NM - 40

GENERAL CORRESPONDENCE

YEAR(S):

1986-1985

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal	Time 9:00	Date 7/11/86

Originating Party	Other Parties
Doug Harris - Farmington Meridian (327-0251)	Dave Boyer OCD

Subject: Meridian Simms Mesa - Navajo Lake Gas Wells

Discussion: Harris wanted to know what TDS to treat B discharge to unlined pits on shore of the lake (W/in 1/4 mile, 150-200' above). Have ~10,000 TDS wate, can go down to 5000 w/treatment. I told him it would depend on GW in area with WQCC Standard of 1000 being used as a ~~Goose~~ minimum guideline number. I said that if Meridian could demonstrate large depth to GW, fine grained material, etc, could talk about unlined pits. Discussion revealed location near lake, very permeable sandstone, 150-200 ft to GW.

Conclusions or Agreements: Since lake has 200 mg/l TDS and they want to disposal of 6000 bbls/day, I told him unlined pits were out unless they ~~co~~ could demonstrate fresh water protection.

Distribution: Meridan Wastewater File

Signed: D J Boyer

EVAPORATION CALCULATIONS FOR MERIDIAN DISPOSAL PONDS. SURFACE AREA - 118'X 260' = 30,680 ft² (at 0' DEPTH)

DISCHARGE

CLIMATOLOGICAL DATA (SOURCE: W.K. SUMMERS, FARMINGTON 4NE NAVAJO DAM)

MONTH	EVAPORATION, IN.	DISCHARGE @ 100 BWPD GAL/MO.	PRECIPITATION, IN.	NET EVAP, IN (FT)
J	.96	130,200	.79	.17 (.014)
F	1.56	117,600	.53	1.03 (.086)
M	3.79	130,200	.84	2.95 (.246)
A	6.72	126,000	.82	5.9 (.492)
M	10.02	130,200	.57	9.45 (.788)
J	11.14	126,000	.59	10.55 (.879)
J	11.55	130,200	1.19	10.36 (.863)
A	9.86	130,200	1.68	8.18 (.682)
S	7.49	126,000	1.12	6.37 (.531)
O	4.84	130,200	1.27	3.57 (.298)
N	2.61	126,000	.92	1.69 (.141)
D	.99	130,200	1.13	-.14 (-.012)

Yr. 1 RESID. DEPTH = DISCHARGE gpm ÷ 7.481 = ft^3 ÷ 30,680 ft^2 = ft. - evap ft + prev. RESID. DEPTH

MONTH	RESIDUAL DEPTH, Et (AT END OF MONTH) 100 BWPD	200 BWPD
.5673 J	.55	1.12
F	.98	2.05 ← USE AREA 35,360 ft^2 FOR DEPTH AT 2ft
M	1.30	2.79
.5490 A	1.36	3.25
M	1.14	3.45
J	.81	3.52
J	.51	3.64
A	.40	3.94
S	.42	4.24 ← USE AREA 40,328 ft^2 FOR DEPTH AT 4ft.
O	.69	4.81
N	1.10	5.50
D	1.81	6.38

Yr. 2	@ 100 BWPD	Yr 2 @ 200 BWPD	
J	2.28 ← USE AREA = 35,360 ft^2	USE 45,584 ft^2	7.13
F	2.64 FOR DEPTH AT 2ft.	FOR DEPTH AT 6ft	7.73
M	2.89		8.24
A	2.87	USE 51,128 ft^2 FOR	8.41
M	2.57	DEPTH AT 8ft.	8.30
J	1.74		8.08
J	1.44 ← USE AREA = 30,680 ft^2		7.90
A	1.33 FOR DEPTH AT 0'		7.90
S	1.35		7.88
O	1.62		8.26
N	2.02 ← USE AREA = 35,360 ft^2	FREEBOARD →	8.78
D	2.52	EXCEEDED	9.47

Yr 3 @ 100 BWPD		Yr 4 @ 100 BWPD
J	3.0	3.79
F	3.36	USE 40,328 ft² → 4.15
M	3.61	FOR DEPTH AT 4 ft 4.33
A	3.59	4.26
M	3.29	3.90
J	2.89	USE 35,360 ft² → 3.44
J	2.52	3.07
A	2.33	2.88
S	2.28	2.83
O	2.47	3.02
N	2.81	3.36
D	3.31	3.86

CONCLUSION: EVAPORATIVE SURFACE AREA APPEARS TO BE ADEQUATE FOR 100 BBLS WATER DISPOSAL PER DAY PAST YEAR 4.

AT 200 BBLS WATER PER DAY, A FREEBOARD of 1.5 ft. IS EXCEEDED NEAR THE END OF YEAR 2. (NO SPRAY EVAPORATION CALCULATIONS INCLUDED).

POND DESIGN FOR MERIDIAN

WAVE CALCULATIONS : REF - US ARMY CORPS ENGR SHORE PROTECTION MANUAL

WIND SPEED = U_A = 50 mph

FETCH = $\sqrt{175^2 + 300^2}$ = 347 (POND 2)

DEPTH = 4.3 (POND 2 EAST EDGE)

SLOPE OF SIDE = 2:1

I FIND WAVE HEIGHT AND PERIOD

FROM Fig 3-27

WAVE HEIGHT = H = 0.4 ft.

PERIOD = T = 0.8 SEC

II FIND BREAKING WAVE HEIGHT, H_b

FROM Fig 7-3 (USE SLOPE = 0.1)

$$\frac{H}{gT^2} = \frac{0.4}{32.2(0.8)^2} = 0.0194$$

g ← GRAVITY CONSTANT

$$\frac{H_b}{H} \simeq 1.0 \qquad H_b \simeq H = 0.4 \text{ ft}$$

$$\frac{H_b}{gT^2} = 0.0194$$

FROM Fig 7-2

$\alpha \simeq 1.8$

$\beta \simeq 1.45$

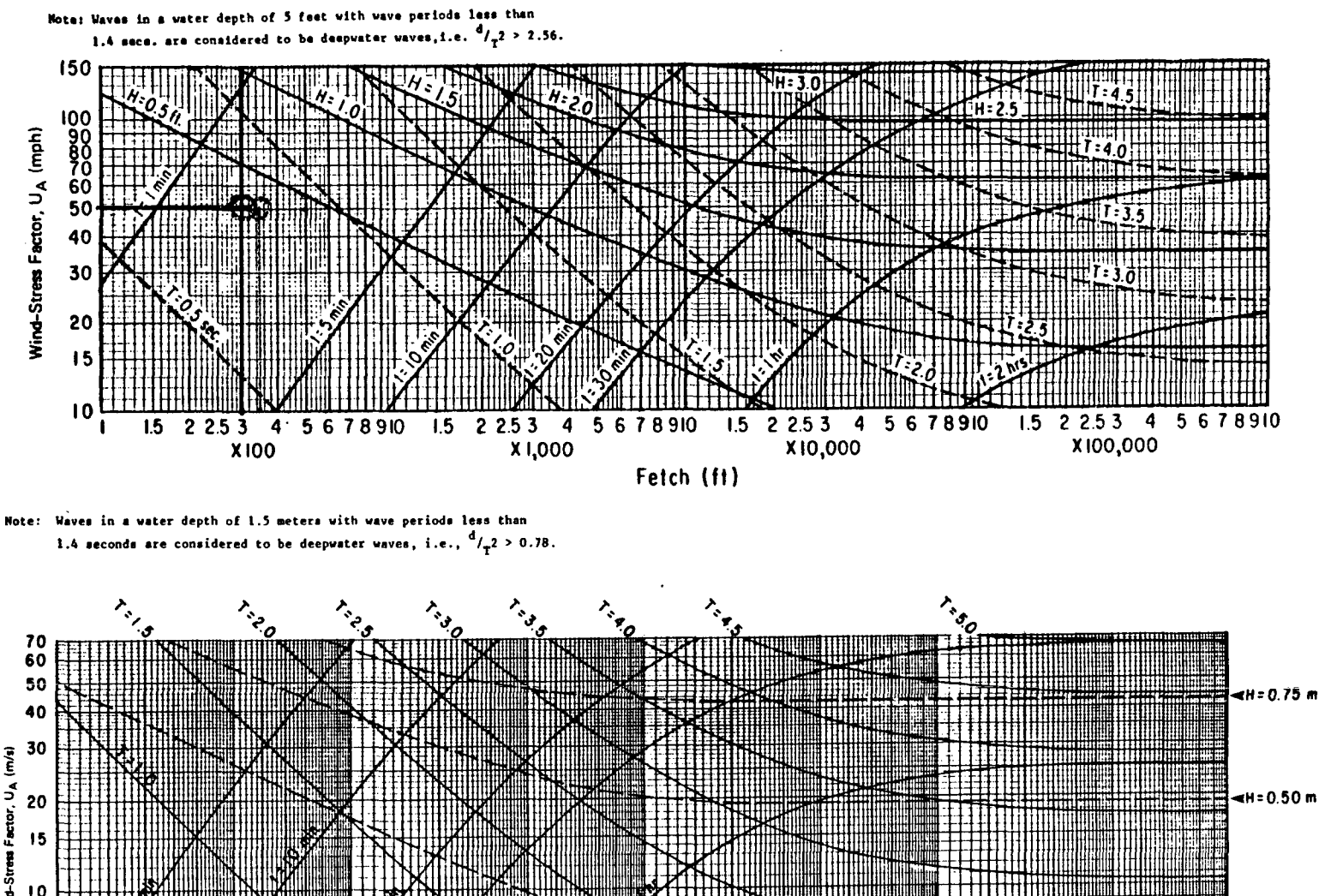


Figure 3-27. Forecasting curves for shallow-water waves; constant depths = 5 feet (upper graph) and 1.5 meters (lower graph).

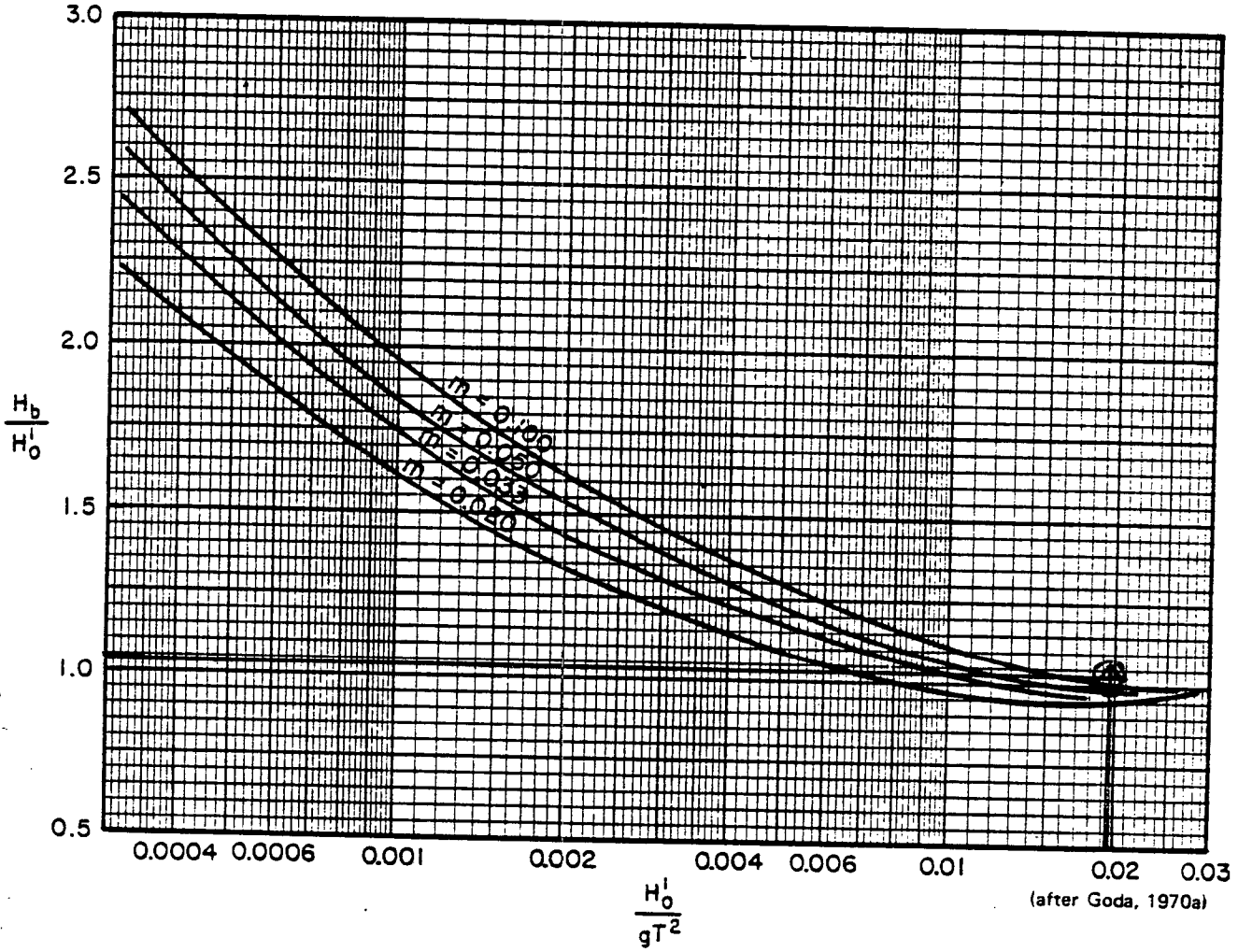


Figure 7-3. Breaker height index H_b/H_o' versus deepwater wave steepness H_o'/gT^2 .

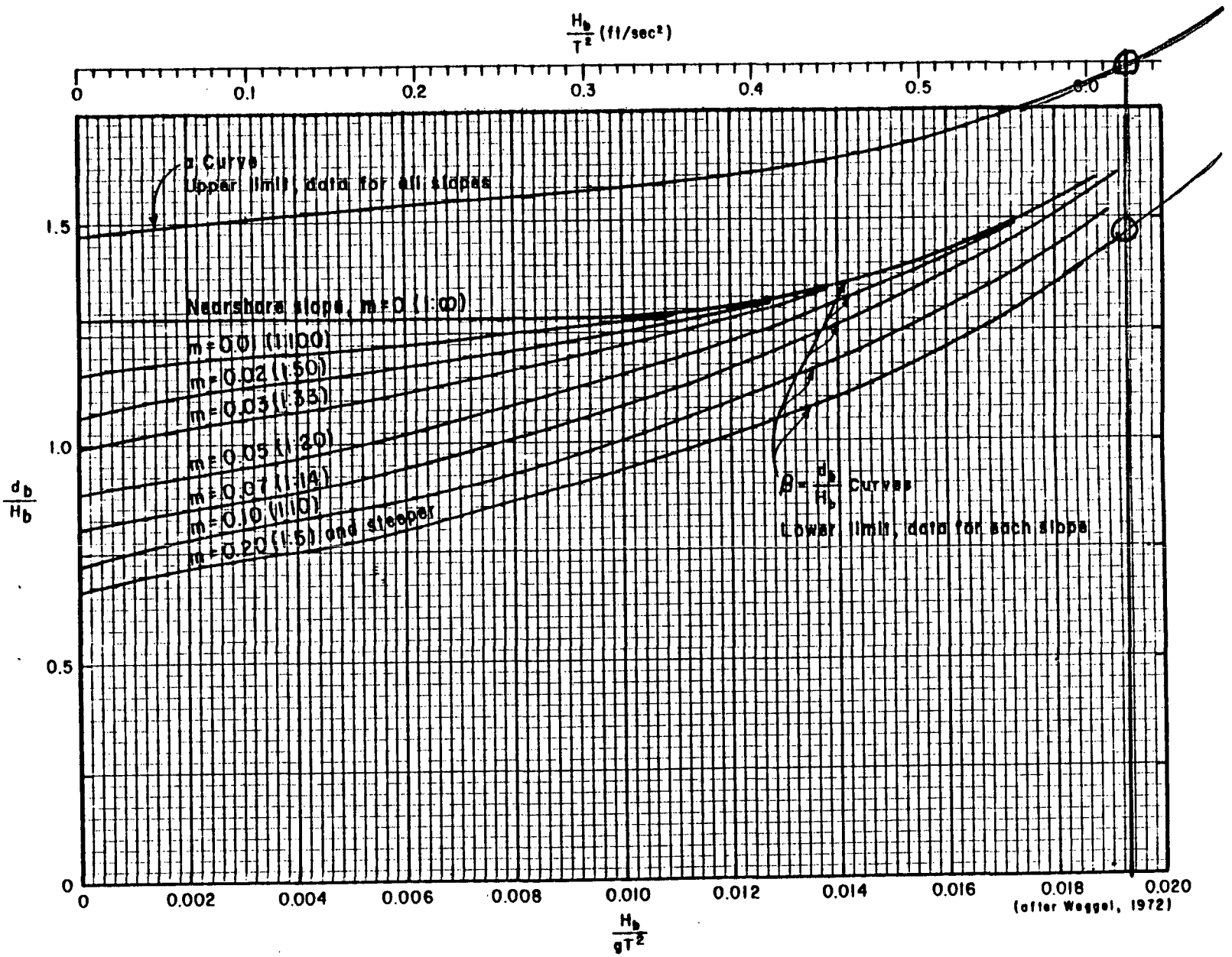


Figure 7-2. α and β versus H/gT^2.

$d_{B\,MAX} = \alpha H_b = 1.8(0.4) = 0.72\,ft$

$d_{B\,MIN} = \beta H_b = 1.45(0.4) = 0.58\,ft$

CONCLUSION: BREAKING WAVES COULD OCCUR AT A DIKE TOE DEPTH BETWEEN 0.58 - 0.72 ft.

III FREEBOARD DETERMINATION

FIND depth, d, AT WHICH OVERTOPPING WILL OCCUR.

A. FOR SOUTH POND (POND 1)

OVERTOPPING WOULD OCCUR WITH A WAVECREST AND DEPTH COMBINATION (y_c) OF SEVEN FEET.

$$y_c = d + h_o + \left(\frac{1+\chi}{2}\right) H_i$$

ASSUME $\chi = 1.0$ (SMOOTH SURFACE)

$H_i = 0.4\,ft.$

$$\frac{H_i}{gT^2} = 0.0194$$

$$\frac{h_o}{H_i} = \frac{2\pi^2 H_i}{gT^2} = 0.383 \approx 0.4 \quad \text{(SEE FIG. 7-90)}$$

NOTE: BECAUSE $T < 1.4$ SEC ASSUME DEEPWATER WAVES (SEE FIG. 3-27)

$h_o = H_i\, 0.40 = 0.16$

$$d = y_c - h_o - \frac{1+\chi}{2} H_i$$

$d = 7 - 0.16 - \left(\frac{1+1}{2}\right)(0.4) = 6.4\,ft.$ CONCLUSION: AT A DEPTH OF 6.4 ft, OVERTOPPING WOULD OCCUR; THUS SET MAX DEPTH AT 6.0 ft. (MIN. FREEBOARD OF 1.0 FT.)

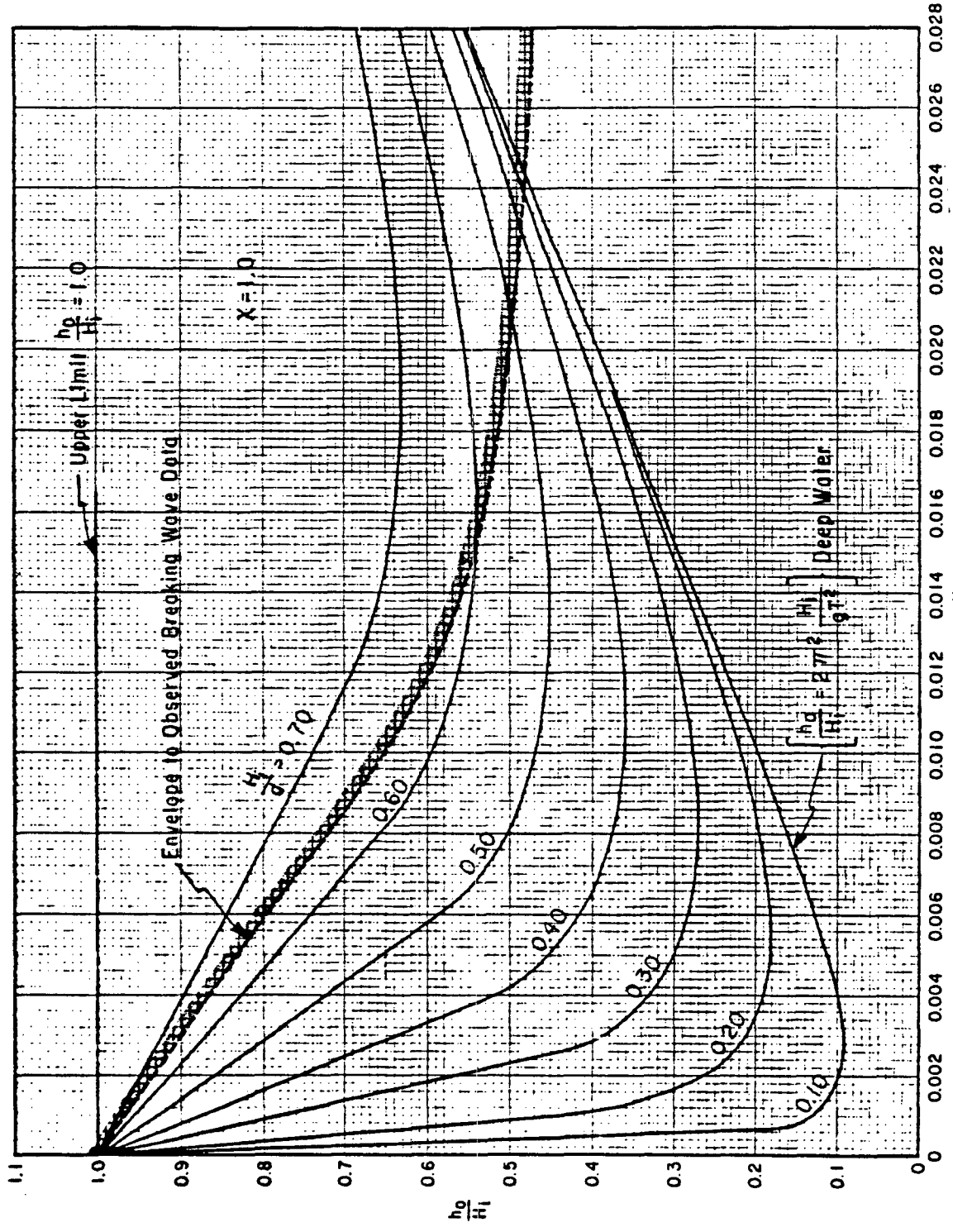


Figure 7-90. Nonbreaking waves; $\chi = 1.0$.

B. FOR NORTH POND (POND 2)

OVERTOPPING WOULD OCCUR WITH A WAVE CREST AND DEPTH COMBINATION (z_c) of 5.8 ft

$z_c = d + h_o + \frac{1+\gamma}{2} H_i$ ASSUME $\gamma = 1.0$

$H_i = 0.4$ $\frac{H_i}{gT^2} = 0.0194$

$h_o = H_i\ 0.40 = 0.16$ (AS IN A.)

$d = z_c - h_o - \frac{1+\gamma}{2} H_i$

$d = 5.8 - 0.16 - \left(\frac{1+1}{2}\right)(0.4) = 5.2$ ft.

CONCLUSION: OVERTOPPING WOULD OCCUR AT A POND DEPTH of 5.2 ft, THUS SET MAX DEPTH AT 4.8 ft (MINIMUM FREEBOARD OF 1.0 ft).

C. FOR EAST POND (POND 3)

OVERTOPPING WOULD OCCUR WITH A WAVE CREST AND DEPTH COMBINATION (z_c) of 7.4 ft.

$z_c = d + h_o + \frac{1+\gamma}{2} H_i$ $d = z_c - h_o - \frac{1+\gamma}{2} H_i$

$d = 7.4 - 0.16 - 0.4 = 6.8$ ft

CONCLUSION: SET MAX DEPTH AT 6.4 ft. (MINIMUM FREEBOARD of 1.0 ft).

FORCE CALCULATIONS -

FORCE DUE TO WAVE ACTION (F_w) -

$\frac{H_i}{g_f T^2} = 0.0194$ $\qquad \frac{H_i}{d} = \frac{0.4}{4.3} = 0.09$

From FIG 7-91

$\frac{F_w}{\omega d^2} \approx 0 \rightarrow F_w = 0$

THUS FORCE DUE TO WAVE ACTION IS NEGLIGIBLE

FORCE DUE TO HYDROSTATIC PRESSURE (F_{HS}) -

$F_{HS} = \int_0^d \rho_w A \, d(d)$ $\qquad A = d(l)$ where $l = 1$ LINEAR FT.

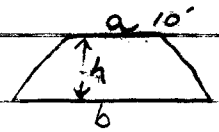
$F_{HS} = \int_0^d \rho_w d l \, d(d) = \frac{1}{2} \rho_w d^2$

let $\rho_w \approx 66 \text{ lb/ft}^3$

SHEAR FORCE FOR BERM (F_S) -

$F_S = V_B \rho_S \mu_S$

$V_B = \left(\frac{a+b}{2}\right) h \, l$



$l = 1$ ft.

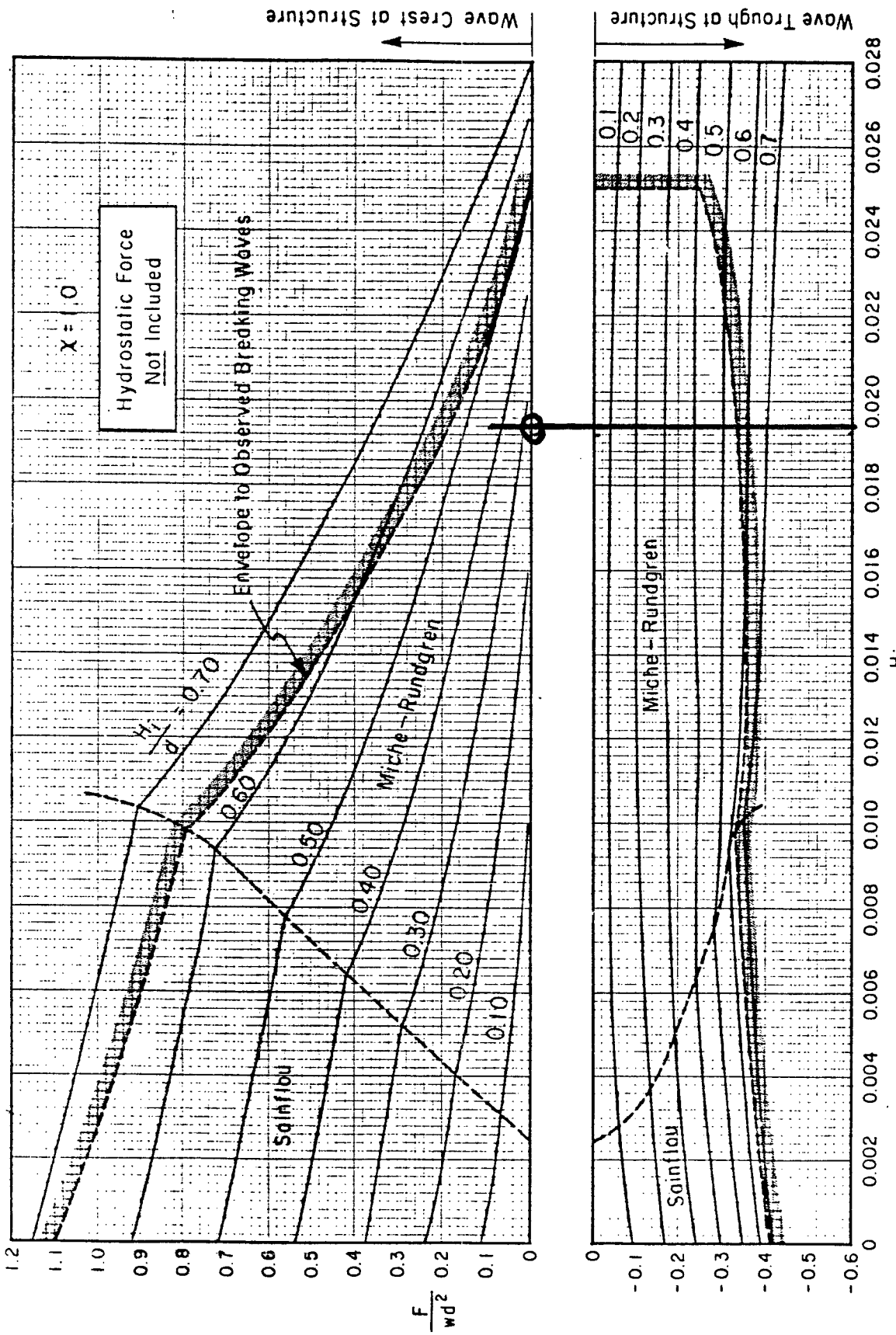


Figure 7-91. Nonbreaking wave forces; $\chi = 1.0$.

$\rho_s = 80 lb/ft^3$ (PROBABLY LOW)

μ_s = FRICTION FACTOR $\tilde{\sim}$ 0.4

SAFETY FACTOR = F_s / F_{HS}

ALL CALCULATIONS ARE BASED UPON MAXIMUM WATER LEVEL ALLOWED TO PREVENT OVERTOPPING

FOR SOUTH POND d = 6.0 ft.

FOR NORTH POND d = 4.8 ft.

FOR EAST POND d = 6.4 ft.

SEE Pgs 2 + 3 of BLUEPRINTS FOR BERM #

BERM #	WATER LEVEL, ft.	F_{HS}, lb/ft	b	h	F_S, lb/ft	SAFETY FACTOR
1S	6	1188	31		6600	5.6
1N	4.8	760	19		7418	9.8
2S	6	1188	47	8	7280	6.1
2N	4.8	760	44		8170	10.8
3E(S)	6.4	1352	25	8.6	4816	3.6
3E(N)	6.4	1352			5346	3.9
4E	6.4	1352	56	10	10560	7.8
4W	4.8	760		7	6160	8.1
5E	6.4	3169	81	16	23360	7.4
5W	6	1188	50	8	7680	6.5
6N	4.8	760		12	13056	17.2
6S	6	1188	50	8	7680	6.5

CONCLUSION: SAFETY FACTORS ARE ADEQUATE

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS
1935 - 1985

TONEY ANAYA
GOVERNOR

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

February 4, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. R. B. Stannard Jr., PE
San Juan Engineers
2101 San Juan Blvd.
Farmington, New Mexico 87401

Re: Application for Meridian Oil Co. Lined Evaporation Ponds to be located in Section 23, Township 30 North, Range 7 West, Rio Arriba County, NM

Dear Mr. Stannard:

We have reviewed the plans and specifications in your application for the above-referenced lined evaporation pits. The design specifications submitted are acceptable and your application is hereby approved.

The approved application consists of the application dated January 10, 1986, and the material dated January 27, 1986, submitted as a supplement to your application. Approval of this application allows for the disposal of any produced water from the vulnerable area as outlined in Oil Conservation Commission Order No. R-7940. Please be advised that the approval of this application does not relieve you of liability should your operation result in actual pollution of surface or ground waters which may be actionable under laws and/or regulations.

There will be no routine monitoring requirements other than those outlined in your application. Underground piping will be pressure tested once a year.

This approval does not take the precedence over local zoning laws and is based on the premise that the ponds will receive only produced water and salt solutions (e.g., KCL solution) which are non-acidic. If in the future, you wish to dispose of other types of waste such as spent acid or septage, the OCD must be notified and prior approval obtained before such a practice commences.

The OCD District Office in Aztec shall be notified at least 24 hours in advance of primary and secondary liner installation to allow for the opportunity of an OCD representative to witness the installation.

On behalf of the staff of the Oil Conservation Division, I wish to thank you (and your staff and/or consultants) for your cooperation during this application review.

Sincerely,

R. L. STAMETS
Director

RLS/JB/dp

cc: OCD - Aztec Office

SAN JUAN ENGINEERS
2101 SAN JUAN BOULEVARD FARMINGTON, NEW MEXICO 87401 TELEPHONE: 505-325-7535

January 27, 1986

State of New Mexico
Energy and Minerals Department
Soil Conservation Division
P.O. 2088
Santa Fe, NM 87501

Attn: Ms. Jamie Bailey

Re: Meridian Oil Company Evaporation Pond Application

Dear Ms. Bailey:

We received your comments on the subject application on January 23, 1986. Below please find our replys to your comments and questions. Where we have modified the design sheets, I have called them out.

Question No. 1 - Sheet 1

a. The gate valves from the loading tank to the skimmer vessel and from the skimmer vessel to the evaporation pond were shown on Sheet 5. The scale was too small to accurately indicate these on Sheet 1, however we do envision installing these values. The nominal detention time in the skimmer vessel is four hours.

b. I have checked with Gary Brink at Meridian and he agrees that a sign will be installed. We have added a suggested sign to Sheet 5/4.

c. No leak detection system was intended for the underground piping. We will pressure test piping prior to start-up and piping will be scheduled for pressure testing once a year.

The High Density Polyethelene (HDPE) piping that we have specified can be joined by either glue or fusion butt weld. Fusion butt weld is a heat process where the ends of the pipe are actually heated and then forced together. Either of these provide joint strength equivalent to the pipe barrel.

d. All underground piping will be pressure tested prior to start-up. Lots will be furnished if you desire. Gate valves have been added to the 'fill' lines as close to the pond as is practicable. The valves are located immediately adjacent

to the top of the dike. These valves will allow virtually the entire length of the 'fill' lines to be pressure tested. We have also included (Sheet 5) connections and gage for pressure tests.

Question No. 2 - Sheets 2 & 3

The cross-sections have been amended to continue the liner to the top of the berm.

Question No. 3 - Sheet 4

a. The liners will be composed primarily of large sheets, that is they will be laid with a minimum of joints. This is not particularly difficult on ponds that are only one acre in size. However, where seams will be necessary, they will be solvent welded seams constructed at temperatures of 100°F or more. This will require the use of heat guns to assure a properly cured seam.

b. The anchor trench detail has been amended to show a 2" excess flap.

c. and d. The inlet pipes have been redesigned to eliminate the need for the concrete pad. The inlet pipes will come through the side of the dike, as shown on the drawings, where they will be sealed with a conventional liner boot. Some of the pipe will be outside of the secondary liner, however that will be pressure tested in accordance with item 1. d. above.

We also understand that the pond will be permitted only for non-acidic solutions and produced water. We believe this information responds to the questions raised in your January 22, 1986, letter. However, if you desire any further information, please don't hesitate to call me.

Very truly yours,

SAN JUAN ENGINEERS

Robert B. Stannard

Robert B. Stannard, Jr., P.E.
Vice President

RBS/ja
cc: Gary Brink, Meridian Oil, P.O. Box 4289, Farmington, NM 87499

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS
1935 - 1985

TONEY ANAYA
GOVERNOR

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

January 22, 1986

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. R. B. Stannard Jr., PE
San Juan Engineers
2101 San Juan Blvd.
Farmington, New Mexico 87401

Re: Meridian Oil Co.
Evaporation Ponds

Dear Mr. Stanndard:

We have reviewed your application for approval to install three lined evaporation ponds in Section 23, Township 30 North, Range 7 West, Rio Arriba County, New Mexico. Upon review of the blueprints, we have the following questions and comments:

1) Sheet 1

   a) No gate valves are shown from the loading tanks to the skimmer vessel or from the skimmer vessel to the evaporation pond. These will need to be installed. What is the intended residence time in the skimmer vessel?

   b) A sign identifying the operator of the system and the facility location needs to be posted on the fence/gate.

   c) Provide information on the leak detection system and pressure testing schedule for all underground pipes, as I discussed with you on January 22, 1986. Please indicate if pipe joints are flanged or glued.

   d) All underground pipes are to be pressure tested prior to start up.

2) Sheets 2 and 3

   a) Cross sections A, C, D, E, F, G, and H indicate

liners are not anchored on top of berms. To provide adequate anchoring of the liners and to prevent soil erosion with use of evaporative sprayers, liners must be anchored on top of berms.

3) Sheet 4

a) Are liners to be sealed by solvent, adhesive, or heat weld?

b) Anchor trench detail -
Liner as indicated does not return to surface on the back side of anchor trench. Liner must return to surface with a minimum 2" excess flap.

c) Detail F-1-
No seal is indicated between liners and concrete pad. This area must be sealed to prevent leaks.

d) Inlet-outlet pipes are located below the secondary liner, with no leak detection system.

The above problems must be resolved before approval can be given. Approval for these ponds will be for disposal of produced water and salt solutions (e.g., KCL solution) which are non-acidic. If you have any questions concerning this matter, please feel free to contact me in Santa Fe at 827-5884.

Sincerely,

JAMI BAILEY
Field Representative

JB/dp

cc: Oil Conservation Division - Aztec
R. L. Stamets
D. G. Boyer

NOTICE OF PUBLICATION
STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
SANTA FE, NEW MEXICO

The OCD has received an application from Meridian Oil Company, Donald C. Walker, Authorized Agent, P. O. Box 4289, Farmington, New Mexico 87499-4289, for surface disposal of produced water from oil and gas production operations. The facility will be located in the NW/4, NW/4, Section 23, Township 30 North, Range 7 West, NMPM, Rio Arriba County, New Mexico. The three ponds located at the facility will each have approximately one acre of evaporative surface area and will receive various amounts of produced water. The ponds will have a double membrane liner with a leak detection system between the liners. The application will be reviewed by the OCD for compliance with rules for protection of fresh water and other applicable regulations, and will be approved if such requirements are met. Copies of the application may be reviewed at the OCD office in Aztec located at 1000 Rio Brazos Rd., or in Santa Fe at the State Land Office, 310 Old Santa Fe Trail, during normal business hours. A minimum of five days from the date of publication of this notice will be allowed before approval or denial of this application is given.

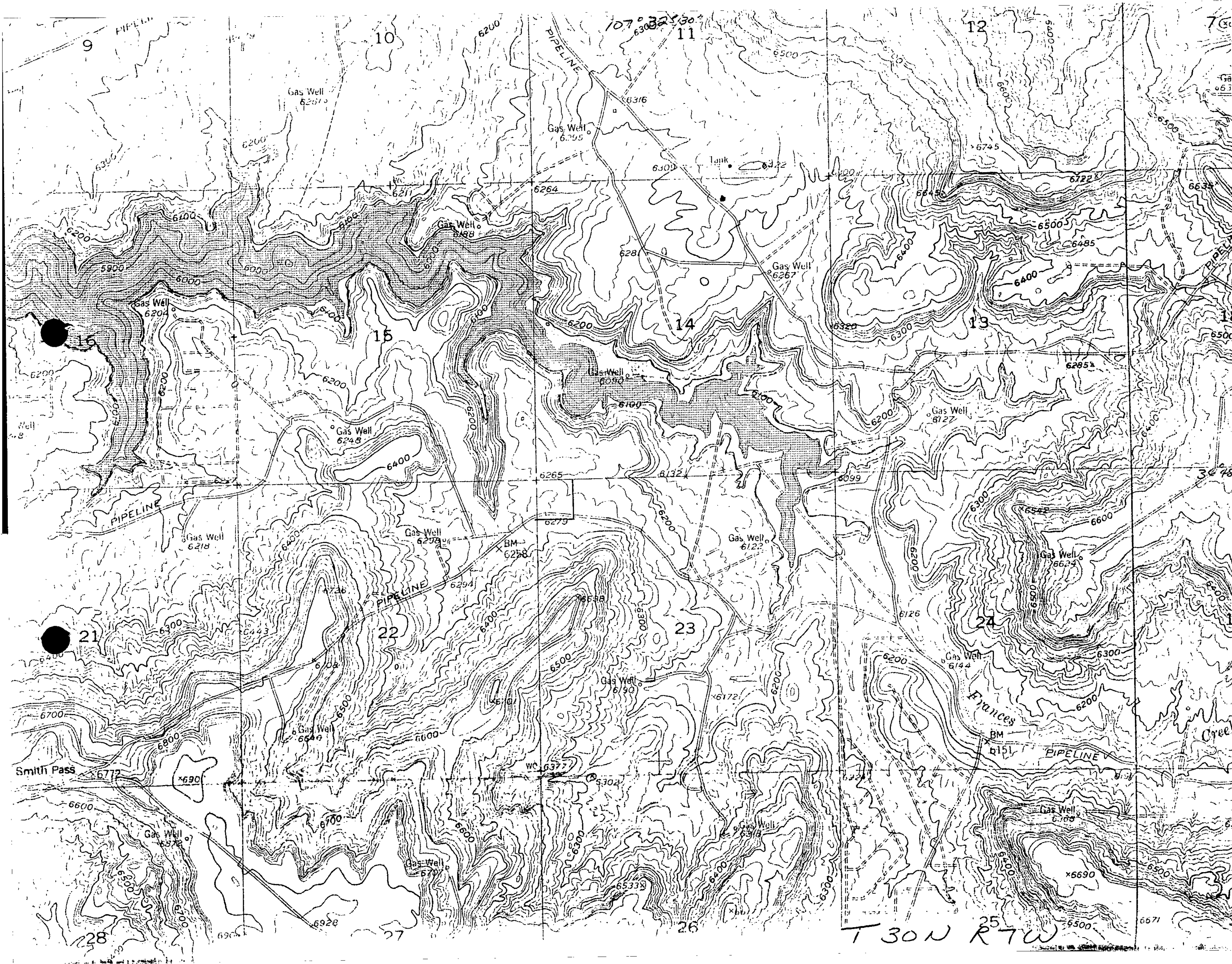
GIVEN Under the Seal of the New Mexico Oil Conservation Commission at Santa Fe, New Mexico, on this 22nd day of January, 1986.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

R. L. STAMETS
Director

S E A L

Sent to papers 1/22/86



9
10
11
12
15
14
13
16
21
22
23
24
28
27
26
25
107° 32' 30"
PIPELINE
Gas Well
Tank
Smith Pass
Frances
Creek
BM
6258
6151
T 30N R7W

SAN JUAN ENGINEERS
2101 SAN JUAN BOULEVARD FARMINGTON, NEW MEXICO 87401 TELEPHONE: 505-325-7535

January 10, 1986

41355

New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

ATTN: Ms. Jamie Bailey

RE: Meridian Oil Evaporation Pond

Dear Ms. Bailey:

Enclosed please find two copies of the proposed construction drawing and Supplemental Information Report for the referenced project. We are submitting this as OUR application for permit to build these ponds, and we request your review. Please address any questions or comments on the project to me. By copy of this letter, I am also forwarding one set to Ernie Busch at your Aztec Office.

We believe that the plans and Supplemental Information are self-explanatory. However, we have been asked by Mr. Walker of Meridian Oil to emphasis the fact that they will very likely be withdrawing some of the water from the ponds for use in drilling operations. This is the reason the little pumping port and the enclosure are going to be installed at the front end of the system.

In summary, then, we are submitting this for your review. Please don't hesitate to contact me if you have any comments or questions regarding what is envisioned.

Very truly yours,

SAN JUAN ENGINEERS

Robert B. Stannard, Jr., P.E.
Vice President

RBS/ja
Enclosures
cc: Ernie Busch, State of New Mexico Oil Conservation Commission,
1000 Rio Brazos Rd., Aztec, NM 87410
Don Walker, Meridian Oil, P.O. Box 4289, Farmington, NM 87401

SUPPLEMENTAL INFORMATION TO ACCOMPANY APPLICATION FOR

PRODUCED WATER EVAPORATION POND

BY

MERIDIAN OIL COMPANY

Prepared by:
San Juan Engineers
2101 San Juan Boulevard
Farmington, NM 87401

ROBERT B. STANNARD, NEW MEXICO, 9155, REGISTERED PROFESSIONAL ENGINEER

Robert B. Stannard, Jr., P.E.

SUPPLEMENTAL INFORMATION TO ACCOMPANY APPLICATION FOR
PRODUCED WATER EVAPORATION POND
BY
MERIDIAN OIL COMPANY

This supplemental information will be used to compliment the design drawings and specifications as prepared by San Juan Engineers.

I. GENERAL INFORMATION

A. The Name of Owner or Legally Responsible Party:

The developer of the pond is Meridian Oil, P.O. Box 4289, Farmington, NM 87499-4289. Telephone: (505) 327-0251. ATTN: Donald C. Walker, Drilling Manager. The name of the land Owner is Mr. Roque Abeyta, whose address is General Delivery, Las Ojos, NM 87551.

B. The Name of Representative or Contact Person:

The manager for Meridian Oil is Donald C. Walker, listed above. For technical questions, contact Robert B. Stannard, P.E., San Juan Engineers, 2101 San Juan Boulevard, Farmington, NM. Telephone: (505) 325-7535.

C. Location of Evaporation Pit:

The evaporation pond is located in the Northwest Quarter Northwest Quarter, Section 23, Township 30 North, Range 7 West, N.M.P.M., Rio Arriba County, NM. A more detailed legal description is shown on the design drawings.

D. Type of Operation:

The purpose of this facility is a non-contaminating disposal facility for produced water. Meridian Oil has drilled wells into the Fruitland Coal formation. These wells historically produce about 200 barrels a day, declining to about 80 barrels per days over 18 months. The number of wells to be drilled and the production of each well is not known at this time. However, the production histories for five representative wells are attached. The long term average of produced water appears to average 50 to 75 BBL/day/well.

E. Copies:

Two copies are enclosed herewith. An additional copy has been sent to the Aztec District Office, ATTN: Ernie Busch.

F. Affirmation:

The required affirmation is the cover sheet of the design drawing, executed by Mr. Walker.

II. GENERAL DESCRIPTION

A. Proposed Operation

1. Disposal Facility Description: The proposed disposal facilities include three ponds of approximately one acre each for evaporation of water produced from the Fruitland Coal formation. These ponds have been designed to evaporate approximately 100 barrels per day per acre by natural evaporation. Installation of sprayers will increase the total evaporation to at least 200 barrels per day per acre. The ponds are designed to provide winter storage of produced water in the amount of 200 barrels per acre per day during the non-evaporative season. However, experience by other companies in the same general area indicate that some evaporation can be counted on in any month when the sprayers are running.

   Ahead of the ponds are pretreatment facilities consisting of two 400 barrel off-loading tanks, a heater treater, and a slop oil storage tank. Produced water is taken to the site by truck from the well pads. It is off-loaded into one of the 400 barrel tanks. The water is then pumped at the initial rate of 500 barrels per day, through the heater treater, and to the ponds for evaporation and/or storage. All "wet" equipment is contained within a spill-containment dike. The ponds have dual liners and leak detection systems as described on the detail drawings and in B. below.

2. The pond system will be three ponds of approximately one acre each. Volumes of storage, area, and evaporative potential are shown on the design drawings. The logs of test holes taken on site are appended to this report. The liner types are shown on the drawings. Generally stated, they are 30 mil minimum CPER-OR surface liner and a 20 mil PVC secondary liner, separated by 6" of sand in the leak detection as described in B. below. Surface drainage has been diverted around the pond. All dikes are a minimum of 18" above the surface so that casual drainage will not enter the ponds. The maximum water surface is envisioned to be 18" below top of the dikes (that is, 18" minimum freeboard). No drying beds or other pits will be required, nor will land application of effluents be required.

3. Details on the aerator, sprayer and other equipment are supplied in the detailed drawings. A very minimum of equipment will be necessary. The heater treater will be installed ahead of the ponds. When the water applied reaches the evaporative capacity of the ponds, sprayers may be installed to increase evaporative capacity.

4. A pumphouse and connecting pipelines have been designed to allow withdrawal of water from the ponds for use in drilling operations. The pumphouse will be locked when not in use. The top of the 4 inch steel riser is one (1) foot above the highest point on the dike, to prevent siphoning.

B. Spill/Leak Prevention and Procedures

Each of the three ponds are constructed with double liners and leak detection systems. The primary liner (surface liner) is 30 mil chlorinated polyethelene, reinforced-oil resistant (CPER-OR), specially formulated to resist hydrocarbons and sunlight. The reinforcing skrim will absorb strain put on the liner so that the plastic material does not separate. Should a small separation occur, the reinforcing skrim will act to localize it. The secondary liner is a 20 mil polyvinyl chloride (PVC) liner, which is not sunlight nor oil-resistant. The liner will not be exposed to either sunlight or hydrocarbons except in the case of a pond failure. Between the liners there is 6" of sand and a header-lateral type underdrain system to detect leakage through the primary liner. Any leakage would be conveyed to a sump adjacent to the pond, where it could be detected. The sump should be inspected at least weekly. If there is a failure in the pond, the pond can either be pumped or drained by gravity to one of the other adjacent ponds while the distressed pond is being repaired.

III. SITE CHARACTERISTICS

A. Hydrologic Features

1. The ponds are about one mile from the Frances Creek arm of Navajo Lake. There are no ground water wells, seeps, spring, marshes, or swamps that are known to be within one mile of the site, except for Frances Canyon. Frances Canyon is a heavily used recreational area. No ground water was found to the depth obtainable by backhoe when the subsurface exploration was done. The ponds are 130 feet (vertically) above the normal pool elevation of Navajo Lake.

2. The analysis of water produced from the existing Fruitland Coal formation well as determined by ElPaso Natural Gas is attached to this report.

3. No hydrogeological calculations have been undertaken. However, a reasonable assumption would be that water flows from the high grounds on the south towards Francis Canyon. The soils are of moderate permeability and this flow should be moderately rapid.

B. Geologic Description of Pit Site

1. The soil types are shown on the logs appended to this supplement.

2. The groundwater aquifers are as shown in 2. above.

3. The composition of the aquafer material is unknown.

4. The depth to rock at the base of the alluvium is unknown. However, based on surrounding topography, the alluvium depth is estimated to be 50 to 75 feet.

C. Flood Protection

Flood potential at the pit site is very low. The major drainage in the area is Frances Canyon. The pond site sits approximately 130' above Frances Canyon. There are several minor drainages on the site. However, the pond site is near the head of these drainages and the contributing area would be very low. No flood protection measures are being taken since the probability of flooding is quite low. However, should a washout or other accident happen, the Oil Conservation Division would be notified immediately.

IV. ADDITIONAL INFORMATION

The design drawings include much in the way of additional and detailed information.

PRODUCTION HISTORY CAHN NO. 1

Exhibit 7

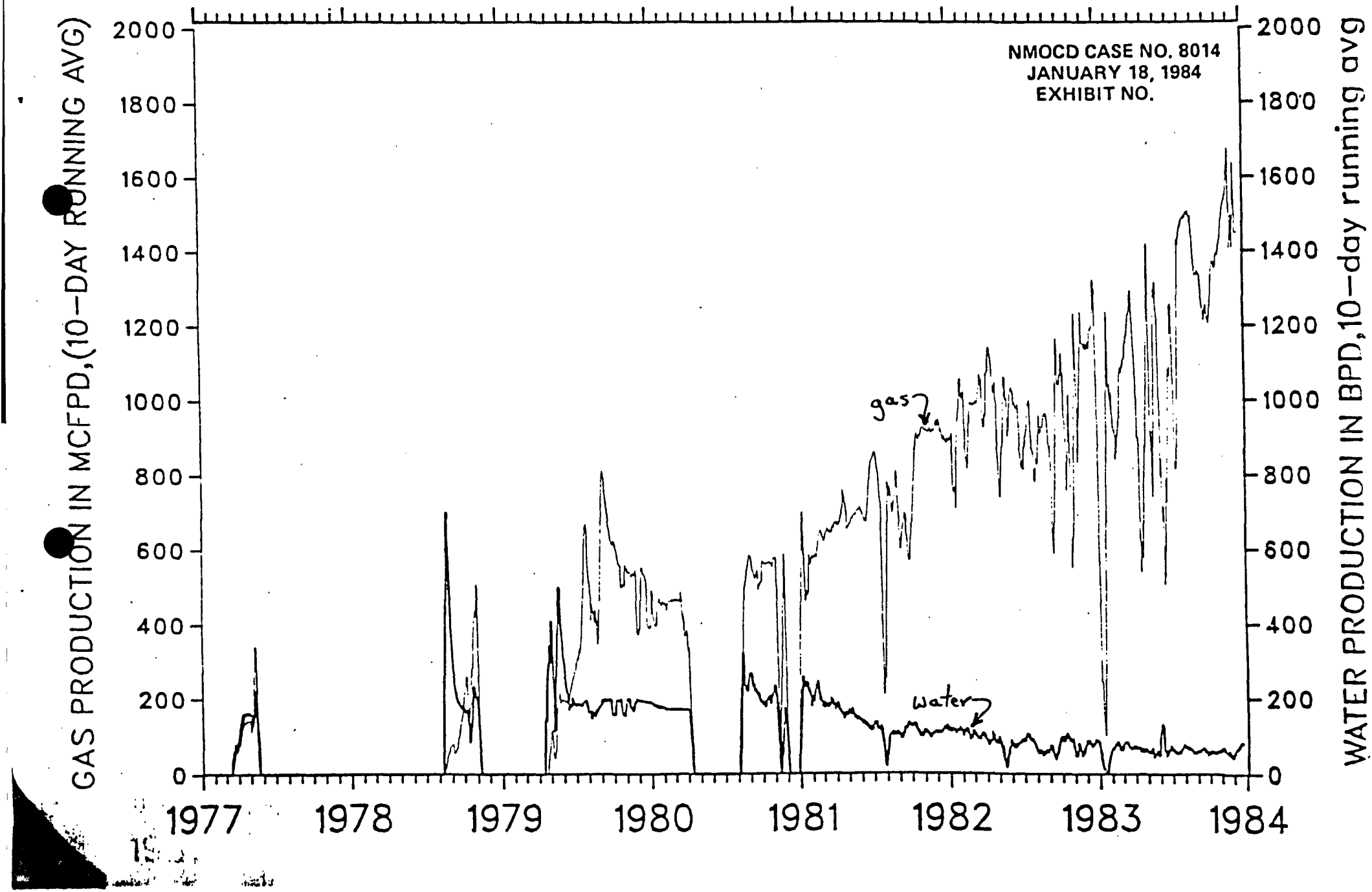


Exhibit 8

PRODUCTION HISTORY SCHNEIDER B 1 S

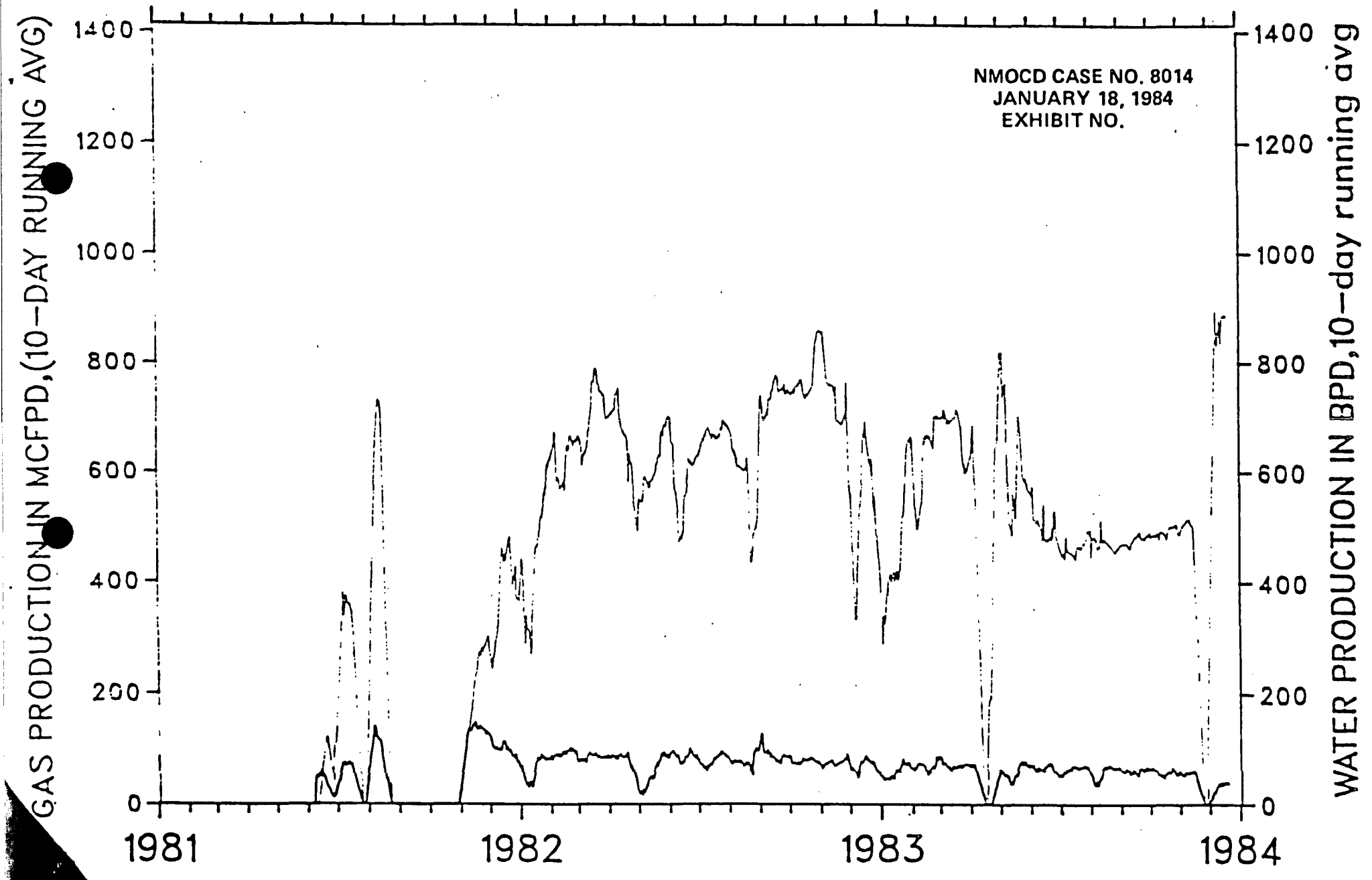


EXHIBIT 1

PRODUCTION HISTORY STATE BW NO. 1

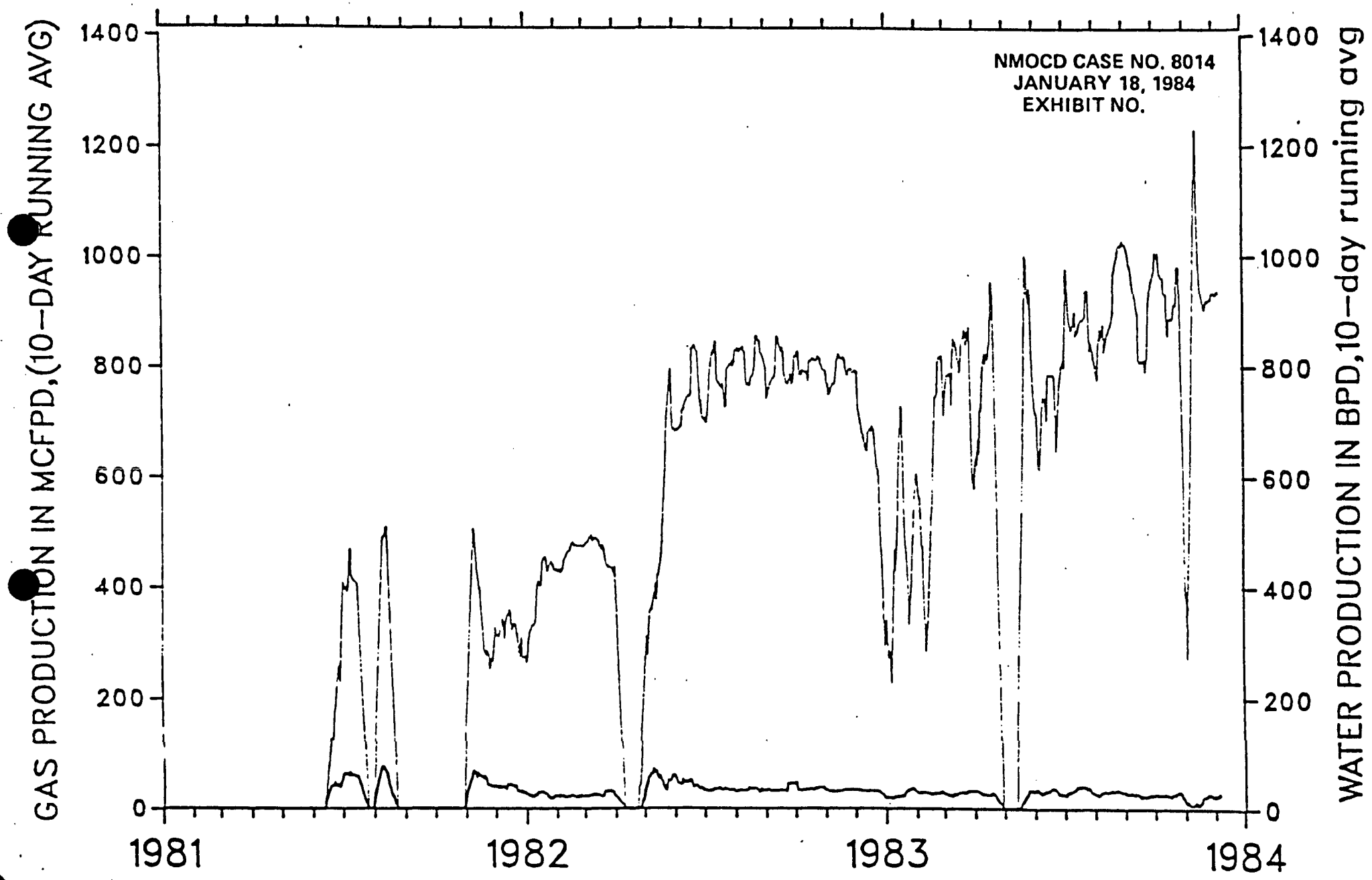


EXHIBIT 10

PRODUCTION HISTORY KEYS G NO. 1

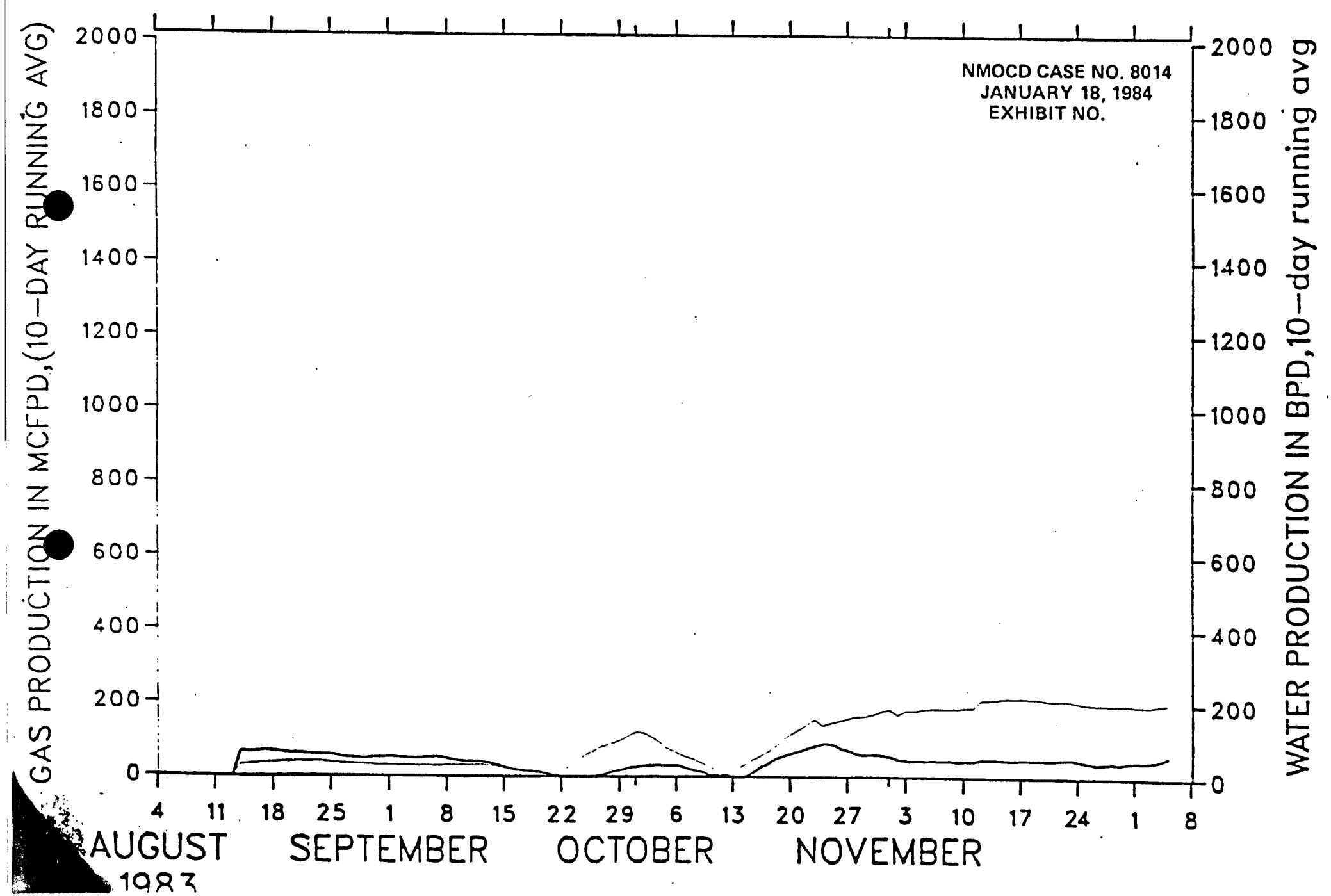
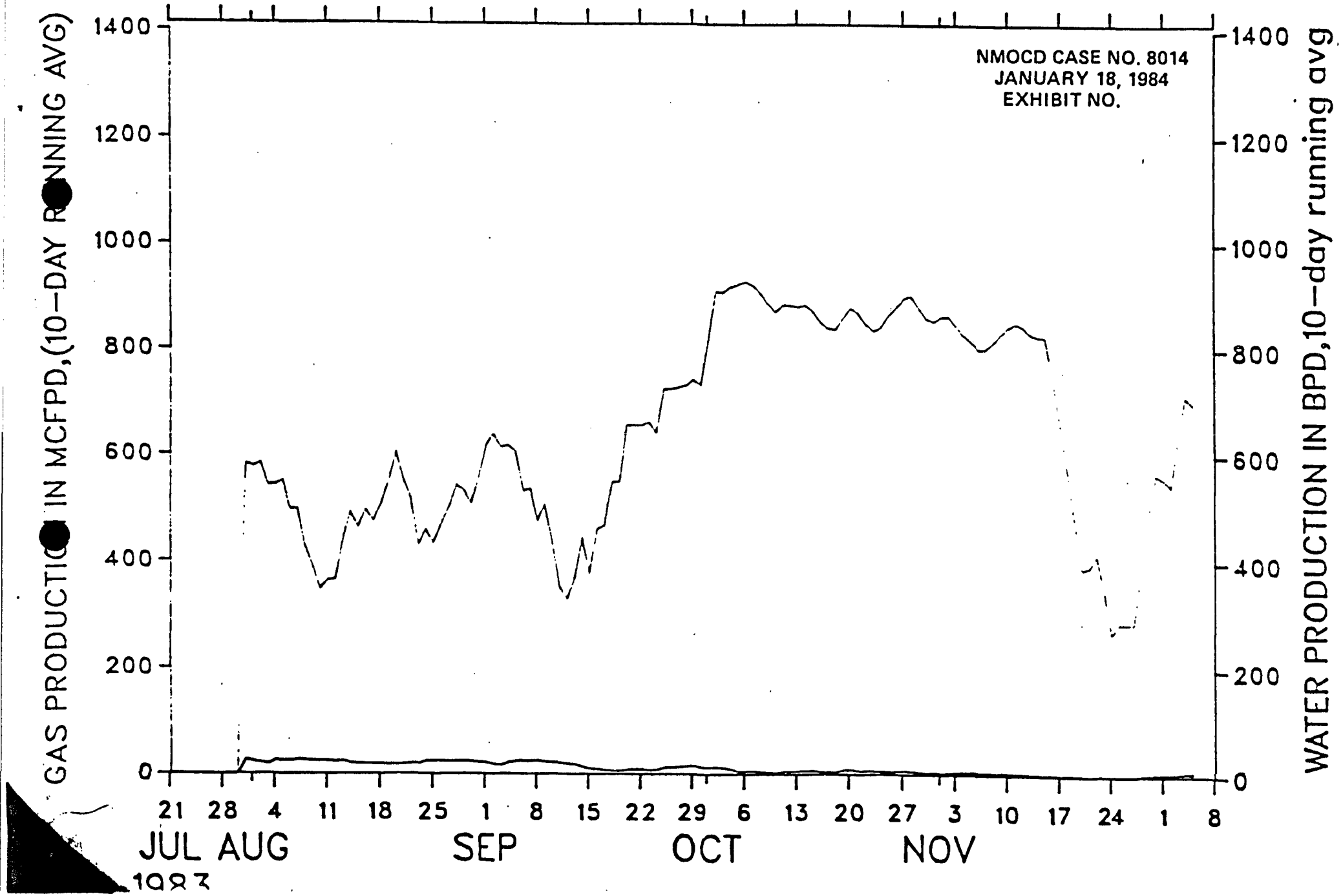


exhibit 11

PRODUCTION HISTORY STATE BX NO. 1



SOIL EXPLORATION AT FRANCES CREEK
FOR
MERIDIAN OIL COMPANY

Hole #	Depth	Description
1	0	Brown Red Sandy Clay
	3'	Brown Red Sandy Clay
	5'	Brown Red Sandy Clay Bottom
2	0-12"	Brown Tan Sandy Clay
	12"	Light Tan Silty Clay
	5'	Light Tan Silty Clay
	5'	Brown Sandy Clay w/Light Tan Lines Mix
	6'	Brown Sandy Clay w/Light Tan Lines Bottom
3	6-12"	Brown Red Sandy Loam
	12"-2.5'	Brown Red Sandy Clay
	2.5'-7'	Light Tan Silty Clay
	7'-9'	Gray Tan Sandy Clay Bottom @ 9'
4	6"-12"	Sandy Loam Brown
	12"-2.5'	Brown Red Sandy Clay
	2.5'-6'	Light Tan Silty Clay
	6'-6.6"	Gray Tan Sandy Clay
	6'6"-7'	6" Green Sandstone Lens Sample
	7'-8'	Gray Tan Sandy Clay Bottom @ 8'
5	6"-12"	Brown Red Sandy Loam
	12"-2'	Brown Red Sandy Clay
	2'-4'	Light Tan Silty Clay Bottom

EL PASO NATURAL GAS COMPANY
SAN JUAN DIVISION
FARMINGTON, NEW MEXICO
PRODUCTION DEPARTMENT WATER ANALYSES

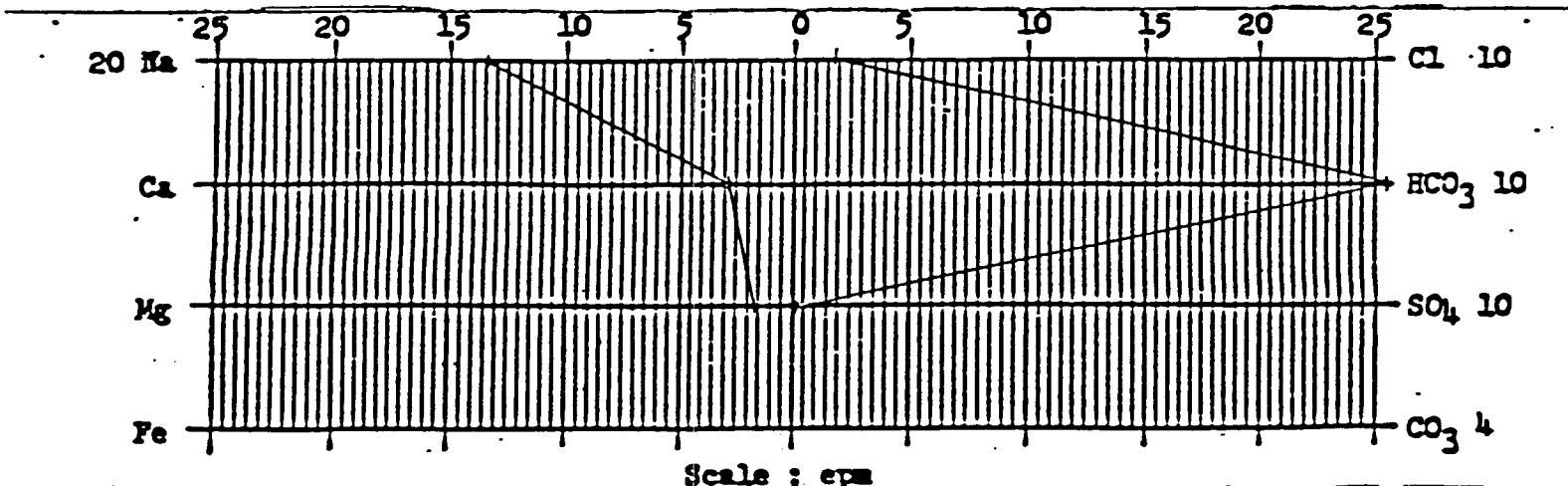
ANALYSIS NO.: 1-11821 DATE: DECEMBER 5,1985
OPERATOR: MERIDIAN OIL WELL NAME: SAN JUAN 30-6 #400
LOCATION: 14-30-7 COUNTY RIO ARRIBA STATE: NEW MEXICO
FIELD: GOBERNADOR FORMATION: FRUITLAND
SAMPLED FROM: BLOW LINE-BLOWING WHILE ON BOTTOM.
DATE SAMPLED: NOVEMBER 30,1985 SECURED BY: DOUG MUSSETT
TUBING PRESSURE: CASING PRESSURE:
SURFACE CASING PRESSURE:

	SAMPLE SIZE	ml. TIT	AS CaCO3	AS ION	epm
TOTAL ALKALINITY	1	12.75	12750		
P ALKALINITY	1	0	0		
BICARBONATE	1	12.75	12750	15555	255.10
CARBONATE	1	0	0	0	0.00
CHLORIDE	25	18.8		672	18.95
SULFATE				10	0.21
TOTAL HARDNESS	10	2.2	220		
CALCIUM	10	1.4	140	56	2.80
MAGNESIUM	10	.8	80	20	1.61
IRON					
SODIUM (CALCULATED)				6207	269.85
H2S					
HYDROCARBONS					
TOTAL DISSOLVED SOLIDS				14640	
pH				8.3	
SPECIFIC GRAVITY			1.016 AT 60F		
RESISTIVITY			53 OHM-CM AT 70		
CONDUCTIVITY			18800 MICROMHOS @ 25C.		

ALL RESULTS EXPRESSED IN PARTS PER MILLION-TRACE IS LESS THAN 0.1 ppm

cc: R. A. ULLRICH
J. D. EVANS
D. C. ADAMS
W. F. LORETT
J.L. WILLIAMS
G.C. KARDOS
FILE

DENNIS BIRD
CHEMIST GCK



STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

MEMORANDUM OF MEETING OR CONVERSATION

☒ Telephone ☐ Personal | Time 9 am | Date 12/16/85

Originating Party	Other Parties
ERNIE Busch - OCD	D. Boyer

Subject: Produced Water Storage - Meridian Oil

Discussion: ERNIE called to say that Meridian (EPNG) is planning to store produced water in above ground tanks in St Francis Canyon* near Navajo Dam in the Vulnerable Area. Water to be used for down drilling.

*(30N, 7W, Sec 14, SW/4)

Conclusions or Agreements: No action - Ernie calling to notify only.

Distribution

Signed D. Boyer

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

50 YEARS
1935 - 1985

TONEY ANAYA
GOVERNOR

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

November 27, 1985

Mr. R. B. Stannard, PE
Vice President, San Juan
Engineering, Inc.
2101 San Juan Blvd.
Farmington, NM 87401

Re: Proposed Evaporation Pond
Meridian Oil

Dear Mr. Stannard:

I have received the preliminary drawings for the Meridian Oil proposed evaporation pit to be located in the NW/4 NW/4 of Section 23, Township 30 North, Range 7 West, Rio Arriba County, New Mexico. I understand that these are preliminary drawings and that much information has been omitted that will necessarily be included in the final design drawings.

I noticed on the drawings (Note #4) that all construction is to comply with New Mexico OCD Order No. R-3221-C. In order to facilitate the approval process for this pit, I have enclosed three sets of guidelines that will be helpful to you for this pit approval and for any future pits you may engineer.

If I may be of further assistance to you, please contact me in Santa Fe at 827-5884.

Sincerely,

Jami Bailey

JAMI BAILEY
Field Representative

JB/dp

Enc.

SAN JUAN ENGINEERING, INC.

101 WEST PINON
2101 SAN JUAN BLVD.

FARMINGTON, NEW MEXICO 87401

TELEPHONE: 505-325-7535

November 20, 1985

New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87504-2088

ATTN: Ms. Jamie Bailey

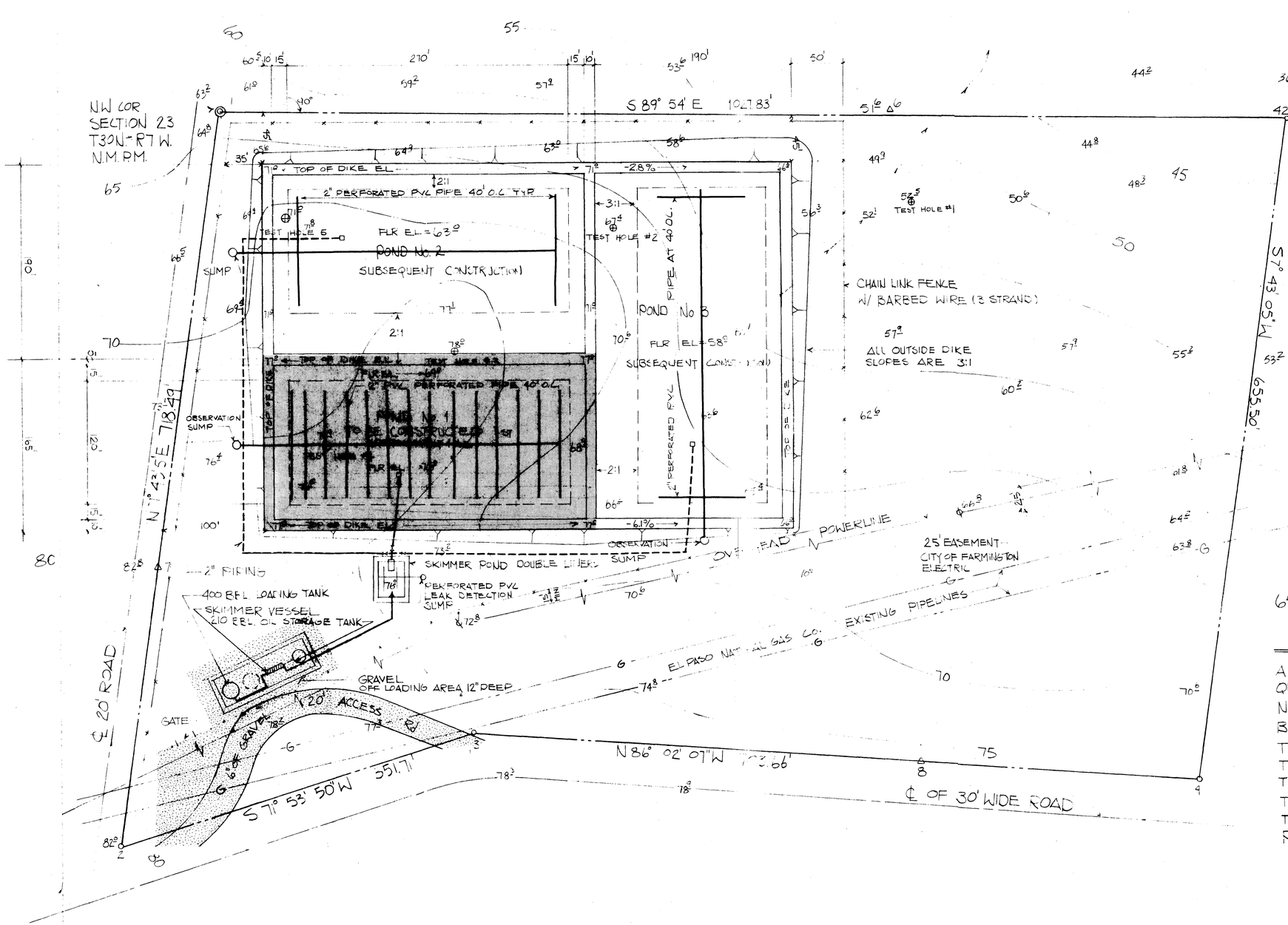
RE: Evaporation Pond, Meridian Oil

Dear Ms. Bailey:

Enclosed please find four copies of the preliminary drawings for the proposed evaporation pond. I contacted Ernie Bush of the Aztec OCD Office and made arrangements to send him copies of the drawings. We will meet on the site at the earliest possible convenience for the required on-site inspection. Please note that while there are three ponds shown for construction, Meridian has not yet decided how many ponds, if any, to build. They are drilling a well into the Fruitland Coal formation and have only speculative information on how much water and gas the well will produce. If the well is a good producer, we can envision that a good number of Fruitland Coal wells will be drilled and all three ponds will be needed. If the pond is a marginal producer or if it doesn't produce as much water as is anticipated, one or two ponds may suffice.

The ponds are anticipated to be built withthe double liner protection system called for in your May 1985 regulation. Some of the information has been omitted from this preliminary plan, however more detailed information will be submitted when the final design drawings are complete.

We intend to use a 400 barrel off-loading tank. Pumping trucks will pump into this tank and the produced water will then flow by gravity to a heater-treater unit. Provision has been made to put in a second 400 barrel off-loading tank if necessary. Provisions would be made to prevent back-siphoning the contents of the tank out onto the ground. From the heater-treater, the recovered oil would go to a 210 barrel storage tank, and would be pumped off and hauled away by truck. The water would flow to a skimmer pond built with the double liner and leak detection system approximately as shown on the drawings. This will provide a secondary insurance that no significant amount of hydro-carbon would reach the primary liners in the pond. All 'wet' equipment will be inside a containment berm so that the effects of an accidental spill could be contained.



NOTES

1) PRIMARY LINER 36MIL CPER-OR.
2) SECONDARY LINER 20 MIL PVC.
3) PVC PIPE LEAK DETECTION SYSTEM.
4) ALL CONSTRUCTION TO COMPLY W/ THE NEW MEXICO O.C.D ORDER #R-3221-C.

LEGAL DESCRIPTION

A 15 ACRE TRACT BEING IN THE NORTHWEST QUATER OF THE NORTHWEST QUATER (NW1/4, NW1/4) OF SEC 23, T 30N, R7W, N.M.P.M. BEGINNING AT THE N.W. CORNER OF SAID SECTION

THENCE S89° 54' E 1027.83 FEET
THENCE S7° 43' 5"W 655.50 FEET
THENCE N86° 2' 7"W 703.66 FEET
THENCE S7° 53' 50"W 351.71 FEET
THENCE N 7° 43' 5" E 718.49 FEET TO THE POINT OF BEGINNING.

PRELIMINARY DESIGN
1 AC EVAPORATION POND
FOR
MERIDIAN OIL

SCALE	DATE	REVISED	DRAFTED BY	SHEET	OF
1"=50'	NOV 14 85		PETERSON	1	
	PROJECT NO. 41355		CHECKED BY		

SAN JUAN ENGINEERING, INC.
2101 SAN JUAN BLVD. FARMINGTON, N.M. 87401