	120.57	1398.0	?	3034	0.152	0.142	0.077	UNK
218	120.72	1400.0	C14	✓ 4011	0.202	0.186	0.095	0.00
219	120.98	1404.7	?	2836	0.142	0.131	0.067	UNK
220	121.32	1410.7	?	2110	0.106	0.098	0.050	UNK
221	121.55	1414.8	?	3146	0.158	0.146	0.074	UNK
222	121.78	1418.9	?	3675	0.185	0.170	0.087	UNK
223	121.93	1421.6	?	663	0.033	0.031	0.016	UNK
224	122.07	1423.9	?	570	0.029	0.026	0.013	UNK
225	122.83	1437.4	?	1204	0.060	0.056	0.028	UNK
226	123.02	1440.6	?	1529	0.077	0.071	0.036	UNK
227	123.33	1446.1	?	1204	0.060	0.056	0.028	UNK
228	123.57	1450.2	?	1493	0.075	0.069	0.035	UNK
229	123.88	1455.7	?	3425	0.172	0.159	0.081	UNK
230	124.57	1467.5	?	6717	0.338	0.311	0.159	UNK
231	124.93	1473.8	?	661	0.033	0.031	0.016	UNK
232	125.12	1477.0	?	386	0.019	0.018	0.009	UNK
233	125.65	1486.1	?	2235	0.112	0.103	0.053	UNK
234	126.07	1493.2	?	1456	0.073	0.067	0.034	UNK
235	126.32	1497.4	?	1476	0.074	0.068	0.035	UNK
236	126.47	1500.0	C15	✓ 1497	0.075	0.069	0.033	0.00
237	126.68	1504.2	?	1649	0.083	0.076	0.036	UNK
238	126.97	1509.8	?	450	0.023	0.021	0.010	UNK
239	127.25	1515.3	?	1141	0.057	0.052	0.025	UNK
240	127.65	1523.1	?	1534	0.077	0.070	0.034	UNK

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
241	127.90	1527.9	?	651	0.033	0.030	0.014	UNK
242	128.23	1534.4	?	852	0.043	0.039	0.019	UNK
243	128.52	1539.8	?	426	0.021	0.020	0.009	UNK
244	129.07	1550.4	?	1704	0.086	0.078	0.038	UNK
245	129.30	1554.9	?	1313	0.066	0.060	0.029	UNK
246	129.52	1559.0	?	1928	0.097	0.089	0.043	UNK
247	130.10	1570.1	?	2531	0.127	0.116	0.056	UNK
248	130.23	1572.7	?	581	0.029	0.027	0.013	UNK
249	131.23	1591.6	?	896	0.045	0.041	0.020	UNK
250	131.68	1600.1	C16	463	0.023	0.021	0.010	0.07
251	133.93	1653.2	?	1652	0.083	0.076	0.034	UNK
252	135.95	1700.0	C17	411	0.021	0.019	0.008	0.00
253	136.45	1712.1	?	1171	0.059	0.053	0.023	UNK
254	138.35	1757.5	?	599	0.030	0.027	0.012	UNK
255	138.73	1766.6	?	1568	0.079	0.071	0.031	UNK
256	140.77	1816.1	?	1145	0.058	0.052	0.022	UNK
257	143.18	1878.6	?	772	0.039	0.035	0.015	UNK

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: **234741 G&M WP-10**
File: CAP22
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 305 Peaks

Composite Report

Hydrocarbon Totals by Group Type

Type	Wt %	Vol %	Mol %
Total Paraffins:	5.539	5.779	4.881
Total Iso-paraffins:	33.991	36.619	35.901
Total Naphthenes:	32.935	32.056	36.550
Total Aromatics:	9.714	8.185	8.625
Total Olefins:	5.901	6.176	6.308
Total C26	0.000	0.000	0.000
Total Unknowns:	11.918	11.184	7.734
Total:	100.000	100.000	100.000

Totals by Carbon Number

Group	Wt %	Vol %	Mol %	Ave. Mw.	Ave. Sp Gr.
Methane	0.000	0.000	0.000	0.000	0.000
Ethane	0.000	0.000	0.000	0.000	0.000
Propane	0.000	0.000	0.000	0.000	0.000
Butanes:	0.000	0.000	0.000	0.000	0.000
Pentanes:	2.409	2.827	3.812	71.796	0.639
Hexanes:	14.983	15.749	20.047	84.920	0.713
Heptanes:	21.236	21.823	24.146	99.935	0.729
Octanes:	18.449	18.472	18.652	112.390	0.748
Nonanes:	14.724	14.753	13.185	126.894	0.748
Decanes:	7.967	7.672	6.485	139.601	0.778
C11's:	4.555	4.075	3.433	150.759	0.838
C12's:	3.048	2.748	2.097	165.194	0.831
C13's:	0.258	0.256	0.159	184.470	0.756
C14's:	0.292	0.287	0.167	198.390	0.763
C15's:	0.105	0.103	0.056	212.420	0.769
C16's:	0.031	0.030	0.016	226.448	0.773
C17's:	0.023	0.022	0.011	240.475	0.777
C18's:	0.000	0.000	0.000	0.000	0.000
C19's:	0.000	0.000	0.000	0.000	0.000
C20's:	0.000	0.000	0.000	0.000	0.000
C21's:	0.000	0.000	0.000	0.000	0.000
C22's:	0.000	0.000	0.000	0.000	0.000
C23's:	0.000	0.000	0.000	0.000	0.000
C24's:	0.000	0.000	0.000	0.000	0.000
C25's:	0.000	0.000	0.000	0.000	0.000
C26's:	0.000	0.000	0.000	0.000	0.000
C26	0.000	0.000	0.000		
Unknowns:	11.918	11.184	7.734		

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234741 G&M WP-10
File: CAP22
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 305 Peaks

Types by Carbon Number

Paraffins:	C1	0.000	0.000	0.000
	C2	0.000	0.000	0.000
	C3	0.000	0.000	0.000
	C4	0.000	0.000	0.000
	C5	0.153	0.183	0.241
	C6	0.147	0.167	0.193
	C7	0.502	0.550	0.569
	C8	1.194	1.273	1.187
	C9	1.252	1.308	1.110
	C10	0.684	0.702	0.547
	C11	0.444	0.448	0.323
	C12	0.453	0.451	0.302
	C13	0.258	0.256	0.159
	C14	0.292	0.287	0.167
	C15	0.105	0.103	0.056
	C16	0.031	0.030	0.016
	C17	0.023	0.022	0.011
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Iso-paraffins:	C4	0.000	0.000	0.000
	C5	1.841	2.227	2.900
	C6	7.454	8.443	9.828
	C7	5.408	5.890	6.133
	C8	5.831	6.198	5.800
	C9	7.656	7.974	6.782
	C10	3.867	3.953	3.088
	C11	1.296	1.298	0.944
	C12	0.640	0.636	0.427
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Aromatics:	C6	0.569	0.485	0.828
	C7	0.000	0.000	0.000
	C8	1.561	1.352	1.671
	C9	1.282	1.106	1.212
	C10	2.205	1.882	1.869
	C11	2.288	1.837	1.778
	C12	1.810	1.524	1.267
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000

	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Naphthenes:	C5	0.415	0.417	0.672
	C6	6.813	6.654	9.199
	C7	11.048	10.876	12.785
	C8	8.241	7.980	8.344
	C9	4.534	4.365	4.081
	C10	1.211	1.135	0.981
	C11	0.527	0.493	0.388
	C12	0.146	0.137	0.101
	C13	0.000	0.000	0.000
	C14	0.000	0.000	0.000
	C15	0.000	0.000	0.000
	C16	0.000	0.000	0.000
	C17	0.000	0.000	0.000
	C18	0.000	0.000	0.000
	C19	0.000	0.000	0.000
	C20	0.000	0.000	0.000
	C21	0.000	0.000	0.000
	C22	0.000	0.000	0.000
	C23	0.000	0.000	0.000
	C24	0.000	0.000	0.000
	C25	0.000	0.000	0.000
	C26	0.000	0.000	0.000
Olefins:	C4	0.000	0.000	0.000
	C5	0.000	0.000	0.000
	C6	0.000	0.000	0.000
	C7	4.279	4.507	4.659
	C8	1.622	1.669	1.649
	C9	0.000	0.000	0.000

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234741 G&M WP-10
File: CAP22
Calibration File: HP_LIQ

Analyzed on: 02-28-1995
Normalized to 100.00%
Processed 305 Peaks

Boiling Point Distribution Data

Wt. Percent Off	deg.C.	Vol. Percent Off	deg.C.
IBP (0.5%)	27.84	IBP (0.5%)	27.84
10.0	68.73	10.0	63.27
20.0	89.78	20.0	87.48
30.0	100.93	30.0	93.64
40.0	109.85	40.0	106.84
50.0	124.00	50.0	119.36
60.0	136.20	60.0	136.00
70.0	152.41	70.0	148.50
80.0	178.18	80.0	174.15
90.0	235.40	90.0	217.50
FBP (99.5%)	>215.00	FBP (99.5%)	>215.00

Research Octane Number = 79.14

(Calculated from Individual Component Values)

Contribution to Total by:

Paraffins:	2.97
Iso-paraffins:	25.13
Aromatics:	9.48
Naphthenes:	26.05
Olefins:	4.92

WT% Hydrogen = Not Calculated

P.I.A.N.O. ANALYSIS
SOUTHERN PETROLEUM LABORATORIES, INC.

Sample: 234741 G&M WP-10 — Analyzed on: 02-28-1995
File: CAP22 — Normalized to 100.00%
Calibration File: HP_LIQ — Processed 305 Peaks

Components Listed in Chromatographic Order

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
1	11.00	474.5	i-Pentane	24756	1.841	2.227	2.900	0.24
2	11.83	500.0	n-Pentane	2026	0.153	0.183	0.241	0.00
3	13.40	536.5	2,2-Dimethylbutane	2764	0.199	0.230	0.263	0.35
4	15.05	564.9	Cyclopentane	5532	0.415	0.417	0.672	0.11
5	15.13	566.1	2,3-Dimethylbutane	14237	0.992	1.124	1.308	0.06
6	15.40	570.0	2-Methylpentane	18373	1.329	1.525	1.752	0.06
7	16.43	583.9	3-Methylpentane	67172	4.933	5.564	6.505	0.10
8	17.82	600.0	n-Hexane	2031	0.147	0.167	0.193	0.00
9	20.10	626.7	2,2-Dimethylpentane	2841	0.203	0.225	0.230	0.08
10	20.35	629.3	Methylcyclopentane	34284	2.520	2.523	3.403	0.09
11	20.73	633.2	2,4-Dimethylpentane	6682	0.472	0.526	0.535	0.12
12	21.32	638.9	2,2,3-Trimethylbutane	600	0.043	0.046	0.050	0.59
✓13	22.87	652.9	Benzene	8797	0.569	0.485	0.828	0.12
14	23.53	658.5	3,3-Dimethylpentane	1993	0.143	0.155	0.162	0.11
15	23.98	662.2	Cyclohexane	61582	4.293	4.132	5.796	0.15
16	25.10	670.8	2-Methylhexane	10048	0.724	0.799	0.820	0.15
17	25.30	672.2	2,3-Dimethylpentane	22773	1.586	1.709	1.798	0.13
18	25.65	674.8	1,1-Dimethylcyclopentane	10836	0.752	0.747	0.870	0.08
19	26.20	678.7	3-Methylhexane	23545	1.704	1.858	1.932	0.09
20	27.03	684.4	1c,3-Dimethylcyclopentane	25489	1.747	1.758	2.022	0.11
21	27.40	686.8	1t,3-Dimethylcyclopentane	22924	1.669	1.670	1.931	0.22
22	27.55	687.8	3-Ethylpentane	7255	0.534	0.573	0.605	0.10
23	27.77	689.2	Heptene-1 ✓	34500	2.479	2.665	2.869	0.10
24	29.52	700.0	n-Heptane	6983	0.502	0.550	0.569	0.00
25	32.38	721.1	Methylcyclohexane	92506	6.415	6.247	7.423	0.03
26	32.83	724.2	2,2-Dimethylhexane	13795	0.981	1.058	0.976	0.52
27	34.10	732.6	036	7884	0.567	0.580	0.656	0.32
28	34.28	733.8	Ethylcyclopentane	6720	0.465	0.454	0.538	0.50
29	34.57	735.6	2,2,3-Trimethylpentane	8060	0.568	0.594	0.565	0.11
30	35.43	741.0	2,4-Dimethylhexane	15757	1.109	1.186	1.103	0.07
31	35.65	742.4	1c,2t,4-Trimethylcyclopentane	2072	0.142	0.140	0.144	0.06
32	36.58	748.0	1t,2c,3-Trimethylcyclopentane	17677	1.239	1.205	1.254	0.37
33	37.05	750.7	040	766	0.055	0.056	0.064	0.40
34	38.92	761.2	2,3-Dimethylhexane	3284	0.246	0.259	0.245	0.42
35	39.13	762.4	1,1,2-Trimethylcyclopentane	1391	0.100	0.097	0.101	0.30
36	40.02	767.1	2-Methylheptane	16271	1.174	1.260	1.168	0.22
37	40.28	768.5	3,4-Dimethylhexane	6904	0.496	0.517	0.494	0.22
38	40.58	770.1	4-Methylheptane	4857	0.349	0.371	0.347	0.28
39	41.05	772.5	1c,2c,3-Trimethylcyclopentane	1807	0.130	0.128	0.131	0.49
40	41.42	774.3	1t,3-Dimethylcyclohexane	11301	0.812	0.798	0.822	0.15

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
41	41.72	775.9	1c,2t,4-Trimethylcyclopentane	38140	2.741	2.666	2.775	0.26
42	42.07	777.6	3-Ethylhexane	12635	0.908	0.953	0.903	0.30
43	43.13	782.8	1,3-Octadiene	4959	0.356	0.349	0.367	0.20
44	43.85	786.2	2,2,5-Trimethylhexane	5325	0.383	0.405	0.339	0.41
45	44.28	788.2	3t-Ethylmethylcyclopentane	4598	0.330	0.323	0.335	0.04
46	44.55	789.5	2,3,5-Trimethylhexane	10078	0.724	0.752	0.642	0.28
47	44.98	791.5	2t-Ethylmethylcyclopentane	1209	0.087	0.085	0.088	0.03
48	45.60	794.3	t-Octene-4	15478	1.112	1.160	1.126	0.14
49	46.90	800.0	n-Octane	16917	1.194	1.273	1.187	0.00
50	47.15	801.4	1c,4-Dimethylcyclohexane	7060	0.502	0.481	0.509	0.40
51	48.83	810.6	053	2141	0.154	0.160	0.156	0.54
52	50.22	818.0	c-Octene-2	1200	0.086	0.089	0.087	0.25
53	50.73	820.6	2,2,4-Trimethylhexane	1054	0.076	0.077	0.067	0.52
54	51.18	822.9	N2	1093	0.079	0.075	0.080	0.51
55	51.62	825.1	2,2-Dimethylheptane	936	0.067	0.071	0.060	0.31
56	52.68	830.4	1c,2-Dimethylcyclohexane	5592	0.402	0.378	0.407	0.41
57	52.92	831.5	N3	1231	0.088	0.085	0.090	0.65
58	54.08	837.2	2,5-Dimethylheptane	30272	2.175	2.274	1.927	0.17
59	54.42	838.8	2,4-Dimethylheptane	15027	1.080	1.131	0.957	0.35
60	54.93	841.2	N4	765	0.055	0.053	0.056	0.48
61	55.47	843.7	Ethylcyclohexane	16912	1.215	1.162	1.231	0.46
62	56.05	846.3	3,3-Dimethylheptane	8903	0.640	0.661	0.567	0.34
63	56.35	847.7	1c,3c,5-Trimethylcyclohexane	515	0.037	0.036	0.033	0.29
64	56.70	849.3	2,6-Dimethylheptane	1530	0.110	0.116	0.097	0.11
65	57.00	850.6	N5	2736	0.197	0.189	0.199	0.54
66	57.37	852.3	N6	1698	0.122	0.117	0.124	0.17
67	58.37	856.7	Ethylbenzene	10996	0.746	0.645	0.798	0.17
68	58.65	857.9	1,1,4-Trimethylcyclohexane	6317	0.454	0.440	0.409	0.20
69	59.05	859.6	1c,2t,4t-Trimethylcyclohexane	7218	0.519	0.494	0.467	0.43
70	59.50	861.5	I3	669	0.048	0.049	0.043	0.55
71	60.32	865.0	N8	6097	0.438	0.421	0.394	0.10
72	60.57	866.0	m-Xylene	3899	0.266	0.231	0.285	0.15
73	60.80	867.0	p-Xylene	6750	0.461	0.401	0.493	0.22
74	61.22	868.7	3,4-Dimethylheptane	1066	0.077	0.078	0.068	0.16
75	61.38	869.4	4-Ethylheptane	1223	0.088	0.090	0.078	0.37
76	61.58	870.3	?	2020	0.145	0.149	0.129	UNK
77	61.85	871.3	N9	2543	0.183	0.176	0.164	0.14
78	62.13	872.5	I4	752	0.054	0.055	0.048	0.01
79	62.50	874.0	4-Methyloctane	5813	0.418	0.435	0.370	0.37
80	62.72	874.8	2-Methyloctane	6930	0.498	0.523	0.441	0.24
81	63.32	877.2	3-Ethylheptane	1210	0.087	0.090	0.077	0.33
82	63.85	879.3	3-Methyloctane	5151	0.370	0.385	0.328	0.14
83	64.07	880.2	1c,2c,4c-Trimethylcyclohexane	9665	0.695	0.661	0.625	0.09
84	64.95	883.6	o-Xylene	1278	0.088	0.075	0.094	0.11
85	65.15	884.4	1,1,2-Trimethylcyclohexane	1473	0.106	0.099	0.095	0.32
86	66.23	888.5	N13	6078	0.437	0.420	0.393	0.00
87	66.45	889.3	I8	10591	0.761	0.781	0.674	0.02
88	66.87	890.9	1-Nonene	6244	0.449	0.461	0.404	0.23
89	67.38	892.8	?	799	0.057	0.059	0.052	UNK
90	67.65	893.8	N14	697	0.050	0.048	0.045	0.17

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
91	68.70	897.6	t-Nonene-3	654	0.047	0.048	0.042	0.30
92	69.17	899.3	c-Nonene-3	683	0.049	0.050	0.044	0.28
93	69.37	900.0	n-Nonane	17876	1.252	1.308	1.110	0.00
94	69.88	903.8	1,1-Methylethylcyclohexane	6542	0.470	0.477	0.423	0.04
95	70.33	907.2	t-Nonene-2	1843	0.132	0.136	0.119	0.36
96	71.08	912.6	i-Propylbenzene	3376	0.209	0.182	0.198	0.16
97	71.70	917.1	c-Nonene-2	5770	0.415	0.421	0.373	0.00
98	72.05	919.6	N19	2996	0.215	0.204	0.194	0.09
99	72.30	921.4	I10	456	0.033	0.034	0.026	0.11
100	72.65	923.9	I11	1352	0.097	0.100	0.078	0.42
101	72.78	924.8	2,2-Dimethyloctane	976	0.070	0.073	0.056	0.02
102	73.02	926.5	2,4-Dimethyloctane	450	0.032	0.033	0.026	0.03
103	73.50	929.9	2,6-Dimethyloctane	1809	0.130	0.134	0.104	0.34
104	73.83	932.2	2,5-Dimethyloctane	11642	0.837	0.858	0.668	0.39
105	74.03	933.6	n-Propylcyclohexane	1066	0.077	0.072	0.069	0.18
106	74.47	936.6	I12	2740	0.197	0.202	0.157	0.02
107	74.73	938.4	?	2306	0.166	0.170	0.132	UNK
108	75.22	941.7	n-Butylcyclopentane	11895	0.855	0.816	0.769	0.42
109	75.62	944.4	N23	317	0.023	0.021	0.018	0.24
110	75.88	946.2	I14	4160	0.299	0.307	0.239	0.16
111	76.15	948.0	?	1853	0.133	0.137	0.106	UNK
112	76.33	949.3	3,3-Dimethyloctane	5758	0.414	0.420	0.330	0.17
113	76.53	950.6	n-Propylbenzene	857	0.054	0.047	0.051	0.11
114	76.75	952.0	3,6-Dimethyloctane	1438	0.103	0.105	0.083	0.05
115	77.05	954.0	N25	2605	0.187	0.175	0.152	0.45
116	77.35	956.0	1-Methyl-4-ethylbenzene	4414	0.278	0.241	0.262	0.04
117	78.02	960.4	1,3,5-Trimethylbenzene	5060	0.320	0.277	0.302	0.58
118	78.23	961.8	N27	3953	0.284	0.266	0.230	0.07
119	78.42	963.0	I16	842	0.061	0.061	0.048	0.07
120	78.90	966.2	4-Methylnonane	1084	0.078	0.080	0.062	0.04
121	79.05	967.1	1-Methyl-2-ethylbenzene	2398	0.151	0.128	0.143	0.03
122	79.30	968.7	2-Methylnonane	5256	0.378	0.390	0.302	0.14
123	79.65	971.0	3-Ethyloctane	3883	0.279	0.283	0.223	0.02
124	80.13	974.1	N28	978	0.070	0.066	0.057	0.03
125	80.33	975.3	?	360	0.026	0.024	0.021	UNK
126	80.57	976.8	3-Methylnonane	6110	0.439	0.449	0.351	0.31
127	80.95	979.2	N29	1552	0.112	0.104	0.090	0.02
128	81.68	983.8	t-Butylbenzene	7023	0.444	0.384	0.376	0.09
129	81.95	985.5	1,2,4-Trimethylbenzene	3731	0.235	0.201	0.223	0.06
130	82.20	987.0	I20	2565	0.184	0.187	0.147	0.01
131	82.33	987.8	i-Butylcyclohexane	3987	0.286	0.270	0.232	0.03
132	82.60	989.5	I21	759	0.055	0.055	0.044	0.53
133	82.95	991.6	I23	1279	0.092	0.093	0.073	0.02
134	83.50	995.0	I24	1250	0.090	0.091	0.072	0.27
135	83.75	996.5	1t-Methyl-2-n-propylcyclohexane	2358	0.169	0.159	0.137	0.28
136	84.15	998.9	sec-Butylbenzene	1580	0.098	0.085	0.083	0.39
137	84.33	1000.0	n-Decane	9778	0.684	0.702	0.547	0.00
138	85.07	1006.9	1,2,3-Trimethylbenzene	544	0.034	0.029	0.033	0.28
139	85.27	1008.8	N32	1679	0.121	0.113	0.089	0.25
140	85.47	1010.6	1-Methyl-4-i-propylbenzene	1126	0.073	0.064	0.062	0.61

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
141	85.63	1012.2	?	736	0.053	0.046	0.045	UNK
142	85.88	1014.5	I27	1033	0.074	0.075	0.054	0.18
143	86.25	1017.9	I28	337	0.024	0.025	0.018	0.16
144	86.67	1021.7	I29	505	0.036	0.037	0.026	0.21
145	87.02	1024.9	sec-Butylcyclohexane	1107	0.080	0.073	0.064	0.59
146	87.20	1026.6	I30	1651	0.119	0.120	0.086	0.55
147	87.37	1028.1	1-Methyl-2-i-propylbenzene	8973	0.564	0.482	0.478	0.37
148	87.78	1031.8	3-Ethylnonane	775	0.056	0.056	0.040	0.06
149	88.08	1034.6	N33	4694	0.337	0.316	0.248	0.05
150	88.53	1038.6	I31	1400	0.101	0.102	0.073	0.18
151	88.73	1040.4	I32	2624	0.189	0.177	0.139	0.03
152	89.05	1043.2	1,3-Diethylbenzene	1482	0.094	0.081	0.079	0.01
153	89.23	1044.8	1-Methyl-3-n-propylbenzene	1994	0.126	0.110	0.107	0.42
154	89.50	1047.2	I33	1168	0.084	0.085	0.061	0.48
155	89.83	1050.1	1-Methyl-4-n-propylbenzene	1798	0.116	0.102	0.098	0.38
156	90.07	1052.2	n-Butylbenzene	969	0.061	0.053	0.052	0.63
157	90.35	1054.7	1,3-Dimethyl-5-ethylbenzene	562	0.036	0.031	0.031	0.35
158	90.67	1057.4	1,2-Diethylbenzene	4125	0.237	0.202	0.201	0.22
159	90.88	1059.3	N35	954	0.069	0.064	0.051	0.30
160	91.27	1062.6	I35	2252	0.162	0.164	0.118	0.07
161	91.60	1065.5	I38	1626	0.117	0.118	0.085	0.30
162	92.00	1068.9	s-C5Bz / 1,3-DM-4-EtBz	3090	0.200	0.174	0.153	0.24
163	92.18	1070.5	I39	2296	0.165	0.167	0.120	0.01
164	92.70	1074.9	1,2-Dimethyl-4-ethylbenzene	1738	0.110	0.092	0.093	0.18
165	92.85	1076.2	I41	2373	0.171	0.173	0.124	0.20
166	93.30	1080.0	?	910	0.065	0.066	0.048	UNK
167	93.47	1081.4	?	979	0.070	0.071	0.051	UNK
168	94.15	1087.2	1-Methyl-4-t-butylbenzene	669	0.043	0.038	0.033	0.15
169	94.57	1090.6	1,2-Dimethyl-3-ethylbenzene	1153	0.075	0.063	0.063	0.13
170	94.80	1092.6	?	1338	0.096	0.081	0.081	UNK
171	94.93	1093.7	?	1321	0.095	0.080	0.080	UNK
172	95.05	1094.6	?	1403	0.101	0.085	0.085	UNK
173	95.22	1096.0	?	765	0.055	0.046	0.047	UNK
174	95.48	1098.2	1-Ethyl-2-i-propylbenzene	1659	0.107	0.090	0.082	0.31
175	95.70	1100.0	n-Undecane	6396	0.444	0.448	0.323	0.00
176	96.30	1106.7	1,2,3,5-Tetramethylbenzene	744	0.047	0.040	0.040	0.17
177	96.53	1109.3	(2-Methylbutyl)benzene	661	0.039	0.033	0.030	0.05
178	96.98	1114.2	1-t-Butyl-2-methylbenzene	2771	0.174	0.147	0.133	0.02
179	97.55	1120.4	A2	1133	0.073	0.062	0.056	0.13
180	97.65	1121.5	?	1550	0.111	0.094	0.085	UNK
181	97.87	1123.9	?	308	0.022	0.019	0.017	UNK
182	98.22	1127.7	?	406	0.029	0.025	0.022	UNK
183	98.62	1132.0	I43	5613	0.388	0.386	0.259	0.72
184	98.95	1135.6	A3	1307	0.083	0.070	0.063	0.71
185	99.25	1138.8	1-Ethyl-2-n-propylbenzene	4351	0.275	0.232	0.211	0.14
186	99.42	1140.6	A4	1000	0.063	0.053	0.048	0.52
187	99.57	1142.2	?	848	0.061	0.051	0.047	UNK
188	99.83	1145.1	1-Methyl-3-n-butylbenzene	2115	0.134	0.113	0.103	0.17
189	100.20	1149.0	1,3-Di-i-propylbenzene	1444	0.091	0.077	0.064	0.77
190	100.38	1150.9	n-Pentylbenzene	1521	0.096	0.081	0.074	0.52

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
191	100.70	1154.3	1t-M-2-(4-MP)cyclopentane	2031	0.146	0.137	0.101	0.67
192	101.10	1158.5	1-Methyl-2-n-butylbenzene	1489	0.094	0.079	0.072	0.32
193	101.57	1163.4	1,2,3,4-Tetrahydronaphthalene	1308	0.083	0.064	0.071	0.78
194	101.97	1167.6	1-t-Butyl-3,5-dimethylbenzene	2093	0.131	0.110	0.092	0.75
195	102.18	1169.8	Naphthalene	631	0.041	0.030	0.036	0.69
196	102.32	1171.2	?	1326	0.095	0.070	0.084	UNK
197	102.60	1174.1	I44	2450	0.169	0.168	0.113	0.03
198	102.78	1176.0	I45	722	0.050	0.050	0.033	0.02
199	103.03	1178.6	?	336	0.024	0.024	0.016	UNK
200	103.35	1181.9	?	471	0.034	0.034	0.023	UNK
201	103.48	1183.2	I47	477	0.033	0.033	0.022	0.67
202	103.65	1184.9	?	517	0.037	0.037	0.025	UNK
203	103.83	1186.8	?	422	0.030	0.030	0.020	UNK
204	104.18	1190.4	1,3-Di-n-propylbenzene	6133	0.388	0.327	0.272	0.03
205	104.52	1193.8	A5	1119	0.071	0.060	0.050	0.34
206	104.63	1194.9	?	2206	0.159	0.133	0.111	UNK
207	104.83	1197.0	?	618	0.044	0.037	0.031	UNK
208	105.13	1200.0	n-Dodecane	6560	0.453	0.451	0.302	0.00
209	105.60	1205.8	?	1170	0.084	0.084	0.056	UNK
210	105.77	1207.9	?	827	0.059	0.059	0.040	UNK
211	106.05	1211.4	?	775	0.056	0.055	0.037	UNK
212	106.27	1214.1	?	1078	0.077	0.077	0.052	UNK
213	106.55	1217.6	1,3,5-Triethylbenzene	13011	0.828	0.698	0.580	0.79
214	106.85	1221.3	1t-Butyl-4-ethylbenzene	660	0.043	0.036	0.030	0.18
215	107.08	1224.1	?	398	0.029	0.024	0.020	UNK
216	107.22	1225.8	1,2,4-Triethylbenzene	1393	0.090	0.076	0.063	0.48
217	107.38	1227.8	?	467	0.034	0.028	0.023	UNK
218	107.65	1231.1	?	605	0.044	0.037	0.030	UNK
219	107.80	1232.9	?	921	0.066	0.056	0.046	UNK
220	107.93	1234.5	?	1215	0.087	0.074	0.061	UNK
221	108.63	1243.0	1-Methyl-4-n-pentylbenzene	543	0.035	0.030	0.025	0.60
222	108.77	1244.6	?	2696	0.194	0.163	0.136	UNK
223	109.20	1249.8	?	320	0.023	0.019	0.016	UNK
224	109.40	1252.2	?	1486	0.107	0.090	0.075	UNK
225	109.68	1255.6	n-Hexylbenzene	2055	0.132	0.111	0.093	0.01
226	109.85	1257.6	?	2498	0.179	0.151	0.126	UNK
227	110.02	1259.6	?	1228	0.088	0.074	0.062	UNK
228	110.25	1262.4	?	2490	0.179	0.151	0.125	UNK
229	110.62	1266.7	2-Methylnaphthalene	1477	0.106	0.078	0.084	0.11
230	110.80	1268.9	?	1485	0.107	0.078	0.085	UNK
231	110.97	1270.8	?	1821	0.131	0.096	0.104	UNK
232	111.18	1273.4	?	3501	0.252	0.185	0.200	UNK
233	111.38	1275.8	?	828	0.060	0.044	0.047	UNK
234	111.55	1277.7	1-Methylnaphthalene	11134	0.800	0.588	0.635	0.19
235	111.97	1282.6	?	339	0.024	0.018	0.019	UNK
236	112.27	1286.1	?	2948	0.212	0.156	0.168	UNK
237	112.50	1288.8	?	1053	0.076	0.056	0.060	UNK
238	112.77	1291.9	?	2082	0.150	0.110	0.119	UNK
239	112.90	1293.4	?	755	0.054	0.040	0.043	UNK
240	113.30	1298.1	?	1613	0.116	0.085	0.092	UNK

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
241	113.47	1300.0	n-Tridecane	3597	0.258	0.256	0.159	0.00
242	113.60	1301.9	?	3395	0.244	0.242	0.150	UNK
243	113.95	1306.9	?	1885	0.135	0.134	0.083	UNK
244	114.13	1309.5	?	525	0.038	0.037	0.023	UNK
245	114.30	1311.9	?	1176	0.085	0.084	0.052	UNK
246	114.53	1315.2	?	3394	0.244	0.242	0.150	UNK
247	114.75	1318.2	?	3743	0.269	0.267	0.166	UNK
248	114.90	1320.3	?	928	0.067	0.066	0.041	UNK
249	115.05	1322.5	?	4422	0.318	0.315	0.196	UNK
250	115.28	1325.7	?	1060	0.076	0.075	0.047	UNK
251	115.47	1328.3	?	917	0.066	0.065	0.041	UNK
252	115.70	1331.6	?	1543	0.111	0.110	0.068	UNK
253	115.92	1334.6	?	830	0.060	0.059	0.037	UNK
254	116.28	1339.7	?	1998	0.144	0.142	0.088	UNK
255	117.07	1350.6	?	4834	0.347	0.344	0.214	UNK
256	117.32	1354.1	?	1237	0.089	0.088	0.055	UNK
257	117.52	1356.8	?	785	0.056	0.056	0.035	UNK
258	117.87	1361.6	?	1107	0.080	0.079	0.049	UNK
259	118.08	1364.6	?	494	0.036	0.035	0.022	UNK
260	118.22	1366.4	?	754	0.054	0.054	0.033	UNK
261	118.35	1368.2	?	1128	0.081	0.080	0.050	UNK
262	118.50	1370.3	?	980	0.070	0.070	0.043	UNK
263	118.70	1373.0	?	1266	0.091	0.090	0.056	UNK
264	119.28	1380.9	?	10436	0.750	0.743	0.462	UNK
265	119.50	1383.9	?	221	0.016	0.016	0.010	UNK
266	119.77	1387.5	?	1825	0.131	0.130	0.081	UNK
267	119.97	1390.2	?	816	0.059	0.058	0.036	UNK
268	120.32	1394.9	?	1645	0.118	0.117	0.073	UNK
269	120.57	1398.2	?	3041	0.219	0.217	0.135	UNK
270	120.70	1400.0	C14	4064	0.292	0.287	0.167	0.00
271	120.97	1404.7	?	2919	0.210	0.206	0.120	UNK
272	121.30	1410.7	?	1980	0.142	0.140	0.081	UNK
273	121.53	1414.8	?	2943	0.211	0.208	0.121	UNK
274	121.77	1418.9	?	3158	0.227	0.223	0.130	UNK
275	122.05	1423.9	?	583	0.042	0.041	0.024	UNK
276	122.83	1437.7	?	983	0.071	0.069	0.040	UNK
277	123.00	1440.6	?	1383	0.099	0.098	0.057	UNK
278	123.32	1446.1	?	1152	0.083	0.081	0.047	UNK
279	123.53	1449.9	?	1493	0.107	0.105	0.061	UNK
280	123.87	1455.7	?	3773	0.271	0.266	0.155	UNK
281	124.55	1467.5	?	7032	0.505	0.496	0.289	UNK
282	124.92	1473.8	?	650	0.047	0.046	0.027	UNK
283	125.10	1477.0	?	437	0.031	0.031	0.018	UNK
284	125.65	1486.4	?	2223	0.160	0.157	0.091	UNK
285	126.07	1493.5	?	1433	0.103	0.101	0.059	UNK
286	126.32	1497.7	?	1375	0.099	0.097	0.057	UNK
287	126.45	1500.0	C15	1465	0.105	0.103	0.056	0.00
288	126.68	1504.6	?	1661	0.119	0.116	0.064	UNK
289	126.95	1509.7	?	401	0.029	0.028	0.015	UNK
290	127.23	1515.3	?	1061	0.076	0.074	0.041	UNK

pk#	Min.	Index	Component	Area	Wt%	Vol%	Mol%	Shift
291	127.63	1523.0	?	1277	0.092	0.089	0.049	UNK
292	127.88	1527.8	?	635	0.046	0.044	0.024	UNK
293	128.22	1534.3	?	802	0.058	0.056	0.031	UNK
294	129.05	1550.3	?	1442	0.104	0.101	0.055	UNK
295	129.28	1554.7	?	1281	0.092	0.090	0.049	UNK
296	129.50	1558.8	?	1812	0.130	0.127	0.070	UNK
297	130.08	1569.9	?	1630	0.117	0.114	0.063	UNK
298	131.02	1587.6	?	227	0.016	0.016	0.009	UNK
299	131.23	1591.6	?	833	0.060	0.058	0.032	UNK
300	131.68	1600.1	C16	437	0.031	0.030	0.016	0.07
301	133.92	1653.0	?	1665	0.120	0.116	0.060	UNK
302	135.93	1700.1	C17	317	0.023	0.022	0.011	0.08
303	136.43	1712.1	?	1452	0.104	0.101	0.049	UNK
304	138.35	1757.7	?	457	0.033	0.032	0.016	UNK
305	140.77	1816.1	?	922	0.066	0.064	0.031	UNK

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No.________

CHAIN-OF-CUSTODY RECORD

Project Number OK0532.001

Project Location Monument New Mexico

Laboratory SPL, INC.

Sampler(s)/Affiliation D. DeLeon - Warren
D. Lowery - G&M

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	FINGER PRINT	Finger PRINT HOLD								TOTAL
WP-2	L	2/25/95 8:00		2						234740		Fingerprint	ON
WP-10	L	2/25/95 9:50		2						234741		Fingerprint	Back
Mid. Heat oil	L	2/25/95 10:05			2					234742		Hold	Table
Condensate oil	L	2/25/95 10:15			2					234743		Hold	GC Lab
LUBE OIL	L	2/25/95 10:25			2					234734		Hold	
						2 X	Hay	-Ext	oil		#200 cc		
								Dr.					
					5100	E.	Shelly						
						S	1000					John	
						T	O/K		74135			Shonfelt	

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers ____

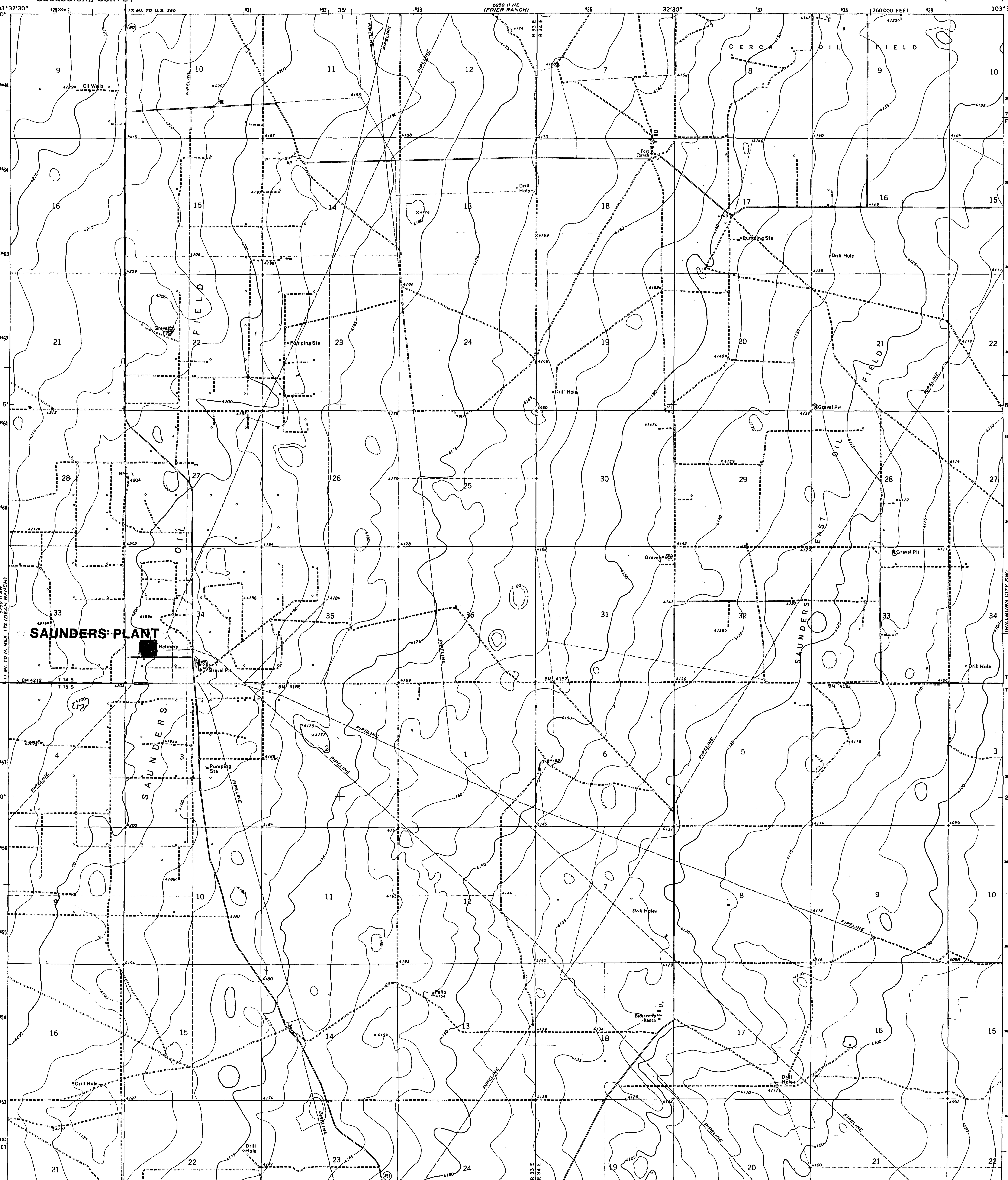
Relinquished by: D. Lowery Received by:	Organization: Geraghty & Miller Organization:	Date 2/25/95 Time 1205 Date / / Time	Seal Intact? Yes No N/A
Relinquished by: Received by:	Organization: Organization:	Date / / Time Date / / Time	Seal Intact? Yes No N/A

Special Instructions/Remarks: ____

Delivery Method: ☐ In Person ☒ Common Carrier Fed. Ex. (SPECIFY) ☐ Lab Courier ~~☒ Other FE~~ DL (SPECIFY)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FORT RANCH QUADRANGLE
NEW MEXICO–LEA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



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Topography by photogrammetric methods from aerial photographs taken 1971. Field checked 1973

Projection and 10,000-foot grid ticks: New Mexico coordinate system, east zone (transverse Mercator) 1000-metre Universal Transverse Mercator grid ticks, zone 13, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NEW MEXICO
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

Saunders

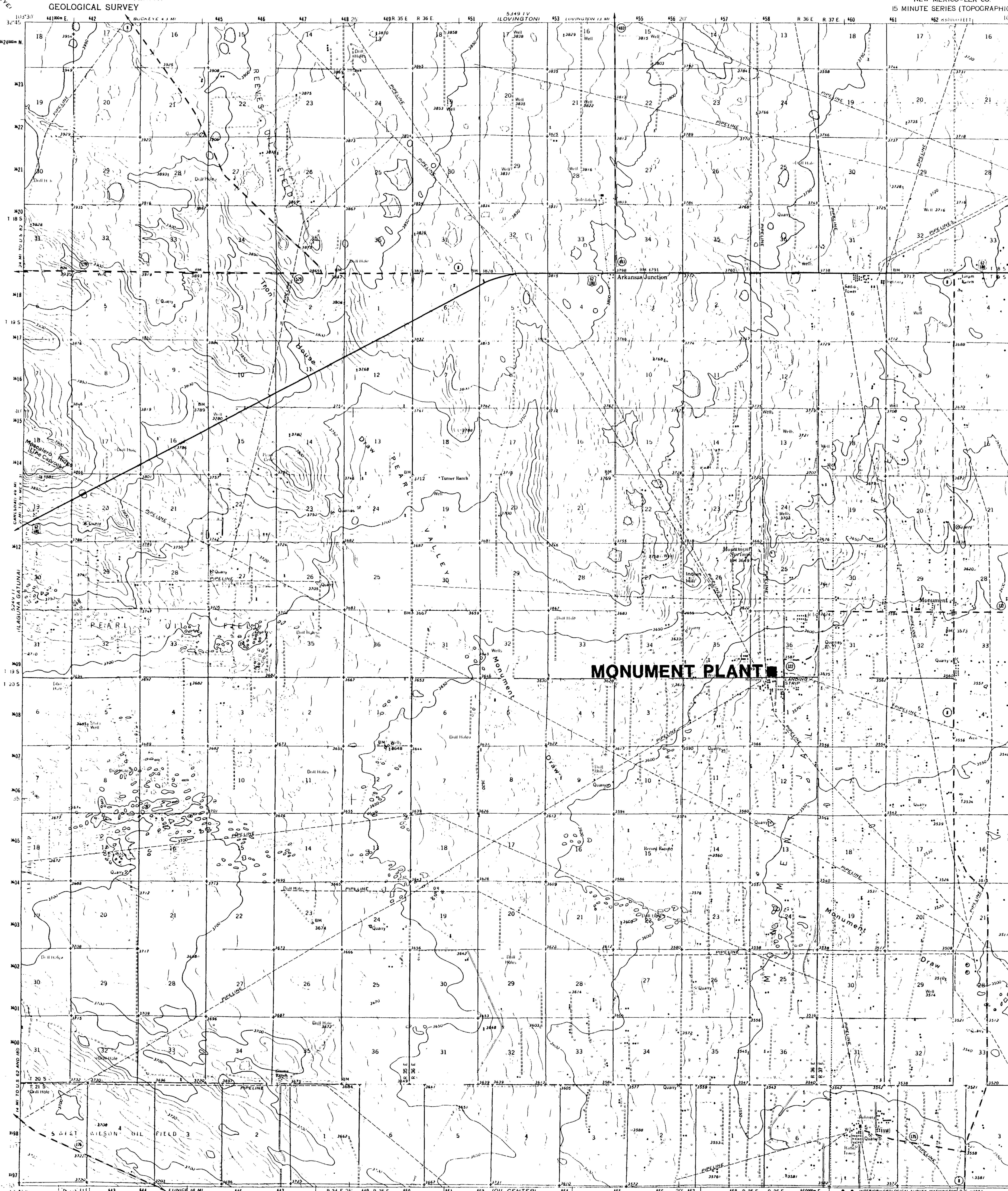
FORT RANCH, N. MEX.
N3300—W10330/7.5

1973

AMS 5250 II SE—SERIES V881

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

MONUMENT QUADRANGLE
NEW MEXICO–LEA CO.
15 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and USC&GS

Planimetry by photogrammetric methods from aerial photographs taken 1957. Topography by planetable surveys 1963

Polyconic projection. 1927 North American datum
10,000 foot grid based on New Mexico coordinate system, east zone
1000 meter Universal Transverse Mercator grid ticks, zone 13, shown in blue

UTM GRID AND 1963 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:62500

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NEW MEXICO
QUADRANGLE LOCATION

ROAD CLASSIFICATION

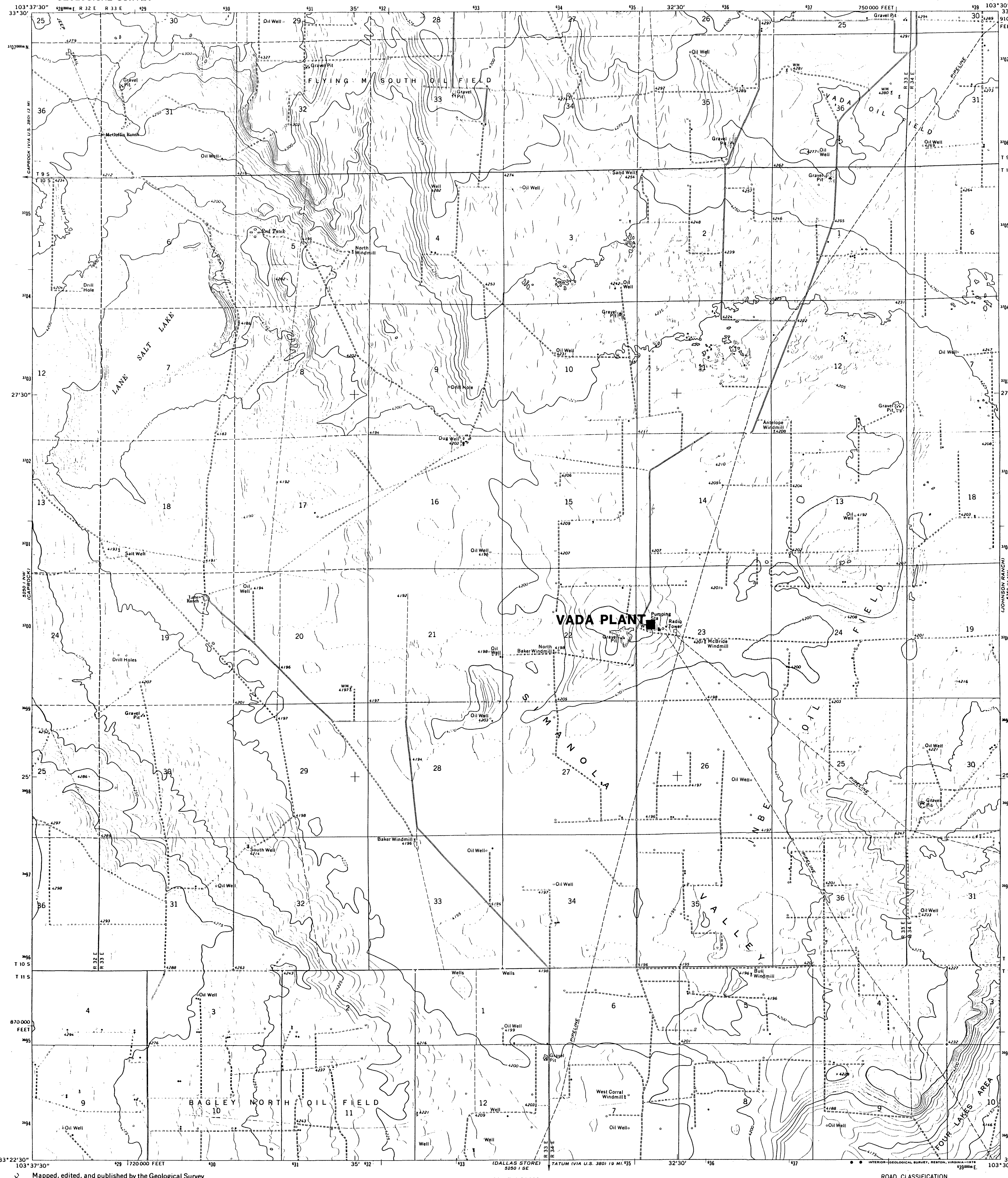
Heavy-duty — Light-duty
Medium-duty — Unimproved dirt
U.S. Route — State Route

MONUMENT, N. MEX.
N3230—W10315/15
1963
AMS 5349 III–SERIES V781

MAR 4 1985
RECEIVED

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

LANE SALT LAKE QUADRANGLE
NEW MEXICO—LEA CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1971. Field checked 1973

Projection and 10,000-foot grid ticks: New Mexico coordinate system, east zone (transverse Mercator) 1000-metre Universal Transverse Mercator grid ticks, zone 13, shown in blue. 1927 North American datum

Fine red dashed lines indicate selected fence lines

UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

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A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

NEW MEXICO
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface
Light-duty road, hard or improved surface
Secondary highway, hard surface
Unimproved road
Interstate Route
U. S. Route
State Route

Vada
LANE SALT LAKE, N. MEX.
N3322.5—W10330/7.5

1973

AMS 5250 I NE—SERIES V881