GW - 26

REPORTS

YEAR(S):

1990 - 1981

Chevron

Warren Petroleum Company
A Division of Chevron U.S.A. Inc.
P.O. Box 1589, Tulsa, OK 74102

Manufacturing Department

Tulsa, Oklahoma
August 27, 1990

William J. LeMay, Director
State of New Mexico
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504-2088

Attention: Roger C. Anderson
Environmental Engineer

SAUNDERS GAS PROCESSING PLANT
LEA COUNTY, NEW MEXICO
DISCHARGE PLAN GW-27 26

Dear Mr. Anderson:

I have attached a copy of our Discharge Plan for the subject facility, which reflects current operations.

In addition to, and as a part of the plan, we will do the following:

- Repair compressor tubing for leaks
- Check berm capacity for lube oil to be sure it contains the contents of one of the largest tanks. We will also berm around the waste water tanks and check the oil tanks for low places.
- Empty and maintain as empty the bucket under the hot oil overflow.
- Annually check sumps for leaks
- Test all underground drain lines older than 25 years.
- Clean up pump area
- Curb diesel and unleaded gasoline storage tanks.

I will submit a progress report to you monthly until all of these projects are completed, and thereby become a part of the Discharge Plan. I expect that all items will be complete by August 1, 1991.

1639/08300/LLJ/L/SNDRS DISG

Meanwhile, if you find that you have any questions, or need further information, please contact Linda Johnson, or me, at (918)560-4138.

Very truly yours,

for J. R. Boyd
Plant Manager

JRB:fy
Attachment

xc: B. G. Schulz

1639/08300/LLJ/L/SNDRS DISG

WARREN PETROLEUM COMPANY,
A DIVISION OF CHEVRON U.S.A. INC.

DISCHARGE PLAN GW-25
FOR
SAUNDERS GAS PROCESSING PLANT

1639/08240/LLJ/SNDRS DISG PLAN
/1

OCT 21 1985

50 YEARS

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

1935 - 1985

TONEY ANAYA
GOVERNOR

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

October 18, 1985

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Warren Petroleum Co.
P.O. Box 1589
Tulsa, OK 74102

Attention: Ms. L. T. Reed

Re: Dicharge Plans for Monument (GW-25), Saunders (GW-26) and Vada (GW-27) Gas Processing Plants - Lea County, NM

Dear Ms. Reed:

The information that was stipulated for approval of the subject discharge plans has been reviewed and accepted by OCD. The above-listed discharge plans are hereby approved for a period of five years. This approval will expire July 31, 1990, and you should submit an application for new approval in ample time before that date.

Hydrostatic tests on the Saunders underground wastewater piping will be required for discharge plan renewal in 1990. Hydrostatic tests of underground wastewater piping at the Vada plant will not be required until 1995.

On behalf of the staff of the Oil Conservation Division, I wish to thank you for your cooperation during this discharge plan review.

Sincerely,

R. L. STAMETS
Director

RLS/JB/dp

cc: Oil Conservation Division - Hobbs

TABLE OF CONTENTS

SECTION I

GENERAL INFORMATION

DISCHARGE PLAN
SAUNDERS PLANT
SECTION I - GENERAL INFORMATION

INTRODUCTION

The following is presented as the Saunders Plant Discharge Plan and is in accordance with Part 3 of the Water Quality Control Commission Regulations.

This Plan provides information regarding any potential discharges onto or below the surface of the ground.

SUMMARY OF WASTEWATER DISPOSAL METHODS
SAUNDERS GAS PROCESSING PLANT

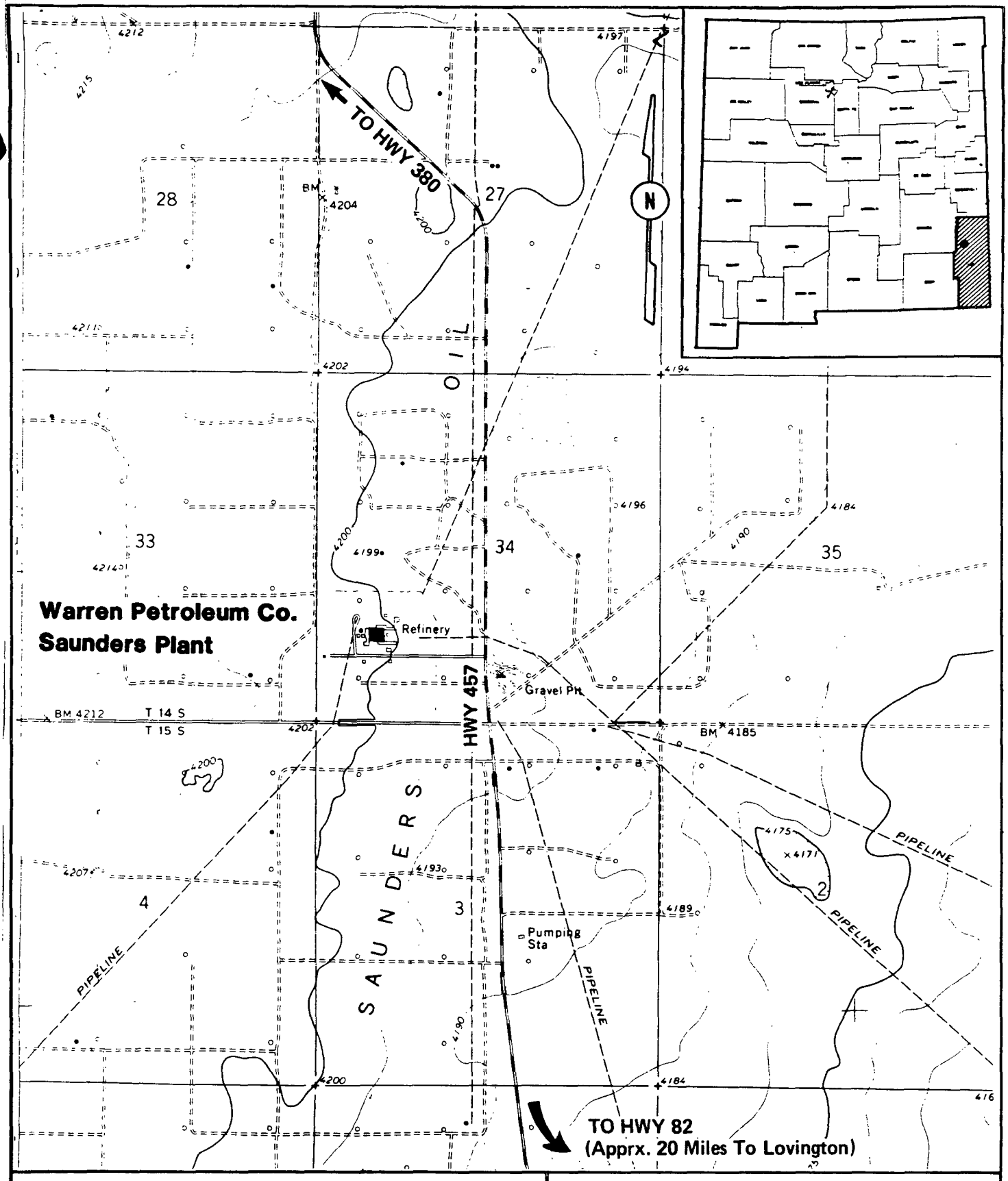
Location	Wastewater Disposal Methods*
34-T14S, R33E Lea County, NM	(1) Maud Saunders Well No. 4 (NMOCD Administrative Order SWD-255 (Amended) (Refer to Section III and Section XI). (Granted 7/13/83)** (2) Charles B. Gillespie-Operated Injection Well (By Continuing Contract)** (a) Gandy Corporation (By Contract) Used in the Event of Well Failure

*Section IX of this Plan further describes the disposal of waste materials generated at the Saunders Plant.

**The average discharge rate for the Saunders Plant is 450 bbls/day as measured by meter.

Scrubber Oil and Used Oil is sold to the Gandy Corporation.

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 disposal when needed and scrubber oil sales.



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

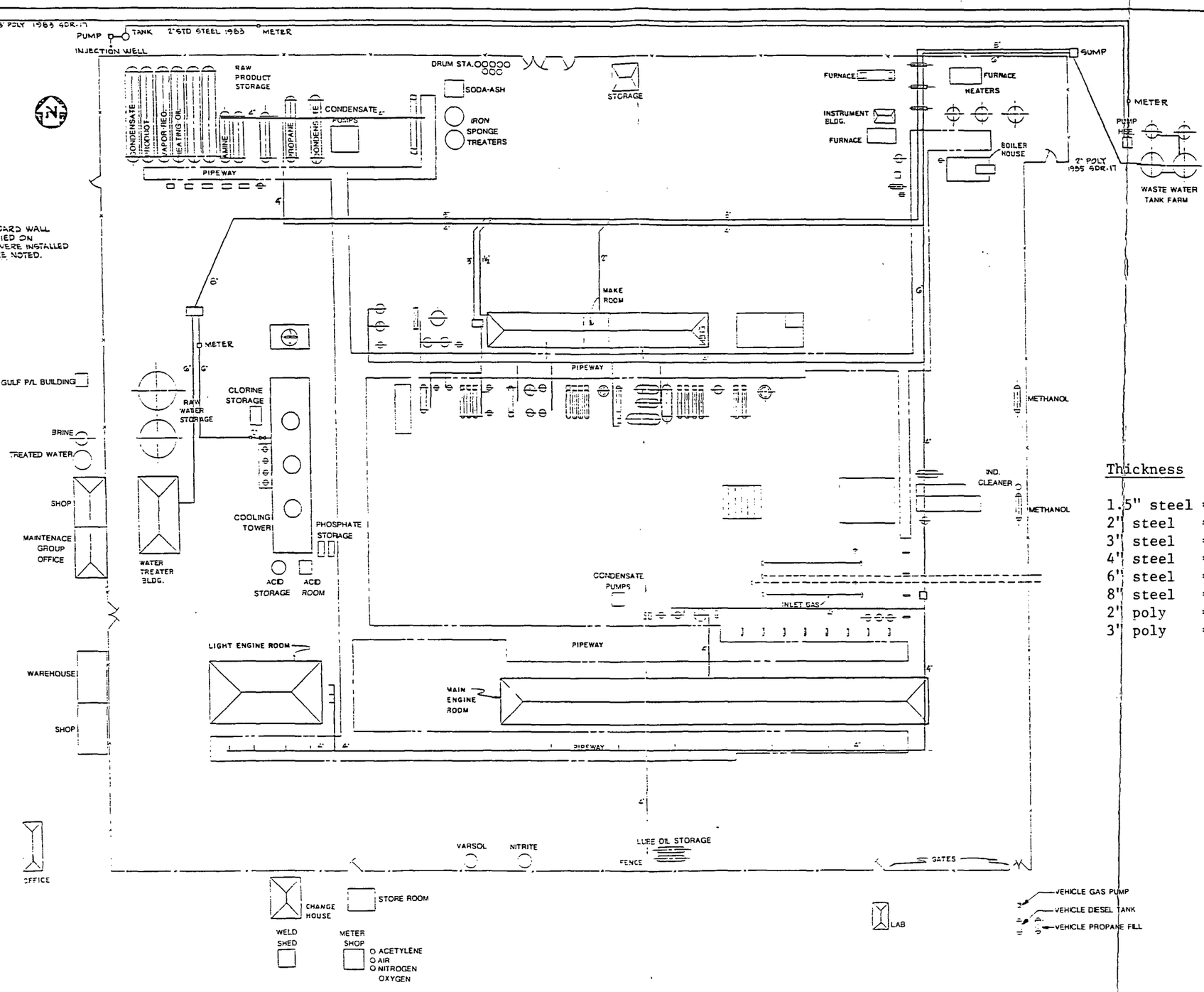
APPROX. EL. 4200
APPROX. LAT. 33°3' 28" N
APPROX. LONG. 103°36' 29" W

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

Warren Petroleum Company

TULSA, OKLAHOMA

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



Thickness

1.5"	steel	= 0.145 in.
2"	steel	= 0.154 in.
3"	steel	= 0.216 in.
4"	steel	= 0.237 in.
6"	steel	= 0.280 in.
8"	steel	= 0.322 in.
2"	poly	= 0.229 in.
3"	poly	= 0.218 in.

GENERAL NOTES	GENERAL NOTES	DWG. NO.	REFERENCE DRAWINGS

NO.	REVISION	BY	DATE	CHK.	APPR.

NO.	REVISION	BY	DATE	CHK.	APPR.

AFE OR WO

ISSUE

DATE | PRELIM. | CONST.

WARREN PETROLEUM COMPANY
A DIVISION OF GULF OIL CORPORATION

PLANT LAYOUT

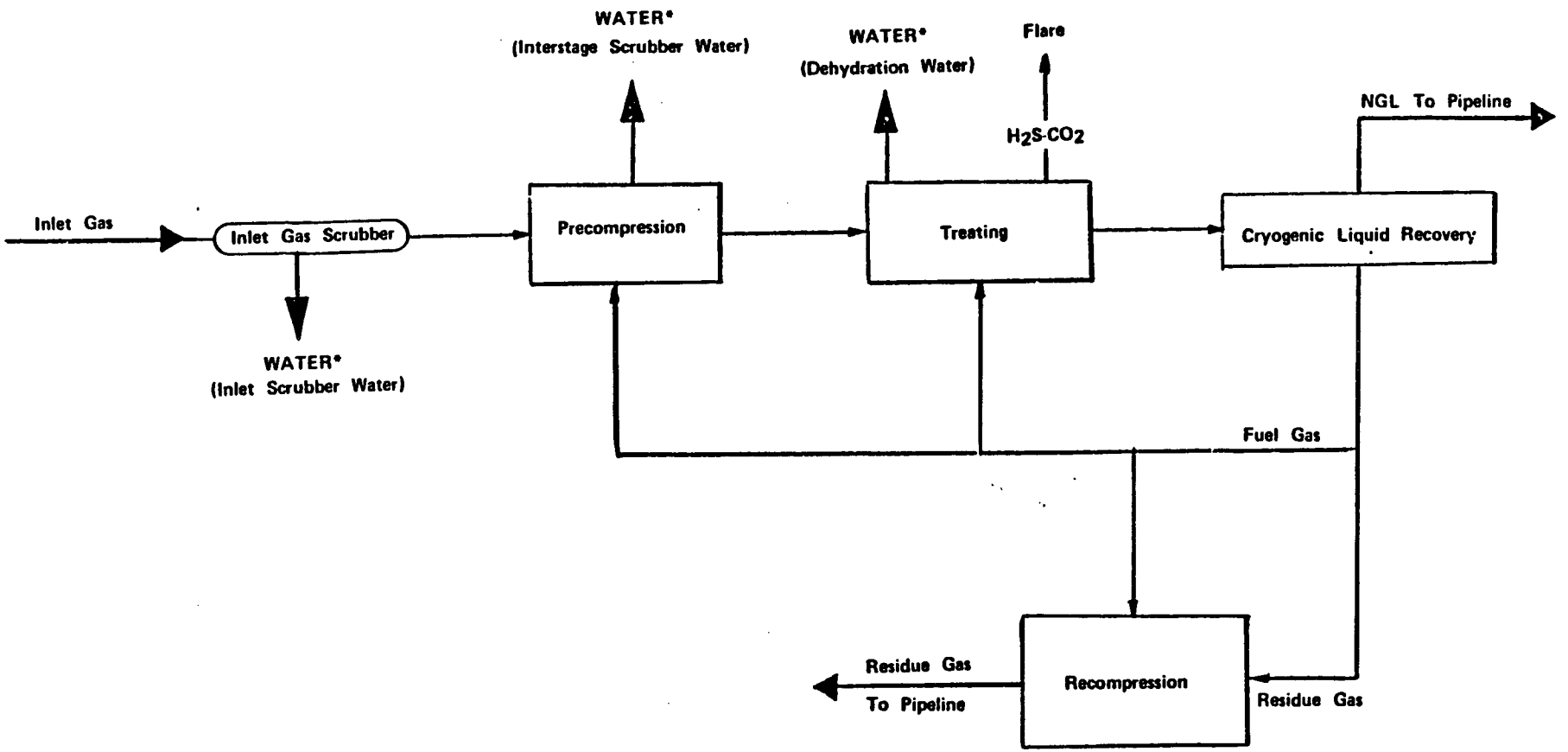
PLT. 146 SAUNDERS LOVINGTON NM

DRAWN LF | DATE 4-8-65 | SCALE NONE

CHECKED | DATE

APPR | DATE

SUMMARY OF WASTE WATER DISCHARGE —SAUNDERS PLANT

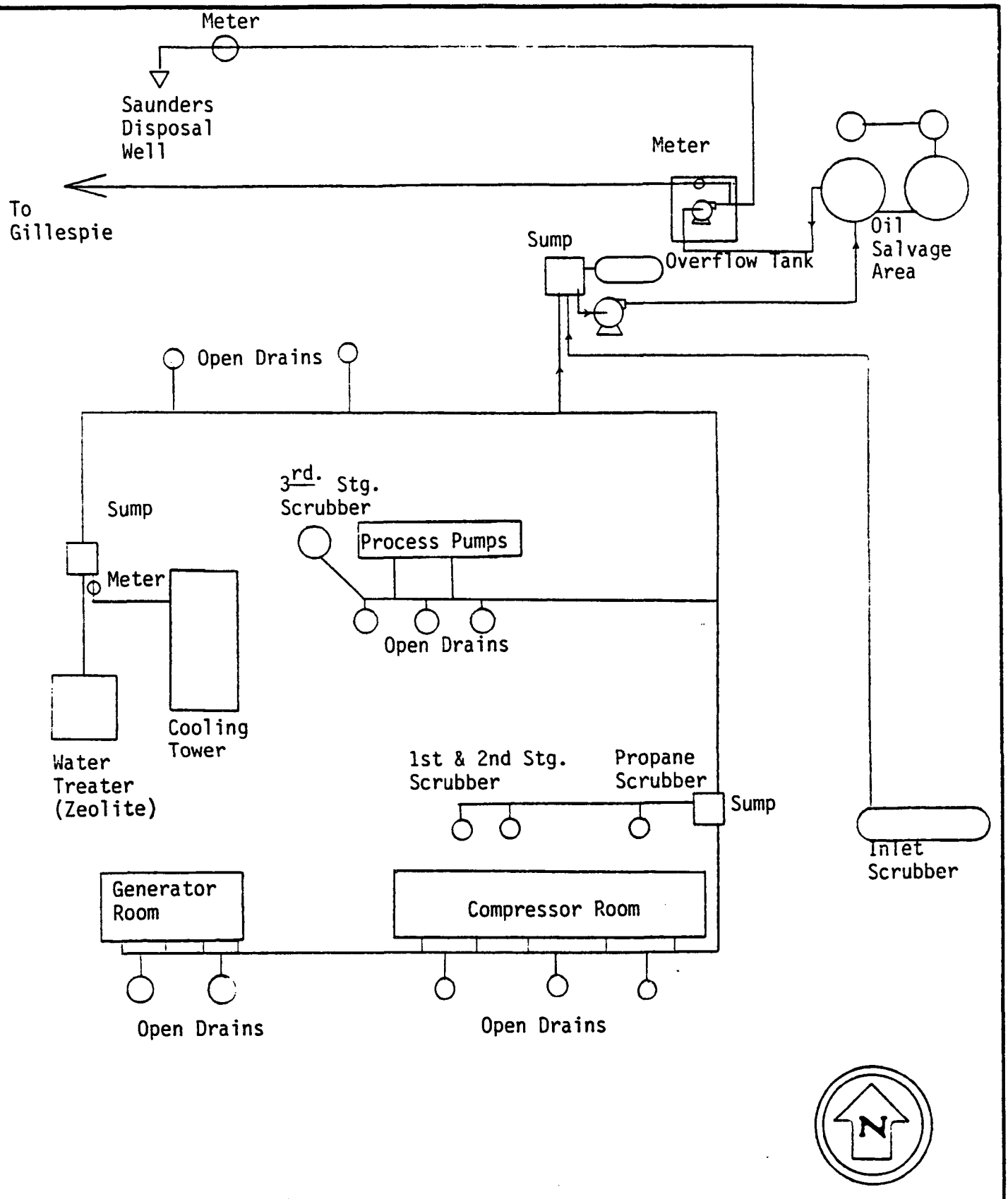


ACCIDENTAL SPILL: PROCEDURES IN THE SPILL CONTROL AND COUNTERMEASURE PLAN WOULD TAKE EFFECT.

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.



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

Waste Water System

Saunders Plt. Lovington, N. M.

DRAWN RLM	DATE 1-22-85	SCALE
CHECKED	DATE	DRAWING NO.
APPROVED	DATE	

SECTION II

ORIGINAL DISCHARGE PLAN FOR SAUNDERS GAS PROCESSING PLANT

INITIAL INFORMATION - OCTOBER 23, 1980

REVISED - MAY 4, 1981

REVISED - NOVEMBER 23, 1981

SECTION II

ORIGINAL DISCHARGE PLAN FOR SAUNDERS GAS PROCESSING PLANT

The retention ponds which were described in the Wastewater Discharge Plan of October 23, 1980, have been filled in.

Warren Petroleum Company

MANUFACTURING DEPARTMENT

November 23, 1981

P. O. Box 1589
Tulsa, Oklahoma 74102

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

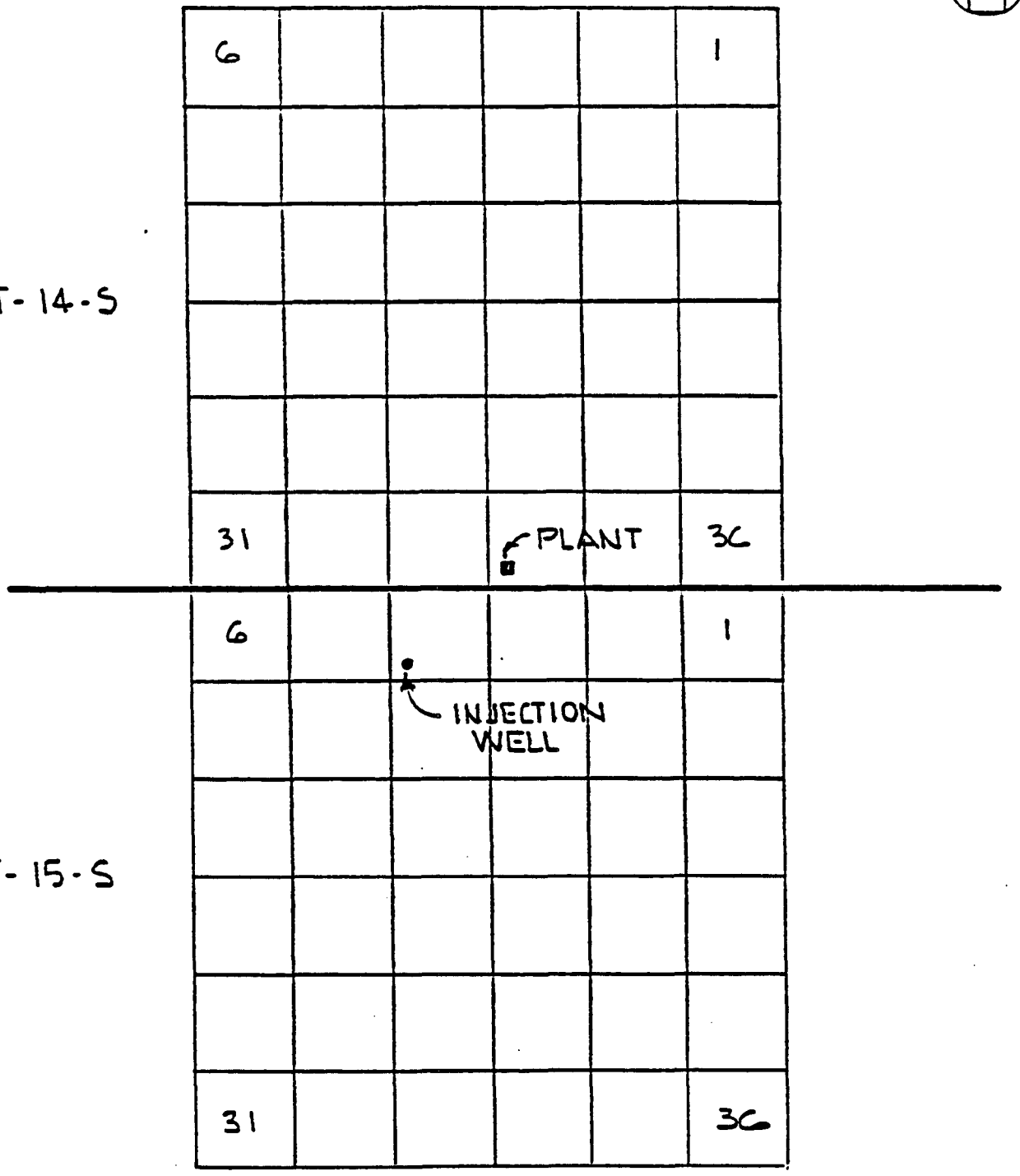
Gulf

R-33-E

N

T-14-S

T-15-S



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

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

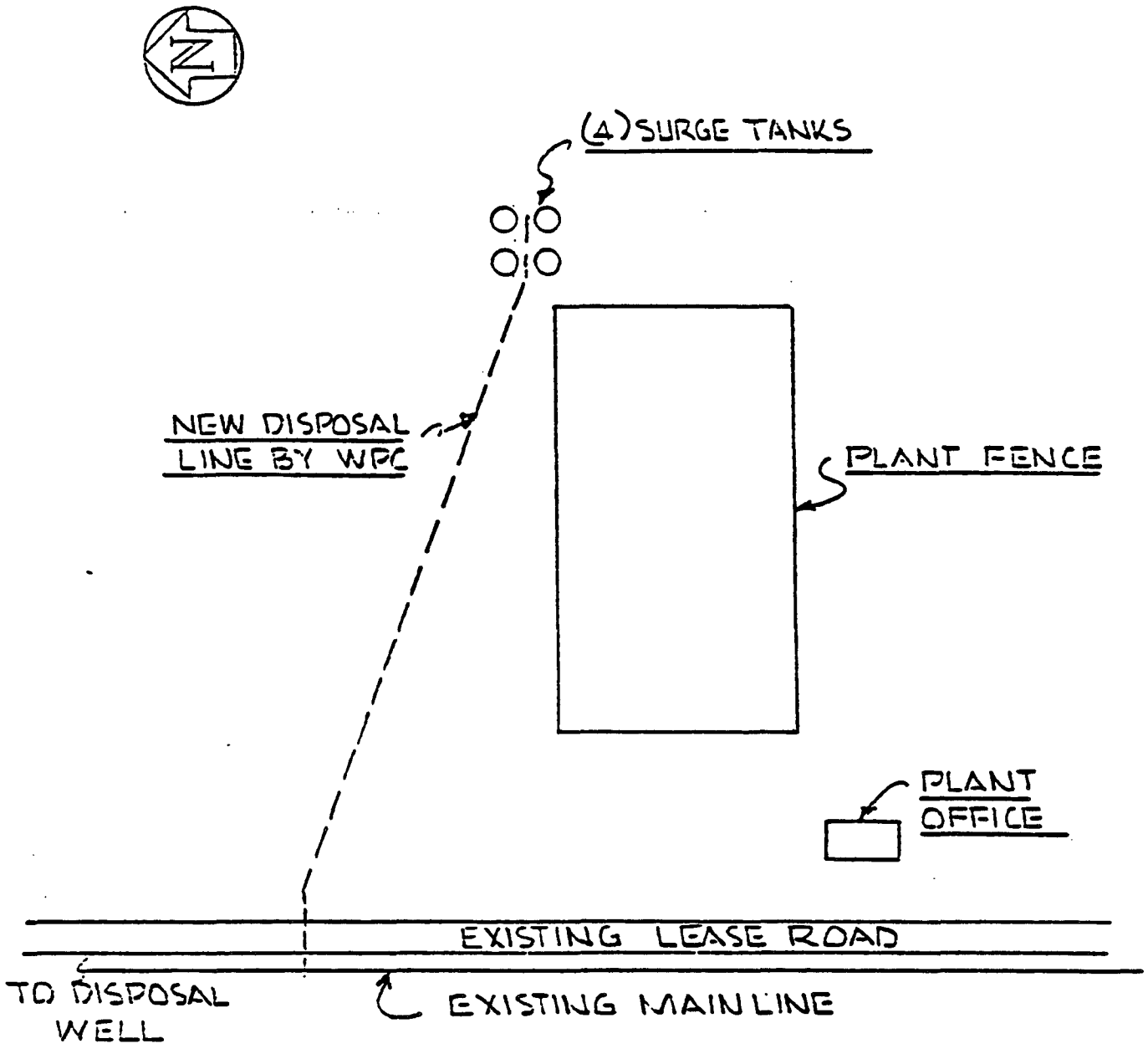
WARREN PETROLEUM COMPANY

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. 146-1003-C	
APPROVED	DATE		



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 8234

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-[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

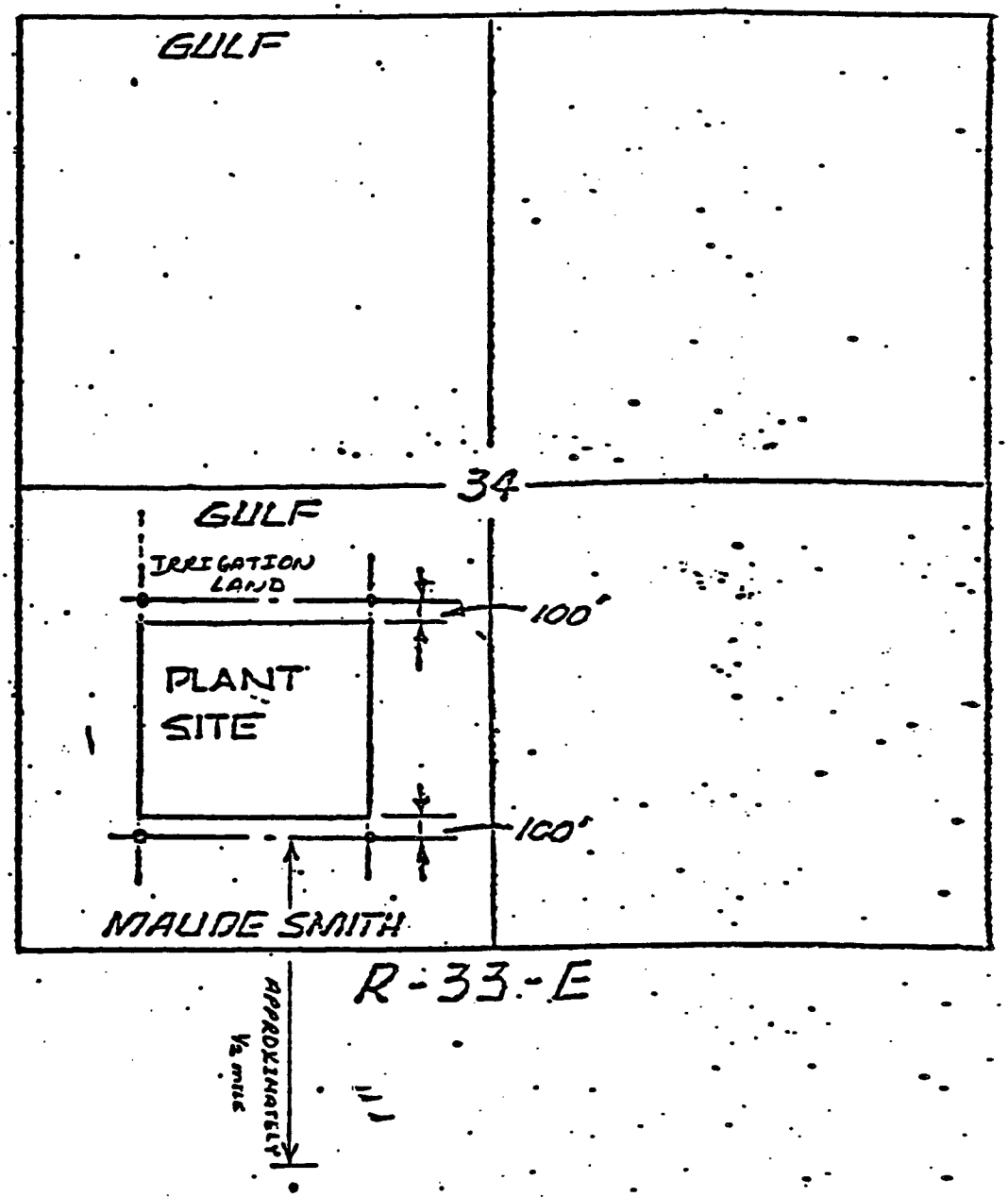
well for disposal. The injection well would be used when conditions for irrigation are not favorable.

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.



LEA COUNTY, N.M.

REVISIONS	BY	DATE	CHK.	APPR.	ISSUED CONST. DATE	ISSUED CONST. BY

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

WARREN PETROLEUM COMPANY

TULSA, OKLAHOMA

PLOT PLAN

PLT. 146 SAUNDERS LOVINGTON

DRAWN P.K. DATE 10-16-20 SCALE

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-T14S-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, 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.

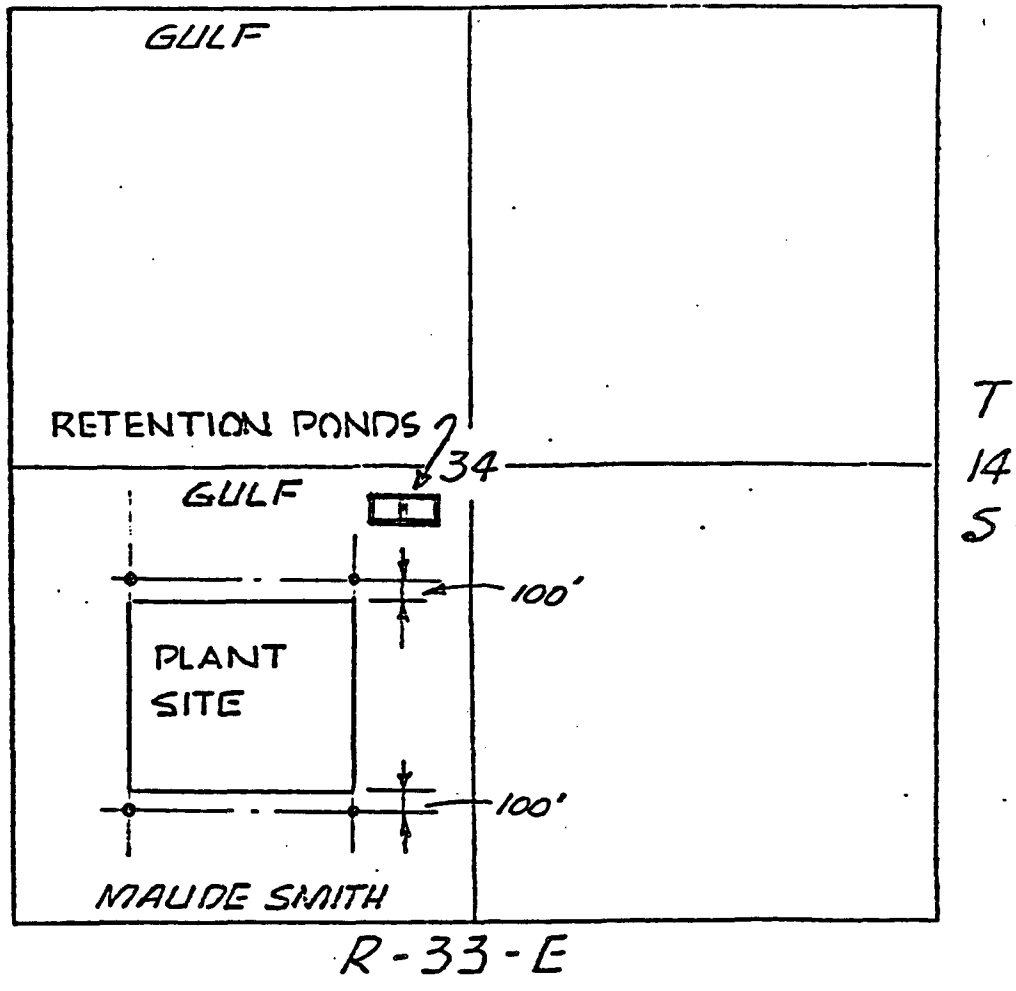
Reviewed by:

Gerald W. Knudsen, P. E.
F. M. FOX & ASSOCIATES, INC.

Very truly yours,

J. E. Moody, 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

PLOT PLAN

PLT. 146 SAUNDERS LOVINGTON, N.

DRAWN P.K. DATE 10-16-80 SCALE

CHECKED DATE

APPROVED DATE

DRAWING NO. 146-1001-(

SECTION III

UPDATE OF ORIGINAL DISCHARGE PLAN FOR SAUNDERS GAS PROCESSING PLANT

SEPTEMBER 30, 1984

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/LLJ:cm

Attachments

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,
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.

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 13th day of July, 1983.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

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,

L. T. Reed, Director
Environmental Affairs

LTR:LLJ:de
Attachment

Gulf

Division of Gulf Oil Corporation

R-33-E

T-14-S

6					1
31			PLANT**		36

T-15-S

6					1
		* INJECTION WELL			
31					36

*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 P.K.	DATE 11-2-81	SCALE NONE	
CHECKED	DATE	DRAWING NO. 146-1002-C	
APPROVED	DATE		

SECTION IV

TOPOGRAPHIC MAP

Warren Petroleum Co.
Saunders Plant

Refinery

Gravel Pit

Pumping Sta

Drill Hole

Gravel Pit

Drill Hole

BM 4212

BM 4204

BM 4185

BM 4157

BM 4171

T 14 S
T 15 S

SAUNDERS

SAUNDERS

PIPELINE

PIPELINE

PIPELINE

PIPELINE

PIPELINE

O I L

5250 II SW
11 MI. TO N. MEX. 178 (DEAN RANCH)

5'

2'30"

3661

3660

3657

3656

SECTION V

GENERAL DESCRIPTION - GAS PROCESSING INDUSTRY AND SPECIFIC REFERENCES FOR THE SAUNDERS 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.

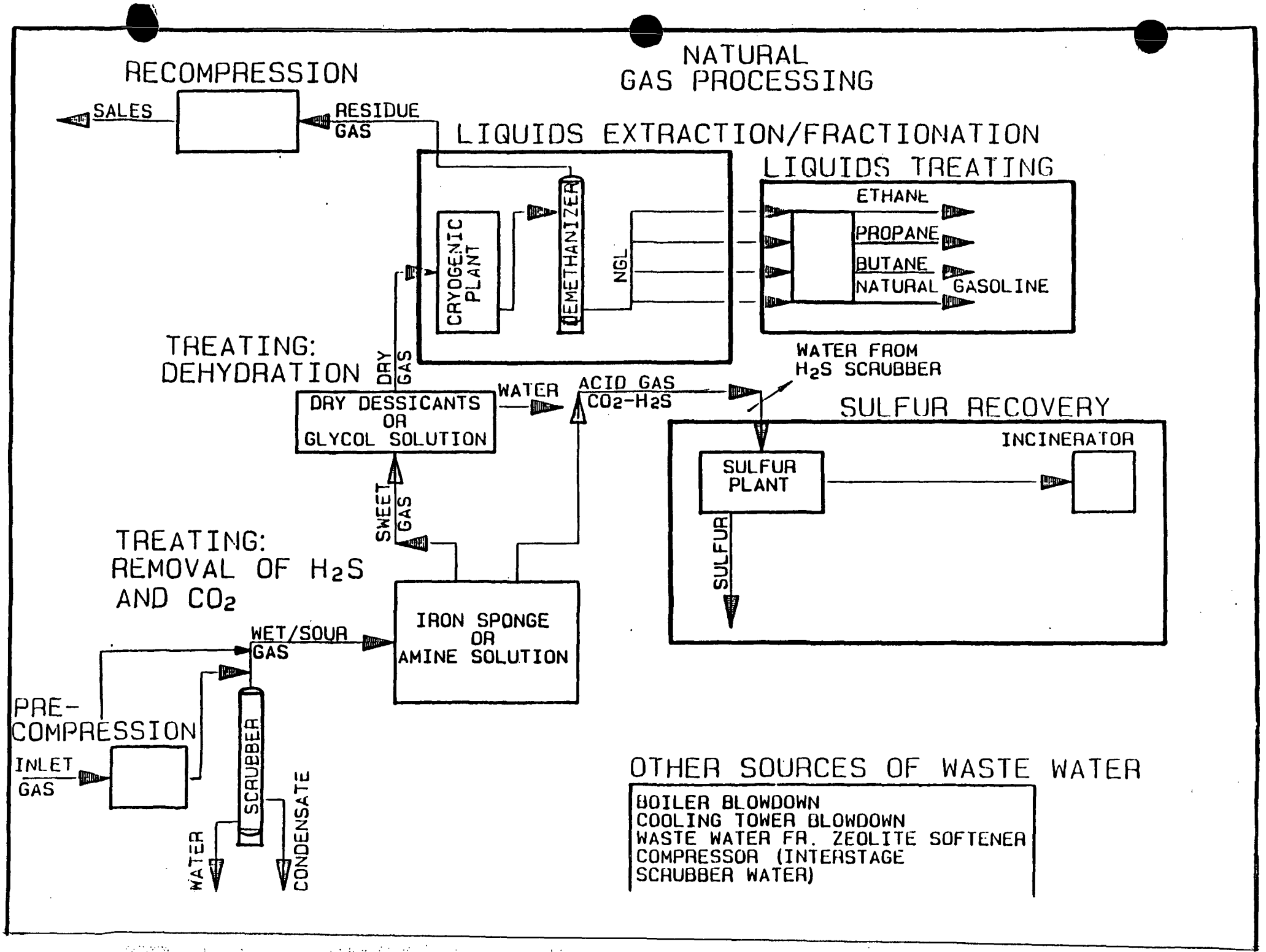
The liquid hydrocarbon components of natural gas are ethane (C^2), propane, (C^3), butane (C^4) and natural gasoline (C^{5+}). The remaining gas, from which the liquids are extracted, is almost entirely methane (C^1).

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, 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 grains 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 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.


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)

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 absorbs 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.

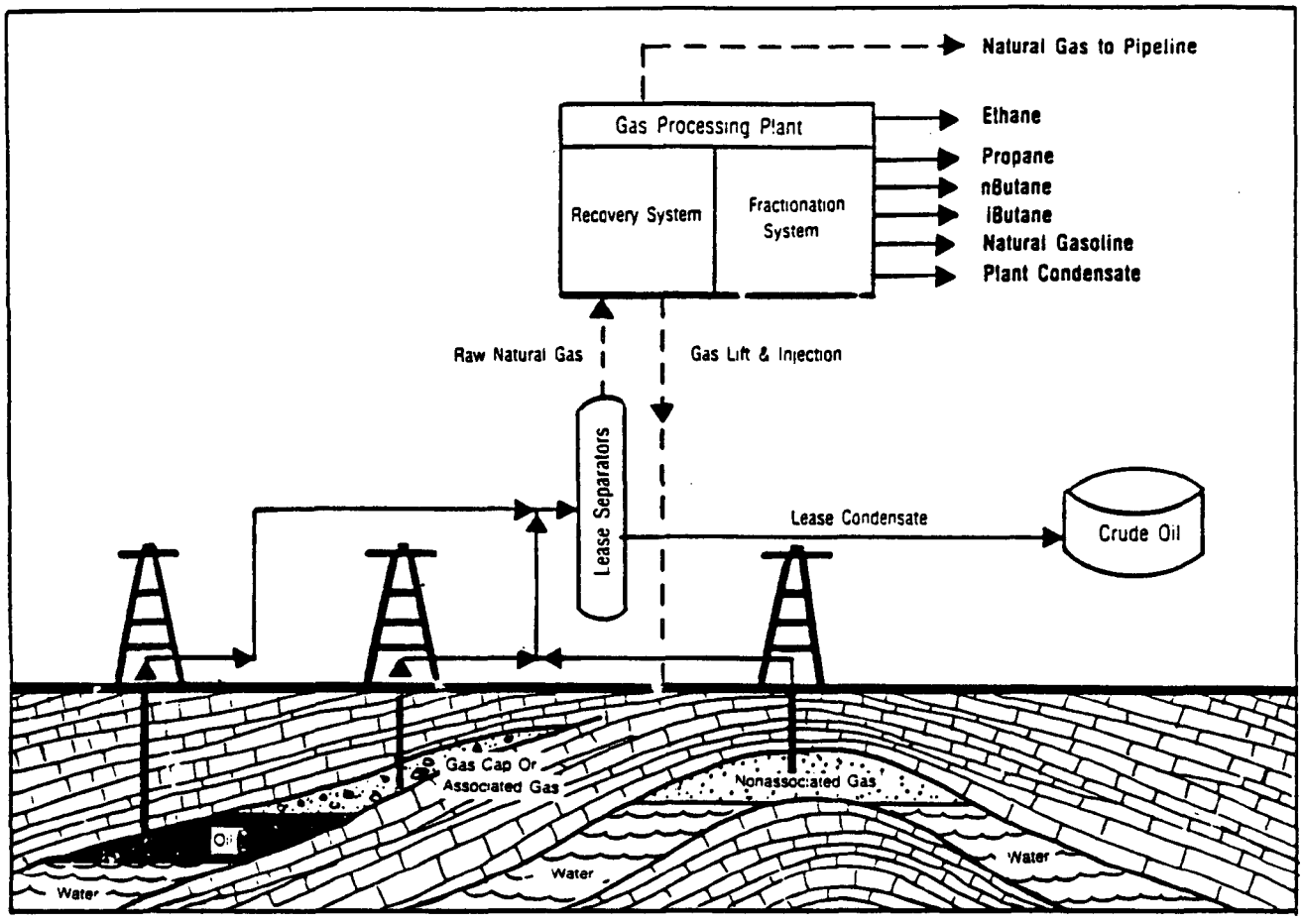
From whatever reservoir, natural gas as produced from the earth has widely varying composition, depending on the field, the formation, or the reservoir from which it is produced. The principal constituents of natural gas are methane and ethane, but most gases contain varying amounts of heavier components, 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.

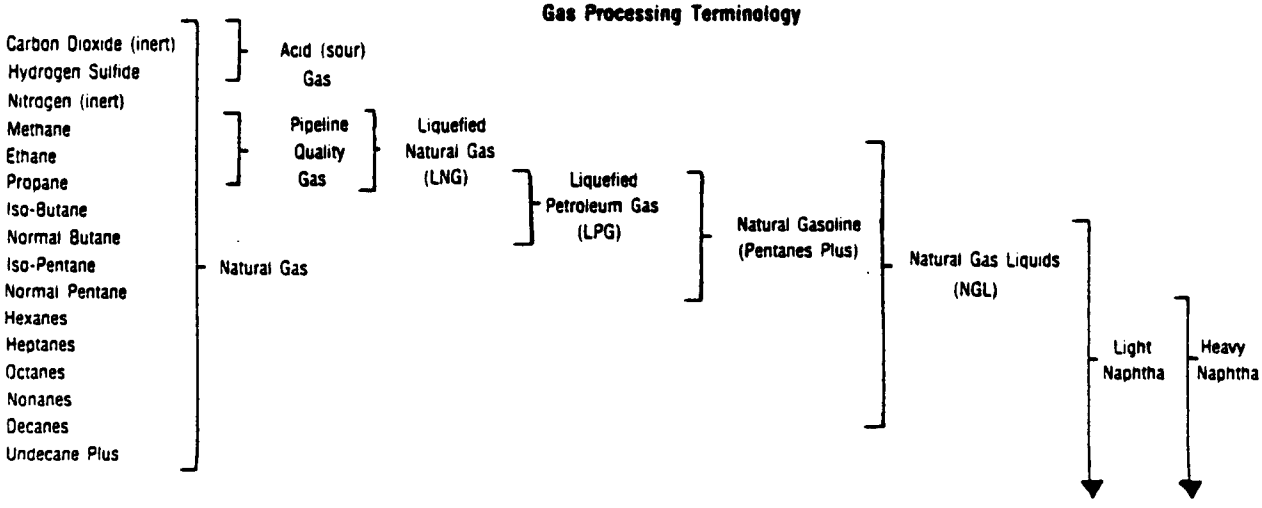
PROCESSING AND MANUFACTURE

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.

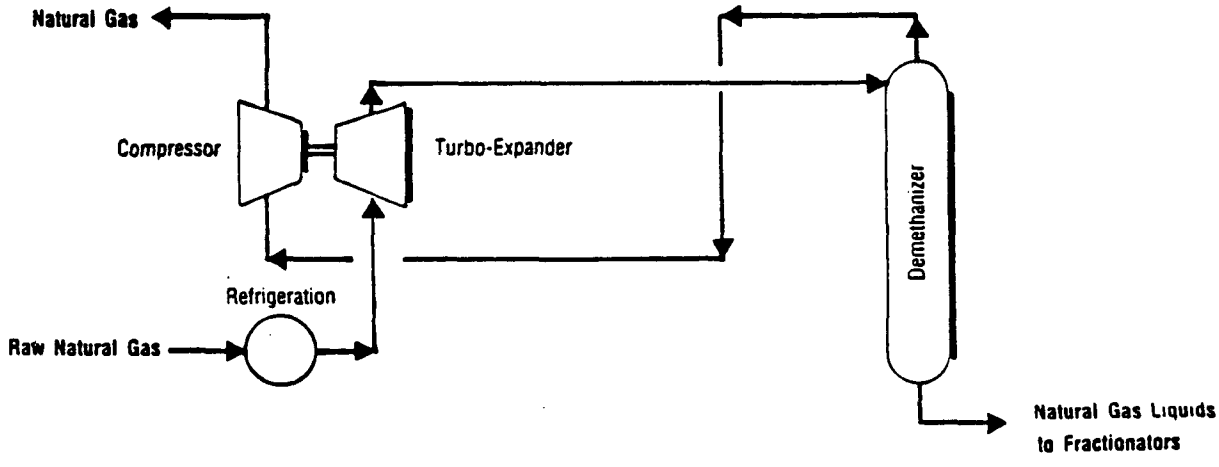
TURBO EXPANDER PROCESS

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.

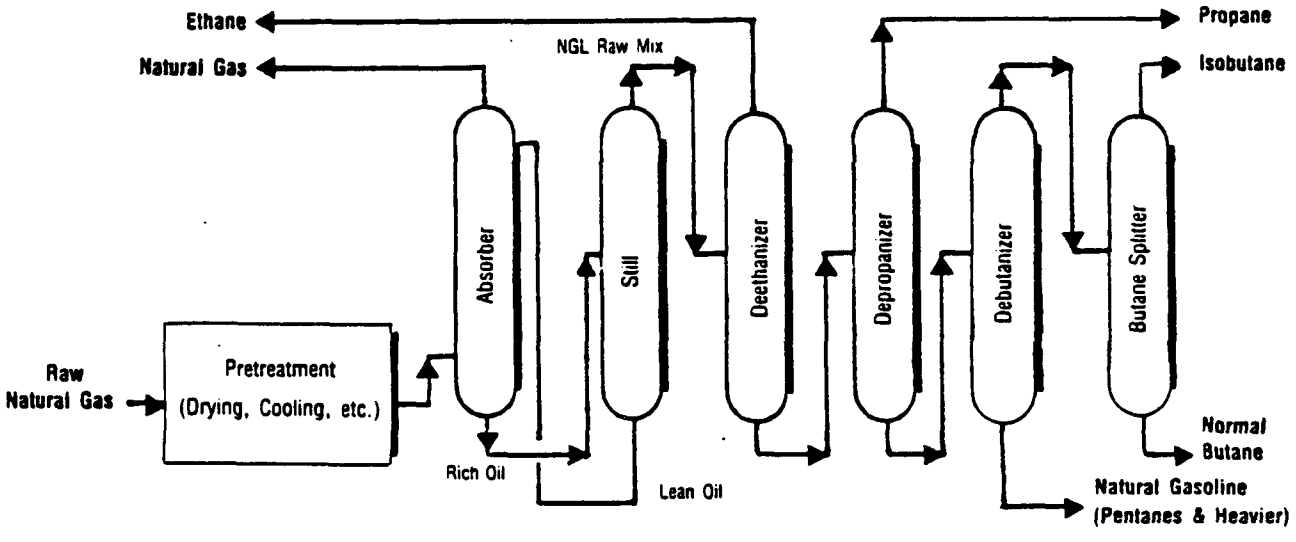
Debutanizer: The next fractionation step is separation of the butanes from the pentanes plus stream. The butanes (both iso and normal) pass overhead and the pentanes plus pass from the bottom of the fractionator.

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

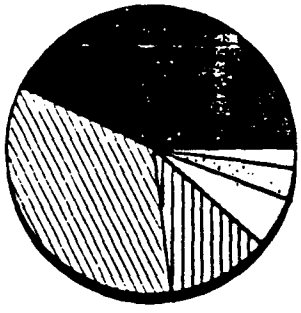
State	No. Plants	Gas Capacity, mmcfd	Gas throughput, mmcfd	NGL Products, m B/D
Texas	411	25,090	13,380	618
Louisiana	100	22,601	14,070	333
Oklahoma	103	4,765	3,110	145
Kansas	23	4,894	2,648	45
New Mexico	41	3,626	2,211	96
	678	60,976	35,419	1,237
Other	181	9,508	5,738	218
U.S. Total	859	70,484	41,157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

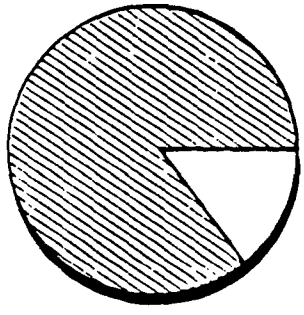
Ethane	28.7%
Propane	34.2%
Normal and Iso-Butane	19.6%
Pentanes plus, including plant condensate	17.5%

PROPANE CONSUMPTION



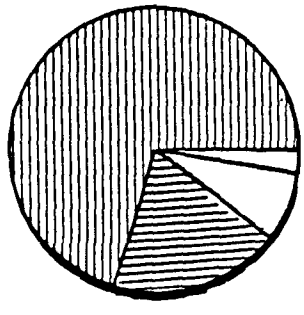
- 2.10% UTILITY GAS
- 3.29% EXPORT
- 5.09% ENGINE FUEL
- 12.57% OTHER
- 34.13% RES & COMM
- 42.82% CHEM & INDUST

ETHANE CONSUMPTION



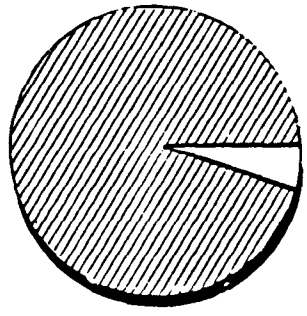
- 13.59% OTHER
- 86.41% CHEMICAL & IND

BUTANE CONSUMPTION



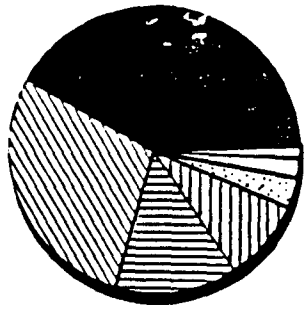
- 1.89% OTHER
- 7.55% EXPORT
- 20.13% CHEM & IND
- 70.43% GASOLINE

PENTANES + CONSUMPTION



- 4.76% CHEM & INDUST
- 95.24% GASOLINE

NGL CONSUMPTION



- 1.13% UTILITY GAS
- 2.13% ENGINE FUEL
- 3% EXPORT
- [illegible]% OTHER
- 14.27% RES & COMM
- 28.54% GASOLINE
- 41.79% CHEM & INDUST

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

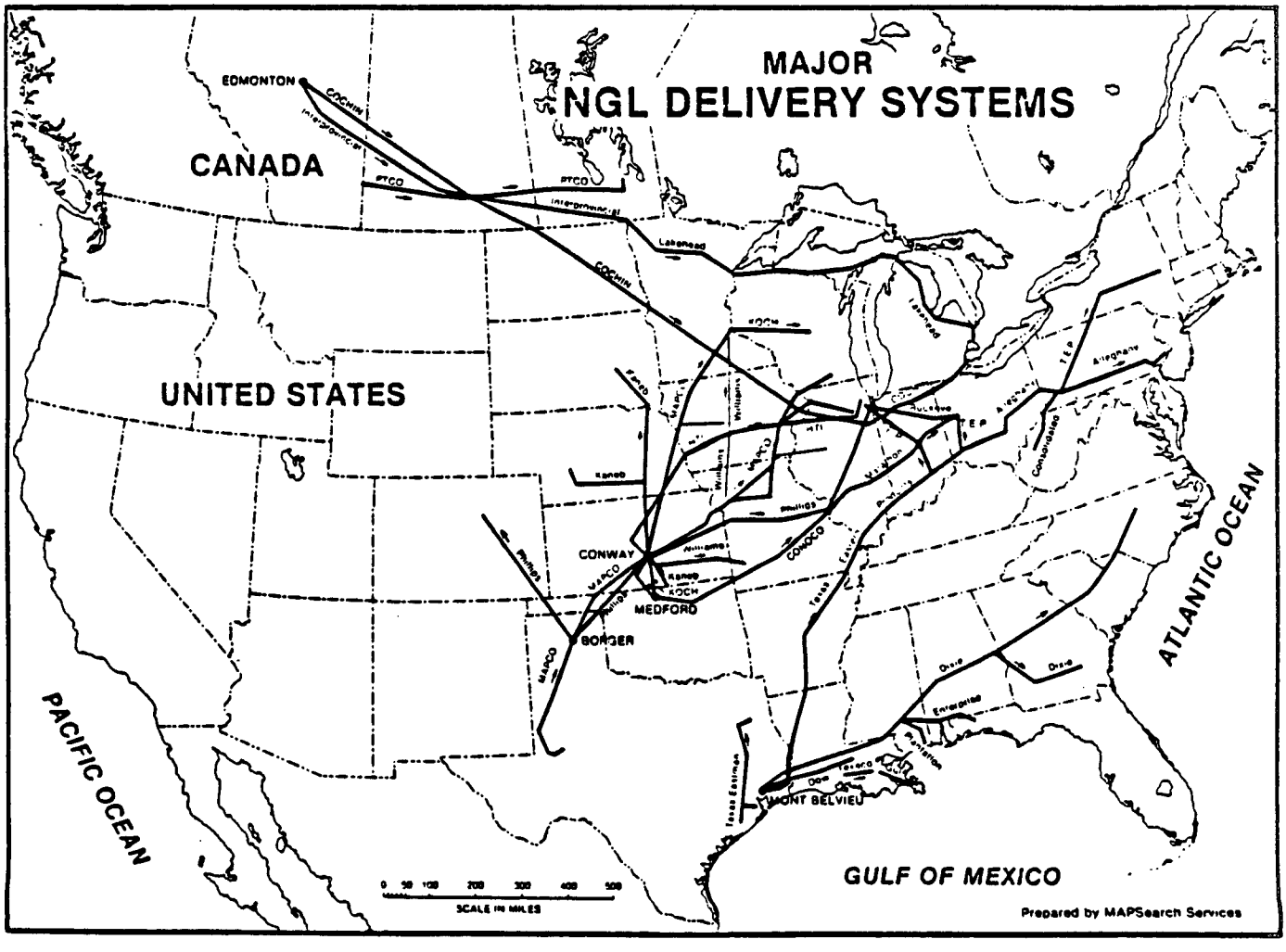
A national network of some 70 thousand miles of high pressure pipelines transport unfractionated NGL streams from production areas to fractionating centers and then transport finished products to major markets.

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.

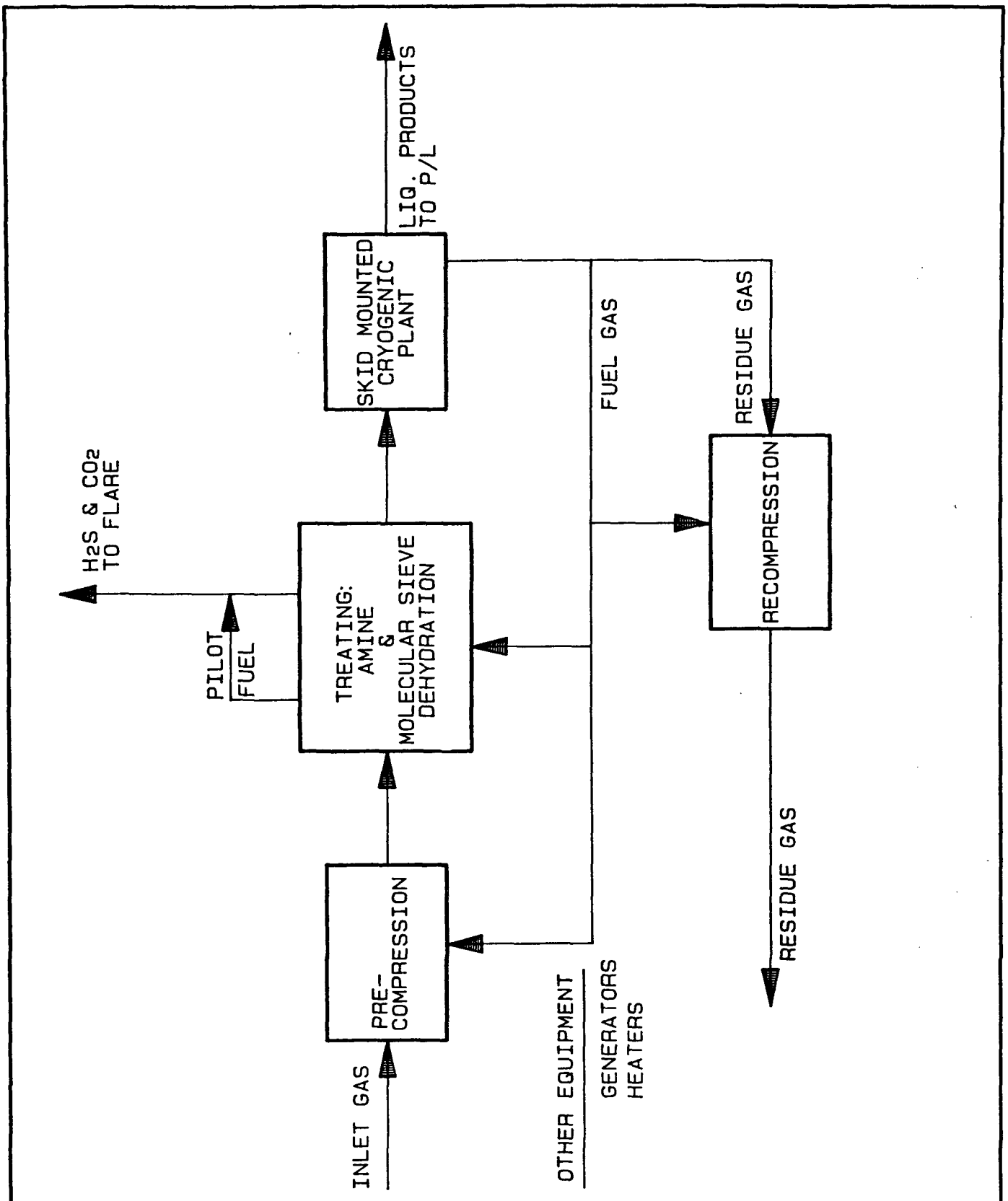
Several pipeline systems extend from central Kansas storage and fractionating facilities into west and upper midwest markets.

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 Saunders Plant

The following diagram outlines gas processing for the Saunders 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
1	REDRAWN	LP	2/85				

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

WARREN PETROLEUM COMPANY
A DIVISION OF CHEVRON U.S.A. INC.
TULSA, OKLAHOMA

PROCESS FLOW DIAGRAM

PLT. 146 SAUNDERS, N.M.

DRAWN	LP	DATE 2-6-85	SCALE NONE
CHECKED		DATE	DRAWING NO. 146-2001-1
APPR.		DATE	

Natural Gas Processing for the Saunders 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 Saunders Plant directly follows. This diagram also shows the final disposition of the water.

At the Saunders Plant, 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.

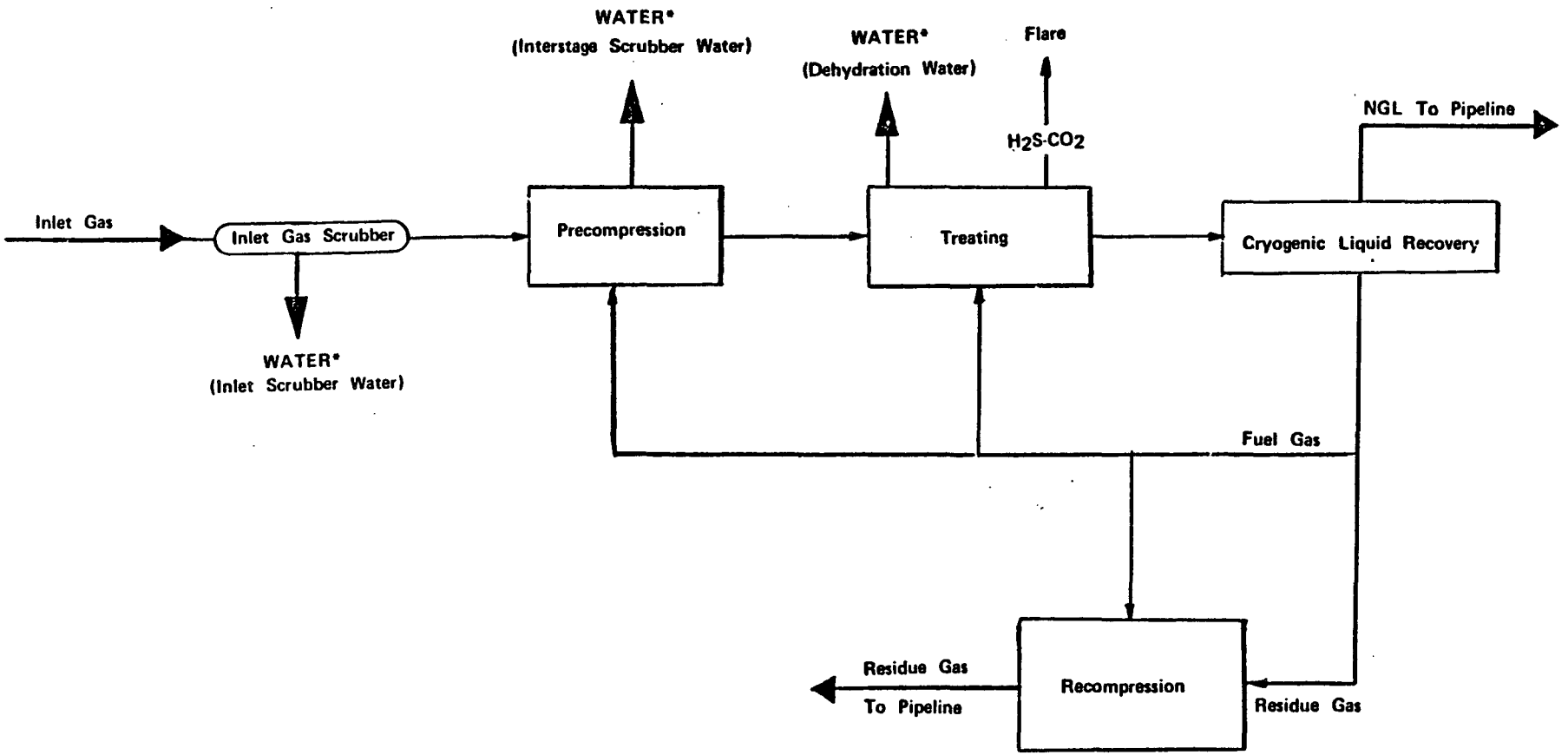
The four are welded steel tanks in which water and oil separate. The water then goes to the Gillespie or Maud Saunders injection well (or may be trucked from the plant). The remaining scrubber oil that separates out is sold to the Gandy Corporation who hauls it from the plant.

The portion of the polyethylene 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 (gauger) for the area wells.

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.

SECTION VI

HYDROLOGIC & GEOLOGIC DATA

SECTION VI

HYDROLOGIC & GEOLOGIC DATA

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 will 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.

SECTION VII

CHEMICAL ANALYSES

SECTION VII

CHEMICAL ANALYSES

The information provided herein describes the sources and disposition of wastewater from the Saunders Plant which has a disposal system whereby no effluent is allowed to reach the ground or to enter a navigable waterway.

Contingency measures would be taken by the plant for wastewater 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.

Section VIII, which follows, contains a current copy of the Spill Prevention Control and Countermeasure (SPCC) Plan for the facility. The SPCC Plan is maintained on site and would be implemented in the event of a spill.

Wastewater sample analyses are 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.

Condensate is held in the storage tank at a pressure of 210 psig. The major constituents of the condensate are: methane (1%), ethane (38%), propane (29%), butanes (17%), pentanes (7%), hexane (8%).

UNICHEM INTERNATIONAL

INDUSTRIAL DIVISION

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

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: _____ (HOBBS LAB)

APPROVED BY: _____

*** INDICATES THAT THIS TEST WAS NOT RUN

UNICHEM INTERNATIONAL

INDUSTRIAL DIVISION

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

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
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

TEL. 512-884-0371

PO BOX 2552 784

JUL 2 1985

JORDAN LABORATORIES, INC.
CHEMISTS AND ENGINEERS
CORPUS CHRISTI, TEXAS
JUNE 27, 1985

WARREN PETROLEUM COMPANY
P.O. BOX 1589
TULSA, OKLAHOMA 74102

REPORT OF ANALYSIS

IDENTIFICATION: W.P.C. MONUMENT
2:00 PM 6-6-85

	MG/L
PHENOLS	0.08
BENZENE	0.12
TOLUENE	0.33
ORTHOXYLENE AND PARAXYLENE	0.60
METAXYLENE	0.66
ALUMINUM	0.50
ARSENIC	0.018
BORON	0.56
CADMIUM	<0.0001
MOLYBDENUM	0.01
NICKEL	<0.01

LAB. NO. M23-3539

RESPECTFULLY SUBMITTED,

CARL F. CROWNOVER

SECTION VIII

SPILL PREVENTION CONTROL

AND COUNTERMEASURE PLAN

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

QUICK REFERENCE REPORTING/NOTIFICATION PROCEDURES

QUICK REFERENCE DOCUMENT

SPILL CONTAMINANT AND NOTIFICATION PROCEDURES

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

Contacts

J. R. Boyd	(505) 396-3157
K. E. Buckley	(505) 396-5514
B. G. Schulz	(918) 560-4400
D. E. Todd	(918) 560-4052 or (918) 243-5279
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); 911 (Lovington)
Ambulance	(505) 398-5555 (Tatum); 911 (Lovington)
Hospital	(505) 396-6611 (Lovington)
Sheriff (Lea County)	(505) 398-4444 (Tatum); 911 (Lovington)
State Police	(505) 911

Other Plant Personnel

K. W. Mapp	(505) 396-7475
R. D. Jones	(505) 396-2471
S. K. Scriviner	(505) 396-3033

Equipment/Disposal Services: Refer to Next Page

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 396-2001	
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	
ROUSTABOUTS	GANDY CORPORATION LOVINGTON, NEW MEXICO	396-4948	
"	CLYDE'S PUMPING SERVICE LOVINGTON, NEW MEXICO	396-2248	396-7018
BACKHOE	DANCO CONSTRUCTION LOVINGTON, NEW MEXICO	396-4163	396-5573
"	GANDY COROPRATION LOVINGTON, NEW MEXICO	396-4948	

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

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 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).

SPILL NOTIFICATION PROCEDURES - Continued

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.

Statutory Authority

New Mexico Statutes Annotated (NMSA) Chapter 70 Oil and Gas, Article 2, §§ 70-2-1 through 70-2-36, Oil and Gas Act.

NMSA Chapter 30 Criminal Offenses, Article 16, §§ 30-16-46 through 30-16-48.

NMSA Chapter 70 Oil and Gas, Article 7, §§ 70-7-1 through 70-7-21, Statutory Unitization Act.

NMSA Chapter 74 Environmental Improvement, Article 6, §§ 74-6-1 through 74-6-4, 74-6-6 through 74-6-13, Water Quality Act.

Regulations

New Mexico Oil Conservation Division (OCD) Rules and Regulations, Section B Miscellaneous Rules.

Activities Regulated

1. This Section applies to miscellaneous rules of the OCD. OCD Section B.

Activities Excluded from Regulation

None is specified.

Agencies

The OCD shall have, and is hereby given, jurisdiction and authority over all matters relating to the conservation of oil and gas and the prevention of waste of potash as a result of oil or gas operations in this state. NMSA § 70-2-6.

2. The Oil Conservation Commission (Commission) shall have concurrent jurisdiction and authority with the OCD to the extent necessary for the Commission to perform its duties as required by law. NMSA § 70-2-6.

Requirements

1. **Scope of rules and regulations.** OCD Rule 1.
   a. The following general rules of statewide application have been adopted by the OCD of the New Mexico Energy and Minerals Department to conserve the natural resources of the state of New Mexico, to prevent waste, to protect correlative rights of all owners of crude oil and natural gas, and to protect fresh waters. Special rules, regulations and orders have been and will be issued when required and shall prevail as against general rules, regulations and orders if in conflict therewith. However, whenever these general rules do not conflict with special rules heretofore or hereafter adopted, these general rules shall apply. OCD Rule 1(a).
   b. The OCD may grant exceptions to these rules after notice and hearing, when the granting of such exceptions will not result in waste but will protect correlative rights or prevent undue hardship. OCD Rule 1(b).

Notification of fire, breaks, leaks, spills, and blowouts. OCD Rule 116. The OCD 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:

a. **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 or 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.) OCD Rule 116-1.

b. **"Major" breaks, spills, or leaks.** Notification of breaks, spills, or leaks of 25 or more barrels of crude oil or condensate, or 100 bbl 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 bbl or more of salt water does reach a watercourse or enters a steam 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. OCD Rule 116-2.

c. **"Minor" breaks, spills, or leaks.** Notification of breaks, spills, or leaks of 5 bbl or more but less than 25 bbl of crude oil or condensate, or 25 bbl or more but less than 100 bbl of salt water, none of which reaches a watercourse or enters a stream or lake, shall be "subsequent notification" described below. OCD Rule 116-3.

d. **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 1,000 or more million of cubic feet (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. OCD Rule 116-4.

e. **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 bbl but less than 25 bbl, notification shall be "subsequent notification" described below. OCD Rule 116-5.

f. **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. OCD Rule 116-6.

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 OCD 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 OCD within 10 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 OCD district in which the incident occurred within 10 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: J. R. Boyd
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: J R Boyd

Name: J. R. Boyd
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: Scott T. Wilson
(Print)

S T Wilson
(Signature)

(Seal)

Date: 9-10-90 Registration No. 9113 State: NM

7. Potential spills - prediction and control:

Major Type Source	Total Quantity of Failure	Rate (Bbls)	Flow (Bbls/Hr)	Secondary Direction	Containment
1) Waste Water(4)	Rupture	2420	2420	NE	Dike
2) Condensate Storage(2)	Rupture	1904	1904 Low Spot	No Flow	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	Dike
7) Gasoline	Leak	48	48	NE	Dike
8) Acid Tank	Leak	12	12	SE	Conc. Dike
9) Solvent Tank	Leak	12	12	SE	Conc. Dike
10) Phosphate(1)	Leak	10	10	Low Area	Conc. Dike
11) Nitrite	Leak	10	10	S	Conc. Dike
12) Biocide	Leak	4	4	SE	Conc. Dike
13) Brine	Leak	210	210	S	None
14) Heating Oil Storage	Leak	714	714	Low Area	None
15) Methanol(2)	Leak	24	24	NE	None
16) Propane Fuel	Rupture	48	48	NE	None
17) Refrig. Propane	Rupture	286	286	Low Area	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 by 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) which hold a total of 1904 barrels. Both 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.

6-12) Spills from all the vessels will be contained within a concrete dike and will never reach the ground.

13-14) Spills from the vessels will be contained by plant personnel.

15-17) Spills from the vessels would be contained by plant personnel. The contents of these vessels will vaporize upon contact with the ambient atmosphere.

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. Inspection 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? No applicable.

      Comment: Inspections at the plant do not require written procedures. A daily visual inspection of the plant is made by Warren personnel. Any leaks in the piping or equipment are repaired as soon as possible. The inspection also includes checking the waste line closest to the plant leading from the plant to the Maud Saunders injection well.

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. No.

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

2. Does the unloading area have a quick drainage system? N/A

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: N/A

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? N/A

   Describe methods, procedures, and/or equipment used to prevent premature vehicular departure:

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

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.

PART II - ALTERNATE B (Continued)

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.

(Text)

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.

(Incident)

S/WPC-SPCC-1

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.

(Incident)

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.

(Incident)

S/WPC-SPCC-1

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.

(Incident)

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.

(Incident)

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.

Yes A strong oil spill contingency plan is intended.

Yes 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 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.

Notification - Internal

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.

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. 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 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:

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.

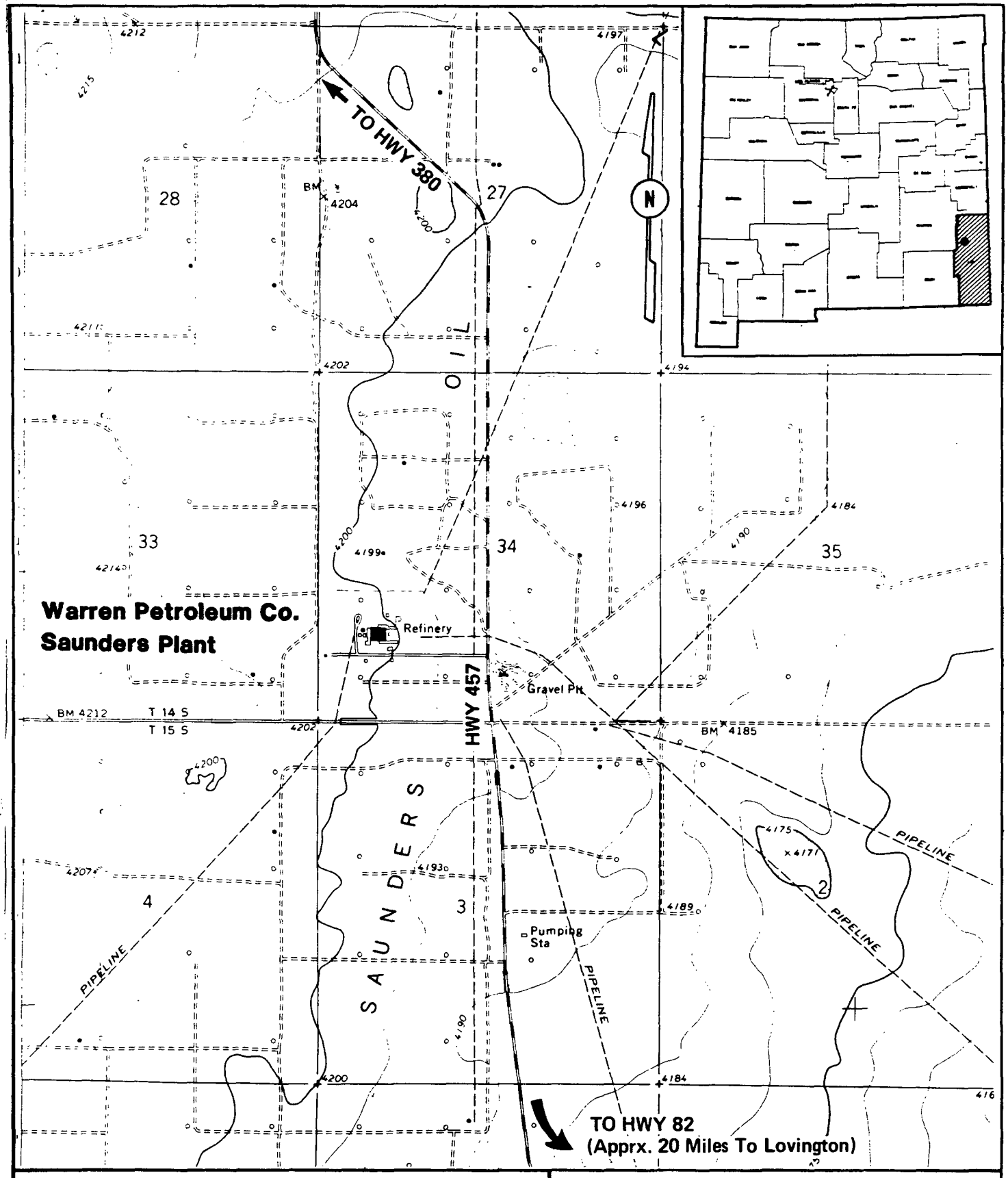
Drainage Location	Drainage Date	Date Bypassing Open	Date Bypassing Closed	Inspection Date	Oil Removal	Signature	Installed Seal #

SAUNDERS PLANT

SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

PART VI

LOCATION MAPS/PLANS



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

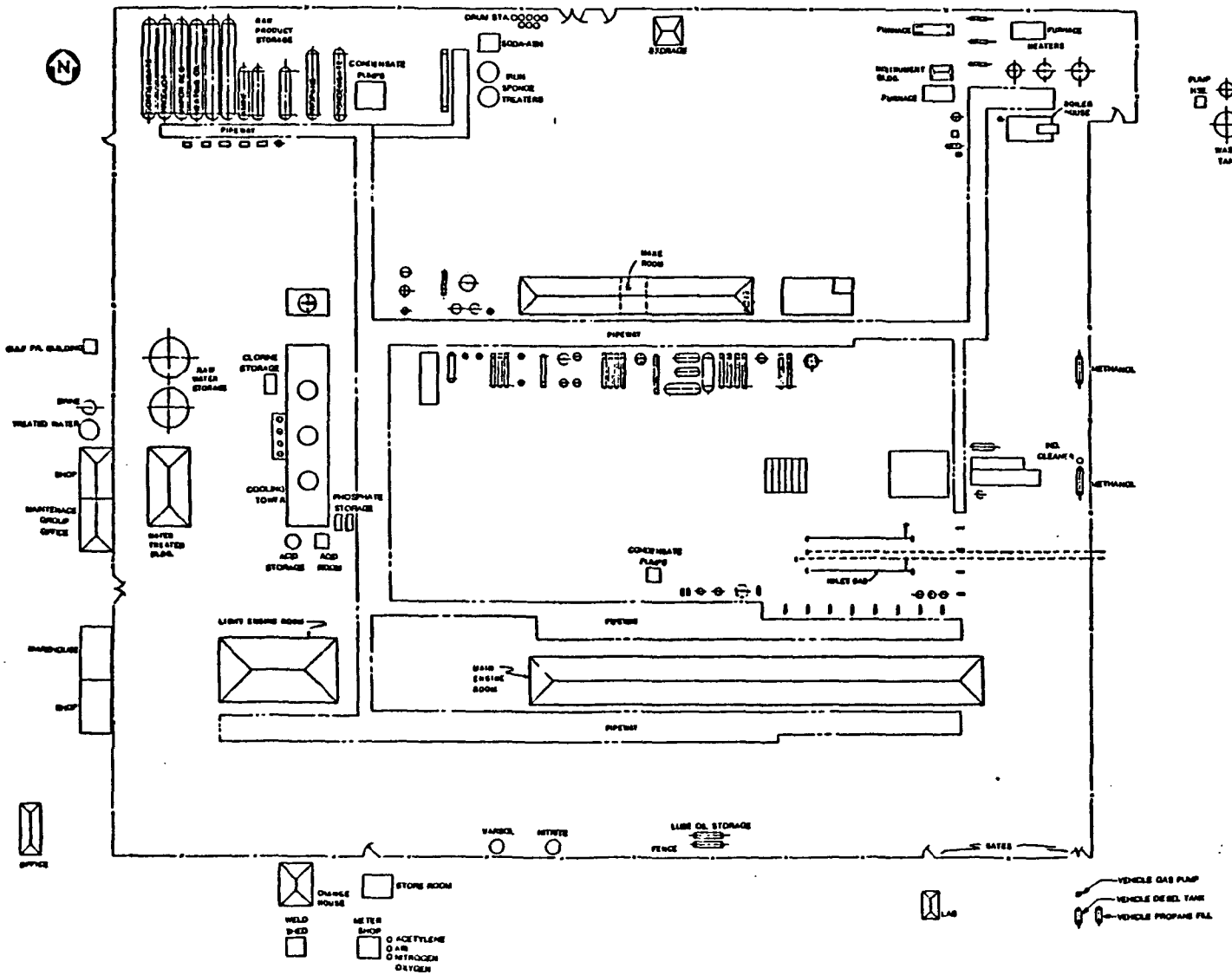
APPROX. EL. 4200
APPROX. LAT. 33°3' 28" N
APPROX. LONG. 103°36' 29" W

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

Warren Petroleum Company

TULSA, OKLAHOMA

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



GENERAL NOTES	GENERAL NOTES	DWG NO	REFERENCE DRAWINGS

NO.	REVISION	BY	DATE	CHK	APPR

NO.	REVISION	BY	DATE	CHK	APPR

AFE OR WO	ISSUE		
	DATE	PRELIM	CONST

WARREN PETROLEUM COMPANY

PLANT LAYOUT

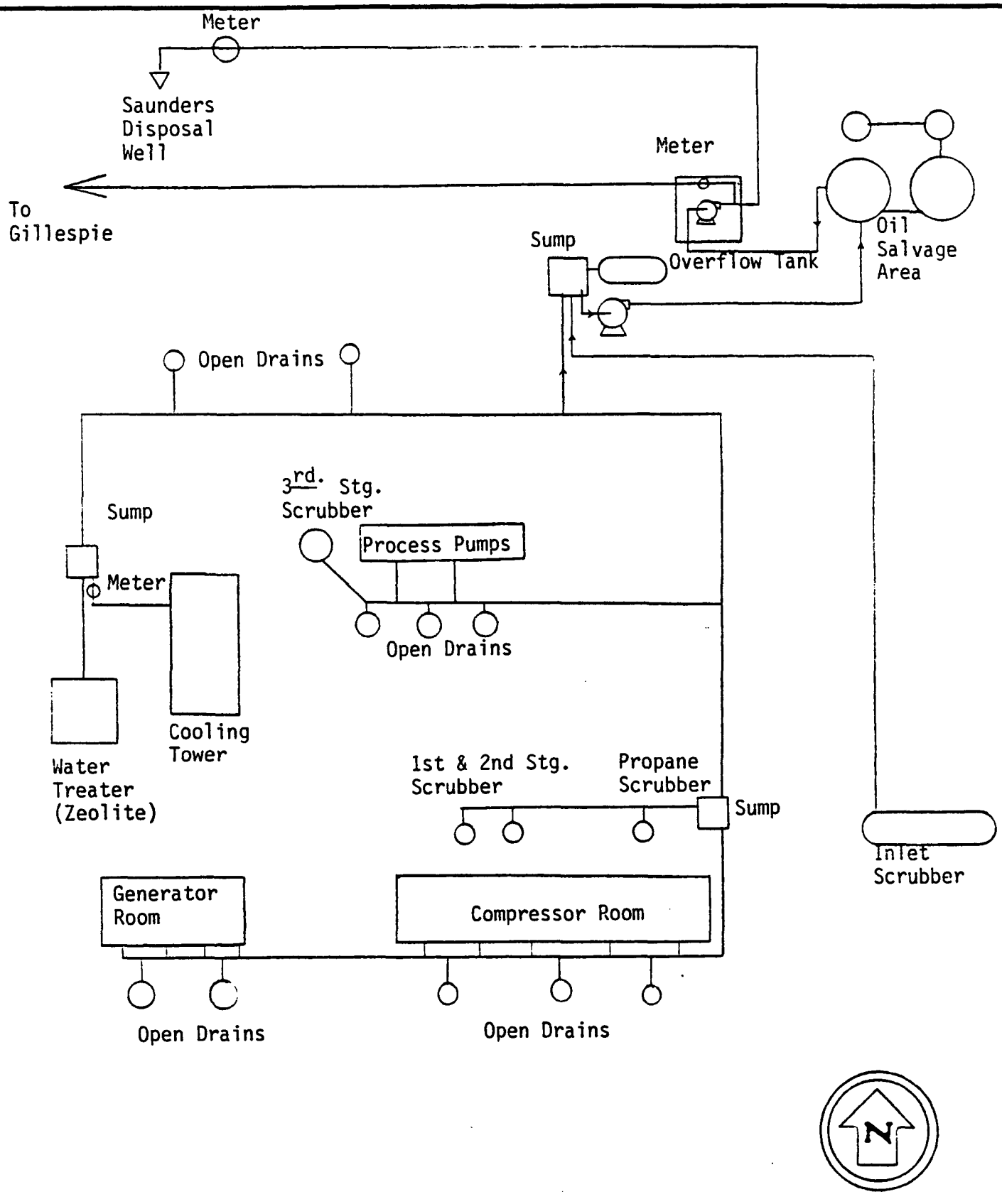
PLT. 146 SAUNDERS LOVINGTON NM

DRAWN LP DATE 2-8-83 SCALE NONE

CHECKED DATE

APPR DATE

WARREN PETROLEUM COMPANY
SAUNDERS PLANT
PLOT PLAN



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

NO. OF UNITS REQUIRED THUS

WO-AFE NO.

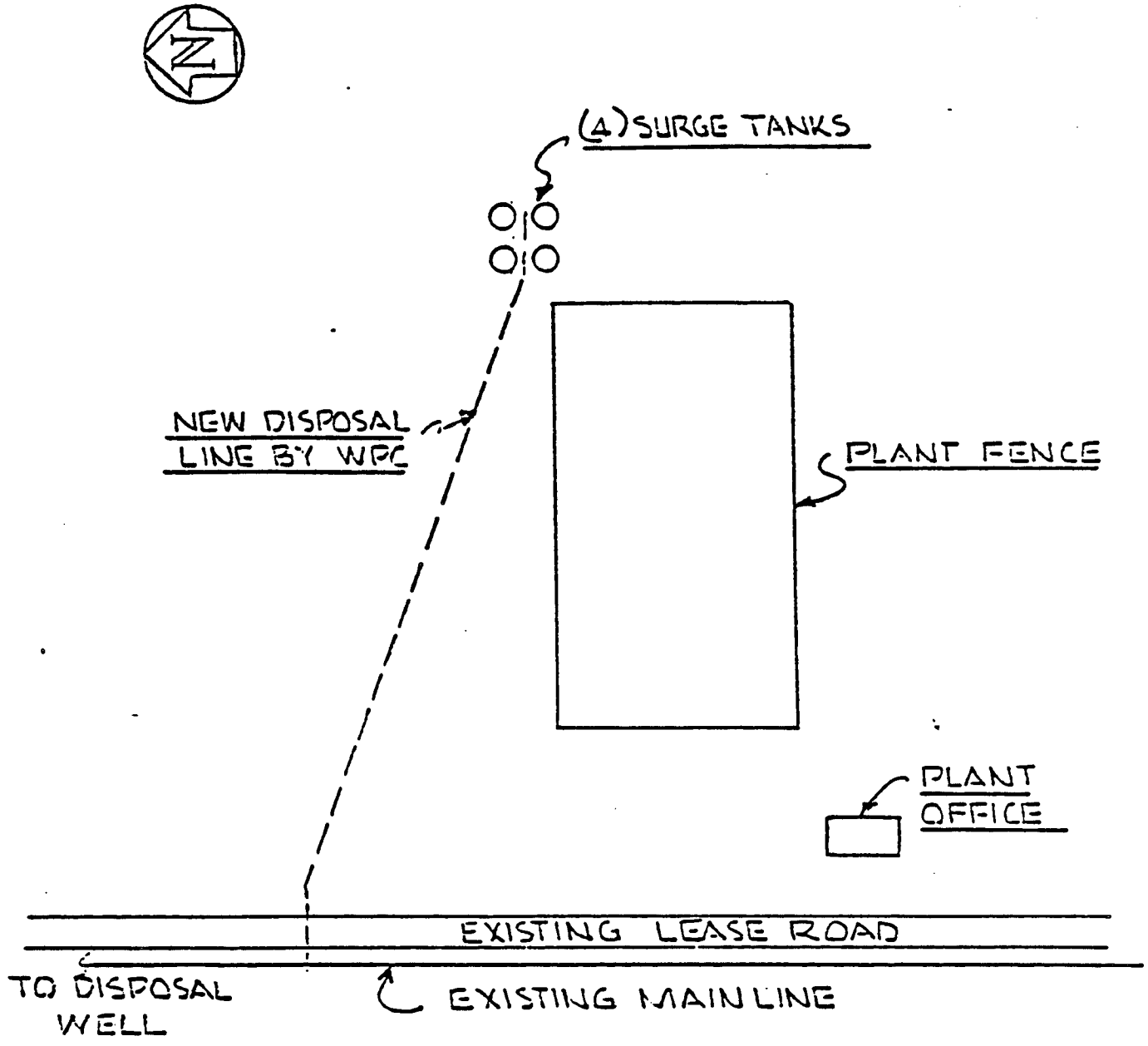
WARREN PETROLEUM COMPANY

TULSA, OKLAHOMA GULF 82341

Waste Water System

Saunders Plt. Lovington, N. M.

DRAWN RLM	DATE 1-22-85	SCALE	
CHECKED	DATE	DRAWING NO.	
APPROVED	DATE		



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

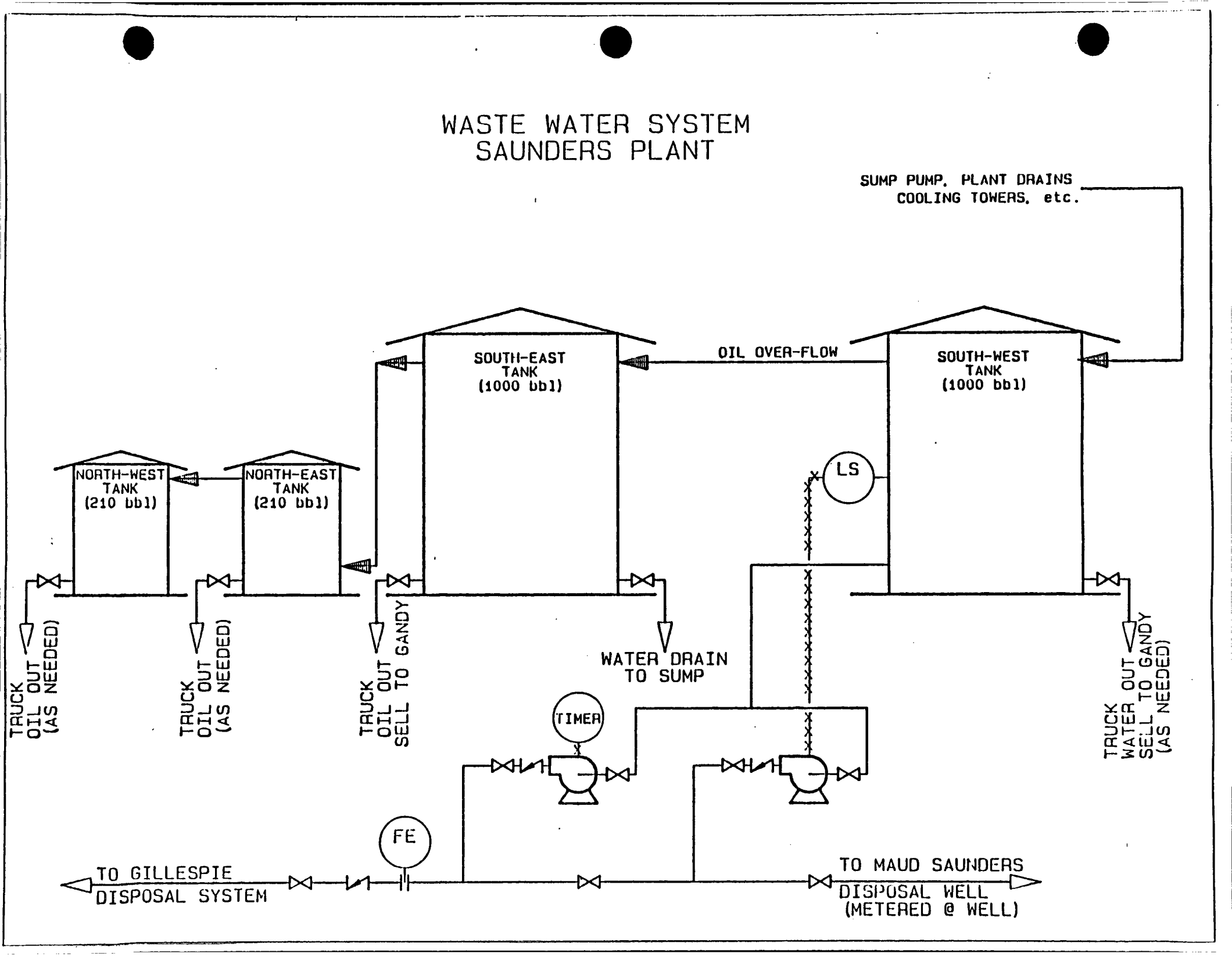
NO. OF UNITS REQUIRED THUS | WO-AFE NO.

WARREN PETROLEUM COMPANY
TULSA, OKLAHOMA GULF 8234

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-	
APPROVED	DATE		

WASTE WATER SYSTEM
SAUNDERS PLANT



R-33-E

T-14-S

6					1
31			"PLANT"		36

T-15-S

6					1
		INJECTION WELL*			
31					36

*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	3-63			

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 P.K.	DATE 11-2-31	SCALE NONE	
CHECKED	DATE	DRAWING NO. 146-1002-0	
APPROVED	DATE		

SECTION IX

WASTE MANAGEMENT PLAN

SECTION IX

WASTE MANAGEMENT PLAN

Sludge accumulation is very slow. When necessary, any sludge is hauled by a Gandy vacuum truck to their approved treatment site.

WASTE MANAGEMENT PLAN

SAUNDERS PLANT

This Waste Management Plan has been developed to meet Corporate and Governmental requirements concerning disposal of various operating materials at the end of its useful life.

At the present time, the Saunders Plant does not generate any RCRA hazardous wastes. If or when it should be determined a hazardous waste exists, it will be disposed of according to RCRA standards with documentation and proper manifests in an approved hazardous waste disposal site. Formal contracts will be negotiated and disposal site inspections will be performed.

Waste Management Plan (Continued)

1. The following list shows the types, expected amounts, and source of wastes which are generated at the Saunders Plant:

TYPE	EXPECTED AMOUNT	SOURCE
Filter Cartridges	1,600/year	Oil Filter, Dehydrator Dust Filters, Air Filters, Amine Filters
Process Waste Water	135,000/yr.	Cooling Tower Blowdown, Wash Water, Produced Water, Brine Water
Plant Trash	15 Tons/yr.	Office Trash, Wood, Carboard, Miscellaneous
Cooling Tower Basin Sludge	6 Tons/yr.	Cooling Tower
Sump & Tank Bottoms	100 Bbls/yr.	Scrubber Oil Tanks, Plant Sumps
Iron Sponge	1,500 lb/yr.	Iron Sponge Treater
Steel Drums	24 year	Chemical & Oil Drums
Concrete	5 Tons/yr.	Miscellaneous Foundations and Sidewalks
Molecular Sieve	2 Tons/yr.	Gas Dehydrators
Iron Exchange Resin	100 Lb/yr.	Water Softeners
Selica Gel	120 Lb/yr.	Instrument Air Dehydrator
Scrap Metal	7 Tons/yr.	Various
Used Oil	1,500 Bbls/yr.	Engines
Spent Charcoal	5,000 Lb/yr.	Amine Filter
Solvent	2,000 gal/yr.	Cleaning Fluid

1a. If asbestos or PCB's are encountered, they will be tagged and when necessary disposed of according to approved methods.

2. For the listed wastes, operating procedures are followed to minimize the amounts generated; such as steel drums are exchanged with the vendor, molecular sieve is regenerated if practical, etc.

3. All wastes listed in No. 1 have been properly classified as hazardous or non-hazardous. If a waste cannot be positively identified as hazardous or non-hazardous, then the Warren Petroleum Environmental Affairs Department will be contacted to recommend an outside company to do testing and analysis.

4. The necessary safety precautions for handling each waste listed in No. 1 above should be taken to avoid adverse health affects. The Safety Department and Environmental Department are contacted when specific precautions are needed. Reference to the Material Safety Sheets (MSDS) is made concerning proper handling of all products.

5. Potential for waste recycling is considered when the use of wastes is feasible in alternative processes, such as re-injecting water into a producing formation for enhanced oil recovery.

6. Following is the proper disposal methods in use for each of the waste items listed in No. 1:

TYPE	DISPOSAL METHOD
Filters	Waste Control of New Mexico
Process Waste Water	Injected into either the Saunders of Gillespie Well. If necessary water may be trucked to a permitted disposal well.
Plant Trash	Waste Control of New Mexico
Cooling Tower Basin Sludge	Dehydrated and trucked to Lovington Landfill upon approval of landfill.
Sump & Tank Bottoms	Vacuum trucked to treating plant.
Iron Sponge	Buried on site after neutralization
Steel Drums	Rinsed, crushed and sold to scrap dealer (those that are not returnable).
Concrete	Disposed of on site
Molecular Sieve	Buried on site
Iron Exchange Resin	Buried on site
Silica Gel	Buried on site
Scrap Metal	Sold to scrap dealer
Used Oil	Added to scrubber oil sales
Spent Charcoal	Buried on site
Solvent	Added to scrubber oil sales

SECTION X

EMERGENCY PIT

EMERGENCY PIT

A dry, emergency pit exists at the Saunders Plant. The pit would be used to contain oil from the heaters in the event of a leak in the heaters. After the emergency, the pit would be cleared; any oil would be recovered and contaminated soil would be disked into the ground.

VII.B.1.a.

RECEIVED

AUG 23 1989

OIL CONSERVATION DIV.
SANTA FE

Submit 4 Copies to Appropriate District Office

DISTRICT I
P.O. Box 1980, Hobbs, NM 88241-1980

DISTRICT II
P.O. Drawer DD, Artesia, NM 88211-0719

DISTRICT III
1000 Rio Brazos Rd., Aztec, NM 87410

State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

P.O. Box 2088
Santa Fe, New Mexico 87504-2088

Form C-134
Aug. 1, 1989

Permit No. H-17
(For Division Use Only)

APPLICATION FOR EXCEPTION TO DIVISION ORDER R-8952
FOR PROTECTION OF MIGRATORY BIRDS Rule 8(b), Rule 105(b), Rule 312(h), Rule 313, or Rule711(I)

Operator Name: Warren Petroleum Company, A Division of Chevron U.S.A., Inc.

Operator Address: P. O. Box 1689, Lovington, NM 88260

Lease or Facility Name Saunders Plant Location M 34 T14S R33E
(Ut. Ltr. Sec. Twp. Rge)

Size of pit or tank: 25 ft. x 35 ft.

Operator requests exception from the requirement to screen, net or cover the pit or tank at the above-described facility.

X The pit or tank is not hazardous to migratory waterfowl. Describe completely the reason pit is non-hazardous.

This is an emergency pit for dumping the hot oil heaters in the event of a fire. It remains empty at all times.

1) If any oil or hydrocarbons should reach this facility give method and time required for removal:

Pit would be emptied by vacuum truck within 24 hours maximum.

2) If any oil or hydrocarbons reach the above-described facility the operator is required to notify the appropriate District Office of the OCD with 24 hours.

_____ Operator proposes the following alternate protective measures:

CERTIFICATION BY OPERATOR: I hereby certify that the information given above is true and complete to the best of my knowledge and belief.

Signature S T Wilson Title Plant Manager Date 8-22-89

Printed Name S. T. Wilson Telephone No. 505/396-3221

FOR OIL CONSERVATION DIVISION USE

RECEIVED
JUN 06 1990

Date Facility Inspected 8/25/89

Inspected by Eddie W Seay

Approved by Jerry Sexton

Title DISTRICT 1 SUPERVISOR

Date AUG 30 1989

SECTION XI

MAUD SAUNDERS WELL NO. 4

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

AMENDED
ORDER SWD-255

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

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.

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 13th day of July, 1983.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY,
Director

NEW MEXICO OIL CONSERVATION DIVISION
CASING--BRADENHEAD TEST

OPERATOR:WARREN PETROLEUM CO.
LEASE: MAUD SAUNDERS WELL # 4 --
POOL: SAN ANDRES UNIT LTR L
FOOTAGE 1815-S SECTION 34 TWN 14 S RANGE 33 E
FOOTAGE 660-W PRESS LMT 856 TYPE LEASE . TYPE WELL S
ORDER NO.SWD-255 DATE INJ. BEGAN .

==========

TEST DATE01-Mar-88 TEST TYPE BHT PASS/FAIL PASS
OPERATOR REP: NDB OCD REP: SMITH

CASING	SIZE	SET AT	TOP CMT	CEMENTED	PRESSURE	REMARKS
SURFACE	13 3/8	416	NDB	500SX		
					> Ø .	
INTERM-1	.	.	.	.		
					> . .	
INTERM-2	.	.	.	.		
					> . .	
PROD	8 5/8	4280	NDB	3300SX		
					25 TO Ø 30 SEC-SLIGHT	
LINER	5 1/2	4219	10010	450SX		
TUBING	2 3/8	4170	PKR		90 S.I.	

IF WELL IS ON VACUUM: SI. MIN. TBG PRESS.
CSG: VACUUM . ,STATIC . APPROX. HRS/DAY WELL 250 BBLS
REMARKS: APPROX. 6 HPD SNC NO
REPAIR LETTER DATE . DATE REPAIR .

==========

TEST DATE22-Feb-89 TEST TYPE BHT PASS/FAIL BSO1
OPERATOR REP: KEN OCD REP: TURNACLIFF

CASING	SIZE	SET AT	TOP CMT	CEMENTED	PRESSURE	REMARKS
SURFACE	13 3/8	416	NDB	500SX		
					> Ø	CMT. NO RISER
INTERM-1	.	.	.	.		
					> . .	
INTERM-2	.	.	.	.		
					> . .	
PROD	8 5/8	4280	NDB	3300SX		
					Ø	PUFF
LINER	5 1/2	4219	10010	450SX		
TUBING	2 3/8	4170	PKR		220 370	AFTER PUMPING

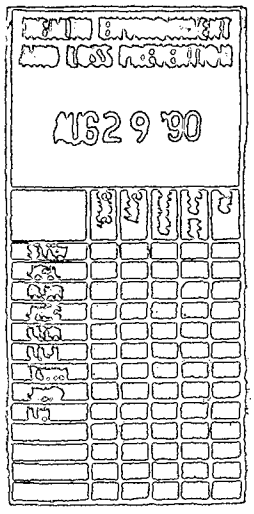
IF WELL IS ON VACUUM: SI. MIN., TBG PRESS.
CSG: VACUUM . ,STATIC . ,APPROX. HRS/DAY WELL 4-6 HRS
REMARKS: 270 BPD SNC NO
REPAIR LETTER DATE . DATE REPAIR .

==========

TEST DATE 1-22-90 TEST TYPE PASS/FAIL PASS
OPERATOR REP: KEN OCD REP: LYLE
CASING SIZE SET AT TOP CMT CEMENTED PRESSURE REMARKS
SURFACE 13 3/8 416 NDB 500SX > — NO RISER
INTERM-1 . . . . > — —
INTERM-2 . . . . > — —
PROD 8 5/8 4280 NDB 3300SX > 0 LIGHT FLOW. TO 0
LINER 5 1/2 4219 10010 450SX > 300 NOT INJ
TUBING 2 3/8 4170 PKR — 420 INJ.

IF WELL IS ON VACUUM: SI — MIN. TBG PRESS —
CSG: VACUUM — STATIC — APPROX. HRS/DAY WELL 24 HRS. AUTO USED
REMARKS: — SNC NO
REPAIR LETTER DATE DATE REPAIRED

==========



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

January 19, 1990

GARREY CARRUTHERS
GOVERNOR

POST OFFICE BOX 19
HOBBS, NEW MEXICO 88
(505) 393-6161

RECEIVED
JAN 23 1990

Warren Petroleum Co.
P.O. Box 1689
Lovington, New Mexico 88260

SUBJECT: Witnessed Bradenhead Test
Injection and Disposal Wells

Gentlemen:

In order to be in compliance with the Injection Control Section of the Federal Safe Drinking Water Act of 1974, which the Oil Conservation Division administers in New Mexico, the Division shall survey all salt water disposal and water injection wells. Your wells listed on the attached schedule should be readied as outlined below and on the date and time indicated on the attached schedule.

1. Since all injection and disposal wells(with the exception of new drills) have been inspected in prior years, it will not be necessary to dig out cellars. If you have a newly drilled injection well that has not been inspected it should be dug out and risers installed and we will inspect it on date of test.

2. Operators shall furnish connections and accurate pressure gauges as well as personnel to assist in the opening of valves.

3. If workover operations make it impossible for wells to be tested at this time, tests may be rescheduled at your request.

4. Your personnel are requested to be present at the time and place indicated on attached Test Schedule and an OCD inspector will meet them and proceed to test wells in a logical order. If operator cannot be present at designated place and time, the Hobbs District Office should be notified in advance.

5. All bradenhead valves with the exception of the tubing on injection and disposal wells must be shutin 24 hours prior to testing.

6. If you have any questions concerning the preparation of wells or the test schedule, please contact Eddie Seay at 505-393-6161.

Very truly yours,

OIL CONSERVATION DIVISION

Jerry Sexton
Supervisor, District I

OIL CONSERVATION DIVISION

BRADENHEAD TEST SCHEDULE

OPERATOR: WARREN PETROLEUM CO. Number of wells to be tested 1 SWD

P.O. Box 1689, Lovington, NM 88260

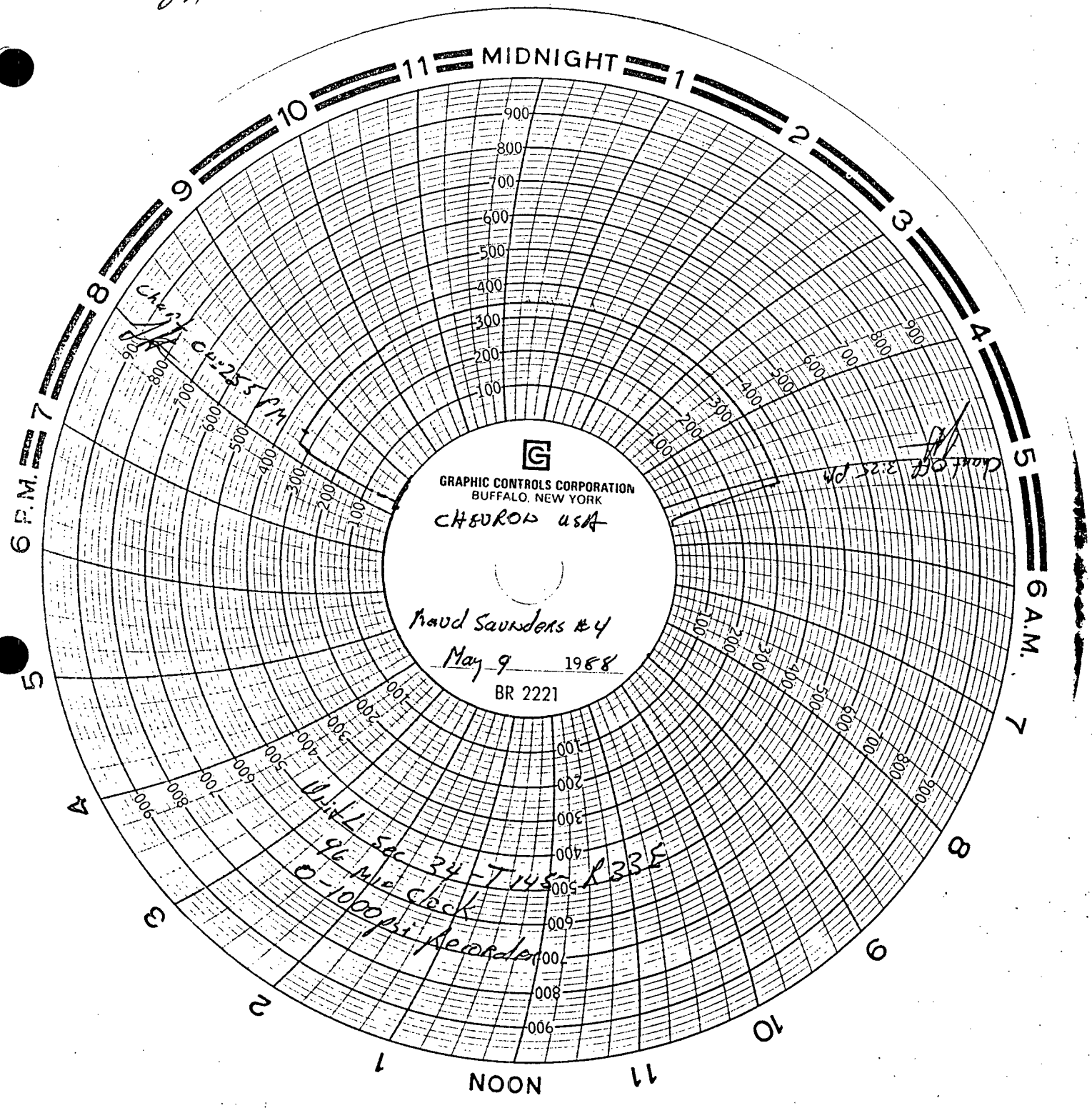
Meet OCD Field Inspector at: 1:00 PM February 22, 1990

At the well listed below

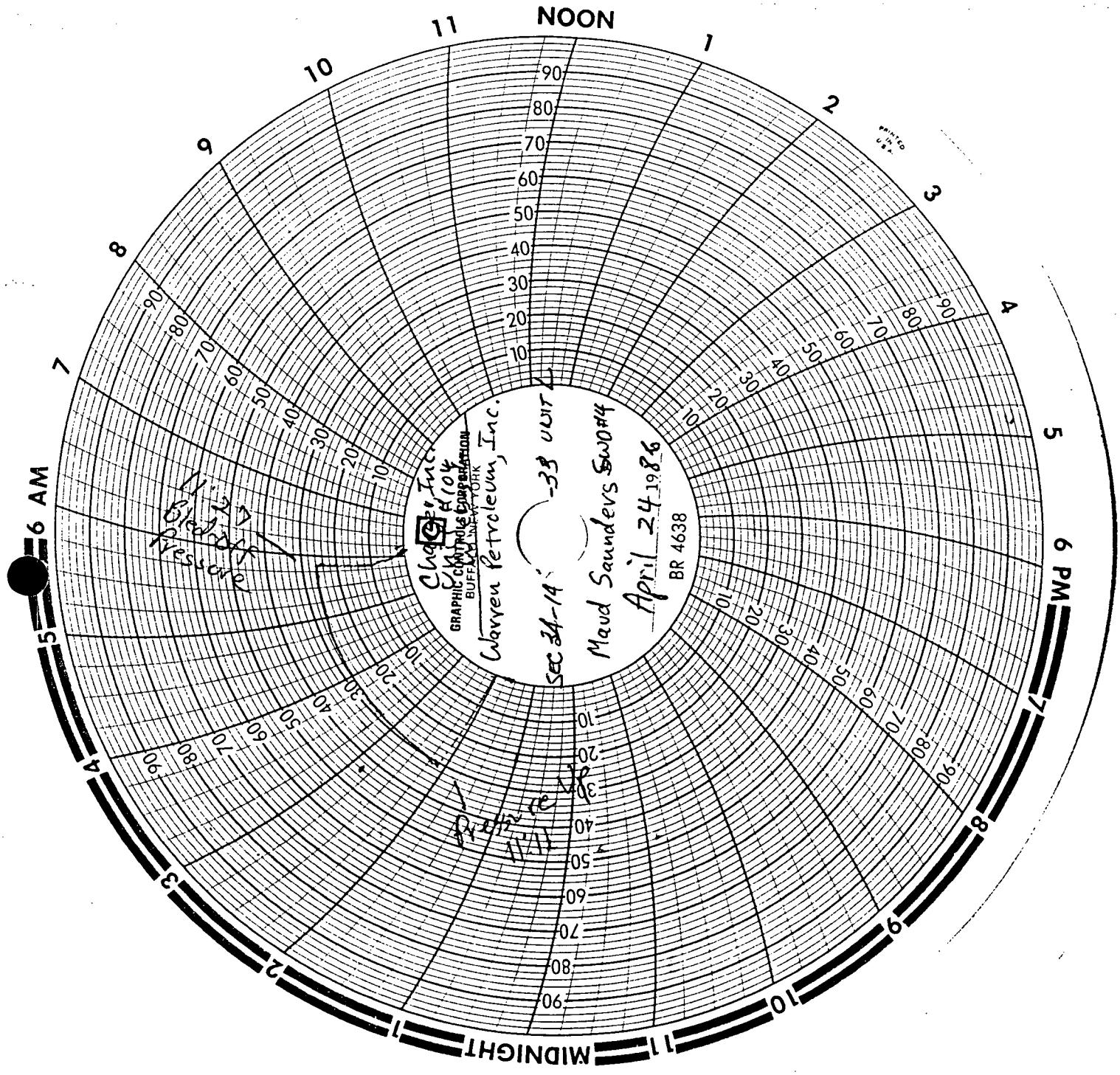
Wells to be tested:

LEASE	WELL #	S-T-R	PRESS LIMIT
Maud Saunders SWD	4-L	34-14-33	856

Copy of Test in May 1988 on Saunders SWDJ well



Copy of Test in April 1986
on Saunders Steld well



File:
Saunders Disposal Well

MAUD SUANDERS #4 SWD WELL
WORKOVER PROCEDURE

A workover was performed on the Maud Saunders #4 SWD well between May 2, 1988 and May 9, 1988. Below is a brief description of the workover procedure as submitted to the Oil Conservation Division:

> Performed workover to increase injection rate as follows: Pulled out of hole with injection tubing and packer. Ran bit and scraper to 5080', circulated hole. Perforated 5 1/2" liner 5030'-5050' with 2 JSPF. Acidized with 8,000 gals. 20% FE Hcl. Initial rate of 2.7 BPM at 1400 psi. Final rate 4.3 BPM and 1900 psi. ISIP 300 psi 15 min. SIP 50 psi. Ran injection test. Injected at 1 BPM and 200 psi for 50 mins. Ran back in hole with Baker AD-1 NP and 136 jts. 2-3/8" EUE I.P.C. tubing. Set packer with 35 pounds tension. Tested annulus to 340 psi for 30 mins., no drop.

WARREN PETROLEUM

FOX

Consulting Engineers and Geologists

FOX Consulting Engineers and Geologists

F. M. FOX & ASSOCIATES, INC.
4765 INDEPENDENCE STREET
WHEAT RIDGE, COLORADO 80033
(303) 424-5578

IRRIGATION PLAN

for

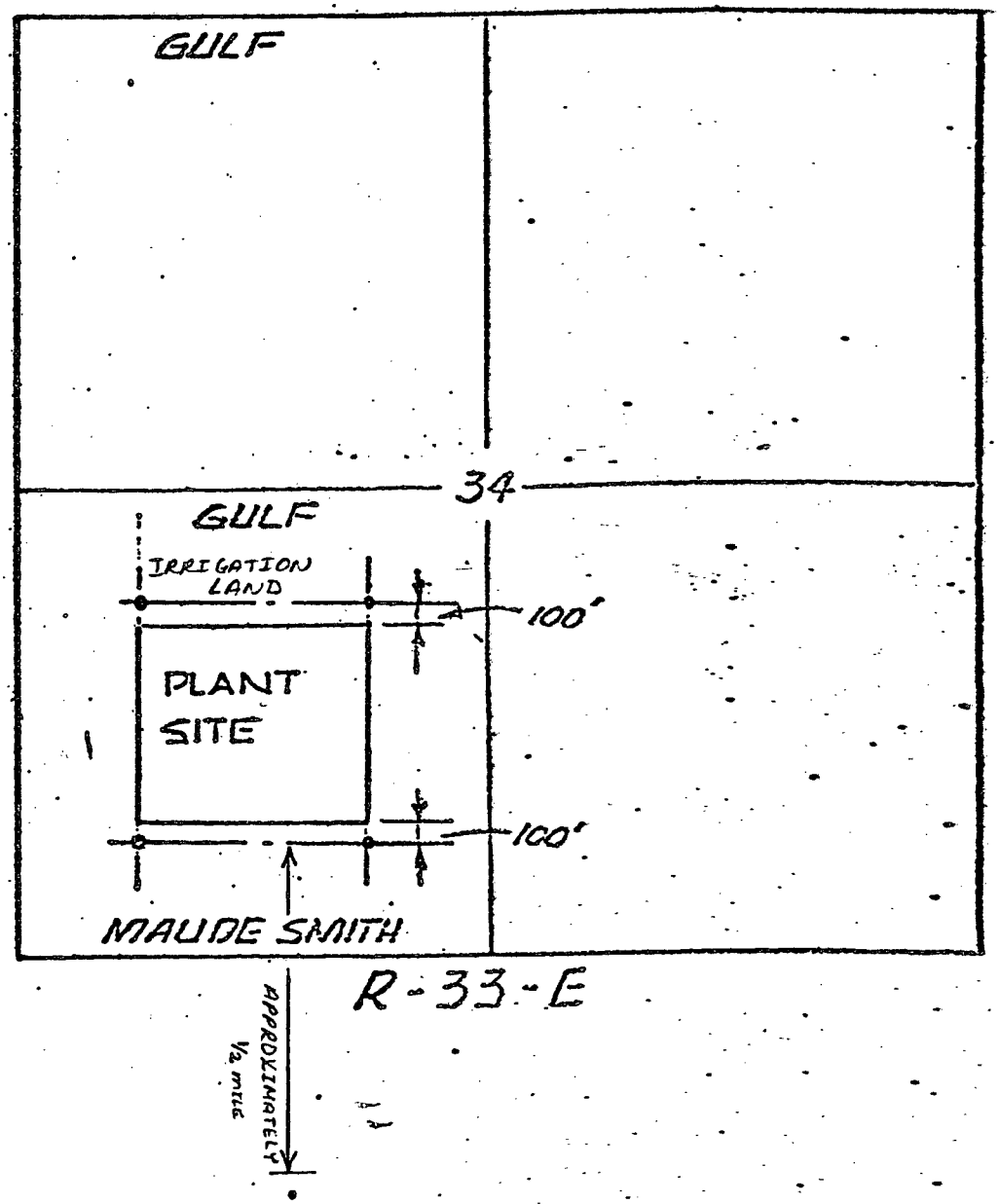
SAUNDERS GAS PLANT

LEE COUNTY, NEW MEXICO

Prepared for:

Warren Petroleum Company

Job No. 1-2534-3222
April 29, 1981



T 14 S

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

PLOT PLAN

PLT. 146 SAUNDERS LOVINGTO

DRAWN P.K. | DATE 10-16-80 | SCALE

TABLE OF CONTENTS

INTRODUCTION

Warren Petroleum Company is presently contracting with a commercial hauler to remove waste process water generated at the Saunders Gas Plant, Lee County, New Mexico. The excessive cost of this removal has necessitated the investigation of alternative disposal methods.

Fox & Associates, Inc. was retained by Warren Petroleum Company to investigate the feasibility of land application of the effluent by means of spray irrigation. In the following plan, we have outlined the results of our investigation and recommended irrigation management practices for rangeland adjacent to the Saunders Gas Plant. The plan is based on analysis of the effluent, topsoils to be irrigated, regional climatology, vegetation and water quality standards established by the New Mexico Water Quality Control Commission.

The results of the chemical analyses of the effluent, particularly the first two samples, indicate that several of the constituents exceed the maximum concentrations allowed for irrigation, as established by the New Mexico Water Quality Control Commission. These maximum concentrations were established to protect surface and ground water and are identical to drinking water standards. Although exceeding some of the maximum allowable constituent concentrations, irrigation with the effluent can be conducted without degrading surface water or ground water.

Based on the factors investigated, specifically, evapo-transpiration rate, soil conditions, topography, and the quality and quantity of the waste water generated at the plant, it is our opinion that all the process water generated at the plant can be safely used for irrigation provided the system is properly managed. A properly managed system is necessary to

assure the even distribution of liquid effluent to a designated land surface area. Proper management, coupled with a systematic assessment of contamination variables will insure safe irrigation of the land surface.

WASTE CHARACTERIZATION

A total of five waste water samples were collected and analyzed (See Table 1 for results). The first two samples were collected on January 21, 1981 from the cooling tower and the holding tank for the purpose of determining if one or both of the wastes could be used as irrigation water. Three additional samples were collected from the holding tank between February 20, 1981 and April 1, 1981. It should be noted that the holding tank is a mixture of all the process water generated at the site including the cooling tower water.

Analysis of the first holding tank sample indicated that the pH was too high for safe application to vegetation. The three additional samples were collected to determine the effect, on salt concentration, of lowering the pH below pH 9; however, the pH and salt concentration of these additional samples was already at a safe level for irrigation. The higher levels in the first sample were probably the result of a temporary modification or fluctuation in the plant process or operation.

The last three analyses indicate that the mixture of all water generated at the site (holding tank water) is more suited for irrigation than the cooling tower water alone. Therefore, recommendations discussed in the following sections are based on irrigation with the holding tank water. The field area requirement and constituent loading

rates are based on constituent concentrations in the first holding tank sample. Although probably not representative of the average water quality, use of this "worst case" sample will give an added factor of safety to the irrigation system.

Table 1 Results of Analyses of Saunders Gas Plant Process Waste Water (Results represent dissolved concentrations reported in mg/l unless otherwise noted)

Parameter	Cooling Tower	Holding Tank	Holding Tank	Holding Tank	Holding Tank
Date	1/21/81	1/21/81	2/24/81	3/30/81	4/1/81
Arsenic	0.019	0.005			
Selenium	0.016	0.016			
Antimony	0.033	0.032			
Mercury	0.003	<0.0005			
Manganese	0.032	0.026			
Cadmium	0.011	0.006			
Chromium	0.110	0.230			
Copper	0.050	0.017			
Lead	0.050	0.050			
Nickel	0.032	0.032			
Silver	0.013	0.006			
Barium	0.320	0.160			
Aluminum	<0.25	<0.25			
Cobalt	0.025	0.038			
Iron	0.200	0.190			
Molybdenum	<0.007	<0.007			
Boron	0.93	0.98			
Cyanide	--	0.032			
Phenols	<0.005	0.074			
Nitrate-N	13.6	9.44	ND	ND	ND
Fluoride	2.52	2.01			
Chloride	272	324	104	170	275
Sulfate	1024	718	240	380	287
pH(units)	8.5	10.2	8.6	7.5	7.4
TDS	2400	1450	550	870	1005

ND = non-detectable

"Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79/020, March, 1979

TOPSOIL CHARACTERIZATION

Three samples of the topsoil to be effected by irrigation at the site were collected and analyzed for the parameters in Table 2.

Table 2 Results of Analysis of Topsoil to be Irrigated at the Saunders Plant Site

Texture	% Organic Matter	Cation Exchange Capacity (CEC)
Loam	2.4	23.3
Sandy Loam	2.6	17.0
Loam	2.4	21.3

The percent organic matter and the cation exchange capacity (CEC) play important roles in a soils ability to adsorb and exchange metals and ions and to promote microbial assimilation and breakdown of ions and compounds. Chromium, for example, will be reduced from hexavalent chromium (Cr^{6+}) to trivalent chromium (Cr^{3+}) and bound in the soil by the soil organic matter. Trivalent chromium is nontoxic to animals and is not taken up by plants, even in large concentrations (The Impact of Metals Present in Municipal Sludges Upon the Human Food Chain, J. B. Lucas, EPA). The organic matter in these soils will also promote sufficient microbial activity for the breakdown of many phenols and other organic compounds, thus lowering the net accumulation of undesirable organics in the soil.

VEGETATION CHARACTERISTICS

The predominant grass species at the site were determined by an on-site inspection and consultation with the Soil Conservation Service

in Lovington, New Mexico. The grasses are predominantly blue grama and black grama. Additional information on these grasses, including transpiration rates and nutrient requirements, was obtained from grass specialists at the Agricultural Research Center at Colorado State University in Fort Collins, Colorado.

SURFACE WATER CONCERNS

There are no significant surface water drainages or natural impoundemnts in the immediate vicinity of the site. Since the area is very flat, surface runoff is minimal. These factors will prevent surface water contamination and runoff of irrigation water from the site.

WATER BALANCE

A water balance study was performed to determine the amount of water which could be added to the soil without allowing contact with ground water (the water balance study is summarized in Table 3). The primary modes of water loss from surface soils are precolation (downward movement of water due to gravity), and evapo-transpiration (losses due to evaporation and transpiration of water, by plants, into the atmosphere). Water loss due to percolation is assumed to be zero in this study, because water will be applied at rates considerably less than the rate at which water is lost from the soil due to evapo-transpiration.

The water balance study allows the determination of the volume of water which can be added to the soil without allowing percolation. As seen in Table 3, the average yearly rainfall is 14.4 inches, and the average yearly evapo-transpiration rate for grasses in the area is 117.3

inches. The difference in the water added and water lost is 102.9 inches. Therefore, 102.9 inches of additional water could theoretically be added to the soil on a yearly basis without any potential for leaching.

Table 3 Water Balance Data for Irrigation of Rangeland Adjacent to the Saunders Gas Plant

Month	[1]Evapo-transpiration(in)	[2]Precipitation (in.)	Net Water Loss	[3]Effluent Applied(in)	Total Water(in)
January	3.6	0.4	3.2	3.2	3.6
February	5.2	0.3	4.9	4.9	5.2
March	9.0	0.6	8.4	8.4	9.0
April	12.7	0.7	12.0	12.0	12.7
May	14.9	2.2	12.7	12.7	14.9
June	16.4	1.3	15.1	15.1	16.4
July	15.7	2.0	13.7	13.7	15.7
August	13.4	2.0	11.4	11.4	13.4
September	10.8	2.4	8.4	8.4	10.8
October	7.6	1.6	6.0	6.0	7.6
November	4.6	0.4	4.2	4.2	4.6
December	3.4	0.5	2.9	2.9	3.4
	117.3	14.4	102.9	102.9	117.3

1 Transpiration rates were obtained from Alma Wilson, Agricultural Research Center, Colorado State University.

2 Evaporation and precipitation rates were obtained from the National Oceanic and Atmospheric Administration, Albuquerque, New Mexico.

3 To prevent percolation of irrigation water into ground water, effluent to be applied was calcuated assuming that all water applied would be transpired or evaporated.

As can be seen in Table 3, the net water loss is not the same for all months of the year. Likewise, the effluent to be applied is not the

same every month. Therefore, management of the amount of field area and effluent application rates will be necessary to prevent over-saturation of the soil and subsequent percolation of the waste water into the subsoils.

FIELD AREA REQUIREMENT

In order to calculate the field area required for safe irrigation of the waste water, maximum loading rates for each water constituent which was above drinking water standards was calculated. The soil loading rates which would exist for irrigation water complying to drinking water standards were calculated and used as the maximum loading rates for the waste water (See Table 4 for maximum loading rates). For example: the total amount of total dissolved solids (TDS) which would be added to the soil if the concentration of TDS was at the drinking water standard (1000 mg/l) would be 26,460 lb/acre. This loading rate assumes irrigation of 102.9 inches of water per year and is used as the maximum loading rate.

Table 4 - Maximum Loading Rate for Constituents Above the Drinking Water Standard N = (2.7)(C)(L).

Where: C = total constituent concentration, mg/l
L = annual liquid loading rate, ft/yr.
N = annual constituent loading rate, lbs/acre/yr.

Constituent	*Constant	C	**L	N
Phenols	2.7	.005	9.8	0.132
Chromium	2.7	.05	9.8	1.323
Boron	2.7	.75	9.8	19.85
Fluoride	2.7	1.6	9.8	42.34
Chloride	2.7	250	9.8	6,615
Sulfate	2.7	600	9.8	15,876
TDS	2.7	1000	9.8	26,460

* The purpose of the constant (2.7) is for conversion of units.

** 9.8 ft/yr = 102.9 in/yr which is the amount of effluent which can be applied as determined in the water balance study.

The minimum field area required is that surface area necessary to prevent overloading of the soil by the waste water or any one constituent in the water. The field area requirements are indicated in Table 5.

Table 5 Field Area Requirement for Application of Saunders Plant Process Waste Water

Effluent $A = 1.118\ Q/L$
Constituent $A = 3040\ (C)(Q)L_C$

Where: A = field area requirement, acres
Q = wastewater generated by the plant, million gallons/day
C = concentration of constituent, mg/l
L = annual liquid loading rate, ft/yr
L_C = loading rate of constituent, lb/acre/yr

Constituent	*Constant	Q	C	L(Lc)	A
Effluent	1,118	.023	**NA	9.8	2.6
Phenols	3,040	.023	0.074	.132	39.1
Chromium	3,040	.023	0.230	1.323	12.2
Boron	3,040	.023	0.98	19.85	3.5
Fluoride	3,040	.023	2.01	42.34	3.3
Chloride	3,040	.023	324	6,615	3.4
Sulfate	3,040	.023	718	15,876	3.2
TDS	3,040	.023	1450	26,460	3.8

* The purpose of the constant is for conversion of units

** NA - not applicable

The average field area required for application of the liquid without allowing percolation into the subsoils is 2.6 acres. This 2.6 acres does not take into account seasonal variations in the weather. Therefore, additional field area requirement calculations were established to assure that the soil is not over-saturated during periods of low evapo-transpiration (refer to Table 6 for minimum monthly field area requirements). The lowest evapo-transpiration rate occurs in December when net water loss is 2.9 inches (See Table 3); therefore, irrigation, assuming

no percolation into the subsoil, will require the greatest number of acres during December. If the effluent which can be applied is assumed to be 2.9 inches/month for the whole year, then the total water which could be added would be 2.9 feet/year (35 inches/year). Using the equation from Table 5, the field area requirement would be 8.9 acres [A = 1,118 (.023)(2.9) = 8.9 acres]. Irrigation during any given month will require even application of the liquid over the minimum field area for that month.

Table 6 Minimum Monthly Field Area Required for Application of Waste Water Based on Monthly Evapo-transpiration and Precipitation Rates from Table 3

Month	Waste Flow Rate (mgd)	Minimum Field Area (Acres)
January	.023	8.0
February	.023	4.9
March	.023	3.1
April	.023	2.1
May	.023	2.1
June	.023	2.0
July	.023	1.7
August	.023	1.9
September	.023	2.3
October	.023	3.1
November	.023	4.3
December	.023	8.9

The highest field area requirement for any of the constituents in question is 39.1 acres for phenols (refer to Table 5). Unlike salts and metals, phenols are broken down by microbes; therefore, accumulation in the soil will be considerably less than .132 lbs/acre. In addition, phenols do not exhibit any significant phytotoxicity. Following a review of world literature, McKee and Wolf concluded that 50 mg/l would not interfere with irrigation (McKee, J.E., Wolf, H.W., 1963, Water

Quality Control Board, Sacramento, California, Pub. 3-A). Because of their definite half-life in the soil and low phytotoxicity, we recommend that phenols not be used in establishing limiting field area requirements.

The next highest field area requirement in Table 5, is 12.2 acres for chromium. As discussed earlier, chromium is reduced to a non-toxic form in the soil; however, significant accumulation of the non-toxic form will occur if the rates of application are not controlled. To minimize this accumulation, we recommend that the 12.2 acres be used as the minimum yearly acreage to be irrigated. In addition to minimizing the accumulation of chromium, this 12.2 acres will provide an added safety factor to the irrigation of the waste water.

IRRIGATION SYSTEM

Spray irrigation should be used for application of the waste water. Spray irrigation will enhance evaporation, thus adding an additional safety factor to the method of application. The specific system design will be determined by Warren Petroleum Company based on economic and management factors.

SYSTEM MANAGEMENT

Land application of waste water from the Saunders Gas Plant is an environmentally sound disposal alternative provided that good management of the system is practiced. Adequate management of the system will require:

1. Periodic verification of the waste water quality;
2. Field inspection by Saunders Plant personnel to prevent irrigation of saturated soils;

3. Application of the waste water in accordance with the minimum monthly and yearly field area requirements; and

4. Storage or alternative disposal of the waste water during periods of excessive rainfall and freezing weather. (The holding tanks presently being used at the site are capable of storing about five production days' waste water).

CONCLUSIONS

We feel that spray irrigation is a sound disposal alternative for effluent generated at the Saunders Gas Plant. The safety of the system is reinforced by three major factors:

1. The data used for all calculations was from the first holding tank sample. This sample exhibited poorer than average water quality for the holding tank and represents the "worst case" sample.

2. The 12.2 acre requirement is based on the addition of chromium which will not be a threat to vegetation or the human food chain.

3. This 12.2 acres is more than four times the acreage required to prevent percolation of the effluent into groundwater.

By following the recommendations provided in this report, irrigation using the Saunders Plant waste water can be carried out without damage to the soils, vegetation, and ground water in the area to be irrigated.

F. M. FOX & ASSOCIATES, INC.

Kip R. White
Staff Environmental Scientist

Reviewed by:

Gerald W. Knudsen, P.E.
Project Environmental Engineer

KRW/rd

Copies: 8

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.