CASE 3806: Motion of the OCC to consider amendment of Order No. R-3221.

Case Number

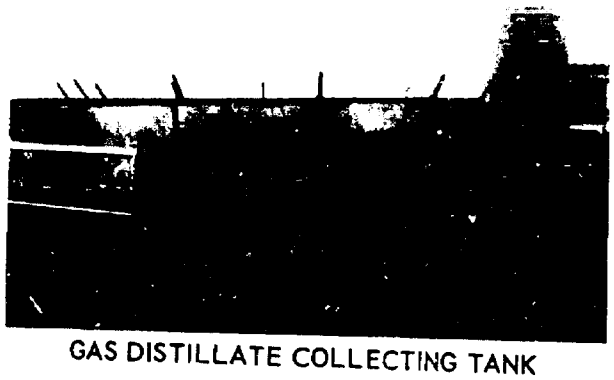
3806

Application

Transcripts.

Small Exhibits

ETC.



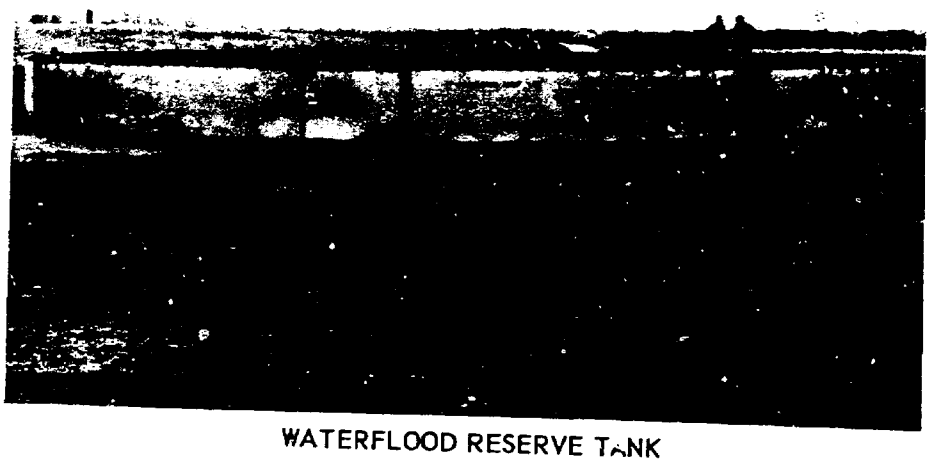
GAS DISTILLATE COLLECTING TANK

" PLASTIC STEEL TANKS"

AVAILABLE IN
SIZES
100 BBL. TO 16,000 BBL.

FOR HANDLING
SALTWATER – FRESHWATER
CRUDE OIL – OIL RESIDUES
and
WASTES

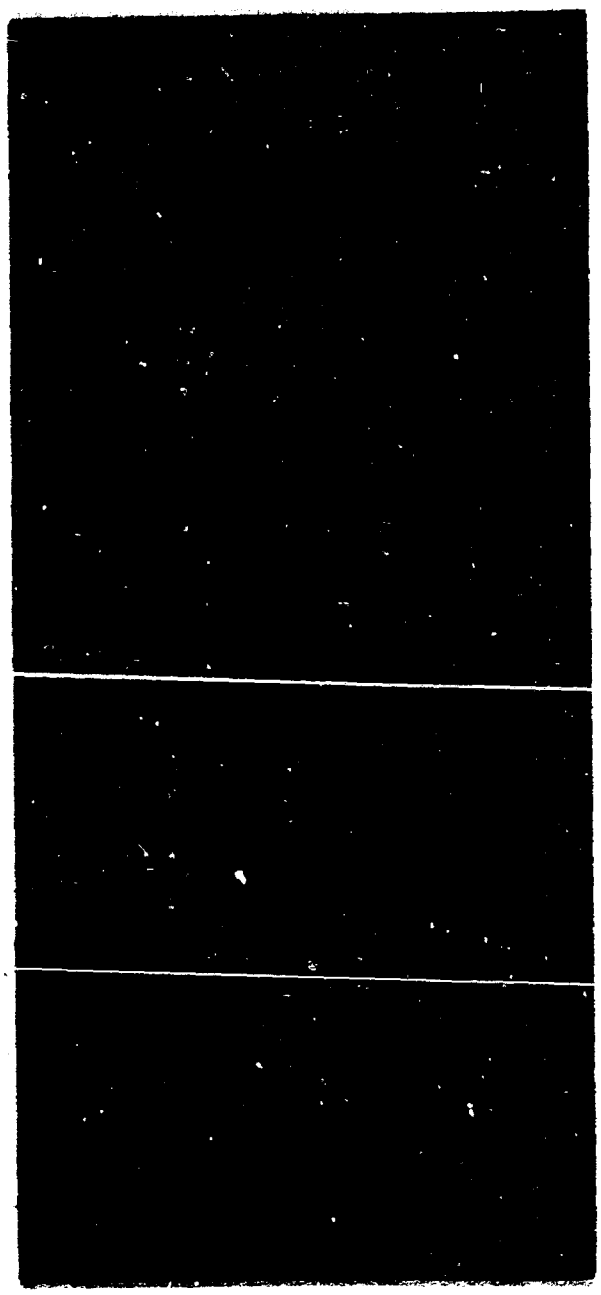
OIL WELL ACCUMULATION TANK



WATERFLOOD RESERVE TANK

PLASTIC PRODUCTS, INC.

1005 Wichita Plaza Wichita, Kansas 67202



*As a surface or above surface installation, they can be visually inspected by your personnel or regulatory agencies. Should leaks occur they can be readily detected - greatly reducing or completely eliminating the hazard of pollution!

*In areas where evaporation can be effective, "Plasti-Steel Tanks" have better evaporative properties than pits of equal capacity and they have far less area for rainfall accumulation.

*On waterfloods, they are more serviceable and cost less to operate than a lined earthen reservoir.

*They can be easily equipped for draw-off of concentrations to reduce or prevent solid build ups or with spreaders for mass distribution (Skimmer-Sedimentation-Aeration, Etc.)

*The plastic liner materials are of the highest quality, impervious to all normal oil field products.

In other words - "Plasti-Steel Tanks" can solve many of your oil field storage and pollution problems in an economic and practical way.

"Plasti-Steel Tanks" are field proven, with hundreds now in use throughout the Mid-Continent area by both Major and Independent oil companies. Because of their exceptional sturdiness and environmental adaptivity, these tanks offer you a serviceable unit under the severest wind and weather abuses (tornados excepted) and can be used for:

Accumulation Tanks	Aeration Tanks	Reserve Tanks
Collecting Tanks	Evaporating Tanks	Settling Tanks
Storage Tanks	Skimming Tanks	Treating Tanks

We would appreciate an opportunity to give you more details, discuss a specific problem or show you some of our installations first-hand.

Won't you use the enclosed reply card so we can?

Cordially,

PLASTIC PRODUCTS, INC.

M. C. "Jack" Green

P.S. Take a look at the enclosed sample of Plastic Liner Material used in "Plasti-Steel Tanks". It's the best quality on the market!

PLASTI-STEEL
Plastic Products Inc.
1005 Wichita Plaza • Area 316 - AM 2-6861 • Wichita, Kansas 67202

Here is the Best

Most Functional

Most Practical

Answer to Your

Storage & Pollution Problems!

In production you have to handle fresh water, saltwater and wastes - any one of which presents problems. Many states have tightened regulations controlling pollution and contamination. There doubtless will be some regulatory measures taken against excessive fresh water waste. "Plasti-Steel Tanks" comply with existing and pending regulations - the ineffective, pollution-prone dirt pits and reservoirs of the past do not.

In addition to solving the regulation problem, consider these advantages that "Plasti-Steel Tanks" offer you:

*The installed cost of a "Plasti-Steel Tank" is approximately the same as that of an impervious lined and fenced pit or reservoir of comparable capacity. It costs a third to a half what a conventional wood or coated steel tank would cost you.

*"Plasti-Steel Tanks" have an uncommonly high salvage value - either for re-use or for resale as farm and ranch stock watering tanks, grain and feed storage, etc. A pit or reservoir has no salvage value, actually will cost you on abandonment. Steel and wood tanks depreciate rapidly and have low resale value.

*"Plasti-Steel Tanks" consist of a pre-fabricated, sectional, bottomless steel tank and a one-piece, fabricated-to-size "bag" liner. They can be transported, erected, dismantled and reset with a minimum labor and equipment cost to you. They are suitable for temporary as well as permanent storage.

*They require no additional fencing. They are stock, weed and debris proof.

*They are designed for installation on or above surface grade. Require only a minimum of dirt work - usually hand grading and removal of rocks, brush, weeds, etc. will suffice.

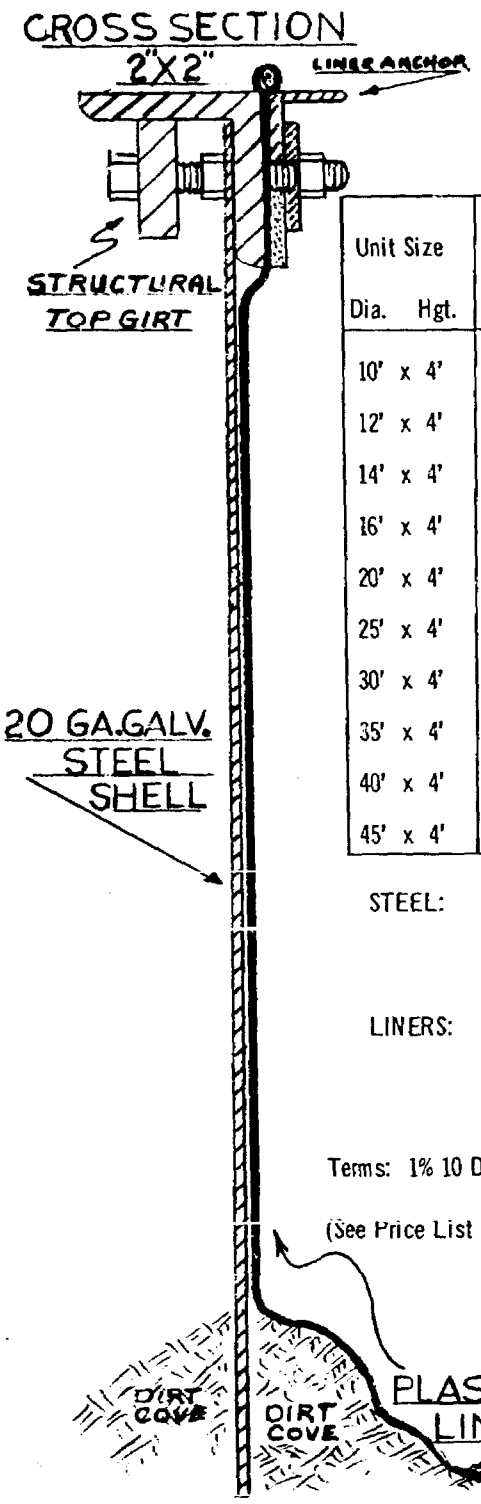
(OVER)

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

PRICE LIST

LIST P-5 EFFECTIVE 3-1-67



STANDARD

PLASTI-STEEL TANK

(Complete Unit)

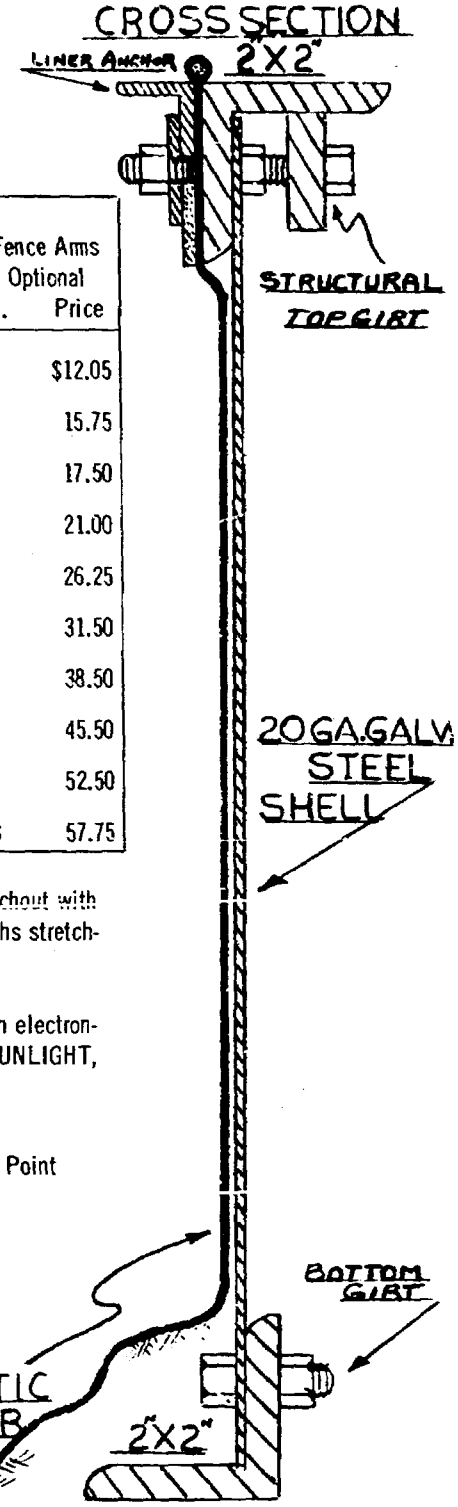
Unit Size Dia.	Hgt.	Capacity in Barrels	Price Complete Unit Steel Design No. 1 and .030" Plastic Liner	Price Complete Unit Steel Design 1-A and .030" Plastic Liner	Fence Arms Optional No.	Price
10'	x 4'	60 Bbls.	$ 256.95	$ 283.70	7	$12.05
12'	x 4'	80 Bbls.	313.50	346.50	9	15.75
14'	x 4'	110 Bbls.	377.00	413.50	10	17.50
16'	x 4'	143 Bbls.	440.85	484.35	12	21.00
20'	x 4'	224 Bbls.	542.55	597.55	15	26.25
25'	x 4'	364 Bbls.	679.50	749.50	18	31.50
30'	x 4'	500 Bbls.	878.70	961.70	22	38.50
35'	x 4'	687 Bbls.	1,053.80	1,152.80	26	45.50
40'	x 4'	900 Bbls.	1,262.95	1,379.45	30	52.50
45'	x 4'	1136 Bbls.	1,461.20	1,585.70	33	57.75

STEEL: Sidewalls furnished in coils of 4' wide x 25' to 40' lengths – stretchout with double splice plates for joining. Structural girts furnished in 20' lengths stretch-out, complete with necessary hardware for erection.

LINERS: Premium Quality Materials, pre-fabricated to size, in one piece, with electronically sealed joints. IMPERVIOUS TO OIL, BRINE, WASTES AND SUNLIGHT, with temperature range -35° to 160° F.

Terms: 1% 10 Days, Net 30 F.O.B. Destination R/T Shipping Point

(See Price List P-6 for sizes 50' x 4' to 120' x 8')



PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

PRICE LIST

LIST P-6

EFFECTIVE 3-1-67

HEAVY DUTY

PLASTI-STEEL TANK

(Complete Unit)

Unit Size Dia.	Hgt.	Capacity in Barrels	Price Complete Unit Steel Design No. 2 and .030" Plastic Liner	Fence Arms Optional No.	Price
50'	x 4'	1,400 Bbls.	$ 2,129.20	40	$ 70.00
60'	x 4'	2,000 Bbls.	2,727.70	47	82.25
70'	x 4'	2,750 Bbls.	3,412.10	55	96.25
80'	x 4'	3,600 Bbls.	4,118.20	62	108.50
90'	x 4'	4,540 Bbls.	4,898.50	71	122.50
100'	x 4'	5,600 Bbls.	5,721.80	78	140.00
120'	x 4'	8,080 Bbls.	7,521.20	94	164.50

UNIT WITH STEEL DESIGN 3 (See Dwg.)
(18 Ga. GALV. SIDEWALL – 3" x 2" Top & Bottom Girts – 2" x 2" Center

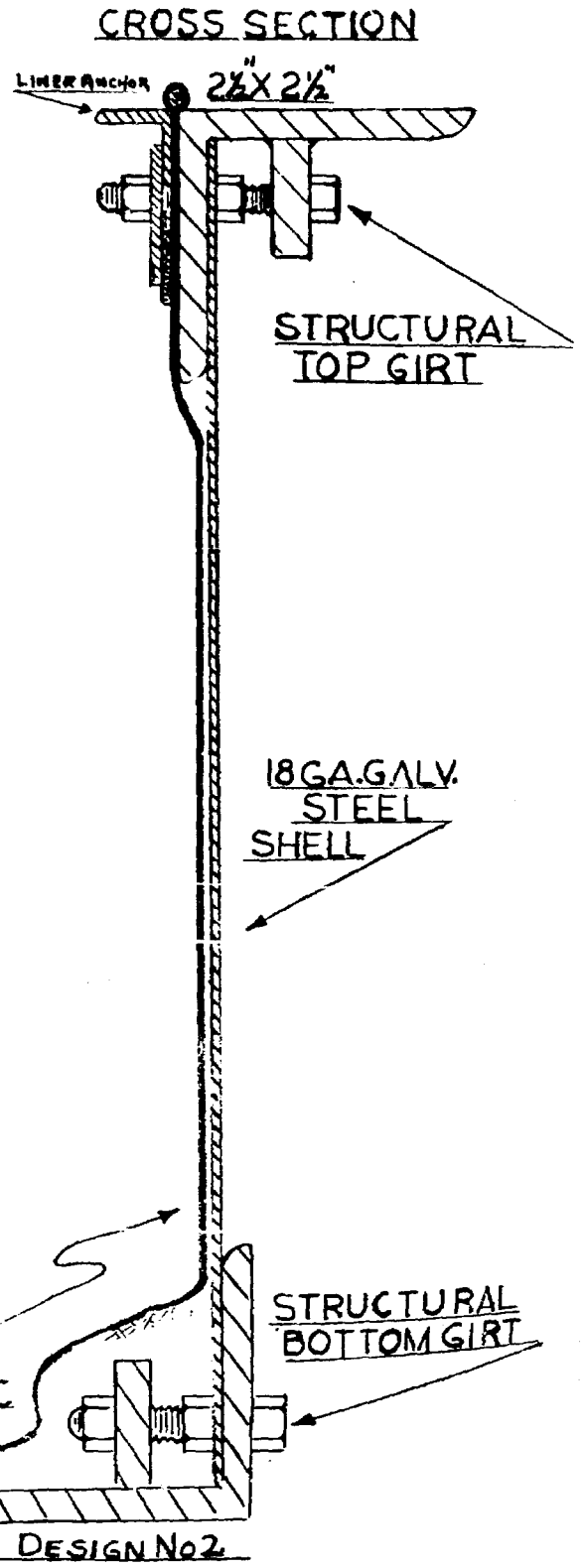
50' x 8'	2,800 Bbls.	3,465.10	40	70.00
60' x 8'	4,000 Bbls.	3,465.10	47	70.00
70' x 8'	5,500 Bbls.	5,299.10	55	96.25
80' x 8'	7,200 Bbls.	6,268.20	62	108.50
90' x 8'	9,080 Bbls.	7,323.20	71	122.50
100' x 8'	11,200 Bbls.	8,414.40	78	140.00
120' x 8'	16,160 Bbls.	10,726.00	94	164.50

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

STEEL: Sidewalls furnished in coils of 4' wide x 25' to 40' lengths – stretchout with double splice plates for joining. Structural girts furnished in 20' lengths stretch-out, complete with necessary hardware for erection.

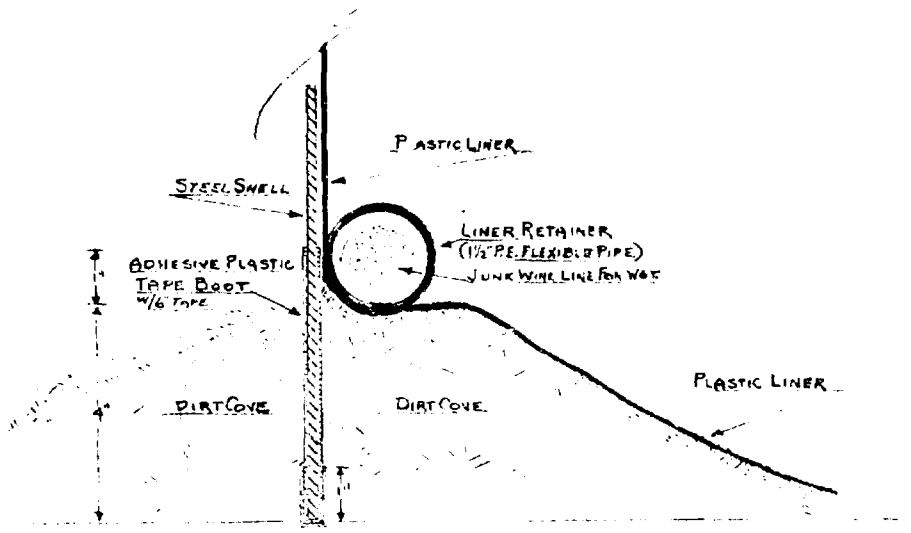
LINERS: Premium Quality Materials, pre-fabricated to size, in one piece, with electronically sealed joints. IMPERVIOUS TO OIL, BRINE, WASTES AND SUNLIGHT, with temperature range -35° to 160° F.

Terms: 1% 10 Days, Net 30 F.O.B. Destination R/T Shipping Point



PLASTI-STEEL TANKS

PATENT PENDING



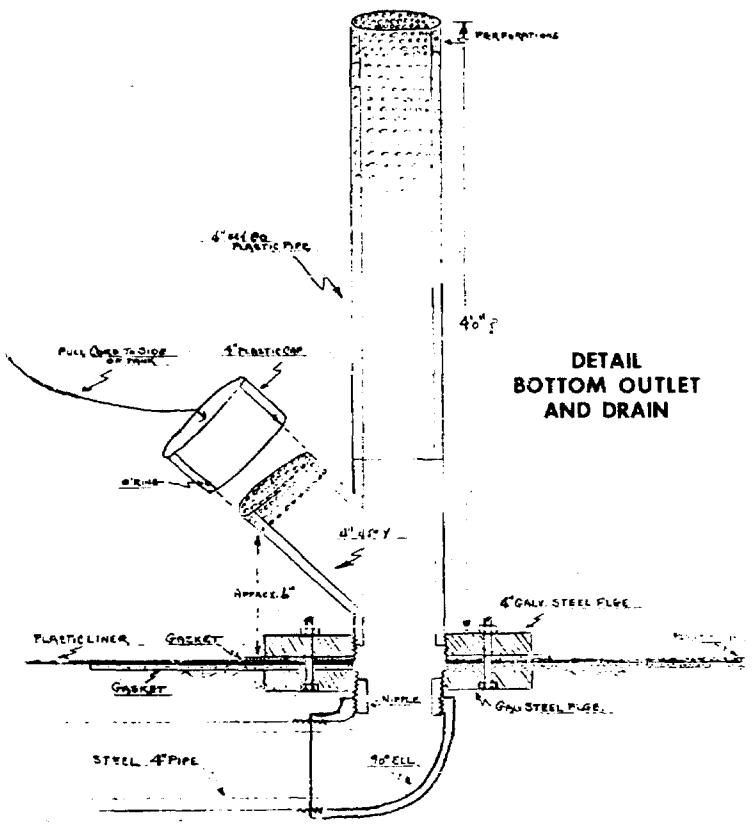
CROSS SECTION TANK BOTTOM

SUGGESTED

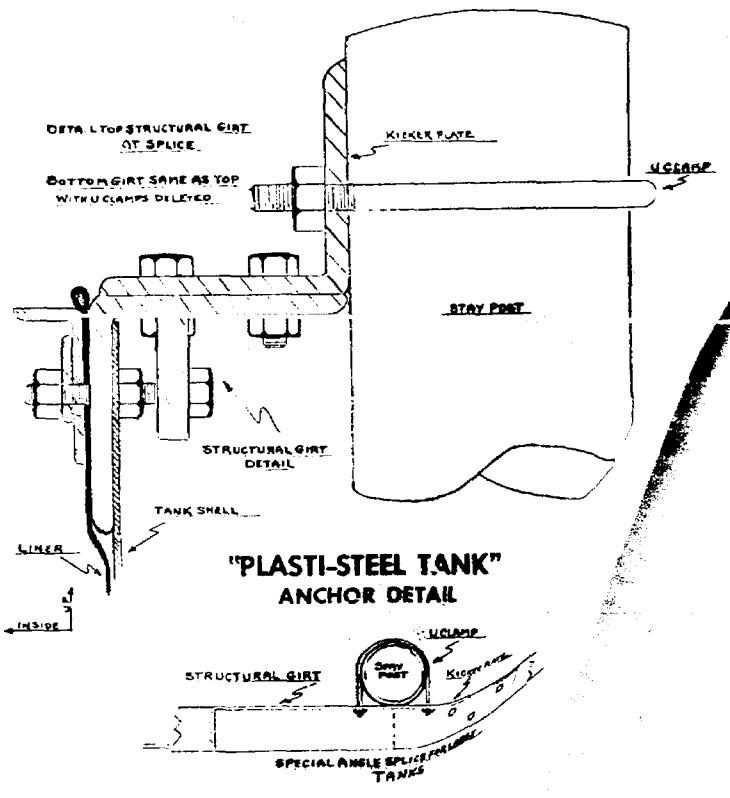
CORROSION RESISTANT TANK BOOT

FOR CORROSIVE GRADES

DWG. 181 9-19-66



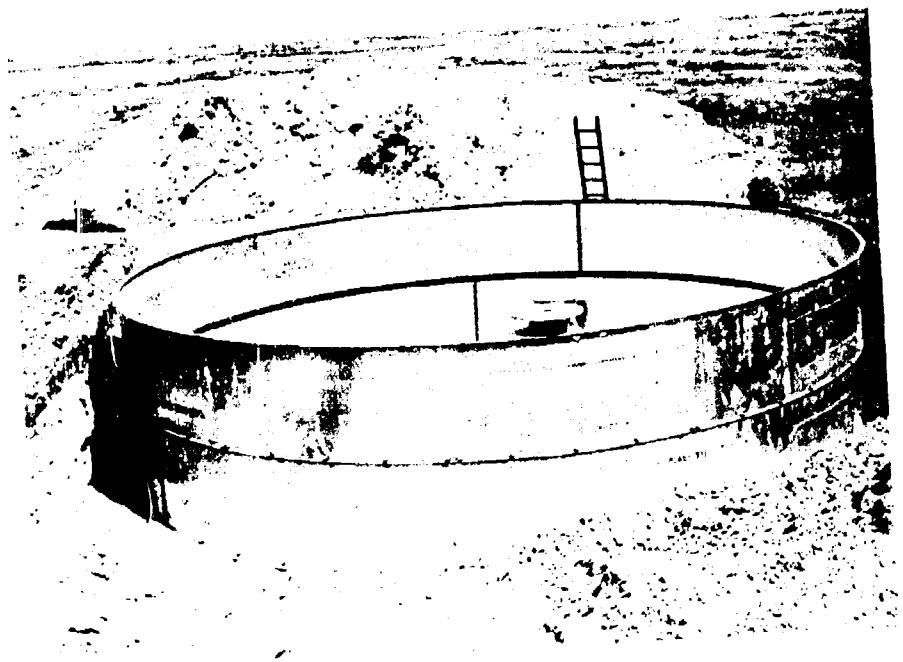
DETAIL BOTTOM OUTLET AND DRAIN



"PLASTI-STEEL TANK" ANCHOR DETAIL

PLASTIC PRODUCTS, INC.

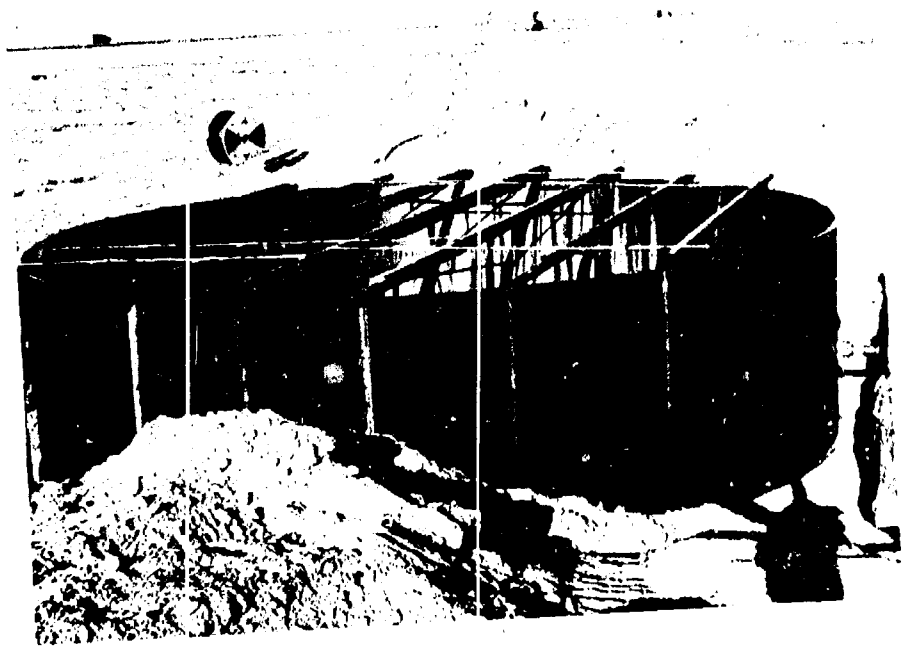
1005 WICHITA PLAZA - AREA 316 - AM 2-6861 - WICHITA, KANS. - 67202



① 2 RING STEEL SHELL

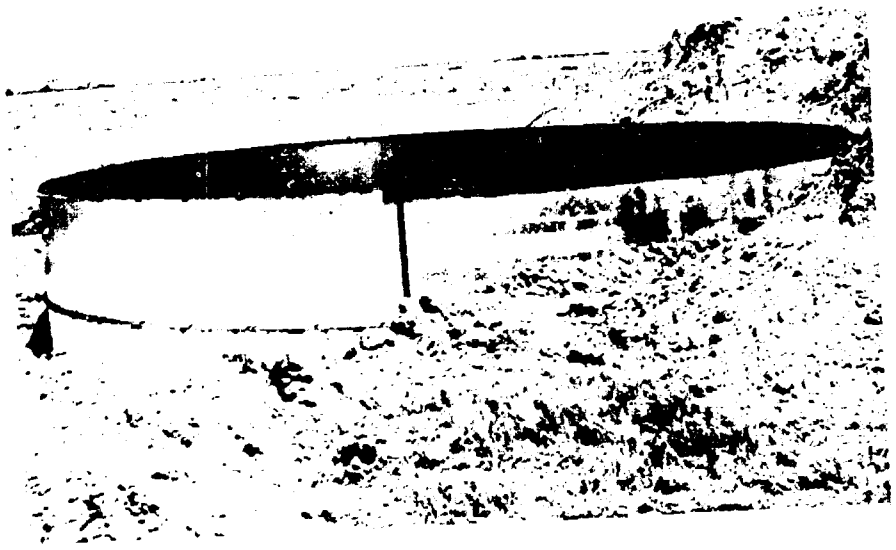
PLASTIC PRODUCTS, INC.
1101 WICHITA PLAZA
WICHITA, KANSAS

35'X8' "PLASTI-STEEL TANK" PAT. PEND. ③
1350 Bbl. CAPACITY

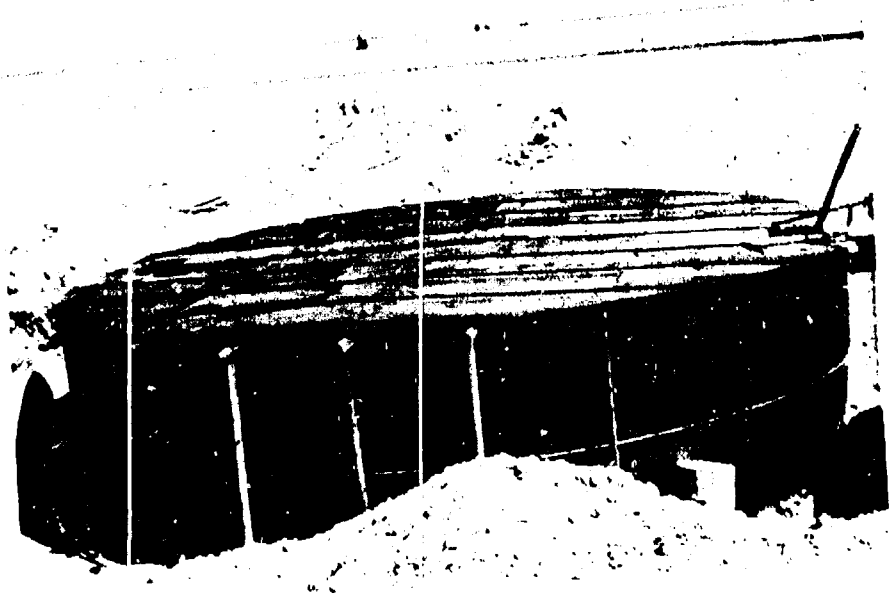


DECK STRUCTURALS

SIZES FROM 16'X4' (190 BBl.)
TO 110'X8' (16,000 BBl.)



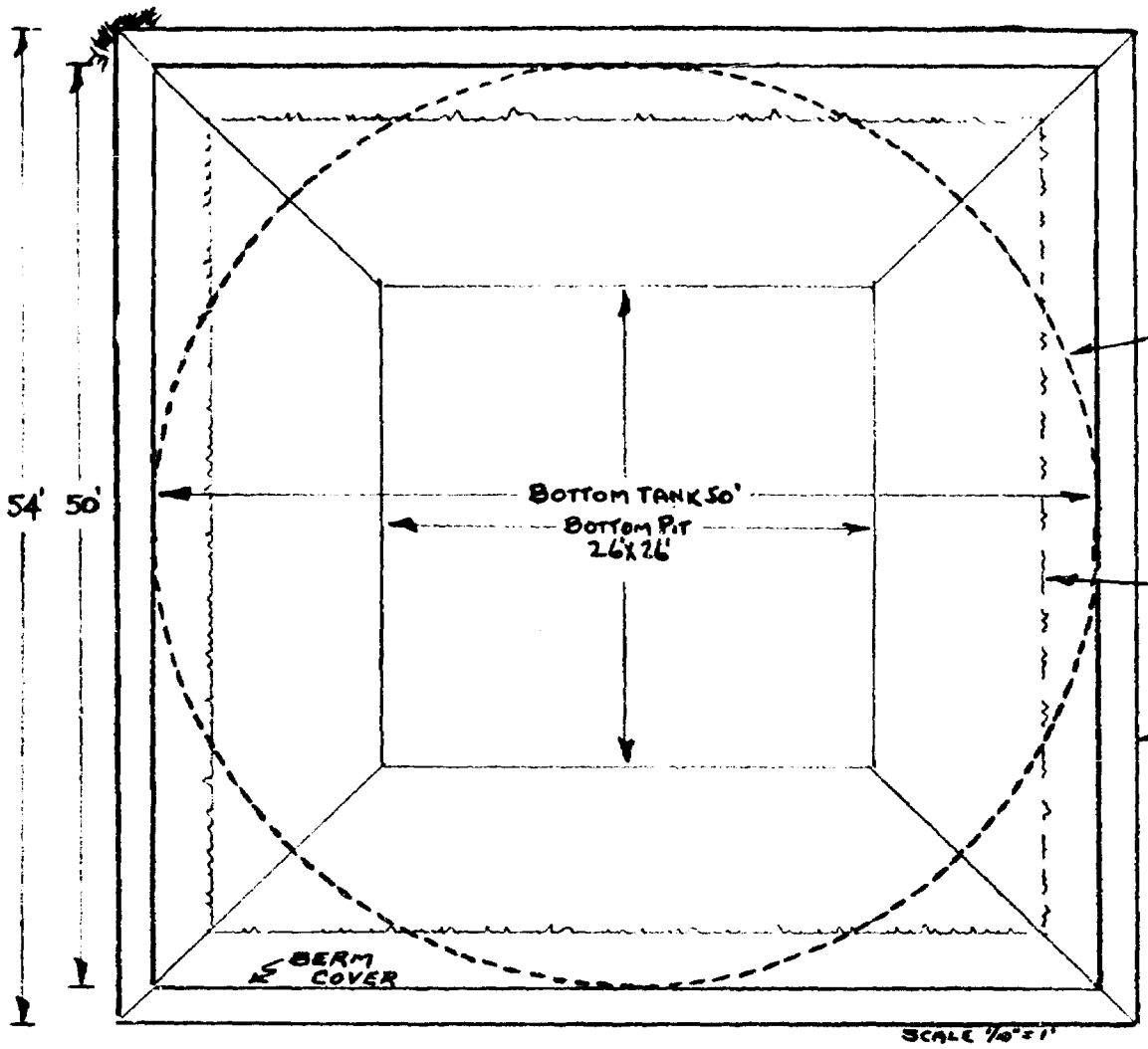
② PLASTIC LINED TANK



④ TANK COMPLETE WITH CONSTRUCTION PLYWOOD DECK

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA - AREA 316 - AM 2-6861 - WICHITA, KANS. - 67202



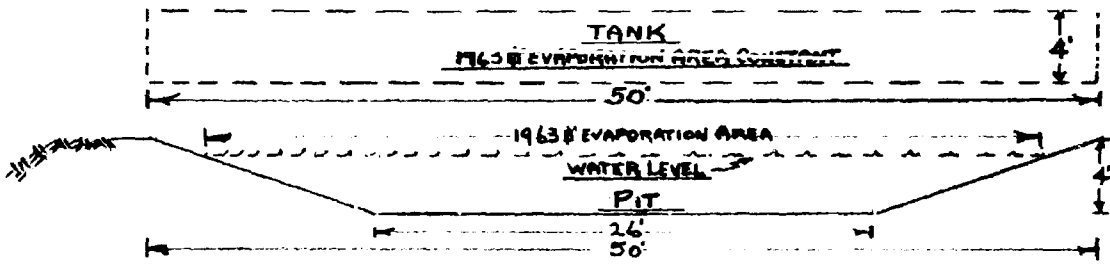
COMPARISON
4'x50' PLASTI-STEEL TANK
vs
4'x50'x50' PIT

50' DIA. TANK
1963 [/] 'Evaporation Area Constant
1963 [/] 'Cumulative Precipitation Area
Max. Cap. 1400 Bbls.

WATER LEVEL IN PIT WITH 1963 [/] ' EVAPORATION AREA

50'x50' PIT
676 [/] ' Min. Evaporation Area
2500 [/] ' Max. Evaporation Area
2916 [/] ' Cumulative Precipitation Area
Max. Cap. 1130 Bbls.

Note



©

COMPARATIVE VALUES PLASTI-STEEL TANK vs PIT						1/30/65
UNIT	EST. COST COMPLETE	MAX. STORAGE BBLS.	MIN. EVAPORATION AREA	MAX. EVAPORATION AREA	CUMULATIVE PRECIPITATION AREA	BBLS. PER YR. CUMULATION W/24" PRECIP.
4' x 50' TANK	APPROX. SAME	1400 BBLS.	1963 [/] '	1963 [/] '	1963 [/] '	876 BBLS.
4' x 50' x 50' PIT		1130 BBLS.	676 [/] '	2500 [/] '	2916 [/] '	1307 BBLS.
TANK		+25%	+300%	-25%	-32%	-32%

NOTE: WATER LEVEL IN PIT WOULD HAVE TO BE MAINTAINED AT NEAR CAPACITY TO HAVE SAME EFFECTIVE EVAPORATION AREA AS TANK WHICH IS CONSTANT AT ALL WATER LEVELS

Plastic Products Inc.

DESIGNERS – DEVELOPERS – FABRICATORS
1101 WICHITA PLAZA AREA 316-262-6861
WICHITA, KANSAS 67202

DWG. 113

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

EVAPORATIVE-COLLECTING
"PLASTI-STEEL TANK"

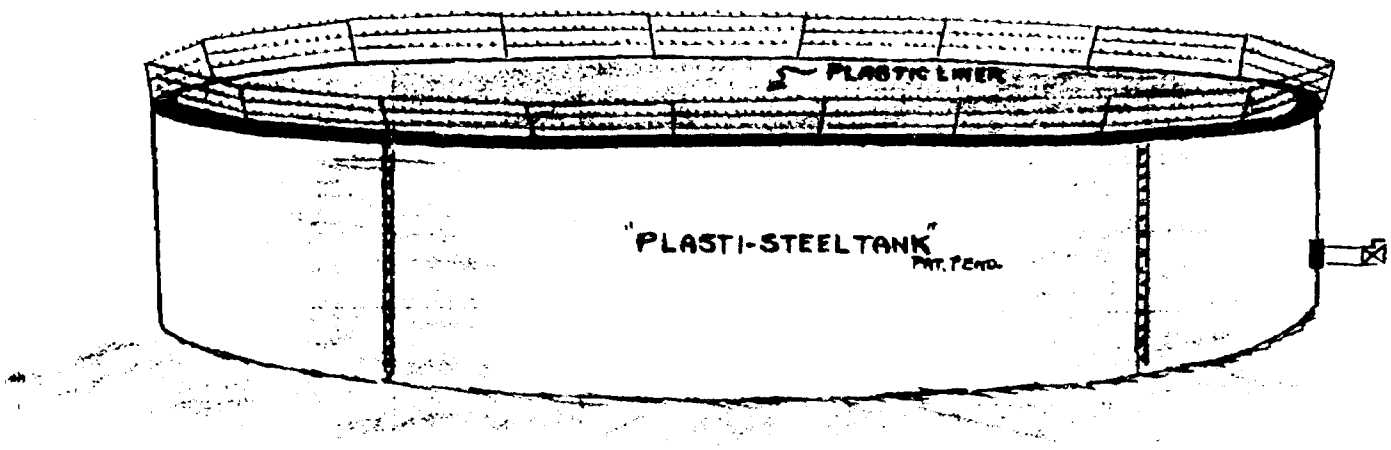


TABLE FOR ESTIMATING EVAPORATIVE VALUES

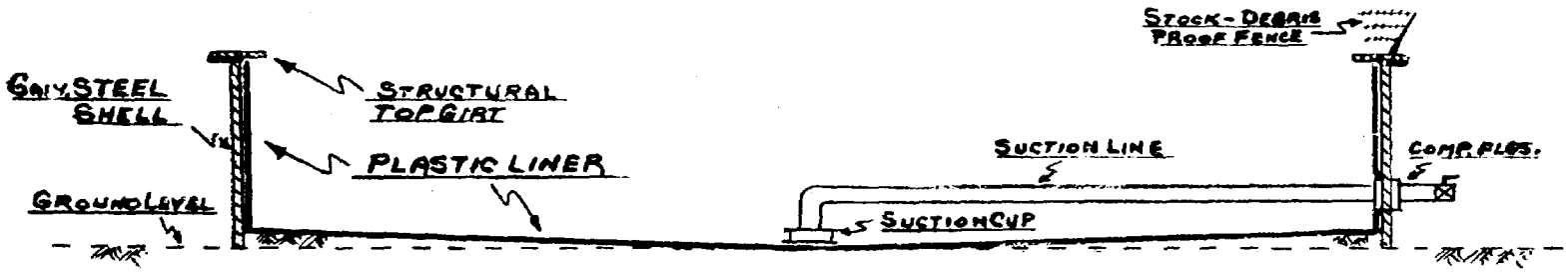
SIZES

Size	16'x4'	20'x4'	25'x4'	30'x4'	35'x4'	40'x4'	45'x4'	50'x4'	60'x4'	70'x4'	80'x4'	90'x4'	100'x4'	120'x4'
Capacity	143 Bbl.	224 Bbl.	364 Bbl.	500 Bbl.	687 Bbl.	900 Bbl.	1,136 Bbl.	1,400 Bbl.	2,000 Bbl.	2,750 Bbl.	3,600 Bbl.	4,540 Bbl.	5,600 Bbl.	8,080 Bbl.
Evaporation	201' ☑	314' ☑	490' ☑	707' ☑	962' ☑	1,257' ☑	1,590' ☑	1,964' ☑	2,827' ☑	3,848' ☑	5,026' ☑	6,361' ☑	7,854' ☑	11,309' ☑

NOTE: Evaporation valves are practically constant where tank has an inch of water in it or is full. To calculate evaporation, take sq. feet of evaporation x estimated evaporation per sq. feet per year for area (i.e., 30' x 4' tank evaporation area 707 sq. ft. x 2 Bbl. per ft. per year/ For Panhandle Area = 1404 Bbl.)

DWG. 134 2-24-66

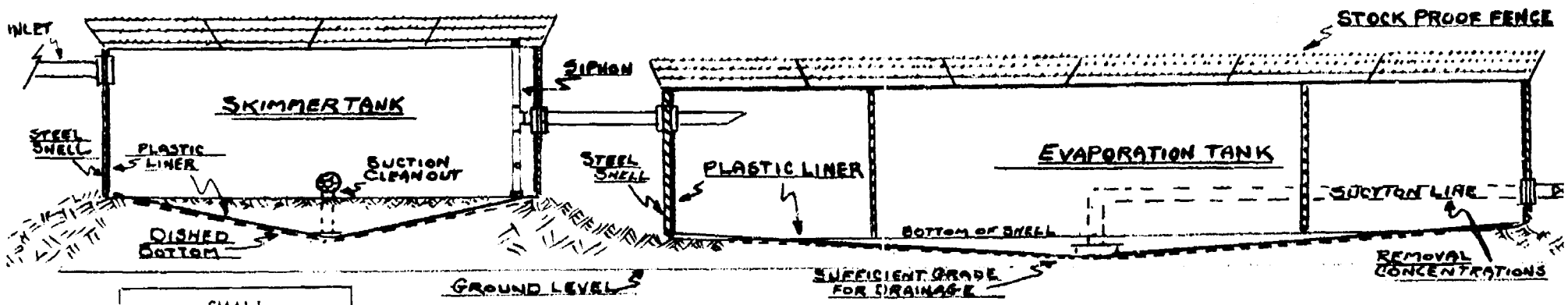
SUGGESTED DESIGN
EVAPORATIVE-COLLECTING TANK
WILL
Remove Concentrations-Prevent Solid Buildup



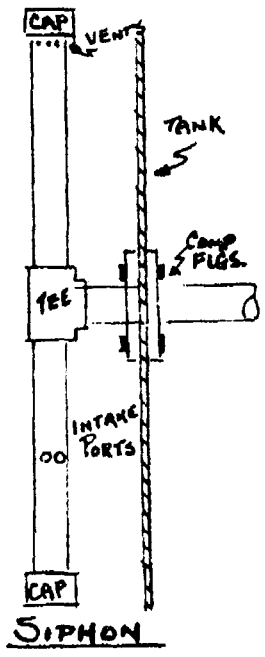
CROSS SECTION

"PLASTI-STEEL TANK"
PAT. PEND.

SKIMMER-EVAPORATION ASSEMBLY



SMALL SKIMMER TANKS	
10' x 4'	60 BBL.
12' x 4'	80 BBL.
14' x 4'	110 BBL.



Tank Size Dia. Hgt.	Capacity	Aeration or Evaporation Area
16' x 4'	143 Bbl.	201 ☐
20' x 4'	224 Bbl.	314 ☐
25' x 4'	364 Bbl.	490 ☐
30' x 4'	500 Bbl.	707 ☐
35' x 4'	687 Bbl.	962 ☐
40' x 4'	900 Bbl.	1,257 ☐
45' x 4'	1,136 Bbl.	1,590 ☐
50' x 4'	1,400 Bbl.	1,964 ☐
60' x 4'	2,000 Bbl.	2,827 ☐
70' x 4'	2,750 Bbl.	3,848 ☐
80' x 4'	3,600 Bbl.	5,026 ☐
90' x 4'	4,540 Bbl	6,362 ☐
100' x 4'	5,600 Bbl.	7,854 ☐
120' x 4'	8,080 Bbl.	11,310 ☐

PLASTIC PRODUCTS, INC.
1005 WICHITA PLAZA - AREA 316 - AM 2-6861 - WICHITA, KANS. - 67202

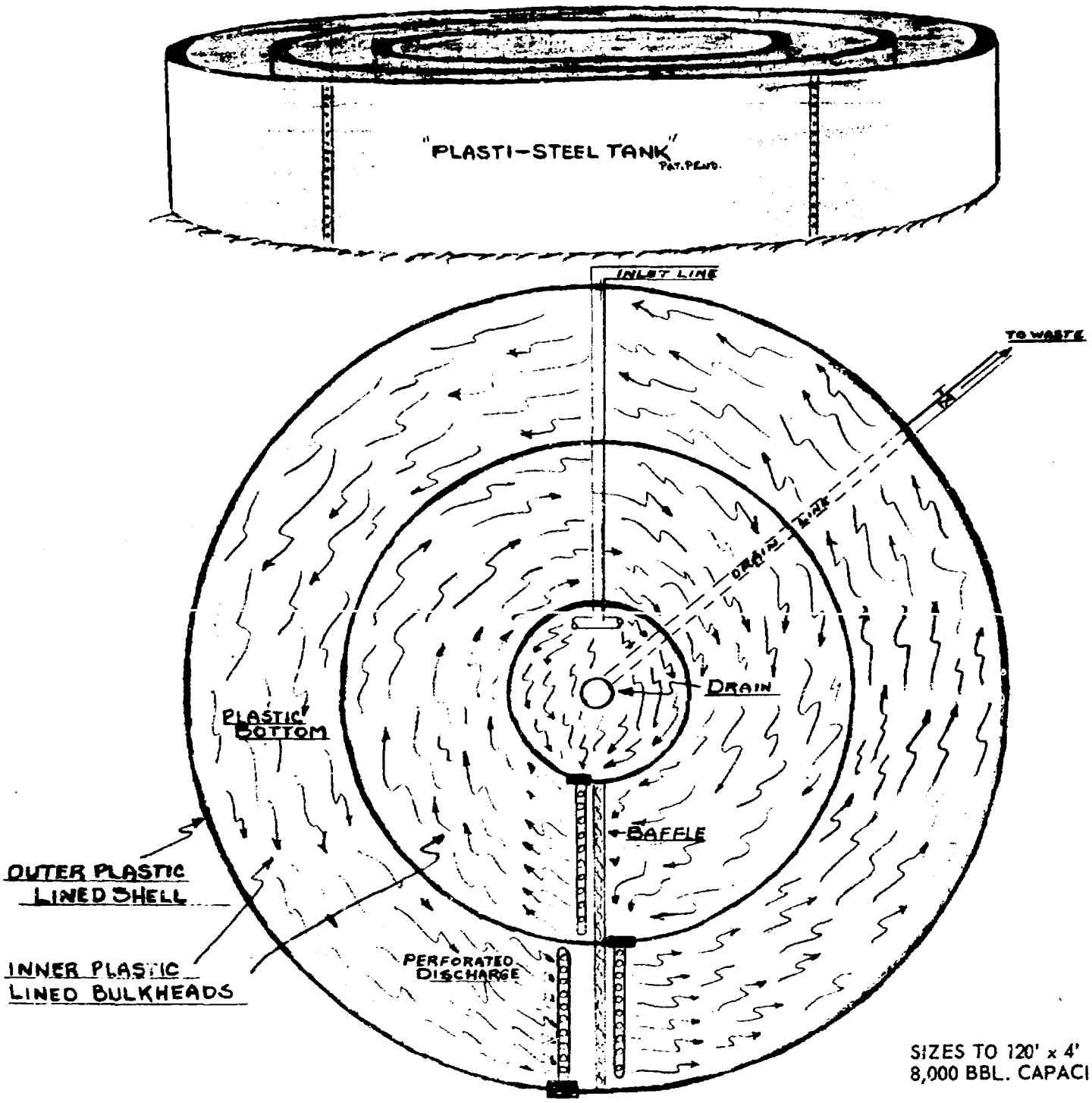
1-20-66 Revised 3-1-67
DWG. 135

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

3 SECTION ASSEMBLY

SEDIMENTATION-FILTERING-SKIMMING



SUGGESTIVE DESIGN

SEDIMENTATION ASSEMBLY

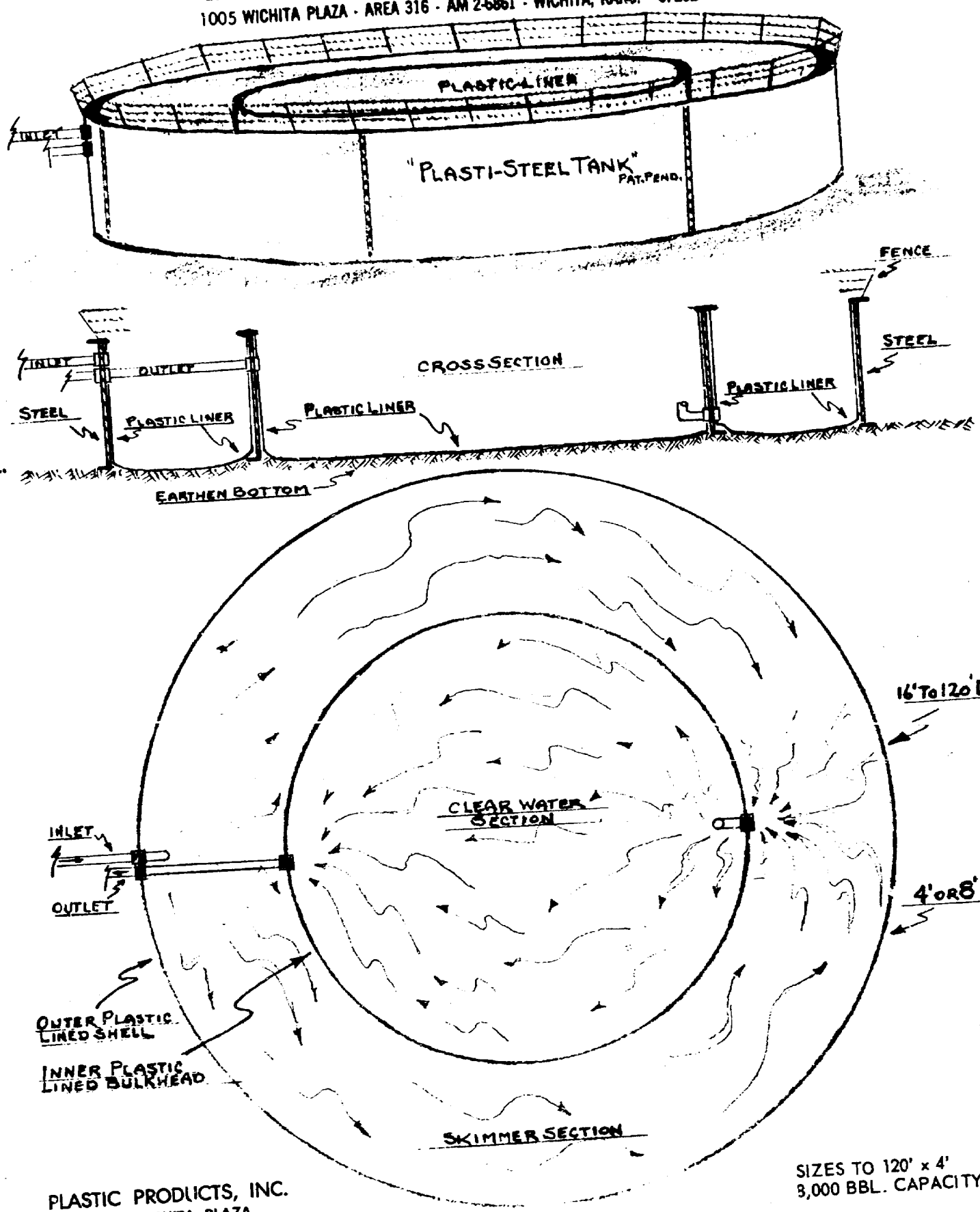
SIZES TO 120' x 4'
8,000 BBL. CAPACITY

2-23-66 – Revised 3-1-67

DWG. 133

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

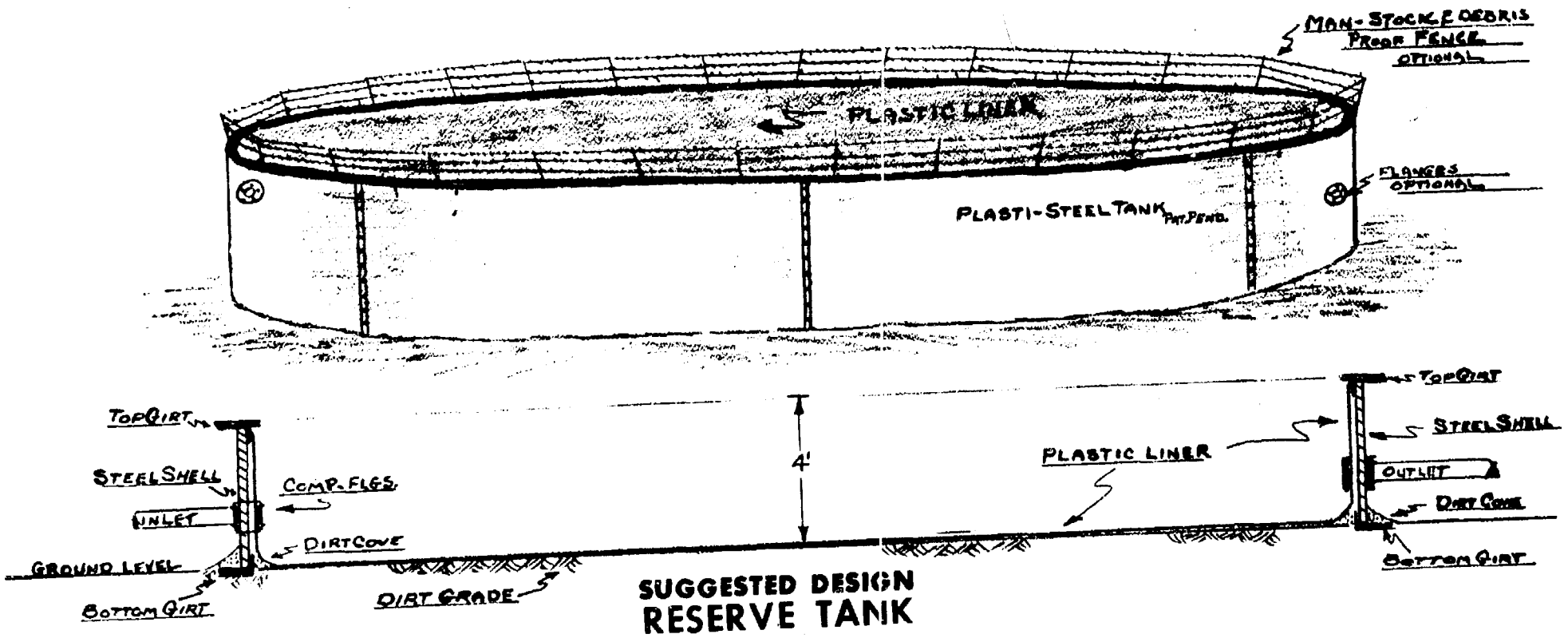


PLASTIC PRODUCTS, INC.
1005 WICHITA PLAZA
WICHITA, KANSAS 67202
Area 316 – AM 2-6861

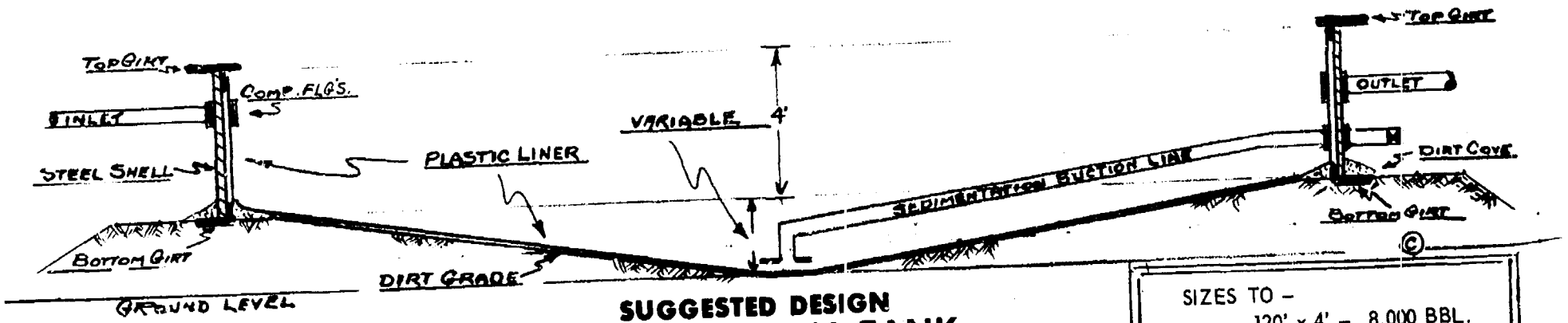
SUGGESTIVE DESIGN
SKIMMER ASSEMBLY

SIZES TO 120' x 4'
3,000 BBL. CAPACITY

DWG. 139
4-10-66 – Revised 3-1-67



SUGGESTED DESIGN
RESERVE TANK

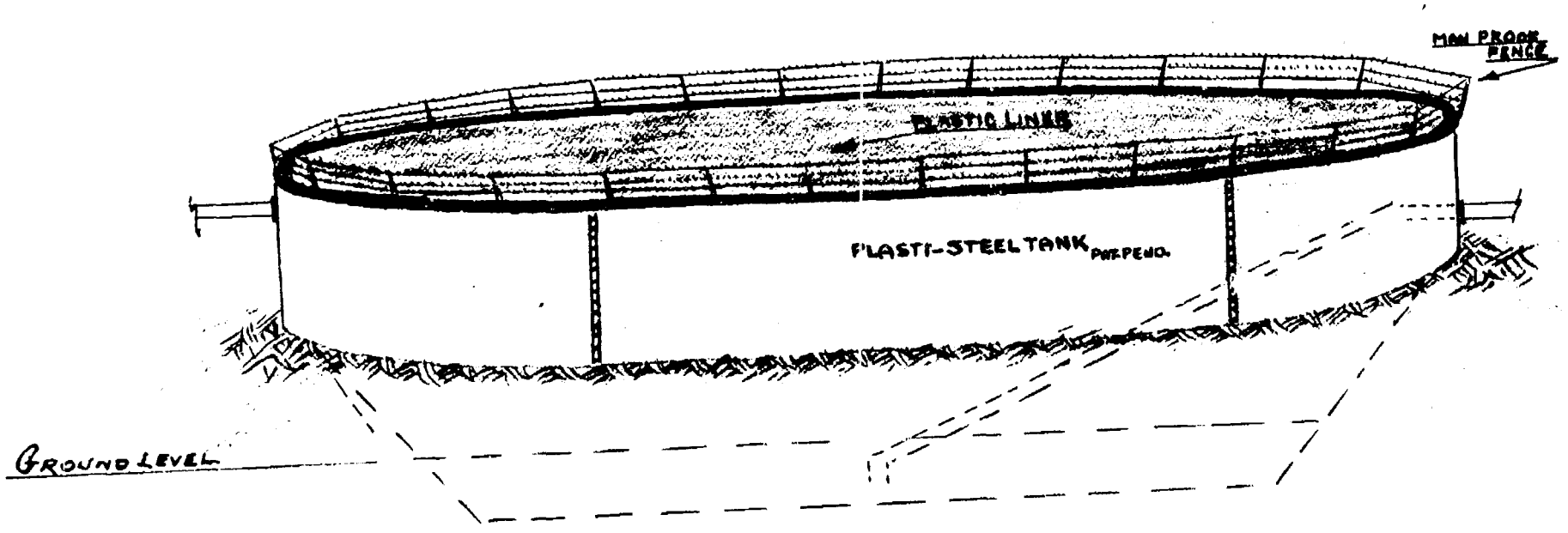


SUGGESTED DESIGN
SEDIMENTATION TANK

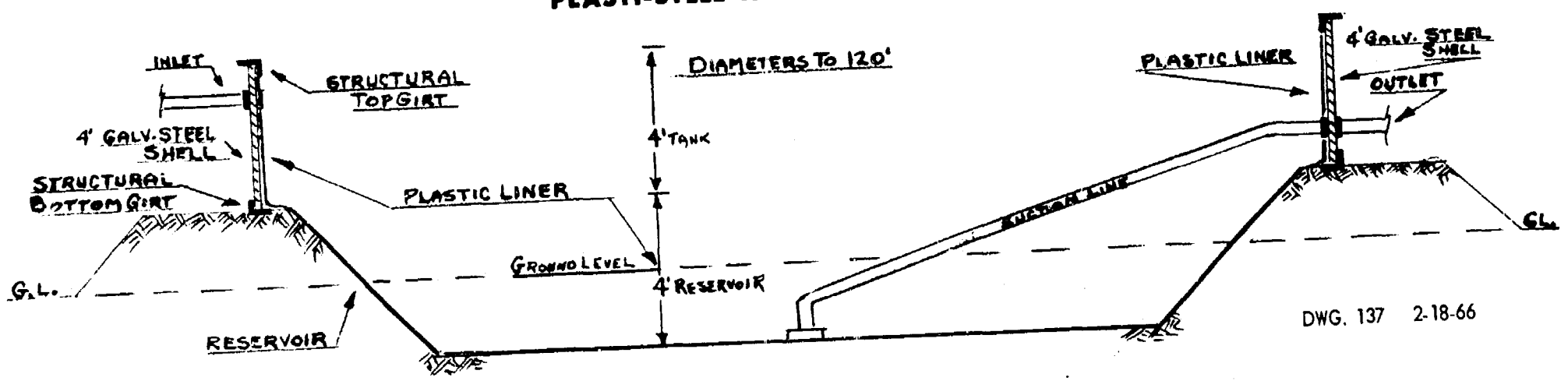
SIZES TO –
120' x 4' – 8,000 BBL.
120' x 8' – 16,000 BBL.

PLASTIC PRODUCTS, INC.
1005 WICHITA PLAZA · AREA 316 · AM 2-6861 · WICHITA, KANS. · 67202

DWG. 136 2-1-66



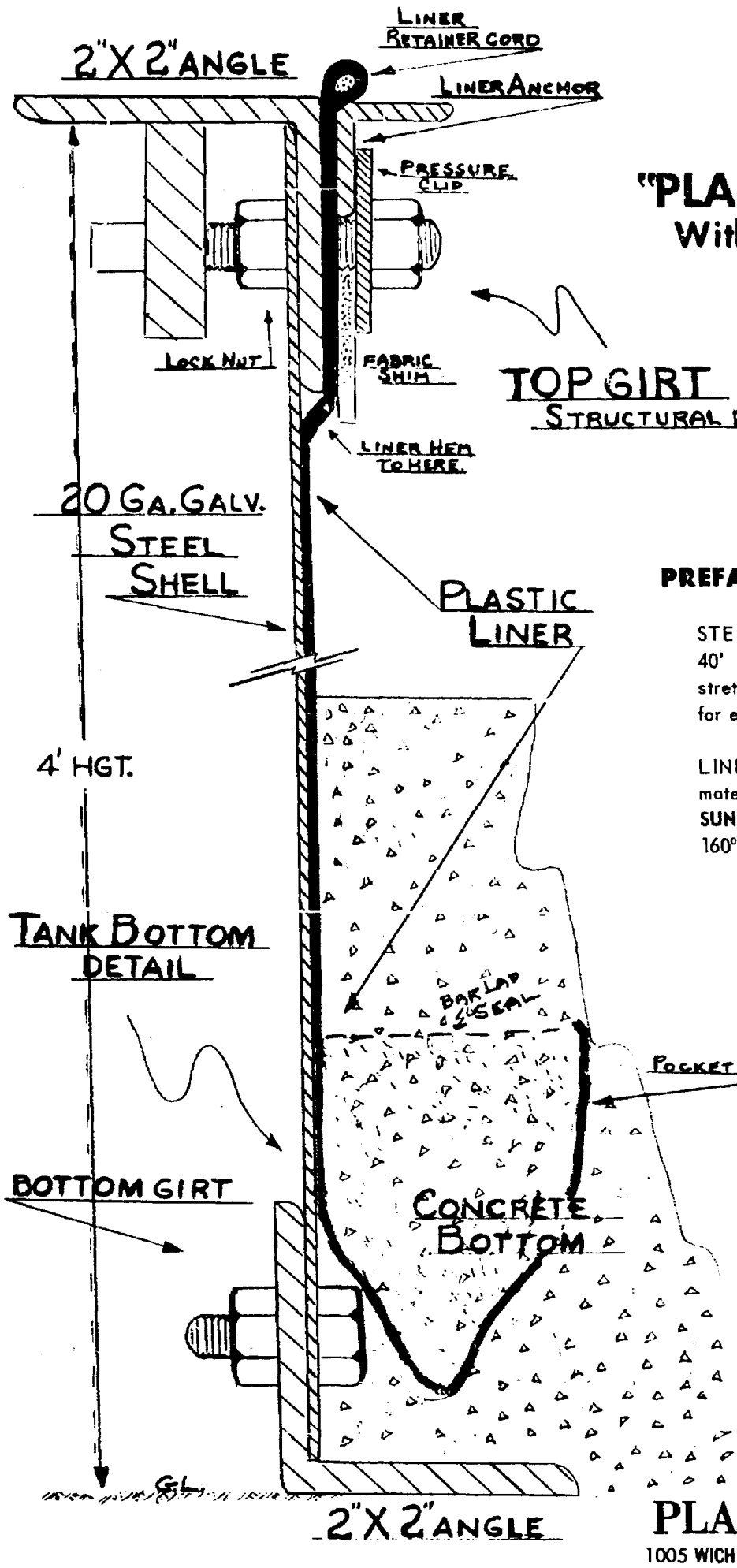
COMBINATION UNIT
PLASTI-STEEL TANK-RESERVOIR



DWG. 137 2-18-66

PLASTIC PRODUCTS, INC. DESIGNERS DEVELOPERS FABRICATORS

1101 WICHITA PLAZA – AREA 316 – AM 2-6861 – WICHITA, KANS. – 67202



"PLASTI-STEEL TANK"

With Concrete Bottom

PAT. PEND.

PREFABRICATED-SECTIONAL TANK

STEEL: Sidewalls furnished in coils 25' to 40' lengths stretchout, girts 20' lengths stretchout, complete with necessary hardware for erection.

LINERS: Prefabricated, of premium quality materials **IMPERVIOUS TO OIL, BRINE AND SUNLIGHT,** with a temperature range -35° to 160° F.

SIZES

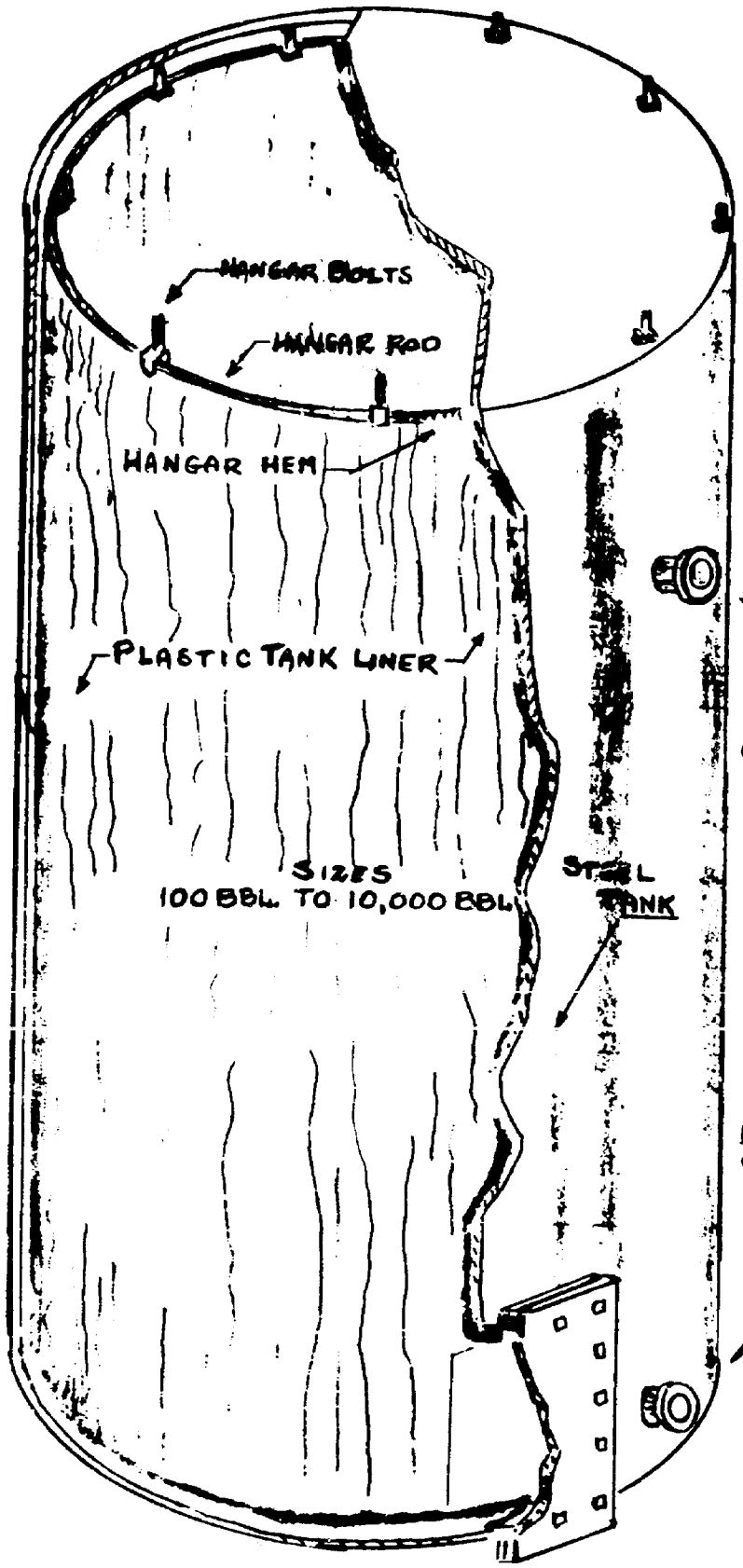
10' TO 120' DIA

DWG. 2C7

2-7-67

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA - AREA 316 - AM 2-6861 - WICHITA, KANS. - 67202

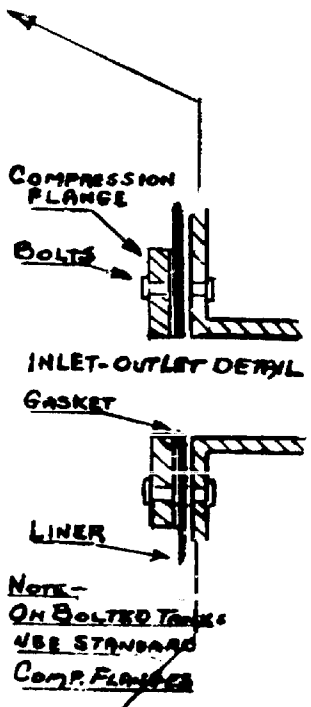


ISOMETRIC OF LINER IN TANK

PLASTIC TANK LINER

..."tank within a tank"

FOR STORAGE OF-
CRUDE OILS
SALTWATER
FRESH WATER
WASTES
CHEMICALS



LINERS FURNISHED COMPLETE WITH HANGAR HARDWARE AND INSTALLATION PROCEDURE.

DWG. 106 1-10-65 REVISED

PLASTIC PRODUCTS, INC.

1005 WICHITA PLAZA - AREA 316 - AM 2-6861 - WICHITA, KANS. - 67202

THE KANSAS STATE DEPARTMENT OF HEALTH

ROBERT H. RIEDEL, M. D.
State Health Officer

December 29, 1965

M. C. Green, President
Plastic Products, Inc.
1101 Wichita Plaza
Wichita, Kansas 67202

Dear Mr. Green:

In reply to your letter of December 21, 1965, the State Department of Health through its Oil Field Section processes applications and issues permits for surface brine ponds. Where such ponds are not approved because they seep and are causing or are likely to cause pollution, sealed ponds or tanks may be used for the storage of oil-field brine.

From the standpoint of pollution prevention, "Plasti-Steel" tanks installed at or above ground surface may be used and are acceptable in Kansas for the storage of oil-field brine.

Sincerely,

OIL FIELD SECTION

Bruce F. Latta
Director & Chief Geologist

BFL:fw

FORM A-1

Arkansas POLLUTION CONTROL COMMISSION
DEDICATED TO CLEAN AIR AND WATER
1100 HARRINGTON • LITTLE ROCK, ARKANSAS 72201

November 30, 1965

Mr. M. C. Green, President
Plastic Products, Inc.
1101 Wichita Plaza
Wichita, Kansas 67202

Dear Mr. Green:

Based on the information submitted with your letter of October 25 it appears that your product would be acceptable for utilization in oil field brine control systems.

Very truly yours,

M. L. Wood, Director

MLW:co

PLASTI-STEEL
Plastic Products Inc.
1005 Wichita Plaza • Area 316 AM 2-6861 • Wichita, Kansas 67202

'67 MAY 19 AM 8 55

May 17,1967

Mr. A. L. Porter, Jr., Director
The New Mexico Oil Conservation Commission
State Capital
Santa Fe, New Mexico

Dear Mr. Porter:

We are pleased to send you the enclosed brochure on our "Plasti-Steel Tanks", a unit we developed for use as storage of oil field, refinery and plant saltwater wastes and other contaminating fluids.

Our units have the approval or acceptance of the regulatory bodies of the states of Kansas, Oklahoma, Arkansas and Texas.

As considerable interest is being shown in them by some of the oil companies operating in New Mexico, we would appreciate a letter from you, possibly along the lines of those from Mr. M. L. Wood and Mr. Bruce F. Latta (copies attached) if after studying the information on our tanks, you would care to send it.

Very truly yours,

PLASTIC PRODUCTS, INC.

M. C. Green

M. C. "Jack" Green, President

MCG:dlm

Encl.

SPECIFICATIONS FOR THE DESIGN AND CONSTRUCTION OF LINED EVAPORATION PITS

File Case 3807

NEW MEXICO OIL CONSERVATION COMMISSION
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

1. LOCATION

(A) Evaporation pits shall not be located in any watercourse or in any lake-bed, sink-hole, or other depression. Pits adjacent to any such watercourse or depression shall be located safely above the high-water level of such watercourse or depression.

2. DESIGN AND CONSTRUCTION

(A) Evaporation pits shall be so designed and constructed as to provide a minimum of 600 square feet of evaporative surface for each barrel (42 U. S. gallons) of water to be placed in said pits on a daily average basis throughout the year.

(B) Pits shall be located on level ground and shall be approximately square. They shall be constructed by excavating and levelling a maximum of six inches below ground level. Excavated material shall be used to form the levees around the pit, said levees to rise a minimum of 18 inches above ground level.

(C) Levees shall be compacted and shall be so constructed as to have an inside grade no flatter than 1:2. Levees shall have an outside grade no steeper than 1:3 (See Fig. 3).

(D) The top of levees shall be flat and level and shall be at least 18 inches wide.

3. MATERIALS

(A) Materials used for lining evaporation pits shall be impermeable and may be rigid, semi-rigid, or flexible.

(B) If rigid or semi-rigid materials are used, leak-proof expansion joints shall be provided, or the material shall be of sufficient thickness and strength to withstand, without cracking, expansion and contraction and settling movements in the underlying earth.

(C) If flexible membrane types of materials are used, they shall be of at least 30 mil thickness and shall have good resistance to tears or punctures.

(D) All materials used for lining evaporation pits shall be resistant to hydrocarbons, salts, and aqueous acids and alkalis.

They shall be fungus- and rot-resistant and shall be sun-resistant or provision made to protect the material from the sun as specified in Section 6 (E).

4. LEAKAGE DETECTION SYSTEM

(A) A leakage detection system of an approved design shall be built into the pit-bed and shall be inspected and approved by the Commission prior to installation of the liner.

(B) Leakage detection systems may consist of but are not necessarily limited to approved fail-safe electric detection devices or the drainage-and-sump method.

(C) If an electric grid detection system is used, provision must be made for adequately testing all components to ensure the system remains functional.

(D) If the drainage-and-sump method of leakage detection system is used, a network of gravel-packed drainage canals or slotted or perforated drainage pipes shall be installed. The network shall be of sufficient density that no point in the evaporation pit-bed shall be more than 20 feet from a drainage canal or drainage pipe or a lateral thereof. Slope for all drainage lines and laterals shall be at least six inches per 50 feet. All drainage shall be to the outer perimeter of the pit and shall gather into concrete or corrosion-proof metal sumps. (See Fig. 2)

5. PREPARATION OF PIT-BED FOR INSTALLATION OF LINER

(A) The bed of the pit and the inside grades of the levee shall be smooth and compacted and shall be free of holes, rocks, stumps, clods, or any other debris which might rupture the liner. In extremely rocky areas, it will probably be necessary to cover the pit-bed with a compacted layer of sand or other suitable material.

(B) Drainage canals shall be dug and sloped prior to requesting inspection of the pit-bed. They shall not be gravel-filled nor shall they receive the slotted drainage pipe (if used) until after the slope and direction of drainage has been approved.

(C) A trench shall be dug on the top of the levee the entire perimeter of the pit for the purpose of anchoring flexible liners.

This trench shall be located nine inches out from the slope break and shall be a minimum of six inches deep. (See Fig. 3)

6. INSTALLATION OF FLEXIBLE MEMBRANE LINERS

(A) The liner shall be put in place only after the pit-bed, leakage detection system, and levee walls have been inspected and approved by a Commission representative.

(B) The pit liner shall be installed and joints sealed according to manufacturer's specifications and with approval of the Commission representative.

(C) The liner shall be laid as evenly and wrinkle-free as possible and shall rest smoothly on the pit-bed and the inner face of the levees, and shall be of sufficient size to extend down to the bottom of the anchor trench, and to come back out and a minimum of two inches beyond. (See Fig. 3)

(D) An anchor of used pipe, old sucker-rods, or other similar material shall be placed over the liner in the anchor trench and said trench backfilled. The anchor shall extend the entire perimeter of the evaporation pit.

(E) If the lining material used for the pit is not sun-resistant, at least one inch sand or other suitable material shall be spread uniformly to cover the liner over the floor of the pit. Gravel or other wave-resistant material with sufficient angle of repose to remain in place shall be used to cover the sloping inner wall of the levee. This material shall extend at least to the anchor trench.

7. HEADER PIT OR SETTLING TANK

(A) A header pit capable of containing a minimum of 30 days produced water shall be installed to receive the salt water to be evaporated prior to running it into the evaporation pit.

(B) Header pits shall be constructed similarly to evaporation pits (including minimum depth of two feet from top of levee to floor of pit and leakage detection system) and shall be lined with neoprene or some other highly oil-resistant material of at least 30-mil thickness.

(C) Syphons or other suitable means shall be employed to draw water from well beneath the oil-water interface in the header pit for transfer to the evaporation pit. The syphon shall be located as far possible from the inflow line into the header pit.

(D) Header pits shall at all times be kept free of appreciable oil build-up to avoid running oil into the evaporation pit.

(E) A settling tank with a minimum capacity of 30 days water production may be used in lieu of a header pit provided that it shall be maintained in leak-proof condition and provided that the water draw-off connection shall be so located and the water-oil interface so maintained as to prevent any flow of oil into the evaporation pit.

8. FENCES AND SIGNS

(A) A fence shall be constructed and maintained in good condition around the evaporation pit installation. Fences shall be constructed with a minimum of four strands of barbed wire on sturdy posts no more than 20 feet apart. Corners shall be braced in two directions. Fences shall not be constructed on the levees.

(B) A sign not less than 12" x 24" with lettering of not less than two inches shall be posted in a conspicuous place on the fence surrounding the evaporation pit installation. The sign shall be maintained in legible condition and shall identify the operator of the evaporation system, the location of the system by quarter-quarter section, township and range, and the permit number of the permit authorizing the installation.

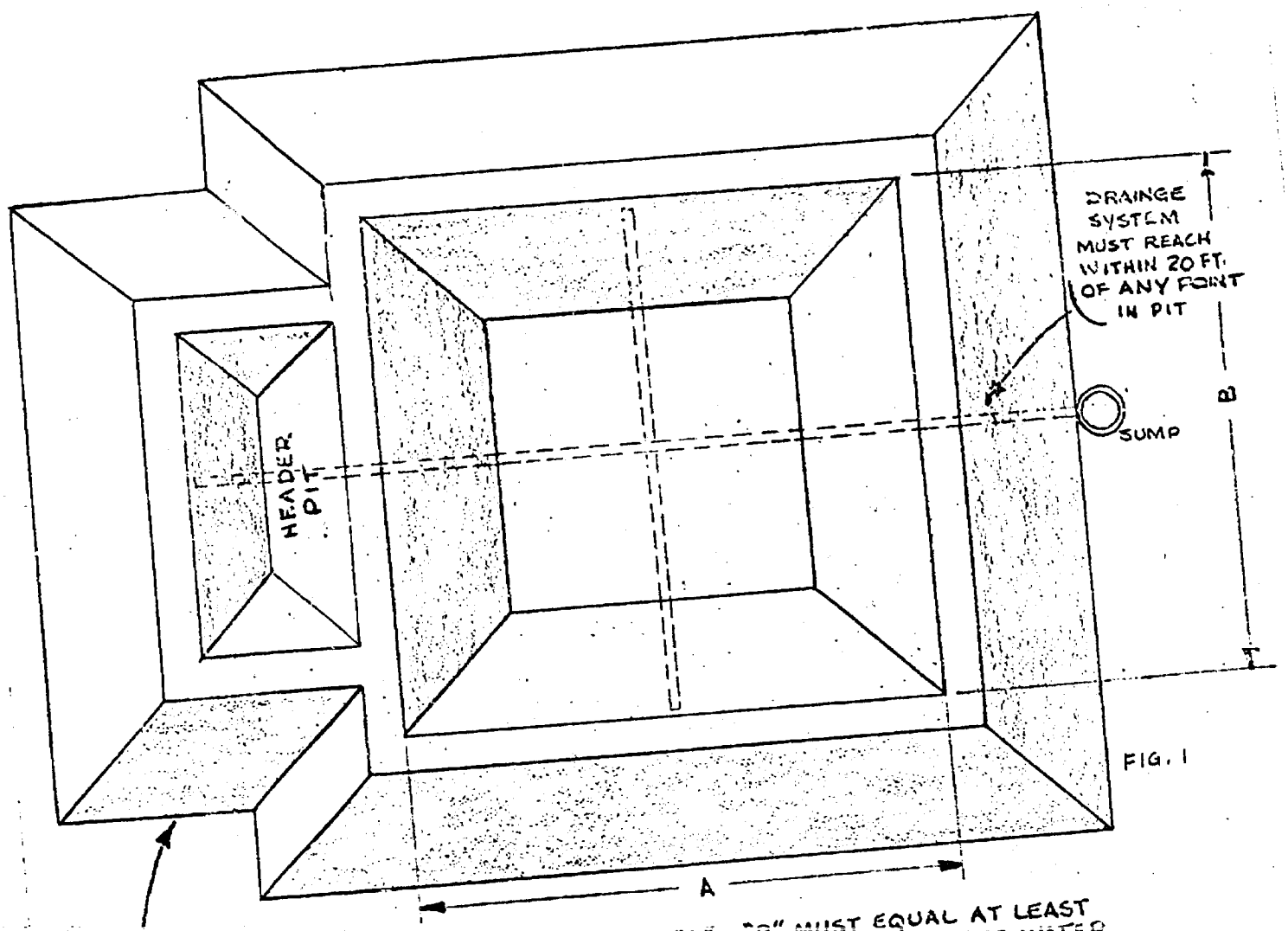


FIG. 1

HEADER PIT MUST HAVE ADEQUATE CAPACITY TO CONTAIN 30 DAYS WATER PROD.

DIM. "A" x "B" MUST EQUAL AT LEAST 600 SQ. FT FOR EACH BBL. OF WATER TO BE PLACED IN PIT ON DAILY AVE. BASIS

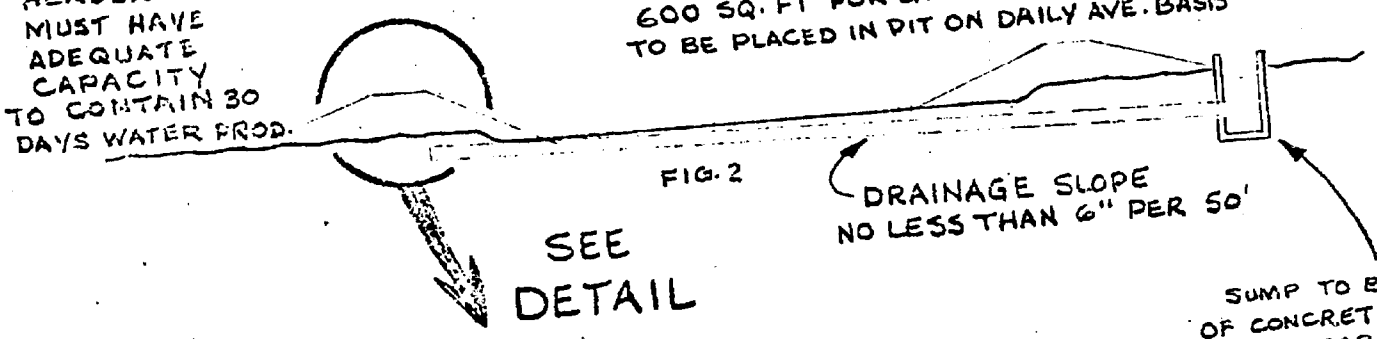


FIG. 2

DRAINAGE SLOPE NO LESS THAN 6" PER 50'

SEE DETAIL

SUMP TO BE OF CONCRETE OR OTHER CORROSION-PROOF MATERIAL & MUST BE KEPT COVERED.

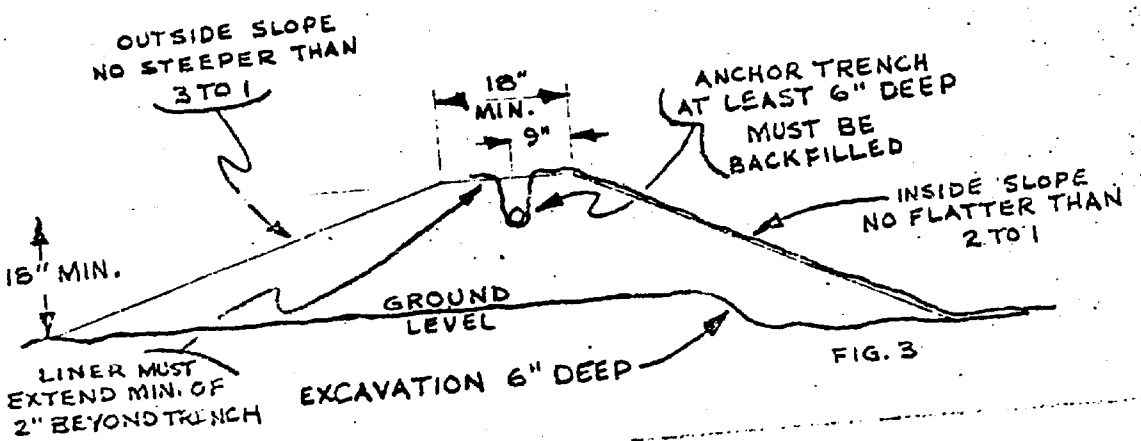


FIG. 3

N.M.O.C.C.

SALT WATER EVAPORATION PIT DESIGN SPECIFICATIONS

PROVIDED HOWEVER, that under certain circumstances, operators will be allowed the use of lined pits for evaporation of produced water.

To qualify for authority to utilize lined evaporation pits, a lease should have a settled or decreasing rate of water production.

The installation proposed must provide adequate storage capacity to safely contain all water produced during the fall, winter and early spring months when evaporation rates are at their minimum. The installation must provide a header pit lined with a suitable oil-resistant material to trap any oil carried over with the water, said header pit draining into the evaporation pits through suitably placed syphons well below the water-oil interface.

Adequate facilities must be provided to facilitate detection of leakage from the evaporation pits, which shall be lined with a satisfactory material which is resistant to salts and aqueous acids and alkalis. The material must also be SUN-resistant or provision made to protect it from exposure to the sun.

Charlie Loveless suggests that we have an upper limit ~~to~~ of wood production per 40 acre tract to be eligible for swap-pit.

Also minimum tensile strength

File prior to construction of pit

numbered permits —
signs —
owner —

inspection prior to installation of liner —
other inspection at desire of Com. —

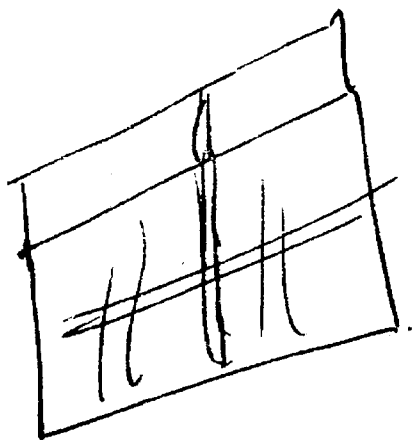
if there is leakage — disposal must cease until repair —

---

must maintain evap. free of oil film —

---

10 95 — —
7.65 —



order (1. Add paragraph to give Dist Sup. auth. to OK pit —

2. Make paragraph dealing with header pit also auth other methods.

order or sump (3. Sump — with 4 laterals —

30 mill minimum for flexible pleable material

— adequately fenced —
— max water disposal per pit?

---

application filed with Dist Sup
1. Drawing
2. materials
3. amt of water
4. Detection device

Specific of construction

Preparation of pit —
rolling
smoothing —
rock free

permit system for pits

DENVER SALT LAKE CITY BUTTE EL PASO

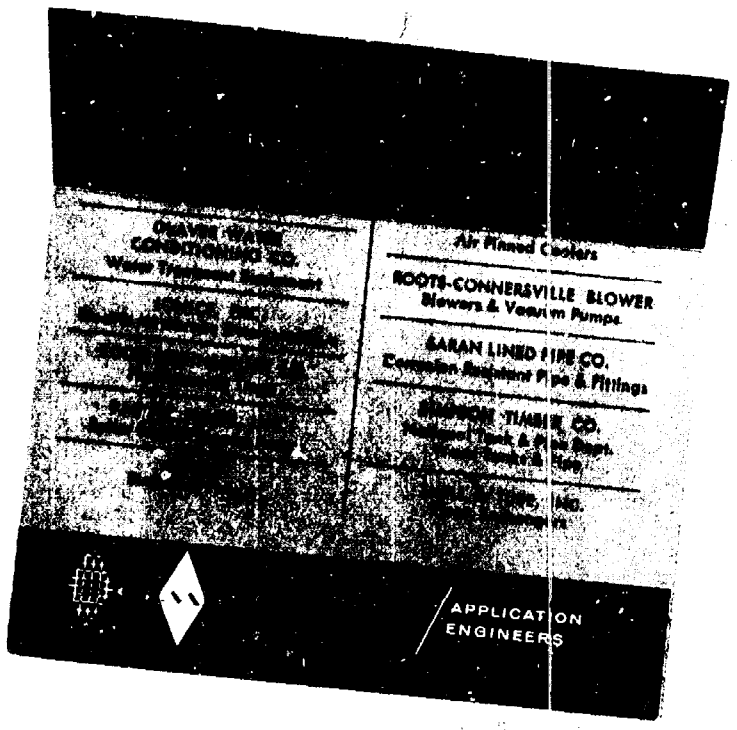
DOCKET MAILED

JAMES BARRETT Date 9/8/65

lding
xas 79901

Telephone (915) 532-5439
Telex: 74-9462
Midland-Odessa Dial "O" Enterprise 603

APPLICATION ENGINEERS


Air Finned Coolers
ROOTS-CONNERSVILLE BLOWER
Blowers & Vacuum Pumps
SARAN LINED FIRE CO.
APPLICATION
ENGINEERS

Denver Technological Center
Englewood, Colorado 80110
Telephone 771-5500
Teletype 910—035-0707

Date 7/8/68

E. E. HOWARD

WALLACE & CO.
APPLICATION ENGINEERS

DENVER, COLORADO
EL PASO, TEXAS
SALT LAKE CITY, UTAH
BUTTE, MONTANA

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 1809
Durango, Colorado 81301

July 25, 1968

Mr. Dan Nutter
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico 87501

Dear Dan:

I enjoyed attending your recent hearing concerning the lining of salt water pits. The testimonies were quite informative.

I was on a field trip in San Juan County, Utah, this week and I brought back a sample of the material which Union Oil Company of California and Texaco Inc. use to line salt water storage pits. I am sending you a sample of the material.

I do not know who sells the material but I have heard it called "Gulfseal." This sealer comes in 3 feet by 6 feet sheets which are overlapped and sealed. The expense is probably more than it would be for polyethylene linings but appears to be very satisfactory in this area.

Sincerely yours,

Jerry W. Long

Jerry W. Long
District Engineer

'68 JUL 26 PM 1

PLEASE FURNISH FURTHER INFORMATION ON:

EARTHEN PIT:

Desired Working Capacity _____ Barrels (Maximum Capacity less one foot freeboard)

Approximate Dimensions: _____ Length _____ Width _____ Depth _____ Slope

PORT-a-LINE TANK WITH LINER

Desired Capacity: _____ Barrels — OR — Diameter _____

TANK LINER

API Tank Size (Capacity) _____ Barrels — Welded _____ or Bolted _____

Extended-Neck Type Cleanout Opening? _____ Yes _____ No.

Type Fluid and Expected Use: _____

Other Pertinent Data: _____

Name _____ Title _____

Company Name _____

Address _____

City _____ State _____ Zip _____

FIRST CLASS
PERMIT NO. 4
WEWOKA, OKLA.

BUSINESS REPLY MAIL
No postage stamp necessary if mailed in the United States

Postage will be paid by

Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

UNION CARBIDE

UNION CARBIDE CORPORATION

FIBERS AND FABRICS DIVISION

270 PARK AVENUE, NEW YORK, N.Y. 10017 • AREA CODE 212 551-2345

July 11, 1968

Mr. John A. Hendershot
Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

Dear Mr. Hendershot:

The following information is provided for your use in discussing oil field pit and tank lining materials with the New Mexico Oil Conservation Commission.

Union Carbide has developed a flexible vinyl sheeting specifically formulated for use in the above applications, identified as KDA 2023, Black, .030" (Unit Liner Company code UCB030). This material will effectively contain pollutants generated by oil well operations and should provide a significant aid in fresh water conservation efforts.

KDA 2023 is based on polyvinyl chloride resins, blended with other additives to provide essential properties, and is fused and processed in our Bound Brook, New Jersey plant into a stable, homogeneous continuous sheet. The nature of the material allows it to be welded into large pieces for pit liners, or into complex shapes for use as liners for tanks of any shape. Both dielectric sealing and salvent sealing are applicable to produce seams which have bond strength equal to the original physical value of the material.

The blend of ingredients used, and the manufacturing process employed to produce the sheet yields the following properties:

Flexibility: KDA 2023 can be sealed and installed easily, even during adverse weather conditions without danger of cracking. The low temperature impact value is -12°F.

Toughness: Considerable strain and abuse do not affect the product. Tensile strength exceeds 2,000 lbs. per square inch. Tear strength is above 300 lbs. per inch. Elongation before breaking is over 300%.

PLEASE FURNISH FURTHER INFORMATION ON:

EARTHEN PIT:

Desired Working Capacity _____ Barrels (Maximum Capacity less one foot freeboard)

Approximate Dimensions: _____ Length _____ Width _____ Depth _____ Slope

PORT-a-LINE TANK WITH LINER

Desired Capacity: _____ Barrels — OR — Diameter _____

TANK LINER

API Tank Size (Capacity) _____ Barrels — Welded _____ or Bolted _____

Extended-Neck Type Cleanout Openings? _____ Yes _____ No.

Type Fluid and Expected Use: _____

Other Pertinent Data: _____

Name _____ Title _____

Company Name _____

Address _____

City _____ State _____ Zip _____

6¢
Stamp

Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

Weatherability: Continuous exposure in both XW and XIA type weatherometers for 200 hours reveal no change other than in appearance values of fading or dulling. No blooming, shrinking, spotting or tackiness was observable.

Extraction Resistance: Under accelerated laboratory conditions, there is no indication that KDA 2023 loses servicability when exposed to crude oil, brine, pumping well fluid, and bottom settlement. A constant monitoring of tensile strength, elongation, and weight change shows no significant degredation.

Fungus Resistance: Rated "excellent" tested by method ASTMD 1924, "Recommended Practice for Determining Resistance of Plastics to Fungi."

Based on careful observation after vigorous exposure, it is our belief that KDA 2023, Black, .030" will fulfill the need for an impervious lining material for fluid containing devices associated with oil pumping operations. This contention is reinforced by an on-site inspection of actual environmental conditions by our technicians, a review of the objectives and regulations with a western states regulatory commission, and an inspection of our testing techniques and facilities by the staff of a western state University concerned with the pollution control problem.

Our evaluation program is continuing, both in the field and in the laboratory. We would be pleased to discuss any aspect of this project with the New Mexico Commission at their request and convenience.

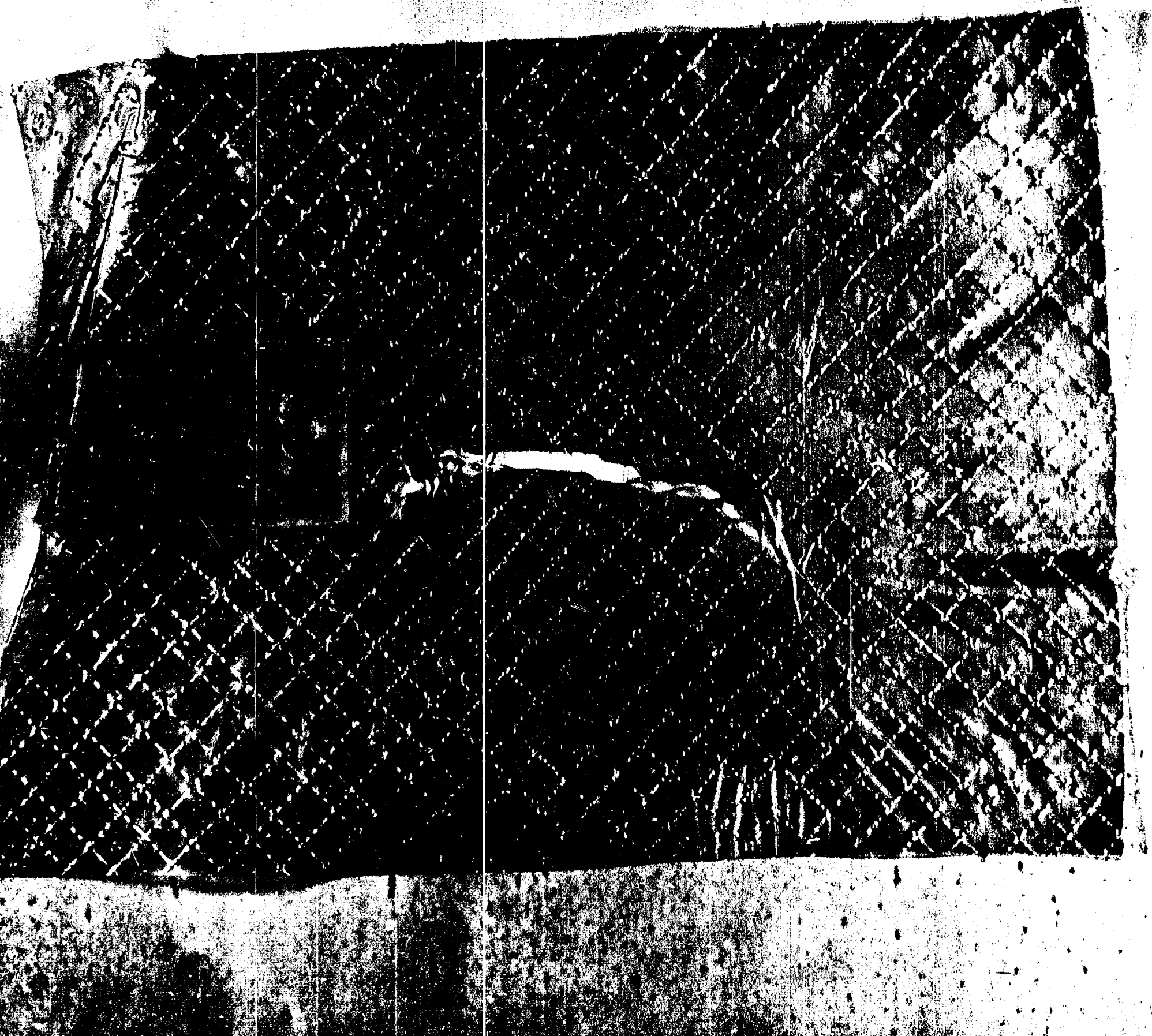
Very truly yours,

T. M Hurley

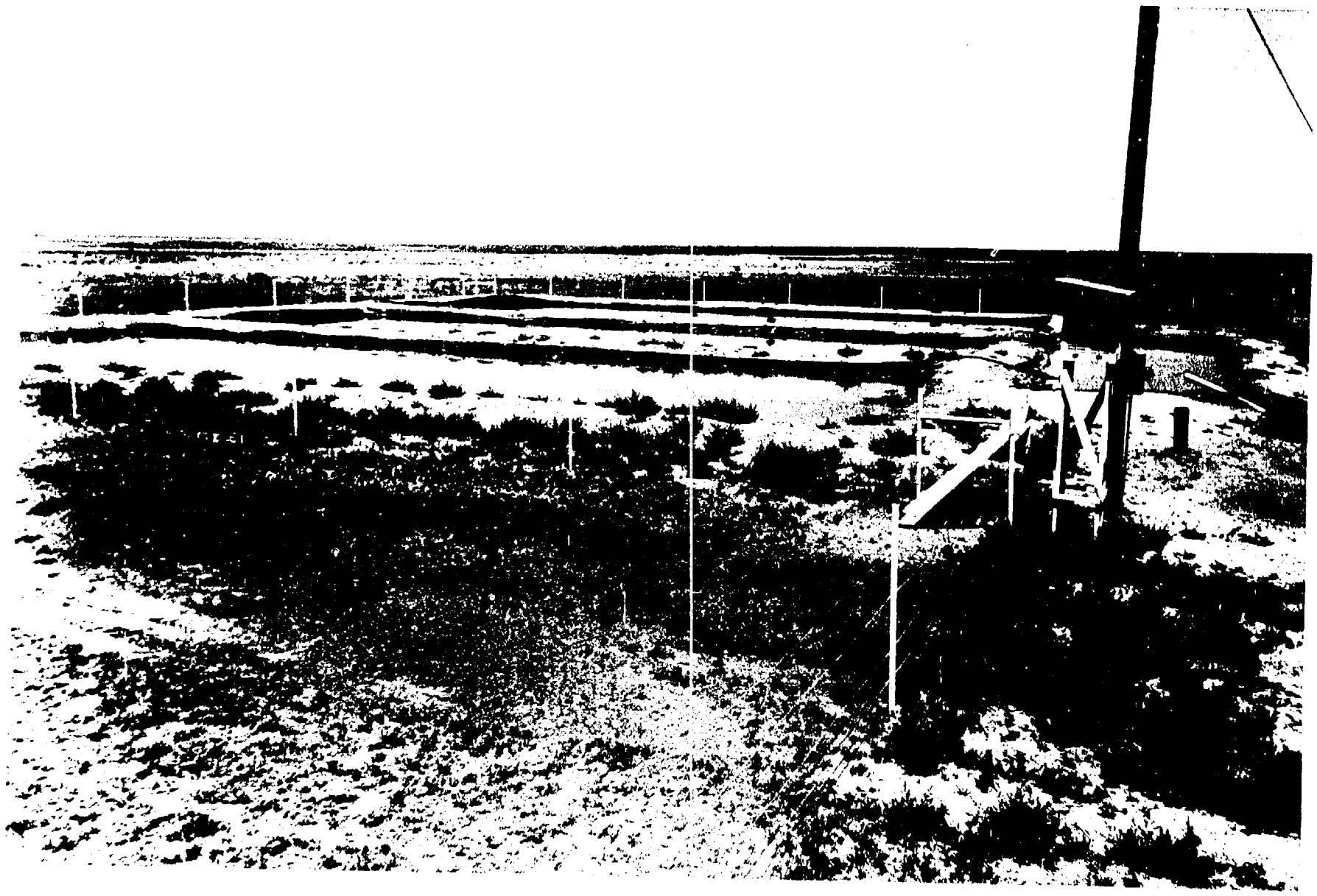
T. M. Hurley
Market Program Manager

TMH:rs


UNIT LINER
COMPANY
BHF-030



photograph by
KEN COREN
ROSWELL, N. MEX.



photograph by
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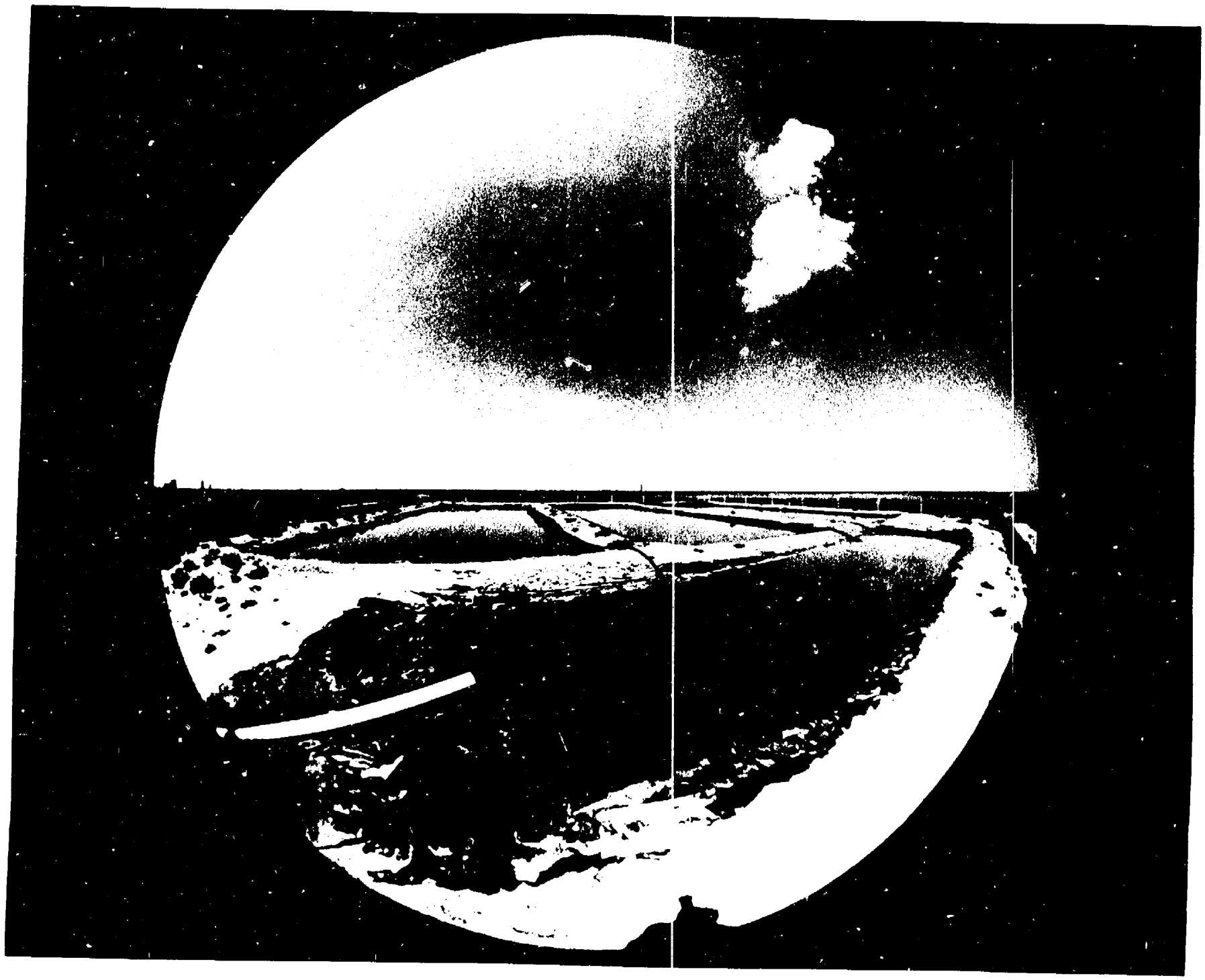
ROSWELL, N. MEX.



photograph by
KEN COBEAN
ROSWELL, N. MEX.

Case 3807

TENNECO

TENNECO OIL COMPANY · P. O. BOX 1031 · 1800 WILCO BUILDING · MIDLAND, TEXAS 79701

July 10, 1968

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87501

Re: Case No. 3807
Salt Water Disposal

Gentlemen:

We note with interest the Commission's consideration of standardizing evaporation pits for salt water disposal. For those areas where subsurface means of salt water disposal are not economically practical, we urge that the Commission provide administrative methods for the use of standardized evaporation pits.

We recommend that evaporation pits be readily utilized for the disposal of up to 50 barrels of water per day per proration unit. In this area, where average annual evaporation losses will exceed 75 inches per year, this volume of produced water can be handled practically in surface pits.

Your consideration of these suggestions would be appreciated.

Yours very truly,

TENNECO OIL COMPANY

J. F. Carnes
District Production Engineer

JFC:gs

MIDWEST OIL CORPORATION
1500 WILCO BUILDING
MIDLAND, TEXAS

GENERAL OFFICES
1700 BROADWAY
DENVER 2, COLORADO

DIVISION OFFICE
1200 CONTINENTAL NATIONAL
BANK BUILDING
FORT WORTH 2, TEXAS

July 10, 1968

Mr. A. L. Porter, Jr.
New Mexico Oil Conservation Commission
State Land Office Building
Santa Fe, New Mexico

Dear Mr. Porter:

In re: Case #3807

It is my understanding that case #3807 to be heard July 17, 1968 will consider salt water disposal by means of lined evaporation pits.

In instances of relatively small amounts of produced water this procedure should be attractive to the Conservation Commission, oil producer and rancher. This idea will prevent premature abandonment of low productivity wells.

Yours very truly,

MIDWEST OIL CORPORATION

C. F. Qualia
District Production Supt.

CFQ/raj

'68 JUL 11 AM 8 40

Docket No. 21-68

DOCKET: REGULAR HEARING - WEDNESDAY - JULY 17, 1968

OIL CONSERVATION COMMISSION - 9 A.M. - MORGAN HALL, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

ALLOWABLE: (1) Consideration of the oil allowable for August, 1968;

(2) Consideration of the allowable production of gas for August, 1968, from thirteen prorated pools in Lea, Eddy, and Roosevelt Counties, New Mexico. Consideration of the allowable production of gas from nine prorated pools in San Juan, Rio Arriba and Sandoval Counties, New Mexico, for August, 1968.

CASE 3806: In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to permit the exemption of certain presently existing and future pools in Eddy and Lea Counties, New Mexico, from certain requirements of said order. The Commission will consider exempting from Order No. (3) of Commission Order No. R-3221 those pools which are within the following-described area:

Township 19 South, Range 30 East: Sections 8 through 36
Township 20 South, Range 30 East: All
Township 20 South, Range 31 East: All
Township 20 South, Range 32 East: W/2
Township 21 South, Range 29 East: All
Township 21 South, Range 30 East: All
Township 21 South, Range 31 East: All
Township 22 South, Range 29 East: All
Township 22 South, Range 30 East: All
Township 23 South, Range 29 East: E/2
Township 23 South, Range 30 East: Sections 1 through 19

and which are in and near Clayton Basin and Nash Draw and those pools within the above-described area which are within three miles of a potash tailings pond.

CASE 3807: In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to provide an administrative procedure whereby lined evaporation pits may be utilized for salt water disposal, provided that they are designed, constructed, and maintained in accordance with certain minimum standards which shall be established by the Commission. All interested parties,

including but not limited to, oil producers, lining materials vendors, consulting engineers, water disposal companies, etc., are requested to attend the hearing and to present evidence relative to the minimum standards which the Commission should adopt.

Further, to consider the amendment of Order No. (4) of Commission Order No. R-3221 to make the provisions of said Order No. (4) apply to those areas and pools affected by Commission Orders No. R-1224-A, R-2526, and R-3164.

Further, to consider the amendment of Order No. (8) of Commission Order No. R-3221 to provide for temporary storage or disposal of water in surface pits for up to 30 days during such contingencies as injection system failures and the evaluation of newly completed wells, subject to approval by the Commission District Supervisors.

CASE 3808: Southeastern nomenclature case calling for an order for the contraction, abolishment and extension of vertical and horizontal limits of certain pools in Lea and Eddy Counties, New Mexico:

(a) Contract the Square Lake Grayburg-San Andres Pool in Eddy County, New Mexico, described as:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
SECTION 11: SE/4
SECTION 15: NW/4

(b) Extend the Grayburg-Jackson Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
SECTION 11: SE/4
SECTION 15: NW/4 and NW/4 SW/4

(c) Extend the Arkansas Junction-San Andres Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 36 EAST, NMPM
SECTION 12: SW/4

(d) Extend the North Bagley-Lower Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 11 SOUTH, RANGE 33 EAST, NMPM
SECTION 14: NW/4
SECTION 20: SW/4

(e) Extend the East Brunson-Ellenburger Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 24: SW/4

(f) Extend the East Brunson-Granite Wash Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 24: S/2

TOWNSHIP 22 SOUTH, RANGE 38 EAST, NMPM
SECTION 19: SW/4

(g) Extend the East Brunson-McKee Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 23: N/2 SE/4

(h) Extend the Drinkard Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 38 EAST, NMPM
SECTION 7: E/2

(i) Extend the Penasco Draw San Andres-Yeso Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 25 EAST, NMPM
SECTION 36: N/2 NE/4

(j) Extend the Sawyer-San Andres Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 9 SOUTH, RANGE 37 EAST, NMPM
SECTION 25: SE/4

(k) Extend the Simanola-Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 10 SOUTH, RANGE 34 EAST, NMPM
SECTION 20: SE/4

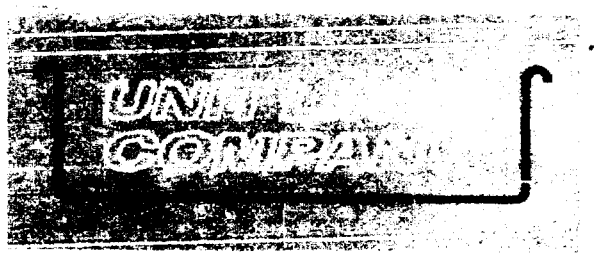
(l) Extend the Vada-Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 9 SOUTH, RANGE 34 EAST, NMPM
SECTION 21: SE/4
SECTION 32: NE/4

(m) Extend the vertical limits of the Moore Permo-Pennsylvanian Pool in Lea County, New Mexico, to include the Wolfcamp Formation from 8042 feet to 8297 feet. Vertical limits redefined as being from the top of the Wolfcamp at 8042 feet to the top of the Mississippian at 9974 feet as in the Amerada Petroleum Corporation State "MA" Well No. 1, located in Unit M of Section 24, Township 11 South, Range 32 East, NMPM.

(n) Abolish the Moore-Wolfcamp Gas Pool in Lea County, New Mexico, described as:

TOWNSHIP 11 SOUTH, RANGE 32 EAST, NMPM
SECTION 23: E/2
SECTION 24: SW/4
SECTION 25: W/2



P. O. Drawer 1460 • Wewoka, Oklahoma 74884

PRICE LIST

EARTHEN PIT LINERS—f.o.b. Chicago, Illinois.

*UCB-030—$0.40 per square foot
**BHF-030—$0.45 per square foot

Liners larger than 30,000 square feet quoted on request.

STANDARD API STEEL TANK LINERS—Available *UCB-030 only-f.o.b. Wewoka, Okla.

Bolted Size (Capacity)	Price Liner Only	Welded Size (Capacity)	Price Liner Only
100 bbls	$ 236.50	100 bbls	$ 222.50
200 bbls	322.50	200 bbls	322.50
250 bbls	355.00	210 bbls	345.00
300 bbls	425.00	300 bbls	425.00
500 bbls (hi or low)	545.00	400 bbls	487.50
750 bbls	685.00	500 bbls	575.00
1,000 bbls (hi or low)	875.00	1,000 bbls	850.00

Quote on request: (1) Liners for larger, non-standard or wooden tanks.
(2) Installation hardware, flanges, etc.

PORT-a-LINE TANK with LINER—f.o.b. Oklahoma City, Oklahoma

Dimensions	Capacity	*UCB-030	**BHF-030
4 x 12	80 bbls	$ 487.50	$ 530.00
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---

*UCB-030—UNIT LINER .030 gauge polymeric vinyl.
**BHF-030—UNIT LINER .030 gauge synthetic rubber.

All liners are one-piece electronically sealed of materials especially compounded to contain oilfield fluids.

Prices subject to applicable state and local taxes and to change without notice.

FORM NO. ULO368

PLEASE FURNISH FURTHER INFORMATION ON:

EARTHEN PIT:

Desired Working Capacity _____ Barrels (Maximum Capacity less one foot freeboard)

Approximate Dimensions: _____ Length _____ Width _____ Depth _____ Slope

PORT-a-LINE TANK WITH LINER

Desired Capacity: _____ Barrels—OR—Diameter _____

TANK LINER

API Tank Size (Capacity) _____ Barrels—Welded _____ or Bolted _____

Extended-Neck Type Cleanout Openings? _____ Yes _____ No.

Type Fluid and Expected Use: _____

Other Pertinent Data: _____

Name _____ Title _____

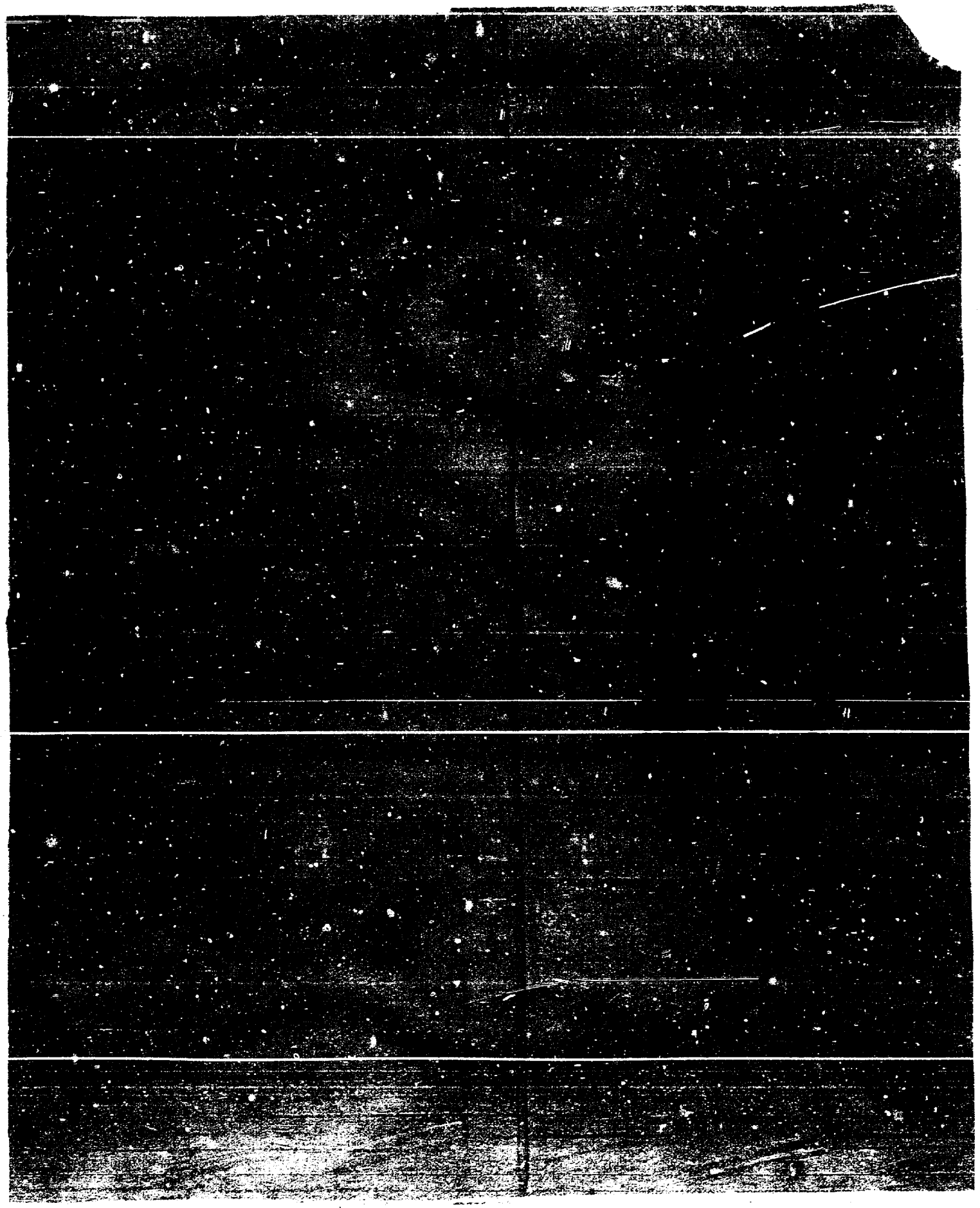
Company Name _____

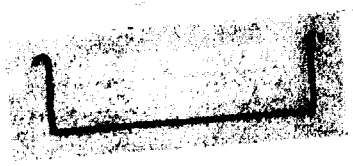
Address _____

City _____ State _____ Zip _____

6¢
Stamp

Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884





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Desired Capacity: _____ Barrels — OR — Diameter _____

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City _____ State _____ Zip _____

FIRST CLASS
PERMIT NO. 4
WEWOKA, OKLA.

BUSINESS REPLY MAIL
No postage stamp necessary if mailed in the United States

Postage will be paid by

Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

New state regulations require a sealed pit, and we have the answer to your needs.

Our new process of fiberglassing provides a **ONE-PIECE, SEAMLESS** pit lining of any desired thickness from one to twelve ounces per square foot. A standard pit is two ounces per square foot.

There is no additive that reduces chemical resistance and causes loss of Barcol hardness and flexural strength.

Our fiberglass application assures a thorough saturation and mixture of fiber, catalyst and resin in a CONTINUOUS surface spread over a thirty-pound felt base. It will conform to ground imperfections, yet still provide uniform structural rigidity and strength. A final seal coat of clear resin is then applied before complete curing of the coating to insure a bond that will not peel or leak.

The process is an Isothalic Isopolyester resin, which we have used successfully for eight years in tank applications, mixed with chopped fiberglass filaments at the time of application.

Let us show you a sample of this coating which, we think, will revolutionize and solve the pit lining problem.

FOR MORE INFORMATION

OR PRICES

ON PIT LININGS AND

FIBERGLASS TANK LININGS,

— C A L L —

(505) 393-5661

— or W R I T E —

P. O. Box 1409

Hobbs, New Mex. 88240

FOUR-STATE AREA RULINGS PROTECT FRESH WATER RESOURCES:

TEXAS	*The Railroad Commission has statewide Rule 8 amended by Special Order No. 20-56841 effective Jan. 1, 1969.*
KANSAS	*Kansas State Board of Health has Article 8 adopted April 1, 1966.*
OKLAHOMA	*The Corporation Commission has Rule 811 as amended by Order No. 62481 effective June 1, 1967.*
NEW MEXICO	*The Oil Conservation Commission has Order No. R-3221-A, effective October 16, 1967.*

- Such rules, orders and articles have been adopted in these and other states for one primary purpose—TO AID IN THE PROTECTION AND CONSERVATION OF FRESH WATER RESOURCES—by providing for the control of oilfield brines, wastes and other deleterious substances resulting from the drilling, production, refining and processing of oil and natural gas.

- The *NEED* exists within the oil and related industries for an effective and economic means to better contain and control its brines and other wastes to avoid intrusion and contamination of fresh water.

- The need has been exploited—compounding the problem. Companies have hastily arisen with grandiose claims. Solutions were quickly conceived and materials that were never designed for oilfield application were pressed into service. In many cases, this resulted in a needless added expense for the oil operator.

- Mr Roy D. Payne, Director of Field Operations of the Railroad Commission of Texas, states, "We feel the operator should be interested in securing the best material possible because most liners are rather expensive and in the event an inferior material is used the Commission will *require it to be replaced,* which would result in a double expense for the operator."

Form No. 0668

ENTER . . . *UNIT LINER COMPANY*

This Company was organized by oil operators who recognized the problems in our industry and realized the inadequacy and inferiority of most of the materials and methods being used.

- Aggressive action generated tremendous interest and immediate assistance by large suppliers and manufacturers in devising, developing, manufacturing and supplying the best possible available materials and methods to comply with the rules and regulations.

- Further, at the request of Unit Liner, The Oklahoma Economic Development Foundation, Inc., of Norman, Oklahoma, is sponsoring a cooperative research project directed by Dr. George W. Reid, a foremost pollution expert and Chairman of the Civil Engineering Department of The University of Oklahoma to identify oilfield fluid containment requirements and independently establish the capabilities of lining materials for this use.

RESULT: ***Three solutions by Unit Liner Company for positive control of oilfield fluids.***

• LINERS FOR STANDARD OILFIELD TANKS

Electronically welded one-piece liners . . . free hanging . . . suspended from tank top . . . no bonding or special preparation.

• LINERS FOR EARTHEN PITS OR PONDS

One-piece liner provides impervious barrier to oilfield and related fluids.

• PORT-a-LINE TANK WITH LINER

A simple and versatile replacement for tank, pit or pond storage or for emergency use. Complete assembly, ready for installation.

Write now for additional details, specifications and samples.

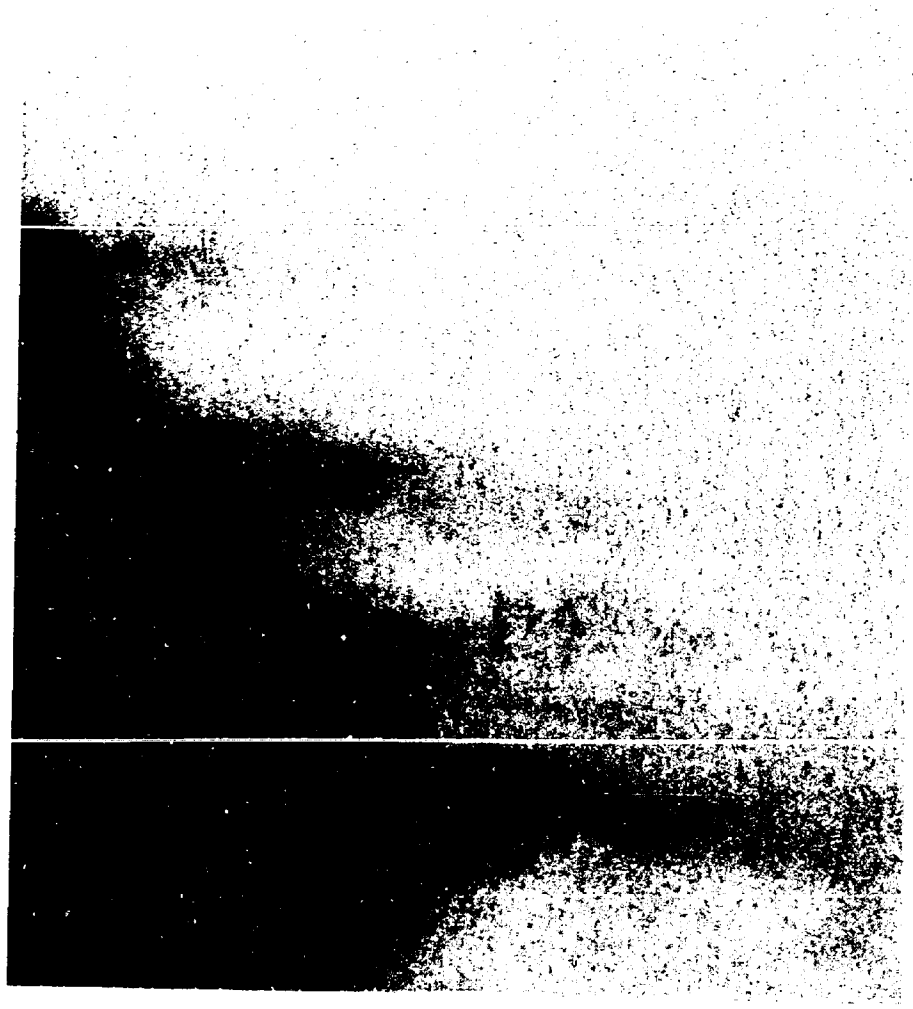
Unit Liner Company
P. O. Box 15495
Tulsa, Oklahoma 74115

UNIT LINER COMPANY

Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

POLLUTION ABATEMENT

BULLETIN NO. 1



UNIT LINER COMPANY

P. O. Drawer 1460 / Wewoka, Oklahoma 74884

Bulk Rate
U. S. POSTAGE
PAID
Wewoka, Okla.
Permit No. 4

DATA AND SPECIFICATION FOR "UNIT LINER UCB-030"

DESCRIPTION

This file sheet describes UNIT LINERS based on UCB-030 Polymeric Vinyl Film for use as an effective impervious barrier to oilfield and related fluids.

STANDARD TANK

APPLICATIONS

This lining has been specifically designed to exhibit excellent resistance to degradation by fluids containing hydrocarbon oils, salt brine, or chemicals in:

- **STANDARD TANKS—WELDED-BOLTED-WOODEN**
- **EARTHEN PITS**
- **PORT-a-LINE TANKS**

AVAILABLE TYPES

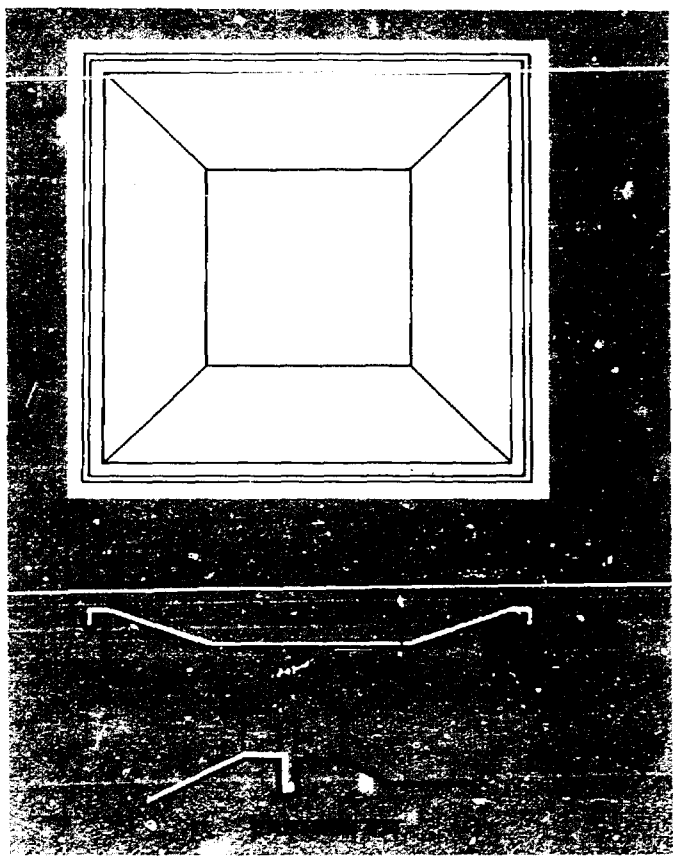
Tank liners of UCB-030 are prefabricated to fit standard API steel tanks (welded or bolted) and, where applicable, incorporate flanges designed to fit extended-neck type cleanouts. UCB-030 liners for Earthen Pits are one-piece prefabricated to size. For pits larger than 20,000 square feet, maximum size sections are joined in the field. UCB-030 Liners are provided in incremental diameters from 12 feet to 120 feet to fit Port-a-Line Tanks in heights from 4 feet to 8 feet. Liners to fit non-standard sizes or types can be custom made on special order.

ADVANTAGES

- Positively prevents escape of harmful or deleterious fluids
- Seams electronically welded for maximum strength
- Easy to handle, transport and install
- Minimum installation preparation
- Effective, low cost per barrell storage

ADVANTAGES DUE TO PROPERTIES OF UCB-030

- Stable homogeneous product—no further treatment or curing required
- Remains flexible over wide temperature range—good low temperature properties
- Good light stability and weathering characteristics
- High tear and puncture resistance
- Resists mold, mildew and fungus



INSTALLATION

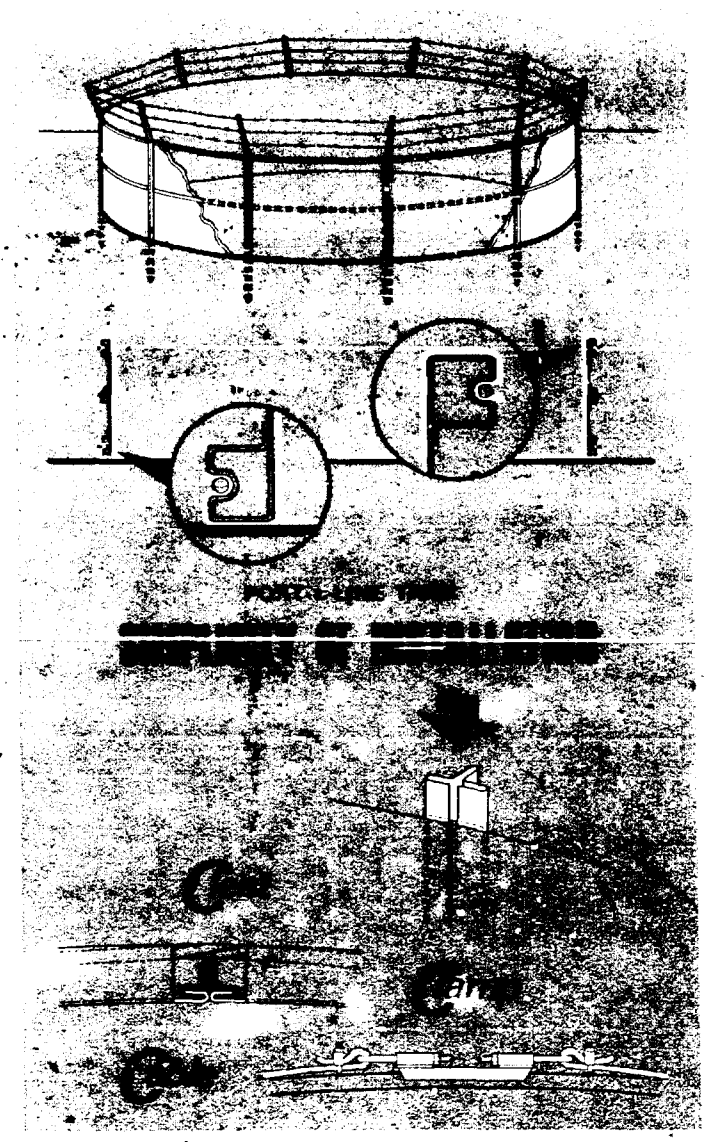
1. Tank Liners. All sharp objects or protrusions in the tank must be removed or covered to protect liner. "J" bolts are installed around the periphery of the top of the tank. Tubing is inserted through the hem around the top of the liner and the liner is drawn to the top of the tank and suspended from the "J" bolts.

2. Earthen Pits. A pit to desired dimensions is excavated. Excercise care to assure straight, level and uniform sides, slopes and bottom. All sharp debris is removed. A cushion of fine sand 2" to 3" thick is spread over the pit area. The liner, prefabricated to size, is unrolled in the pit and the edges anchored.

3. Port-a-Line Tanks. Prefabricated steel sections eight feet long are assembled into a circle on level soil covered by 2" to 3" sand cushion. The liner, prefabricated to tank dimensions, is installed and secured by preformed extrusions electronically welded to the liner.

OTHER CONSIDERATIONS

- Review fluid contaminants with Unit Liner
- Installation should be by Unit Liner company approved firms



SPECIFICATION

Unit Liner UCB-030 — A polymeric vinyl film manufactured from a thermoplastic polymer compounded by Union Carbide Corporation for Unit Liner Company. It shall be 30 gauge, uniform in thickness, smooth and free from pinholes and shall conform to the following Typical Test Values:

Tensile Strength, p.s.i.
Machine Direction 2332
Transverse Direction 2061

Elongation, %
Machine Direction 366
Transverse Direction 353

100% Modulus, p.s.i.
Machine Direction 995
Transverse Direction 946

Graves Tear, lbs/inch
Machine Direction 307
Transverse Direction 316

Low Temperature Impact . . . . . −12°F

Flammability, 45° S.P.I. Test—
Self Extinguishi

Unit Liner Company
P.O. Drawer 1460
Wewoka, Oklahoma 74884

Unit Liner Company
P.O. Box 15495
Tulsa, Oklahoma 74115

FORM NO. ULO568

PRINTED IN U.S.A.

UNIT LINER COMPANY

P.O. DRAWER 1460 / WEWOKA, OKLAHOMA 74884 / TELEPHONE 405-257-2398

July 24, 1968

Mr. A. L. Porter
Oil Conservation Commission
Land Office Building
Santa [illegible]

Dear Mr. Porter:

We have [illegible] to Wewoka and want to take this opportunity to express our thanks for permitting John Owen and myself to review the history, activity and materials of the Unit Liner Company with you and your staff.

As we stated, Unit Liner is making every effort to formulate methods and [illegible] materials to adequately supply the oil operators needs to conform to the [illegible] anti-pollution regulations. To this end we always welcome the opportunity [illegible] with the various interested organizations. We certainly derived some benefit [illegible] this [illegible] and hope that we in turn were of assistance to your cause.

Just yesterday I received two interesting letters from Mr. S. W. Schmitt of Du Pont and [illegible] these were of a nature that you might like to have them in your personal file. Both of these letters apply to the Du Pont Hypalon material that we distribute for oilfield pit liners.

If at any time you have any suggestions as to how we might better provide materials or services of our type to the oil industry, we would most sincerely appreciate your contacting us. Also, if there are areas where we may develop information to assist you, please do not hesitate to call on us.

Again thank you for your courtesy and time to present the case of Unit Liner.

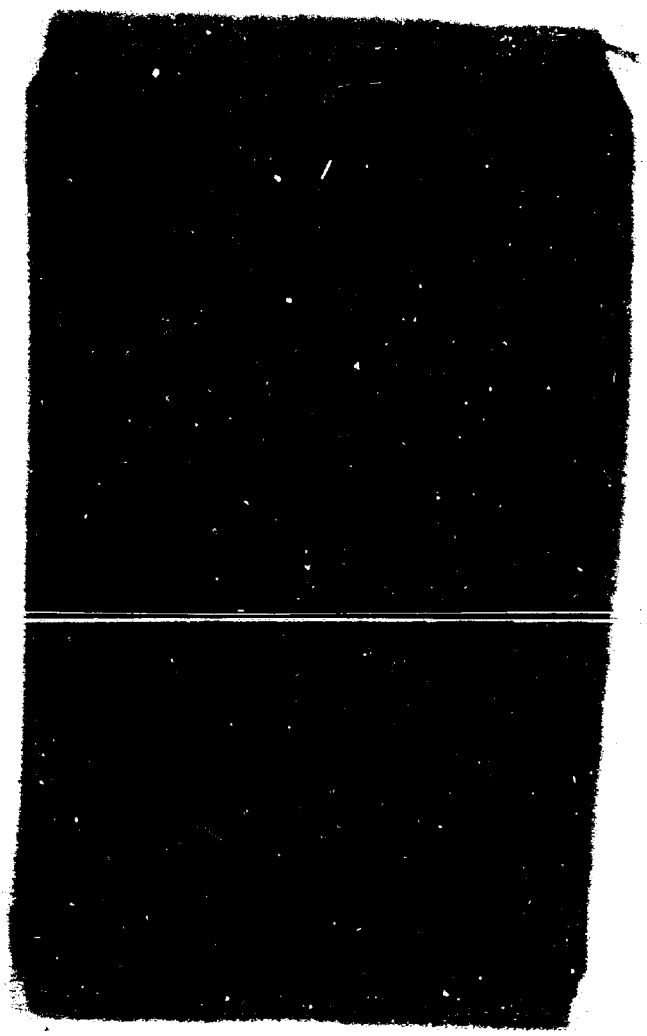
Very truly yours,

J. A. Hendershot

J. A. Hendershot

JAH:ah
Enclosures-2
cc: Mr. Joe Ramey (w/attachments)

QUALITY LININGS AND RELATED PRODUCTS FOR THE POSITIVE CONTAINMENT OF OILFIELD FLUIDS



EL-1000 REV. 6-64

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
P. O. Box 406
WILMINGTON, DELAWARE 19898

ELASTOMER CHEMICALS DEPARTMENT
ELASTOMERS LABORATORY

July 18, 1968

Mr. John Hendershot
Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

Dear Johnnie,

I'm sorry that I haven't been in touch with you earlier, but things have been pretty hectic, and my vacation also intervened.

I am attaching a copy of my letter to George Reid, which has some information regarding the samples we obtained when I visited Oklahoma. This bears out our experience - namely, that HYPALON® film works in the pits. We know that by conventional testing procedures, the HYPALON film has less than adequate oil resistance. At the same time, conventional tests do not duplicate the field conditions of time and exposure. The conclusion I have to come to is that we don't know how to predict performance in brine/oil pit service by common laboratory procedure. You and I both know that HYPALON film such as you have purchased has an outstanding record of service in the field. I hope that Dr. Reid and his group will be able to develop some torture test that will be meaningful in terms of experience. I mention all this in answer to the comments about HYPALON that you passed on to me.

The data we obtained indicates to me the progressive cure of the HYPALON, sometime between four months in the winter, and a year and a half.

I have received the oil and the samples. As soon as we have our tests finished, I'll be in touch with you. Many thanks for your letters and all the trouble you have taken to pass on your comments and experience. From what Mitch tells me, things are starting to move for you, and I'm glad to hear that.

Best regards,

Stan

S. W. Schmitt

Attachment

SWS:jc

EL-1000-T REV. 12-64

DUPONT
ESTABLISHED 1802

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
P. O. Box 406
WILMINGTON, DELAWARE 19898

ELASTOMER CHEMICALS DEPARTMENT
ELASTOMERS LABORATORY

July 18, 1968

Professor George Reid
Director, Department of Civil Engineering
University of Oklahoma
Norman, Oklahoma 73069

Dear George,

I have completed the physical tests on the HYPALON® samples obtained during my visit to Oklahoma. These results, together with a few brief comments are shown below.

A. Maud Pit

Service Record - Installed January 1967, oil contamination completely covers surface of water in pit.

Appearance - Oil was visible on the surface of the liner up to within 1 to 2 feet of the top of the pit. At the time of inspection, the fluid level was down to about 1 1/2 feet in depth. A gridiron pattern of wrinkling was apparent below the high water mark. To the hand, the oil - soaked material was tough, and rubbery with no apparent ill effect from being exposed to the crude oil. Tests were performed on samples cut from overlaps of seams. Therefore, these particular samples were exposed to the liquid on both sides.

Results of Tests - Properties determined on the samples are shown below. Since samples of the original, unexposed material were unavailable, typical properties of fresh HYPALON film (uncured) are shown are comparison.

	Oil Exposed	Typical Original
Tensile Strength, psi	1600	1000
Elongation, %	400	500 - 600
Specific Gravity	1.427	1.5 (approx.)

B. Hembry Lease

Service Record - Installed January 1968, heavy oil contamination of salt water.

Appearance - Same as (A) above.

Results of Tests - In this case, samples were taken from oil exposed material, and from a section which had only been exposed to weather. The weathered sample would be expected to be very close to original properties, considering the time of year that it was exposed.

	Weathered	Oil Exposed
Tensile Strength, psi	1000	900
Elongation, %	575	540
Specific Gravity	1.505	1.372

I see by some of John Hendershot's letters that your program is underway. Let me know if we can be of any assistance

Sincerely,

S. W. Schmitt

cc: John Hendershot
Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

Case 3807

CHARLES C. LOVELESS, JR.
SUITE 727 PETROLEUM BUILDING
ROSWELL, NEW MEXICO

REG. PETROLEUM ENGINEER
TEXAS
NEW MEXICO

TELEPHONE
OFFICE MAIN 2-1958
HOME MAIN 2-7313

July 19, 1968

Mr. A. L. Porter, Jr.
Oil Conservation Commission
State of New Mexico
Santa Fe, New Mexico

Dear Pete:

I am such a rambler when I get on the witness stand as on the occasion of the open pit hearing last Wednesday, that I never really know whether what I say has any real significance. There were a couple of points that did not seem to come out too plainly. First, there seemed to be some doubt that the evaporation units sized 100'x40' (three total) would indeed evaporate 30 BPD year round. The other point which seemed to me left dangling, at least in my own mind, was the question of pit liners and the resulting need to inspect by the State authorities.

At the outset of my testimony I tried to emphasize that too rigorous standards would defeat the whole purpose of granting an exception to marginal wells. If liner standards were set at thicknesses of 30-40 mils as in Texas, the cost of the evaporative pit would be in the order of $10-12,000 due to liner costs alone. At least, some of the salesmen quoted prices (40-50¢) per square foot, and this would knock out quite a few marginal wells. I sincerely believe after visiting with Mr. L. L. Yeager who represented the Griffolyn people, the reinforced polyethylene which runs 6-10 mils in thickness will do an equally good job and at one-tenth the cost. There are several manufacturers of the reinforced polyethylene all equally good. These films run around 4.5-5¢ and would keep the price of the pits at a minimum. The most important thing, once the liner is in, is to protect it from livestock.

Now, as for inspection: Joe Ramey's observation that every pumper would have a yellow wax pencil may be well taken. I doubt it. Perhpas there is a better way to gage the opening levels such as an upright ruler on a weighted base which could be tossed in to the center of the pit and pulled out with a string. I think the point is exaggerated and if the penalty for fudging were strong enough most operators would play square.

These were just some after thoughts. In closing, let me assure you that I would guarantee an operator that the pit like the one we built for experimentation would handle 30BPD notwithstanding the many varried data on rates of evaporation.

Sincerely,

Charles

UNIT LINER COMPANY

P. O. Drawer 1460 • Wewoka, Oklahoma 74884

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FORM NO. ULO368

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Form No. 0668

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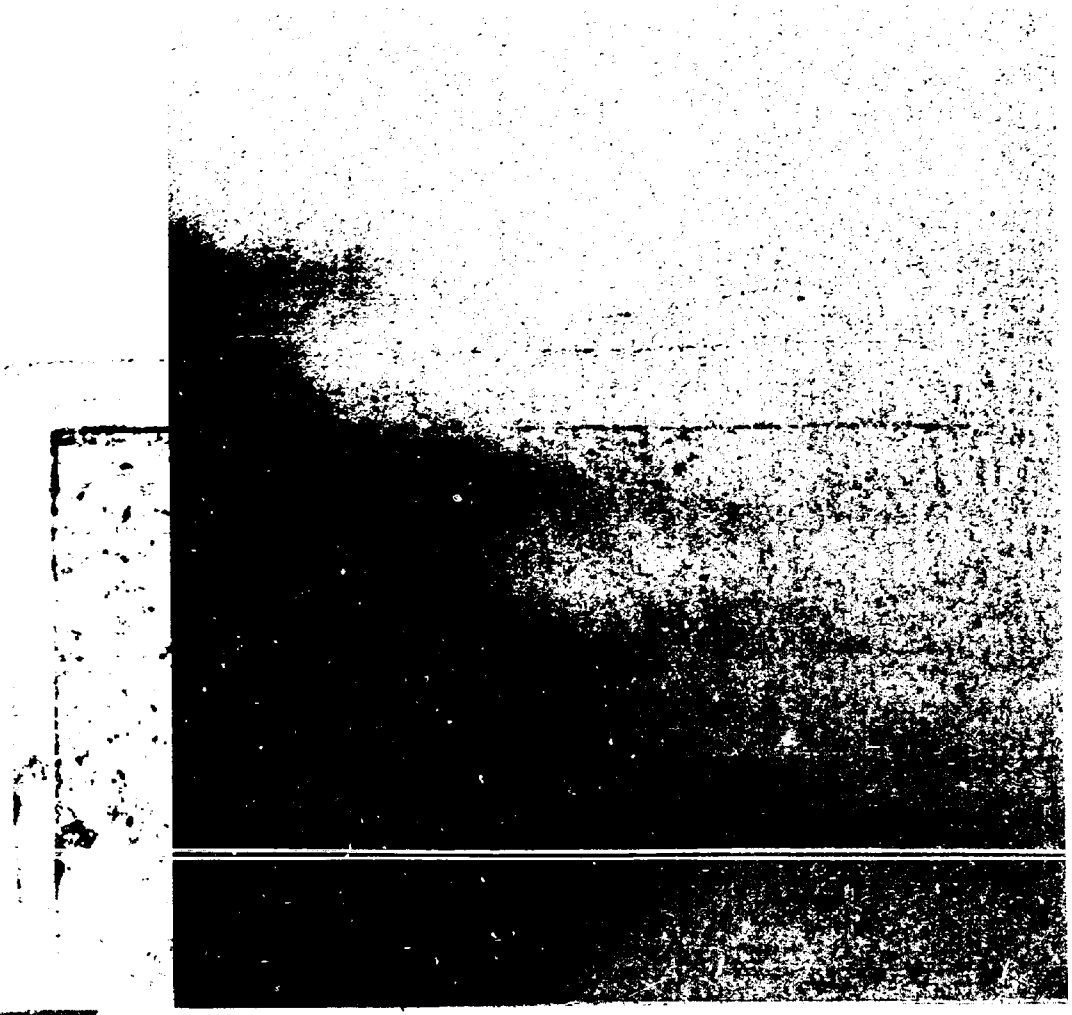
Unit Liner Company
P. O. Drawer 1460
Wewoka, Oklahoma 74884

POLLUTION ABATEMENT

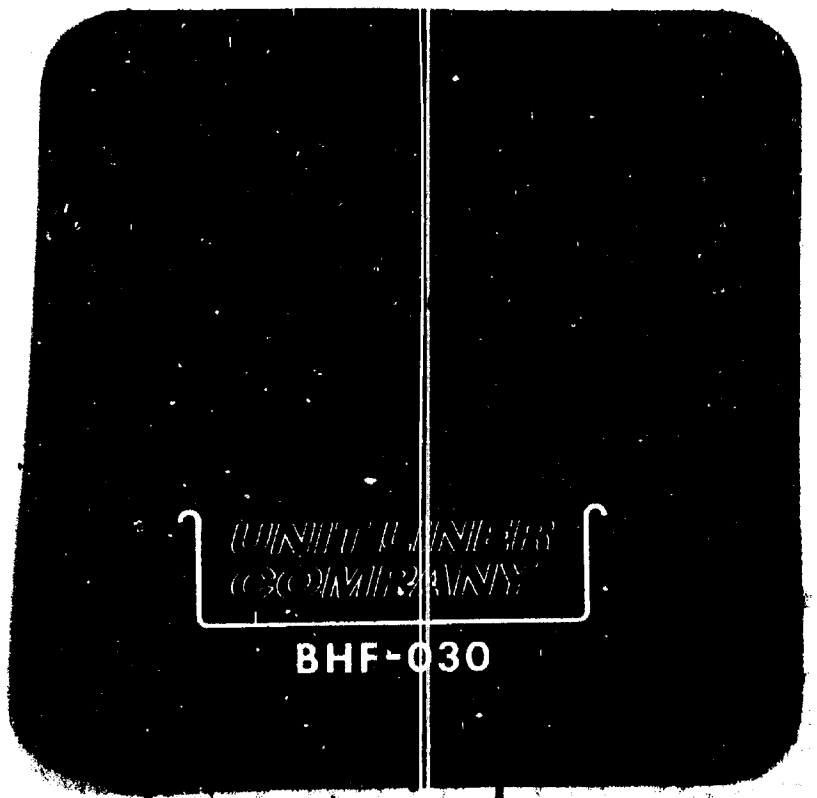
BULLETIN NO. 1



UNIT LINER COMPANY

P. O. Drawer 1460 / Wewoka, Oklahoma 74884

Bulk Rate
U. S. POSTAGE
PAID
Wewoka, Okla.
Permit No. 4


UNITED FINISHER
COMPANY
BHF-030

UNIT LINER COMPANY

DESCRIPTION

This file sheet describes UNIT LINERS based on Du Pont HYPALON® synthetic rubber for use as an impervious barrier where fluid containment service conditions are severe.

APPLICATIONS

This elastomeric liner has been expressly developed to contain oilfield fluids in:

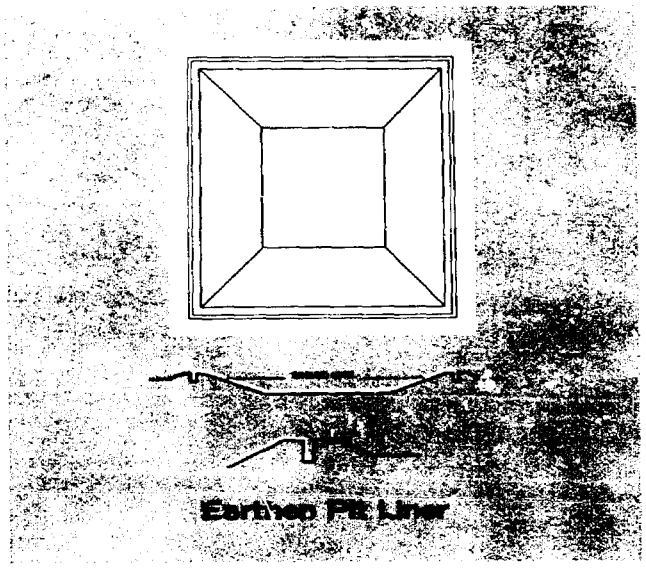
- Earthen pits
- Port-a-Line tanks

AVAILABLE TYPES

The earthen pit liner of HYPALON is manufactured to size in one piece as specified. For pits larger than 20,000 square feet, the liner is prefabricated into maximum size sections and joined in the field. Steel Port-a-Line tanks with a liner of HYPALON are provided in incremental diameters from 12 feet to 120 feet.

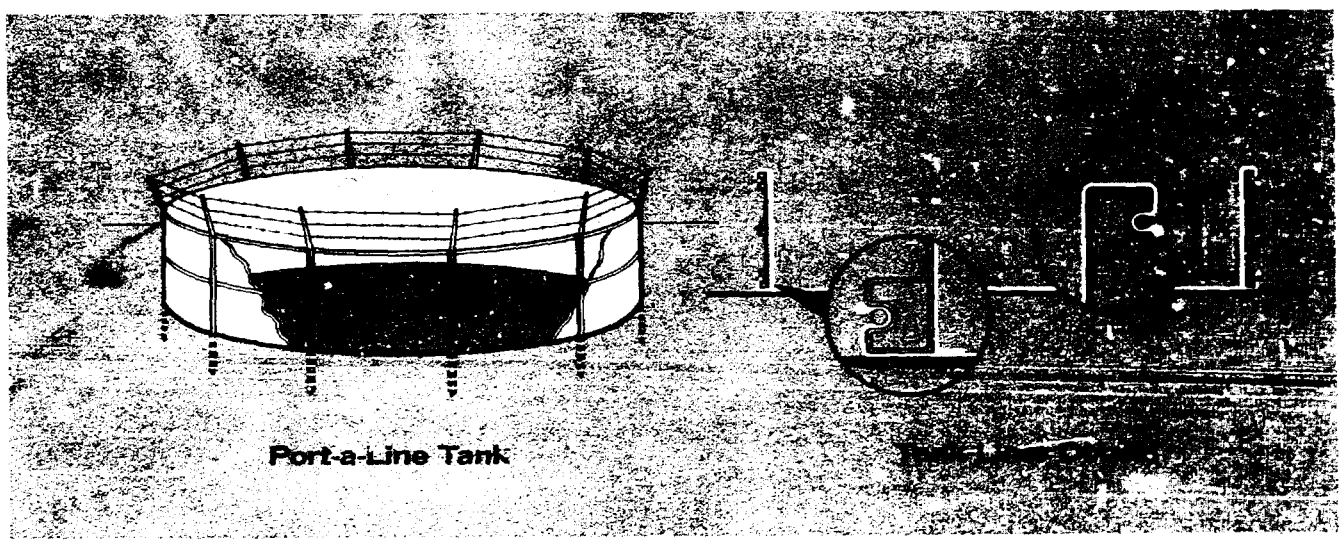
ADVANTAGES

- Economically prevents escape of oilfield fluids
  Low cost per year of service
- Easy to transport and install
- Minimum installation preparation
- Seams are electronically welded for maximum strength
- Component parts selected for maximum service life



Advantages due to the properties of Du Pont HYPALON

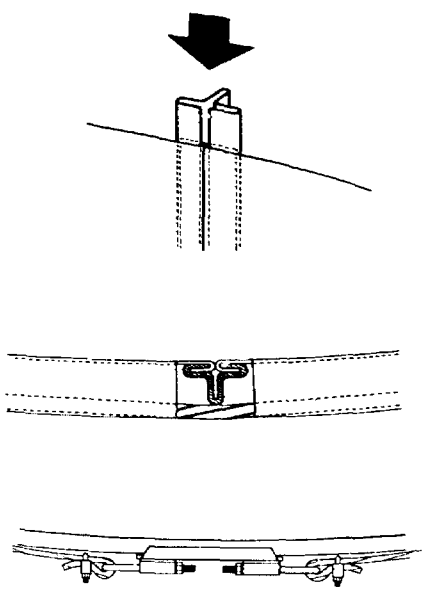
- highly resistant to hail damage
- excellent aging and weathering characteristics
- flexible and elastic over a wide temperature range
- highly resistant to hydrocarbon oils, fuels, salt brine, chemicals
- resists mold, mildew, fungus
- resists puncture and tearing



INSTALLATION

1. **Earthen Pits.** A pit to desired dimensions is excavated. Exercise care to assure straight, level and uniform sides, slopes and bottom. All sharp debris is removed. The liner of HYPALON, prefabricated to size, is unrolled in the pit and the edges are anchored.

2. **Port-a-Line Tanks.** Four-feet-high by eight-feet-long steel sections are assembled into a circle on level and smooth soil. The liner of HYPALON, prefabricated to tank dimensions, is installed and secured by preformed extrusions electronically welded to the liner.



Details of Connector Cleat and Cable Clamp

OTHER CONSIDERATIONS

- Review fluid contaminants with Unit Liner Company
- Installation should be by Unit Liner approved firms

SPECIFICATION

UNIT LINER BHF-030 shall be manufactured from a synthetic rubber compound containing as the sole polymer not less than 45%, by weight, of Du Pont HYPALON for uncured film. It shall be a uniform 30 mils in thickness, smooth and free of pinholes, and it shall conform to the following physical requirements:

PHYSICAL PROPERTIES OF UNIT LINER BHF-030*
based on Du Pont HYPALON synthetic rubber

Property	Test Method	Requirement
Tensile strength	ASTM D412	1000 psi minimum
Elongation at break	ASTM D412	250% minimum
After heat aging (14 days @ 212°F.)	ASTM D412	
Tensile strength		1300 psi minimum
Elongation at break		150% minimum
Water resistance	ASTM D471	
% weight increase	7 days @ 70°F.	5% maximum
	14 days @ 120°F.	10% maximum
Low temperature properties		
Cold bend test	ASTM D2136 (⅛" mandrel)	–30°F. No crack
Brittleness point	ASTM D746	–45°F.
Ozone resistance	ASTM D1149	
	300 pphm, 20% strain	
	104°F. for 400 hours	No effect

*Materials made in U.S.A.

UNIT LINER COMPANY


BHF-030

UNIT LINER COMPANY

DESCRIPTION

This file sheet describes UNIT LINERS based on Du Pont HYPALON® synthetic rubber for use as an impervious barrier where fluid containment service conditions are severe.

APPLICATIONS

This elastomeric liner has been expressly developed to contain oilfield fluids in:

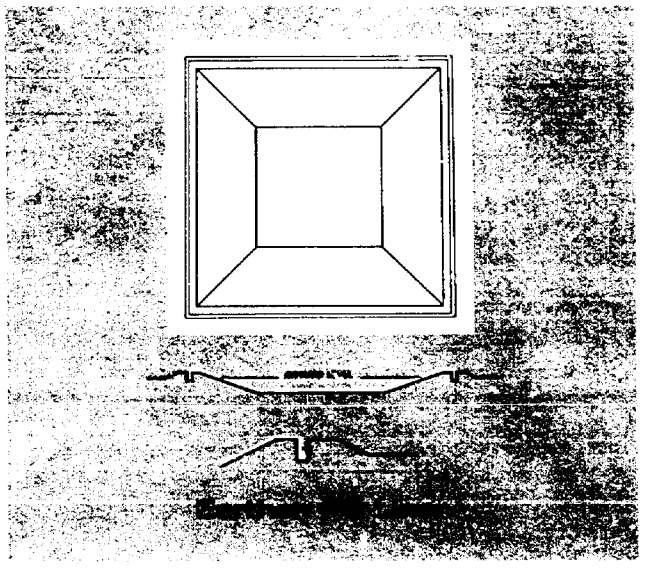
- Earthen pits
- Port-a-Line tanks

AVAILABLE TYPES

The earthen pit liner of HYPALON is manufactured to size in one piece as specified. For pits larger than 20,000 square feet, the liner is prefabricated into maximum size sections and joined in the field. Steel Port-a-Line tanks with a liner of HYPALON are provided in incremental diameters from 12 feet to 120 feet.

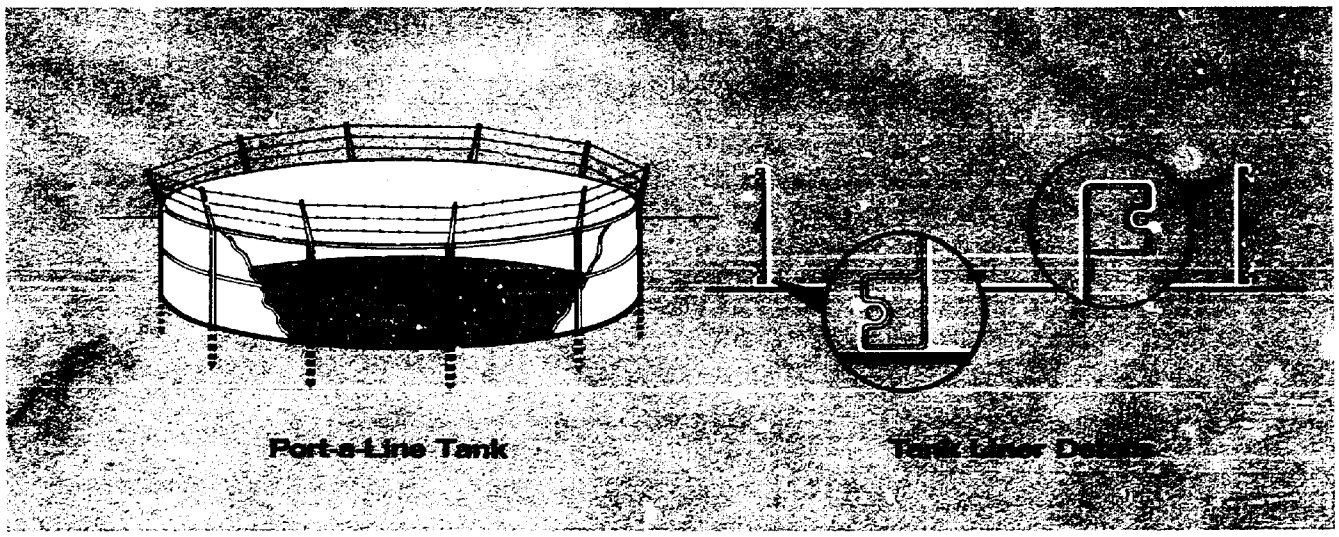
ADVANTAGES

- Economically prevents escape of oilfield fluids
  Low cost per year of service
- Easy to transport and install
- Minimum installation preparation
- Seams are electronically welded for maximum strength
- Component parts selected for maximum service life



Advantages due to the properties of Du Pont HYPALON

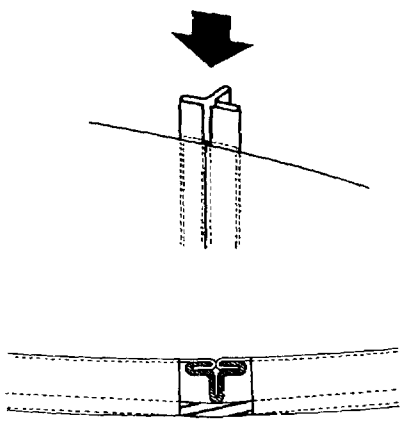
- highly resistant to hail damage
- excellent aging and weathering characteristics
- flexible and elastic over a wide temperature range
- highly resistant to hydrocarbon oils, fuels, salt brine, chemicals
- resists mold, mildew, fungus
- resists puncture and tearing



INSTALLATION

1. **Earthen Pits.** A pit to desired dimensions is excavated. Exercise care to assure straight, level and uniform sides, slopes and bottom. All sharp debris is removed. The liner of HYPALON, prefabricated to size, is unrolled in the pit and the edges are anchored.

2. **Port-a-Line Tanks.** Four-feet-high by eight-feet-long steel sections are assembled into a circle on level and smooth soil. The liner of HYPALON, prefabricated to tank dimensions, is installed and secured by preformed extrusions electronically welded to the liner.



Details of Connector Cleat and Cable Clamp

OTHER CONSIDERATIONS

- Review fluid contaminants with Unit Liner Company
- Installation should be by Unit Liner approved firms

SPECIFICATION

UNIT LINER BHF-030 shall be manufactured from a synthetic rubber compound containing as the sole polymer not less than 45%, by weight, of Du Pont HYPALON for uncured film. It shall be a uniform 30 mils in thickness, smooth and free of pinholes, and it shall conform to the following physical requirements:

PHYSICAL PROPERTIES OF UNIT LINER BHF-030*
based on Du Pont HYPALON synthetic rubber

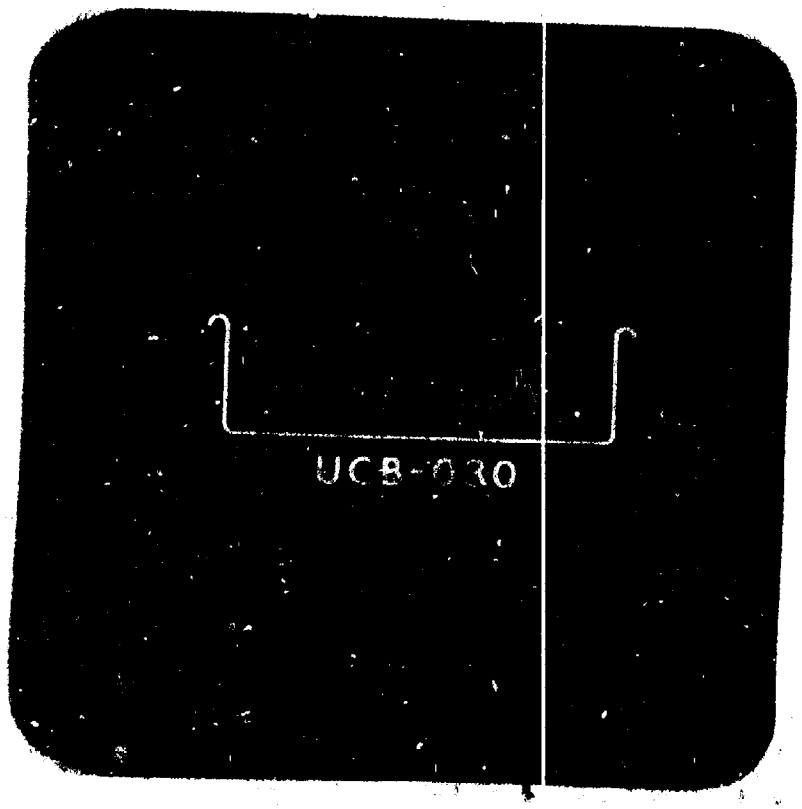
Property	Test Method	Requirement
Tensile strength	ASTM D412	1000 psi minimum
Elongation at break	ASTM D412	250% minimum
After heat aging	ASTM D412 (14 days @ 212°F.)	
Tensile strength		1300 psi minimum
Elongation at break		150% minimum
Water resistance	ASTM D471	
% weight increase	7 days @ 70°F.	5% maximum
	14 days @ 120°F.	10% maximum
Low temperature properties		
Cold bend test	ASTM D2136 (⅛" mandrel)	−30°F. No crack
Brittleness point	ASTM D746	−45°F.
Ozone resistance	ASTM D1149 300 pphm, 20% strain 104°F. for 400 hours	No effect

*Materials made in U.S.A.

UNIT LINER COMPANY

FORM NO. 6801

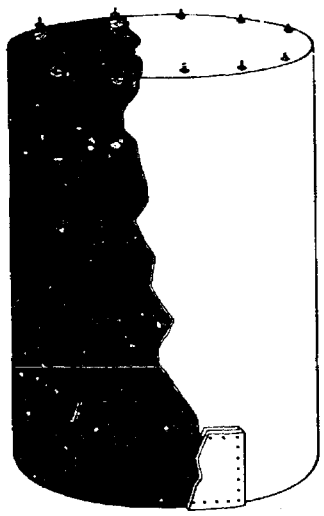
PRINTED IN U.S.A.


UCB-030

UNIT LINER COMPANY

DESCRIPTION

This file sheet describes UNIT LINERS based on UCB-030 Polymeric Vinyl Film for use as an effective impervious barrier to oilfield and related fluids.



STANDARD TANK

APPLICATIONS

This lining has been specifically designed to exhibit excellent resistance to degradation by fluids containing hydrocarbon oils, salt brine, or chemicals in:

- STANDARD TANKS—WELDED-BOLTED-WOODEN
- EARTHEN PITS
- PORT-a-LINE TANKS

AVAILABLE TYPES

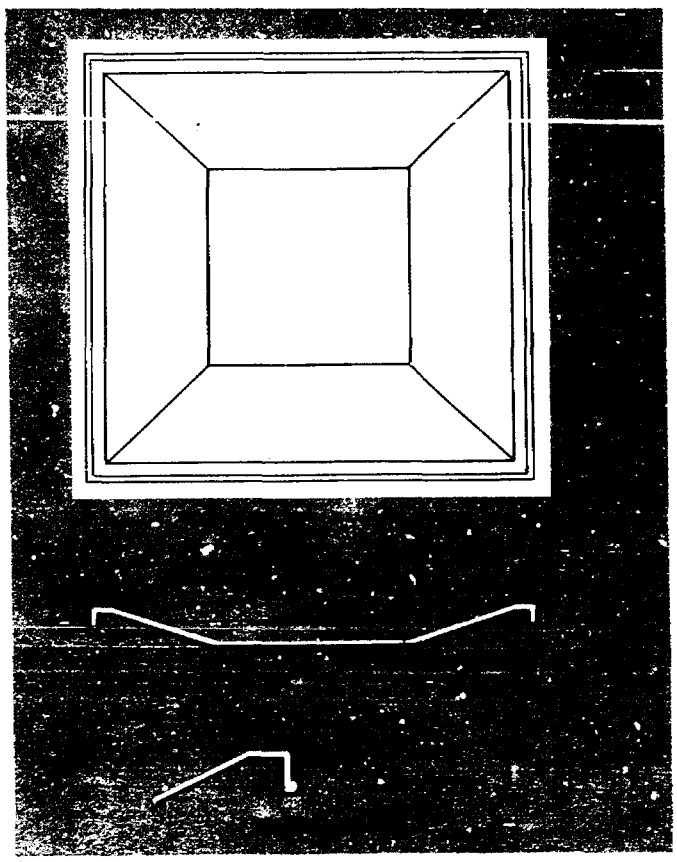
Tank liners of UCB-030 are prefabricated to fit standard API steel tanks (welded or bolted) and, where applicable, incorporate flanges designed to fit extended-neck type cleanouts. UCB-030 liners for Earthen Pits are one-piece prefabricated to size. For pits larger than 20,000 square feet, maximum size sections are joined in the field. UCB-030 Liners are provided in incremental diameters from 12 feet to 120 feet to fit Port-a-Line Tanks in heights from 4 feet to 8 feet. Liners to fit non-standard sizes or types can be custom made on special order.

ADVANTAGES

- Positively prevents escape of harmful or deleterious fluids
- Seams electronically welded for maximum strength
- Easy to handle, transport and install
- Minimum installation preparation
- Effective, low cost per barrell storage

ADVANTAGES DUE TO PROPERTIES OF UCB-030

- Stable homogeneous product—no further treatment or curing required
- Remains flexible over wide temperature range—good low temperature properties
- Good light stability and weathering characteristics
- High tear and puncture resistance
- Resists mold, mildew and fungus



INSTALLATION

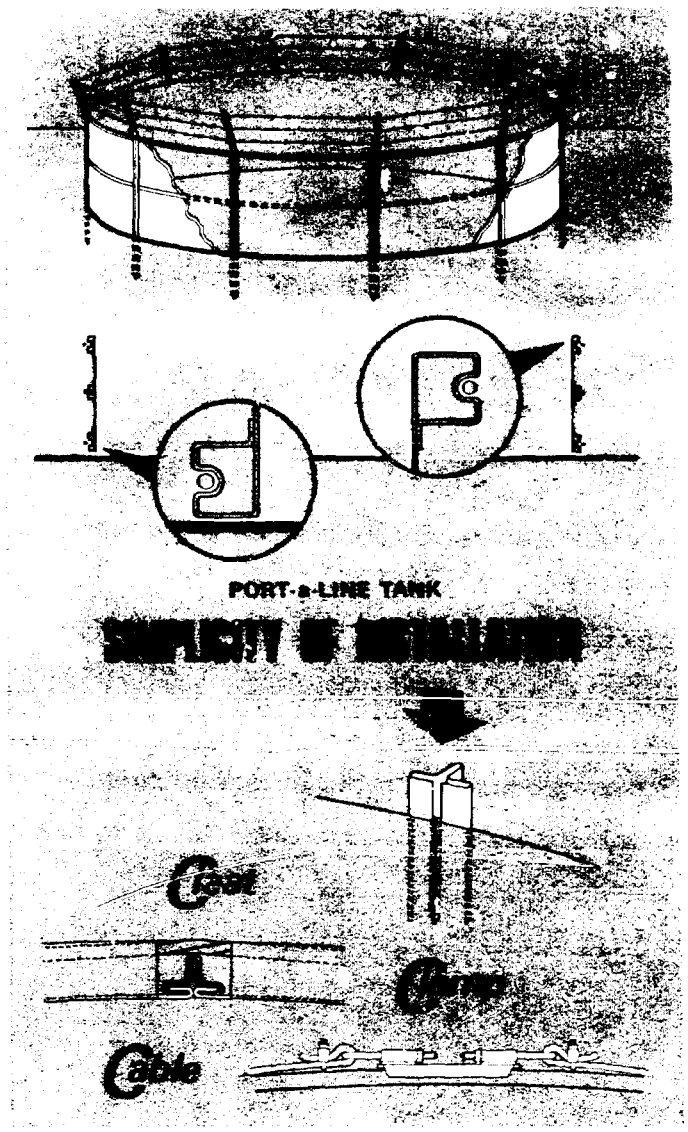
1. Tank Liners. All sharp objects or protrusions in the tank must be removed or covered to protect liner. "J" bolts are installed around the periphery of the top of the tank. Tubing is inserted through the hem around the top of the liner and the liner is drawn to the top of the tank and suspended from the "J" bolts.

2. Earthen Pits. A pit to desired dimensions is excavated. Excercise care to assure straight, level and uniform sides, slopes and bottom. All sharp debris is removed. A cushion of fine sand 2" to 3" thick is spread over the pit area. The liner, prefabricated to size, is unrolled in the pit and the edges anchored.

3. Port-a-Line Tanks. Prefabricated steel sections eight feet long are assembled into a circle on level soil covered by 2" to 3" sand cushion. The liner, prefabricated to tank dimensions, is installed and secured by preformed extrusions electronically welded to the liner.

OTHER CONSIDERATIONS

- Review fluid contaminants with Unit Liner
- Installation should be by Unit Liner company approved firms



SPECIFICATION

Unit Liner UCB-030 —A polymeric vinyl film manufactured from a thermoplastic polymer compounded by Union Carbide Corporation for Unit Liner Company. It shall be 30 gauge, uniform in thickness, smooth and free from pinholes and shall conform to the following Typical Test Values:

Tensile Strength, p.s.i.	
Machine Direction	2332
Transverse Direction	2061
Elongation, %	
Machine Direction	366
Transverse Direction	353
100% Modulus, p.s.i.	
Machine Direction	995
Transverse Direction	946
Graves Tear, lbs/inch	
Machine Direction	307
Transverse Direction	316
Low Temperature Impact	−12°F
Flammability, 45° S.P.I. Test— Self Extinguishing	

Unit Liner Company
P.O. Drawer 1460
Wewoka, Oklahoma 74884

Unit Liner Company
P.O. Box 15495
Tulsa, Oklahoma 74115

FORM NO. ULO568

PRINTED IN U.S.A.

GOVERNOR
DAVID F. CARGO
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

August 13, 1968

Mr. David White
Pan American Petroleum Corporation
Post Office Box 1410
Fort Worth, Texas 76101

Re: Case No. 3806
Order No. R-3221-B-1
Applicant:
OCC

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. Porter, Jr.
A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC
Other Mr. Ralph Gray

GOVERNOR
DAVID F. CARGO
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
GUYTON B. HAYS
MEMBER

P. O. BOX 2088
SANTA FE

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY - DIRECTOR

July 25, 1968

Re: Case No. 3806
Order No. R-3221-B

Mr. David White
Pan American Petroleum Corporation
Post Office Box 1410
Fort Worth, Texas

Applicant:

OCC

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Very truly yours,

A. L. PORTER, Jr.
Secretary-Director

ALP/ir

Carbon copy of drder also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC
Other Mr. Ralph Gray, Artesia, New Mexico

April 14, 1967

Frank E. Irby, Chief, Water Rights Division

Fred H. Hennighausen, District Supervisor

Disposal of water used in the Processing of Potash

Attached is a report from E. C. Barry to me concerning an investigation he made of the disposal of water used in the processing of potash in Lea and Eddy Counties, New Mexico. As noted in his summary, the potash companies are disposing of some 14,000 acre feet of highly salinized brines per year in open, unlined ponds. The National Potash Company has installed facilities to pump excess brines into Laguna Plata, a natural depression which covers several sections and at the present time has a large surface area of water impounded. We will immediately obtain samples of the water in this lake, which has a large drainage area, to determine what the present quality is. Within the next few years Kermac Potash Company plans to commence a new disposal area north of the present disposal area and which will cover about 1,000 acres.

We will continue our investigations and attempt to obtain quality of water data from shallow wells in the area. There is reportedly some stock wells of fair quality in the vicinity.

Fred H. Hennighausen
District Supervisor

FHH:td
encl.

C O P Y

Case 3806 Exhibit #3

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Oce Exhibit No. 3
Case No. 3806

XERO COPY

April 14, 1967
VI-U-4; VI-C-4

Fred H. Hennighausen, District Supervisor

E. C. Barry, Basin Supervisor

Disposal of water used in the processing of potash

There are six active potash companies within Eddy County, New Mexico and one in Lea County, New Mexico. All seven dispose of water used in the processing of potash by gravity flow through earthen or concrete ditches or through steel pipelines. The flow is directed by gravity into depressions, or sinks, where it evaporates and seeps underground.

The oldest plant operation, which is now owned by U. S. Borax, dates back to 1931. The other plants, in order of beginning operation are, the Potash Company of America, International Minerals, Duval, National Potash, Southwest Potash and Kermac Potash which started in 1965.

Figures on quantities of potash produced by each company are released only to the New Mexico Mining Commission. The details of processing are not generally made available, however, the basic methods used are flotation and fractional crystallization, and one company reported that out of eight tons of ore only one ton of potash is recovered, leaving seven tons of every eight mined to be disposed to the tailing pile. The resultant brine water after ore processing is used to sluice the tailings to the disposal ponds. The average amount of fresh water used by each company is approximately 2,400 acre feet per annum.

The method of disposing of the tail water having a high content of brine and dissolved solids (sodium chloride and potassium chloride and smaller amounts of calcium and magnesium chlorides and sulphates) is the same by all companies. On March 27, 1967 a field check was made by E. C. Barry to determine the approximate size of the evaporation ponds. A sample of tail water disposal was taken to determine the chlorides and specific conductance. A map showing the location of disposal ponds is attached to this report. A summary of the field check and other information is as follows:

U. S. Borax: The refinery is located in Section 13, Township 23 South, Range 28 East, and the flow of the tail water is to the southeast of the plant into a salt lake located in Sections 17 and 18 of Township 22 South, Range 29 East. The lake area is very large and covers several sections. A sample taken within the plant area indicates 131,000 ppm of chloride.

Part of the fresh water supply is obtained from a water well (C-791) located in the [illegible] of Section 13, Township 23 South, Range 28 East. This well is supplemental to Pecos River rights for a total of 6,518.625 acre feet per annum under surface

files 302 and 302-Amended, 717.2 acre feet per annum under files 1856 and 1955-Combined and 15 cubic feet per second under file 1942. No other source of fresh water was found at the time of the field check.

The company estimates 5½ cfs of water is disposed of in the salt lake each year. If on a 350-day continuous basis, this would approximate 3,020 acre feet per annum of brine water.

In addition to the refinery, U. S. Borax operates a granular plant at the mine in Township 19 South, Range 30 East, NMPM. At this plant water is supplied by three on-site wells (not declared) and shaft water approximating 403 acre feet per annum. Approximately 355 acre feet of brine is disposed of in a salt tailings dump.

International Minerals: The plant is located in Section 12, Township 22 South, Range 29 East and the flow of the tail water is to the south and southeast of the plant where it flows into a lower area. The area is very large and covers several sections. A sample taken within the plant area indicates 11,220 ppm of chloride.

The fresh water supply is obtained from two water wells, C-110 and C-111, both located in the east one-third of Lot 9, La Huerta subdivision of Section 31, Township 21 South, Range 27 East. Declarations C-110 and C-111 claim an annual use of 2,000 gpm from each well. No other wells or source of fresh water was found at the time of the field check. In reply to our letter of March 23, 1967, attached to this report, it was stated that fresh water input is 2,500 gpm and output of brine water to the disposal area was 1,500 gpm at the current rate of production. Totalizing meter reports indicate 3,480.6 acre feet of fresh water used during 1966 and at the ratio of 2,500 to 1,500, would be 2,088 acre feet per annum of brine water.

Potash Company of America: The plant is located in Section 4, Township 20 South, Range 30 East, and the flow of the tail water is to the west and south of the plant. The area is very large and covers several sections. A sample taken within the plant area indicates 10,050 ppm of chloride. The fresh water supply is obtained from water wells L-1880 through L-1884 and Enlarged, and L-1880 through L-1884-Combined-S, located respectively in the SW¼SE¼SW¼, SW¼SW¼SW¼, SE¼SW¼SE¼, SE¼SE¼SE¼, NW¼SE¼SW¼, all in Section 13, Township 17 South, Range 33 East, and the SE¼SW¼SW¼ of Section 12, Township 17 South, Range 33 East. The total appropriation from the 6 wells is limited to 3,950 acre feet per annum. Totalizing meter reports indicate 1,089 acre feet was used from the 6 Lea County basin wells during 1966. The field check disclosed that the company has other water wells on the plant location to supplement their supply,

however, these wells have not been recorded with this office although they are now within the Capitan basin. A reply to our letter of March 23, 1967 stated that 750 ppm reached the lake disposal area. This would approximate 1,160 acre feet on a 350-day basis.

Duval Corporation: The plant is located in Section 31, Township 20 South, Range 30 East, and the flow of the tail water is to the west of the plant. The area is very large and covers several sections. A sample taken within the plant area indicates 90,200 ppm of chloride. The fresh water supply is obtained from water wells L-3616, L-3617, L-3594 and L-5284, located respectively in the SE¼SW¼NW¼ of Section 21, the SW¼SW¼SE¼ of Section 20, the SW¼SW¼ of Section 21 and the NE¼NE¼SE¼ of Section 21, all in Township 17 South, Range 34 East. The total permitted appropriation from all wells is 2000 acre feet per annum. Totalizing meter reports indicate 1,416 acre feet was used from these wells during 1966. No other source of fresh water was found at the time of the field check. A reply to our letter of March 23, 1967 indicates 85% (or 1,204 acre feet) would be disposal brine water.

National Potash: The plant is located in Section 18, Township 20 South, Range 32 East, and the flow of the tail water is to the east and north of the plant. The area is very large and covers several sections. A sample taken within the plant area indicates 14,680 ppm of chloride. The fresh water supply is obtained from water wells L-1613, L-1614, L-1613 & L-1614-Combined-S, L-2347, L-2348, L-2349 and L-2350, located respectively in the SW¼NW¼SE¼ of Section 11, the SW¼NW¼SE¼ of Section 12, the W½ of Section 2, all in Township 18 South, Range 34 East, and in the SW¼SW¼ of Section 10, the SW¼SW¼ of Section 9, the SE¼NW¼SE¼ of Section 7, and the SE¼NW¼SW¼ of Section 8, all in Township 18 South, Range 35 East. The total permitted appropriation from all wells is 4,830 acre feet per annum. Totalizing meter reports indicate 1,269 acre feet was used during 1966. No other source of fresh water was found at the time of the field check.

A reply to our letter of March 23, 1967 indicates that approximately 350,000,000 gallons, or 1,074 acre feet per year, is brine disposal water.

Southwest Potash: The plant is located in Sections 9 and 10 of Township 19 South, Range 30 East and the flow of the tail water is to the east of the plant. The area is very large and covers several sections. A sample taken within the plant area indicates 188,200 ppm of chloride. The fresh water supply is obtained from wells under files L-1695, L-1696, L-1697, L-3398 and L-3795, located respectively in the SE¼SE¼NE¼ of Section 25, Township 17 South, Range 33 East, and the SE¼SE¼SW¼ of

Section 30, the SE¼SE¼SW¼ of Section 30, the SW¼NE¼NE¼ of Section 28, the NW¼NW¼ of Section 26, all in Township 17 South, Range 34 East. The total appropriation under all files is 3,972 acre feet per annum. Totalizing meter reports indicate 1,901 acre feet was pumped from these wells in 1966. The company has two additional wells to this supply of fresh water recorded under files CP-378 and CP-379, located respectively in the NW¼SE¼SE¼ of Section 9 and in the SW¼NW¼SW¼ of Section 10, both in Township 19 South, Range 30 East. A sample taken from well CP-379 indicates 124,000 ppm of chloride. The claimed appropriation under CP-378 and CP-379 is a total of 1,855 acre feet per annum. A reply to our letter of March 23, 1967 indicates that 972,964,000 gallons (2,986 acre feet) of fresh and brackish water was used last year and that nearly all was routed to the tails disposal area.

Kermac Potash Company: The plant is located in Section 4, Township 21 South, Range 31 East, and the flow of the tail water is to the south and southwest of the plant. Field check of this plant was also made May 9, 1966. The area is very large and covers several sections. A sample was taken from the evaporation lake and the results indicate 178,000 ppm of chloride. The fresh water supply is obtained from wells under files L-2722, L-2723, L-2724, L-2725 and L-3068, located respectively in the SW¼NW¼NW¼ of Section 1, the NE¼SW¼ of Section 2, both in Township 18 South, Range 34 East, the SE¼ of Section 35, the SW¼SW¼SW¼ of Section 36 and the SE¼ of Section 34, all in Township 17 South, Range 34 East. The total appropriation of these permits is 3,810 acre feet per annum. Use, according to meter records, in 1966 was 1,774 acre feet. Judging from other plants and disposal brine probably is about 1,500 acre feet per year.

In summary, seven potash companies in the area between Carlsbad and Hobbs and southeast of Carlsbad are disposing of some 14,000 acre feet per annum of highly concentrated brines in eight open, unlined ponds where the water either evaporates or seeps underground.

E. C. Barry
Basin Supervisor

ECB-td
Attachments:
map
letter 3-29-67 from U. S. Borax
" 3-30-67 " International Minerals
" 3-31-67 " Potash Company of America
" 3-20-67 " Duval Corporation
" 3-28-67 " National Potash
" 3-28-67 " Southwest Potash

[redacted] EX - 5-A

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION		CHLORIDES
1.	Lovington San Andres	57	29,454	60,029	SWD		4,899
2.	West Lovington San Andres	59	28,589	53,190	SWD		65,320
3.	Hume Queen	24	11,519	58,192	SWD		124,960
4.	West Hume Queen	2	475	-0-	---		---
5.	Mesa Queen	29	6,478	2,053		Pit	172,530
6.	North Square Lake Grayburg San Andres	48	6,096	51		Pit	52,540
7.	Henshaw Queen Grayburg San Andres	6	722	-0-	---		---
8.	Square Lake Grayburg San Andres	364	58,340	65,446	SWD 12,577	Pit 52,869	65,630
9.	West Henshaw Grayburg	79	2,821	376		Pit	---
10.	High Lonesome Queen	69	49,852	34,872	SWD 31,177	Pit 3,695	149,632
11.	Cave Grayburg	57	21,531	42,998	SWD		65,675
12.	Forest San Andres	19	163	-0-			---
	East Red Lake Queen Grayburg	39/58	1,506	13		Pit	---
13.	Dog Canyon Grayburg	5	301	127		Pit	---
14.	Eagle Creek San Andres	3	186	-0-	---		---
15.	Empire Yates Seven Rivers	133	911	49		Pit	133,480
16.	Red Lake Grayburg San Andres	207	23,517	21,973		Pit	116,679

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION		CHLORIDES
17.	Aid Yates Seven Rivers	13	300	-0-	---		---
18.	Grayburg Jackson Queen Grayburg SA	795	164,760	114,544	SWD 5,583	Pit 108,961	69,775
19.	Fren Seven Rivers	103	5,738	153		Pit	---
20.	Maljamar Grayburg San Andres	686	243,388	122,658	SWD 26,868	Pit 95,790	96,093
21.	Baish Yates	9	1,021	932		Pit	---
22.	Pearsall Queen	33	12,727	4,914		Pit	---
23.	Corbin Yates	2	94	24			---
	Corbin Queen	25	2,124	291			---
		27	2,218	315		Pit	
24.	Vacuum Grayburg San Andres	528	348,713	65,210			---
	Vacuum Queen	3	-0-	-0-			---
	Vacuum Yates	10	2,007	154			---
		541	350,710	65,364		Pit	
25.	South Carter San Andres	13	5,330	2,073		Pit	68,000
26.	Bishop Canyon San Andres	7	2,234	10,115		Pit	3,200
	Bishop Canyon Queen	2	692	-0-			---
		9	2,926				
27.	East Hobbs San Andres Grayburg	25	11,125	26,483		Pit	8,505
28.	Hobbs Grayburg San Andres	353	345,388	334,756			5,150
	Bowers Seven Rivers	61	2,973	278			---
		414	348,361	335,034	SWD		

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION		CHLORIDES
29.	Arkansas Junction Queen	11	-0-	-0-			---
	Arkansas Junction San Andres	1	912	2,620	Pit		7,171
30.	East E. K. Queen	6	3,176	882	Pit		179,630
31.	EK Yates Seven Rivers Queen	88	10,664	6,574	Pit		42,890
32.	South Corbin Queen	5	2,541	10	Pit		---
33.	Querecho Plains Delaware	1	132	217	Pit		153,005
34.	South Maljamar Grayburg	1	19	14	Pit		---
35.	Young Queen	29	3,038	1,520	Pit		164,000
36.	Watkins Grayburg	1	657	-0-	---		---
37.	Shugart Yates Seven Rivers Queen	7	7,136	1,186	SWD 292		85,370
	Shugart Delaware	237 / 244	47,446 / 54,582	7,491 / 8,677		Pit 8,385	140,225
38.	Tamano San Andres	2	405	-0-	---		---
39.	Leo Queen Grayburg	7	321	-0-	---		---
40.	North Benson Queen Grayburg	46	17,070	1,541		Pit	---
41.	Loco Hills Grayburg San Andres	336	159,440	272,983	SWD		17,040
42.	Turkey Track Queen Grayburg	59	5,150	1,121		Pit	55,380
	Turkey Track Seven Rivers	5 / 64	141 / 5,291	-0- / 1,121			---
43.	Artesia Queen Grayburg San Andres	581	61,130	53,356	SWD 25,971	Pit 32,385	53,782

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION	CHLORIDES
44.	Dayton Grayburg	13	132	8		---
	Dayton San Andres	2	10	5	Pit	---
		15	142	13		
45.	Atoka Grayburg	8	401	826		---
	Atoka San Andres	76	18,346	12,623		---
		84	18,747	13,449	SWD	
46.	Penasco Draw San Andres Yeso	7	1,780	Est. 100	Pit	99,400
47.	Millman Grayburg	10	750	91	Pit	---
48.	East Millman Seven Rivers Queen Grayburg	74	15,569	21,812	SWD 2,755 Pit 19,057	100,497
49.	East Turkey Track Queen	9	370	-0-	---	---
50.	Red Hills Yates	3	33	-0-	---	---
51.	East Benson Yates	4	327	64	Pit	---
52.	North Hackberry Yates	49	7,226	2,597		40,470
	Hackberry Seven Rivers	3	464	2,211		---
		52	7,690	4,508	Pit	
53.	West Lusk Yates	4	339	338	Pit	33,320
54.	Lusk Yates	7	495	1,141	Pit	11,289 25,600
55.	West Tonto Yates	7	3,945	9,026	Pit	---
56.	South Tonto Yates	6	495	781	Pit	---
57.	Pearl Queen	199	203,502	129,414	SWD 107,688 Pit 21,726	126,655
	Pearl Seven Rivers	1	769	-0-		---
		200	204,271	129,414		

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION	CHLORIDES
58.	East Pearl Queen	1	3	7	Pit	---
59.	Eumont Yates Seven Rivers Queen Oil	631	83,974	239,467		31,400
	Eumont Yates Seven Rivers Queen Gas	407 1,038	729 84,703	1,067 240,534	SWD 231,724 Pit 8,810	3,137
60.	Monument Grayburg San Andres	487	291,113	810,085	SWD	4,696
	Eunice Grayburg San Andres	316 803	120,230 411,343	206,479 1,016,564	SWD 189,052 Pit 17,427	91,147
61.	House San Andres	8	957	145	Pit	93,365
62.	Skaggs Grayburg	80	18,673	28,509	SWD 23,849 Pit 4,760	84,845
63.	North Wilson Yates Seven Rivers	1	43	14	Pit	---
64.	Lynch Yates Seven Rivers	58	28,406	100,404	Pit	26,070
65.	Lea Yates	1	59	-0-	---	---
66.	Middle Lynch Yates	2	1,581	458	Pit	---
67.	San Miguel Yates Seven Rivers	1	279	122	Pit	---
68.	North Lynch Yates Seven Rivers	2	592	90	Pit	---
69.	Teas Yates Seven Rivers	21	3,424	1,618	Pit	22,152
70.	West Teas Yates Seven Rivers	8	9,776	2,943	Pit	---
71.	Salt Lake Yates	6	2,124	5,222	Pit	6,781
72.	Halfway Yates	5	450	3,038	Pit	14,768
73.	Parallel Delaware	2	558	389	Pit	186,020
74.	PCA Yates	6	694	2,375	Pit	---

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION		CHLORIDES
75.	Dos Hermanos Yates Seven Rivers	16	3,325	102,802		Pit	15,925
76.	Barber Yates	10	3,998	26,288		Pit	17,466
77.	Scanlon Delaware	1	235	-0-	---		---
78.	Russell Yates	65	4,331	45,402	SWD 18,600	Pit 26,802	20,022
79.	Saladar Yates	10	320	15		Pit	20,176
80.	McMillan Seven Rivers Queen	14	405	2,430		Pit	1,420
81.	Carlsbad Delaware	1	190	-0-	---		99,045
82.	Cedar Hills Yates	4	270	850		Pit	4,580
83.	West Wilson Seven Rivers	7	675	13,612		Pit	---
84.	Wilson Yates Seven Rivers	51	7,267	32,922		Pit	5,015
85.	North San Simon Yates	19	1,186	1,169		Pit	---
86.	Penrose Skelly Grayburg	195	21,102	20,292	SWD 1,165	Pit 19,127	5,276
87.	Arrowhead Grayburg	96	21,563	101,888		Pit	2,779
88.	South Eunice Seven Rivers Queen	287	42,613	57,313		Pit	14,450
89.	Jalmat Yates Seven Rivers Oil	418	93,285	716,280		Pit	27,821 4,382
90.	Quahada Ridge Delaware	1	11	68		Pit	---
91.	Dark Canyon Delaware	1	88	200		Pit	100,465
92.	Cass Draw Delaware	1	164	-0-	---		---
93.	Triste Draw Delaware	12	2,050	3,448		Pit	---

	POOL	NO. OF WELLS	OIL VOLUME	WATER VOLUME	DISPOSITION	CHLORIDES
94.	Cruz Delaware	6	3,263	7,481	Pit	---
95.	Langlie Mattix Seven Rivers Queen	1,218	148,471	332,708	SWD 36,781 Pit 295,927	41,890 5,242
96.	Teague Grayburg	1	33	-0-	---	---
97.	Dollarhide Queen	73	11,158	25,410	SWD	---
98.	Double X Delaware	19	5,123	8,405	Pit	---
99.	Malaga Delaware	20	1,058	2,099	Pit	94,075
100.	Sulfate Draw Delaware	1	60	55	Pit	---
101.	Corral Canyon Delaware	8	1,289	2,331	Pit	---
102.	Paduca Delaware	69	45,286	15,107	Pit	77,745
103.	West Jal Delaware	1	173	62	Pit	---
104.	Leonard Seven Rivers	2	141	-0-	---	---
105.	South Leonard Queen	15	1,016	976	Pit	115,375
106.	Rhodes Yates Oil	53	21,413	3,667	Pit	144,485
107.	Scarlorough Yates Seven Rivers	70	55,504	217,410	SWD 121,883 Pit 95,527	3,443
108.	Salado Draw Delaware	11	3,309	1,961	Pit	184,392
109.	El Mar Delaware	58	24,885	10,762	Pit	159,570
110.	East Mason Delaware	2	1,696	174	Pit	---
111.	Battleaxe Delaware	4	1,302	1,421	Pit	---

[illegible]	[illegible] Delaware	40	7,189	8,415	Pit	---
148.	Bandy Draw Delaware	8	1,425	372	Pit	79,875
149.	Pool Delaware	2	278	606	SWD	---
150.	Wells Delaware	4	428	-0-	---	---

	WELLS	OIL	WATER IN SWDS	WATER IN PITS	TOTAL WATER
TOTALS	10,714	3,062,639	1,698,036	2,183,660	3,881,696

WATER REQUIREMENTS AND USES IN NEW MEXICO MINERAL INDUSTRIES

By M. M. Gilkey and Ronald B. Stotelmeyer

* * * * * * * * * * * * information circular 8276

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

Core drilling for oil led to the discovery of potash in the Carlsbad area. This was in 1925. First production was in 1931, by the U.S. Potash Co., later called U.S. Borax & Chemical Co. By 1957 six companies were mining and processing potash in the area. Potash production in New Mexico, valued at $85.1 million in 1962, constitutes about 90 percent of total national production. About 95 percent is used for fertilizer.

Flotation and fractional crystallization are the two basic ore-treatment methods used to recover sylvite from the Carlsbad ores. Sylvite may be separated from halite by floating or depressing the sylvite, the medium being brine saturated with both sodium and potassium chlorides. The flotation reagent, usually amine chloride or amine acetate, is added to the deslimed pulp. After conditioning, the pulp is sent to flotation cells for recovery of the sylvite. The halite reject is repulped and pumped to a tailings disposal area. In the fractional-crystallization method, generally the crushed ore is mixed with hot saturated sodium chloride brine, which selectively dissolves the potassium chloride. Subsequent cooling of the brine results in separation of the potassium chloride by crystallization. Fractional crystallization may involve using a vacuum to effect rapid cooling.

Following are water-oriented descriptions of the potash operations.

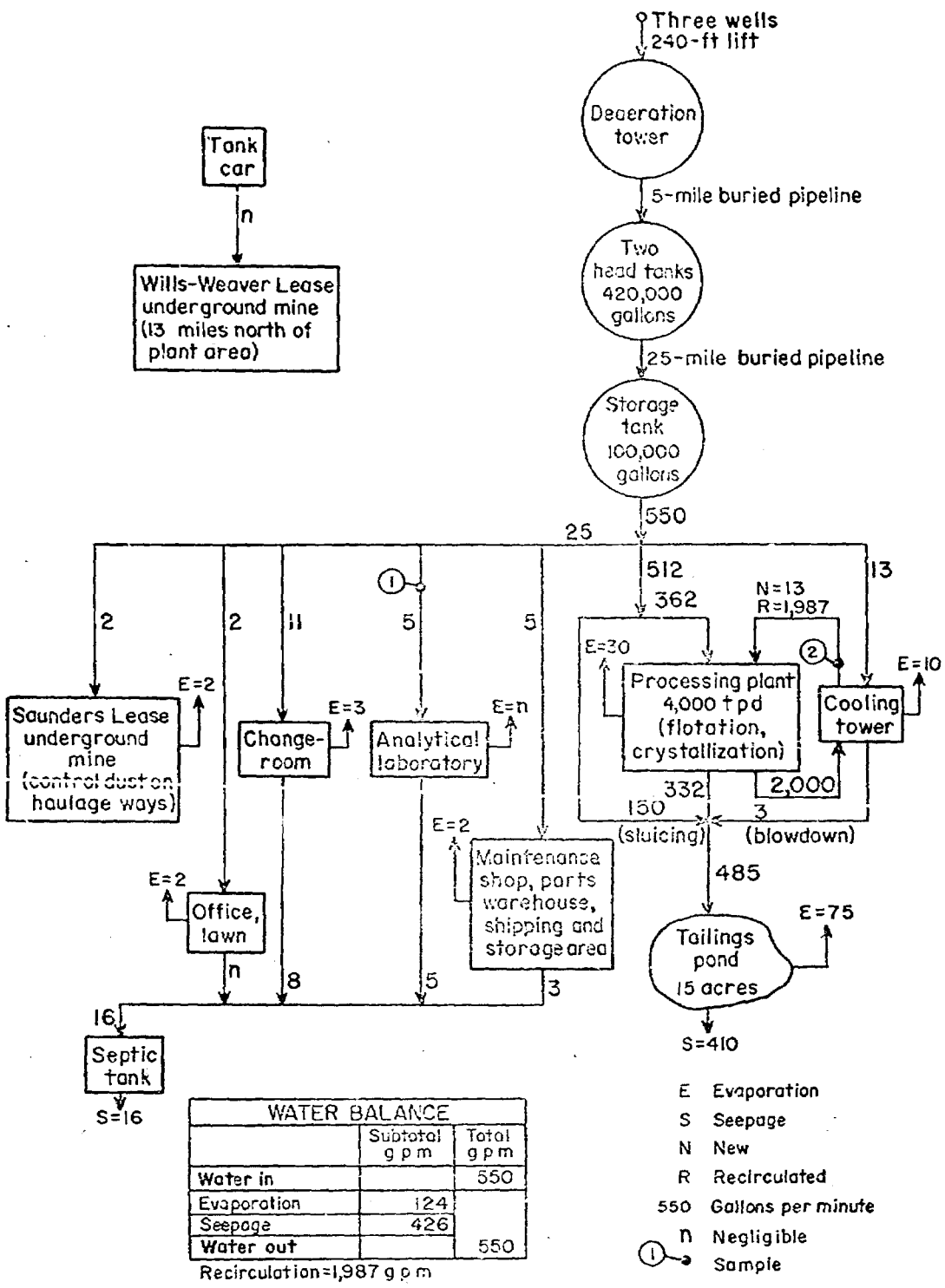
Duval Sulphur & Potash Co.

Twenty-two miles east of Carlsbad is a 4,000-tpd plant operated by Duval Sulphur & Potash Co. (fig. 5). The product is muriate of potash. The ore (sylvinite) comes from two underground mines, one in the plant area and one 13 miles to the north. All units are operated 365 days per year. Operations are on a three-shift basis except at the outlying mine where the work schedule is two shifts per day. Employees total 360.

Three wells provide the 550 gpm of makeup water needed for the operation (fig. 6). From a deaeration tower near the wells, the water is pumped 5 miles to two 210,000-gallon head tanks. Gravity flow delivers the water the remaining 25 miles to a 100,000-gallon storage tank. The pipeline is 12 inches in diameter at intake and 10 inches wide at discharge. The entire line is buried 4 feet.

Water requirements for the mines are small; all blast holes are auger drilled without water. At the Wills-Weaver Lease mine the negligible amount needed, all for domestic purposes, is brought in by tank car. The Saunders Lease mine, in the plant area, takes 2 gpm for dust control on underground haulage ways.

New water for processing and waste disposal totals 525 gpm. No water is needed for dust control in crushing operations; dust is collected by mechanical means. About 30 gpm is lost by direct evaporation and kiln-drying of product. Recirculation of 1,937 gpm for cooling in the crystallization section involves a loss of 10 gpm in the water-cooling tower. About 150 gpm of new water is added to the plant discharge; the total of 485 gpm is barely sufficient to sluice the 2,900 tpd (about 2 tons per minute) of waste to the



WATER BALANCE		
	Subtotal g p m	Total g p m
Water in		550
Evaporation	124	
Seepage	426	
Water out		550

Recirculation=1,987 g p m

FIGURE 6. - Schematic Waterflow Diagram, Duval Sulphur & Potash Co., Eddy County, N. Mex.

pond. The pond, about a mile from the mill, is in a permeable formation, which accounts for the small size of the pond and consequent relatively low evaporation loss. Seepage of 410 gpm represents nearly 80 percent of the water entering the processing system. Recirculation from the tailings pond would be economically infeasible, mainly because of high cost of removing slimes.

A total of 23 gpm of new water is required for the changeroom, laboratory, shop, warehouse, shipping and storage area, and office. A negligible amount of water goes to air conditioning.

The company has investigated water conservation possibilities by experimenting with lignin sulfonate, which is a dust palliative, and hexadecanol, an evaporation inhibitor. In both cases results were inconclusive. With recirculation of 1,987 gpm, the present water supply is sufficient.

Although the new water is potable, it requires deaeration to prevent corrosion in pipelines. Sodium sulfite is added as a scavenger in oxygen removal. The recirculated water is occasionally treated with small amounts of hydrochloric acid to remove scale from pipelines and the heat exchanger. Results of analyses of the new water (sample 1) and the recirculated water (sample 2) are given in the appendix.

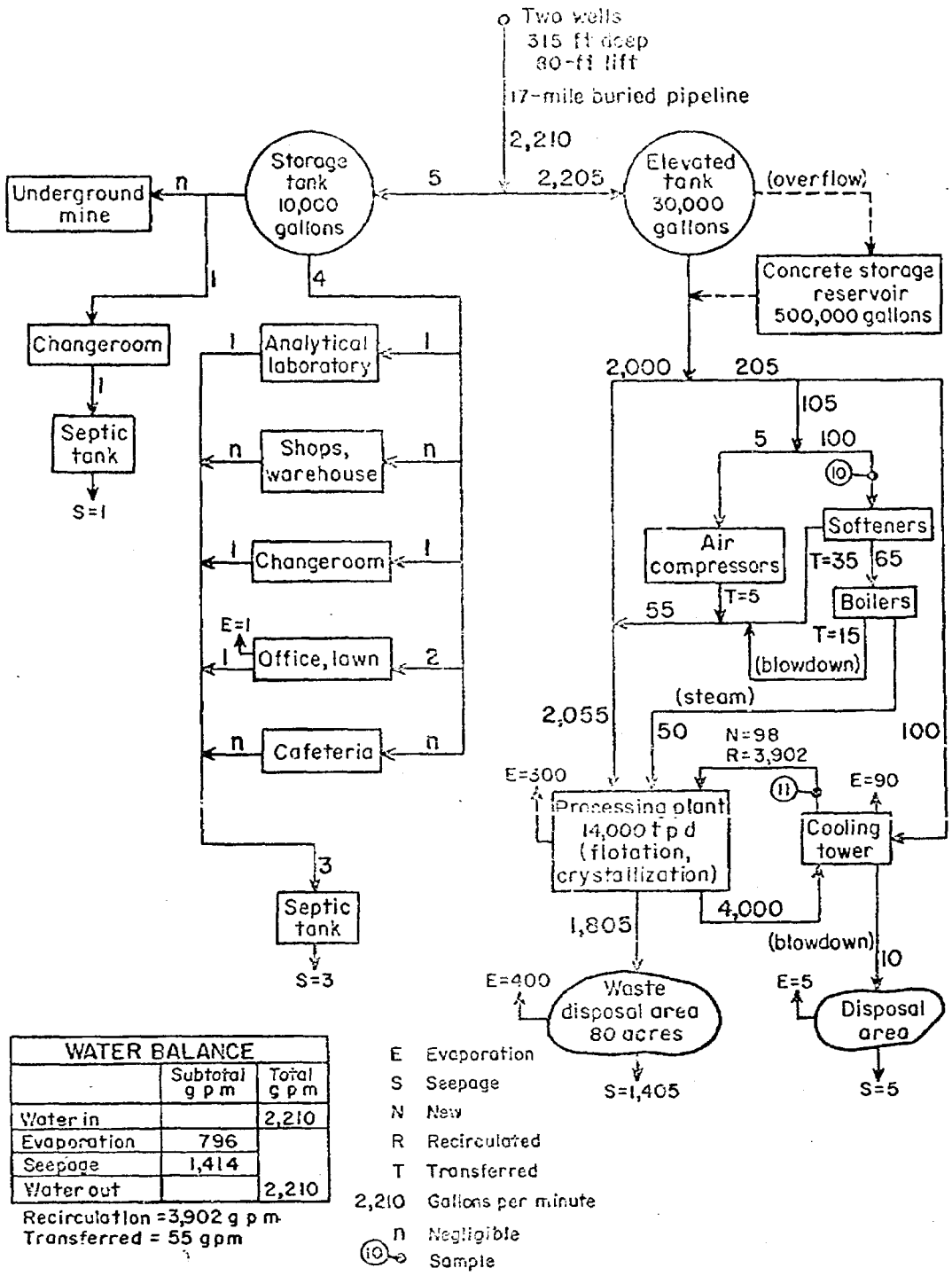
Cost of the new water, for power, maintenance, and treatment, is 15 cents per 1,000 gallons. For the same items, recirculated water costs an estimated 1 cent per 1,000 gallons.

International Minerals & Chemical Corp.

East of Carlsbad 27 miles are an underground potash mine and 14,000-tpd processing plant operated by International Minerals & Chemical Corp. (figs. 5 and 7). The plant products include muriate of potash, potassium sulfate, potassium magnesium sulfate, and chemical-grade potassium chloride. Both the mine and plant are operated three shifts per day, 350 days per year. Employees total 850.

All water is brought to the operations through a 17-mile buried pipeline from LaHuerta, a suburb of Carlsbad. Total new water for the operations is 2,210 gpm (fig. 8). Five gpm goes to a 10,000-gallon storage tank that supplies the mine and miscellaneous units requiring small amounts of water, mainly for domestic use. Water for processing and closely related uses, totaling 2,205 gpm, is delivered to a 30,000-gallon elevated tank with a connected concrete reservoir that receives the tank overflow.

About 2,000 gpm goes directly to processing operations, including flotation and crystallization. The water softeners and boilers take 100 gpm. Steam from the boilers, equivalent to 50 gpm, is used to heat solutions and to develop vacuum in the crystallizers. Fifty-five gpm from the air compressors, softeners, and boilers is transferred to processing intake. (The 35 gpm from the softeners is backwash and rinse water.) For cooling in the crystallization section, water is recirculated through cooling towers at 3,902 gpm.



WATER BALANCE		
	Subtotal g p m	Total g p m
Water in		2,210
Evaporation	796	
Seepage	1,414	
Water out		2,210

Recirculation = 3,902 g p m
Transferred = 55 g p m

E Evaporation
S Seepage
N New
R Recirculated
T Transferred
2,210 Gallons per minute
n Negligible
(10) Sample

FIGURE 8. - Schematic Waterflow Diagram, International Minerals & Chemical Corp., Eddy County, N. Mex.

Makeup water for the cooling tower amounting to 100 gpm compensates for evaporation and blowdown. Water losses in processing, totaling 300 gpm, result mainly from concentrating brine by evaporation, and from kiln drying of products. Tailings, largely sodium chloride, are pumped to a disposal area; total water carrying the discharged material is 1,805 gpm. Evaporation and seepage from this disposal area are estimated at 400 gpm and 1,405 gpm, respectively.

Cost of the new water is 12.1 cents per 1,000 gallons for power and maintenance.

Boiler feed is zeolite softened, and a patented compound is added for further conditioning.

Two water samples were analyzed; the results are given in the appendix. Sample 10 represents new water, and sample 11 represents water recirculated from the cooling towers.

National Potash Co.

Thirty-one miles east of Carlsbad is a 5,000-tpd plant operated by National Potash Co. (fig. 5). The product is muriate of potash. A company-operated underground mine in the plant area supplies 2,000 tpd of the sylvinite ore processed, and the remaining 3,000 tpd is purchased.

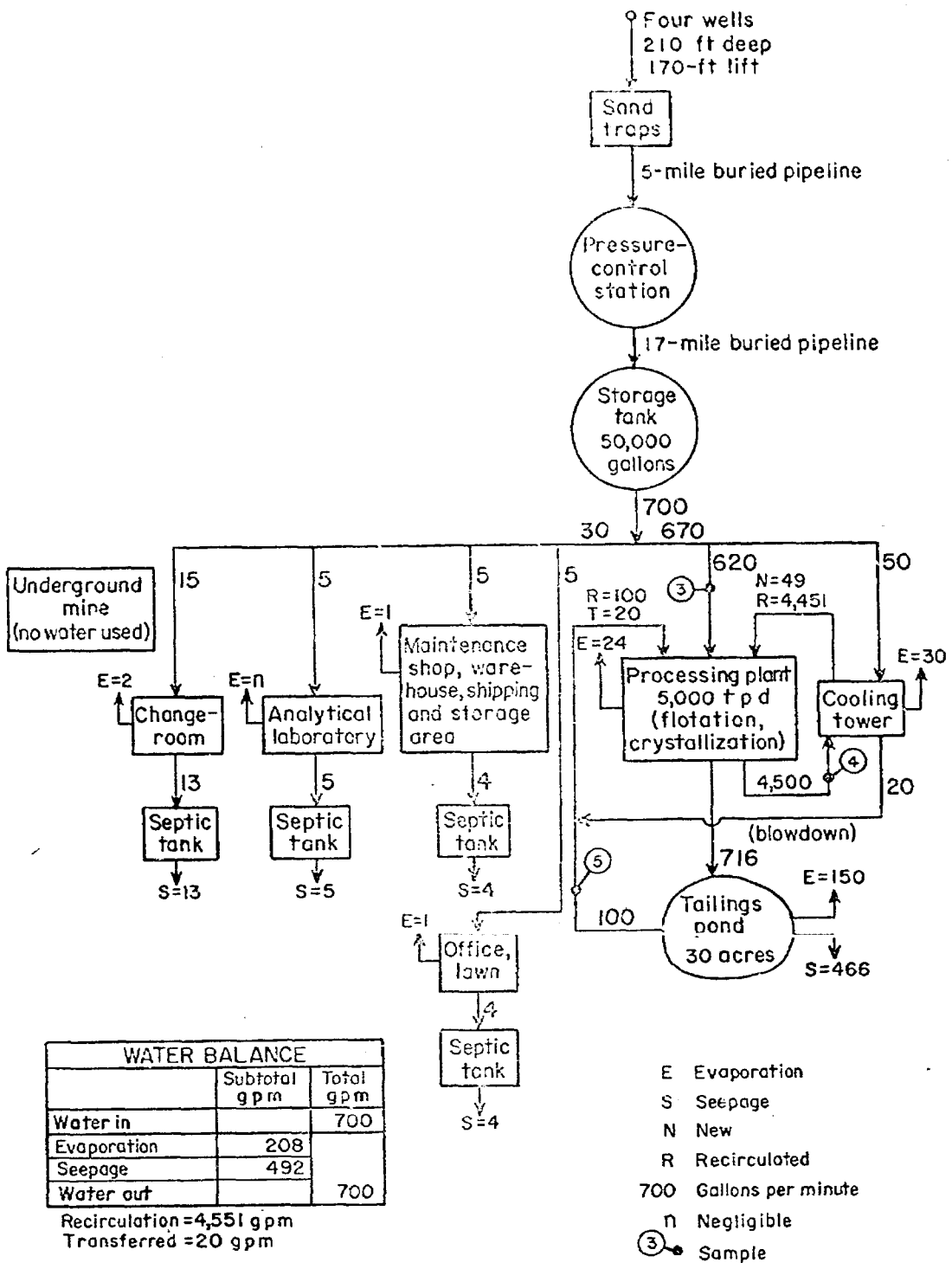
The processing plant is operated three shifts per day, 350 days per year, and the mine, two shifts per day, 260 days per year. Employees in company operations total 195.

All new water for the operation (fig. 9) comes from four wells in the Cap Rock area, about 22 miles to the northeast. The required 700 gpm is lifted 170 feet, then pumped 5 miles to a pressure-control station from which it flows by gravity to a 50,000-gallon storage tank in the plant area. The 10-inch concrete-lined pipeline is buried about 2 feet.

No water is required in the mine. Blast holes are auger drilled. In the crushing plant, dust is collected by mechanical means.

The processing system takes 670 gpm of new water, which is most of the new water used in the operation. About 24 gpm is lost by direct evaporation and in kiln drying of the product. An additional 30 gpm is evaporated at the cooling tower, from which 4,451 gpm is recirculated to the crystallization unit. Blowdown from the cooling tower, 20 gpm, joins the 100 gpm recirculated from the tailings pond to the flotation unit. Seepage into ground water from the 30-acre tailings pond accounts for 466 gpm, nearly 70 percent of the new water entering the system.

New-water intake for the changeroom, laboratory, shop, warehouse, shipping and storage area, and office totals 30 gpm. Seepage from the four septic tanks is 26 gpm.



WATER BALANCE		
	Subtotal gpm	Total gpm
Water in		700
Evaporation	208	
Seepage	492	
Water out		700

Recirculation = 4,551 gpm
Transferred = 20 gpm

E Evaporation
S Seepage
N New
R Recirculated
700 Gallons per minute
n Negligible
③ Sample

FIGURE 9. - Schematic Waterflow Diagram, National Potash Co., Lea County, N. Mex.

Total intake for the entire operation is 5,271 gpm. Of this amount, reused (recirculated and transferred) water constitutes 87 percent.

Water recirculated through the cooling tower is treated with sodium chromate to prevent corrosion in heat exchangers and pipes, and with hydrochloric acid to prevent scaling.

Materials used for softening boiler feed include sodium polyphosphate, sodium sulfite, and a patented compound. (Steam is used for heating brine and in crystallization.) Total cost of treating the new and recirculated waters is about $50 per day. Results of analyses of three samples of the water are given in the appendix. Sample 3 represents new water; sample 4, crystallization cooling water before it enters the cooling tower; and sample 5, recirculated water from the tailings pond.

Cost of the new water is 5.0 cents per 1,000 gallons for power and maintenance, these two items being about equal. For all recirculated water the reported cost is 3.0 cents, including 0.5 cent for power and 2.5 cents for maintenance.

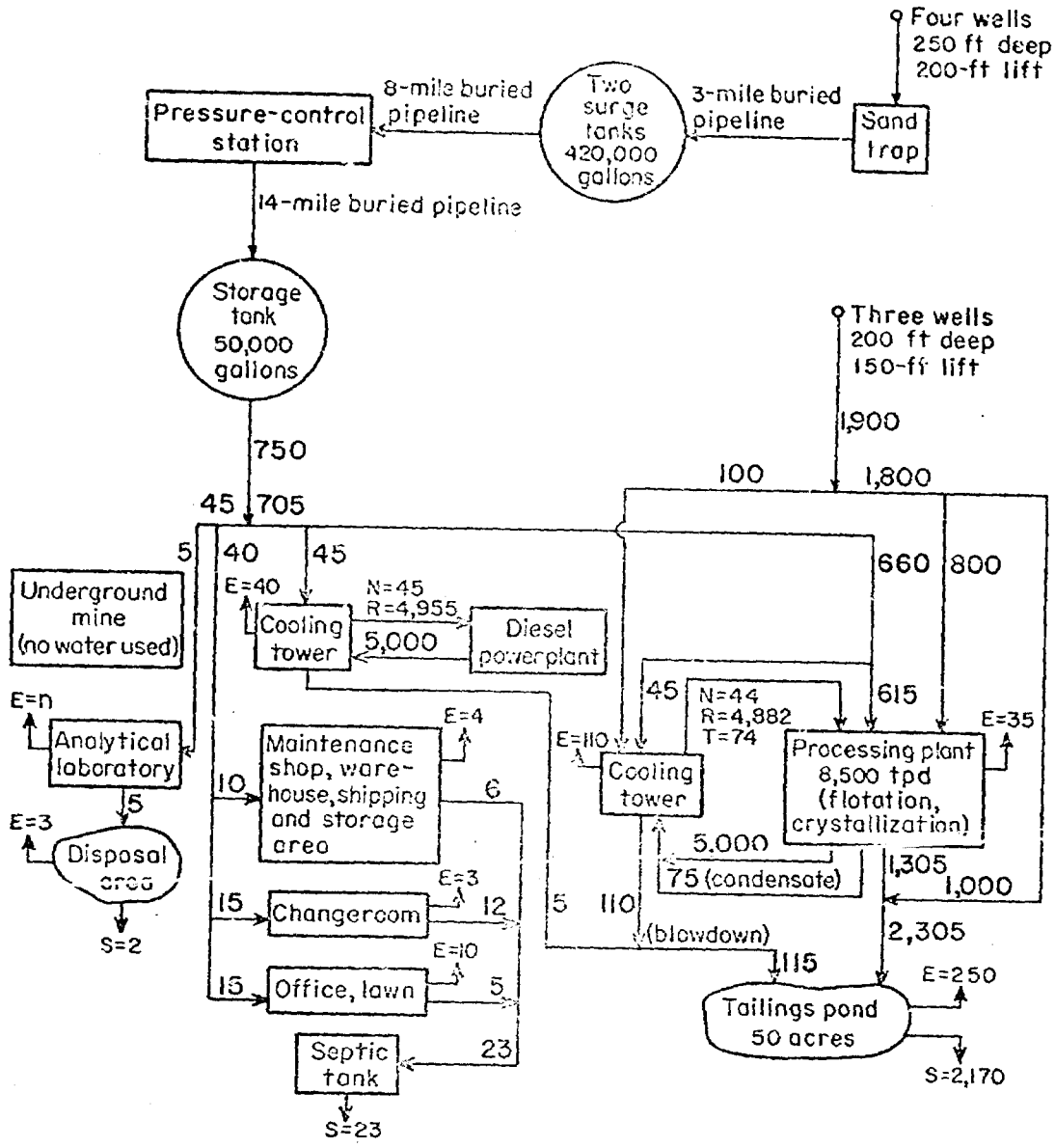
Potash Company of America

This company operated an underground potash mine and 8,500-tpd processing plant 21 miles northeast of Carlsbad (fig. 5). The principal product is muriate of potash; some potassium sulfate is produced. Operations are on a continuous basis. Employees total 800.

Water for the operation is obtained from seven wells (fig. 10). Four wells in the Cap Rock area provide 750 gpm of good-quality water. This is lifted about 200 feet and pumped 3 miles to surge tanks from which it flows by gravity 8 miles to a pressure-control station. From the pressure-control station gravity delivers the water to a 50,000-gallon elevated storage tank at the plant, a distance of 14 miles. The pipeline is buried 2 feet. Three wells in the plant area supply 1,900 gpm of low-quality water.

No water is used in mining. Dust from crushing operations is collected mechanically.

For the diesel powerplant and the processing system, new-water intake totals 2,605 gpm. Makeup demand is minimized by recirculating 4,955 gpm to the powerplant and 4,882 gpm to the crystallization section of the processing plant. Also, 74 gpm of condensate is transferred to the crystallization-section cooling system. Water from the three low-quality wells includes 800 gpm for washing floors and equipment and for once-through cooling in the processing plant, 1,000 gpm for conveying tailings to the tailings pond, and 100 gpm added at the cooling tower. Using the 100 gpm of low-quality water (100,000 ppm dissolved solids) for cooling is necessitated by inadequacy of the supply of good water. Maintaining the proper chemical balance in flotation precludes recirculating from the 50-acre tailings pond.



E Evaporation
S Seepage
N New
R Recirculated
T Transferred
750 Gallons per minute
n Negligible

WATER BALANCE		
	Subtotal gpm	Total gpm
Water in		2,650
Evaporation	455	
Seepage	2,195	
Water out		2,650

Recirculation = 9,837 gpm
Transferred = 74 gpm

FIGURE 10. - Schematic Waterflow Diagram, Potash Company of America, Eddy County, N. Mex.

Evaporative losses from the two cooling towers amount to 150 gpm. Losses in the processing plant, totaling 35 gpm, include 10 gpm direct evaporation and 25 gpm in kiln drying of products. Other losses in the system are at the tailings pond; of the 2,420 gpm entering the pond, 250 gpm is evaporated and 2,170 gpm seeps into the ground.

For the changeroom, analytical laboratory, office, maintenance shop, warehouse, and shipping and storage area, new-water intake totals 45 gpm. Most of this is for domestic uses. Seepage accounts for 25 gpm and evaporation for the remaining 20 gpm.

For the entire operation, total intake is 12,561 gpm. Of this amount, 9,911 gpm, or 79 percent of the total, is recirculated or is transferred to a lower quality use. If more Cap Rock water were available, it would be added at the cooling towers to improve quality. The capacity of the four wells in the Cap Rock area is limited to the present 750 gpm. Moreover, the water table in that area is declining about 1 foot per year.

Boiler feed, included in the 615 gpm of higher quality makeup for the processing plant, is zeolite softened.

Cost of the Cap Rock water, for power and maintenance, is $3,000 per month, or about 9 cents per 1,000 gallons.

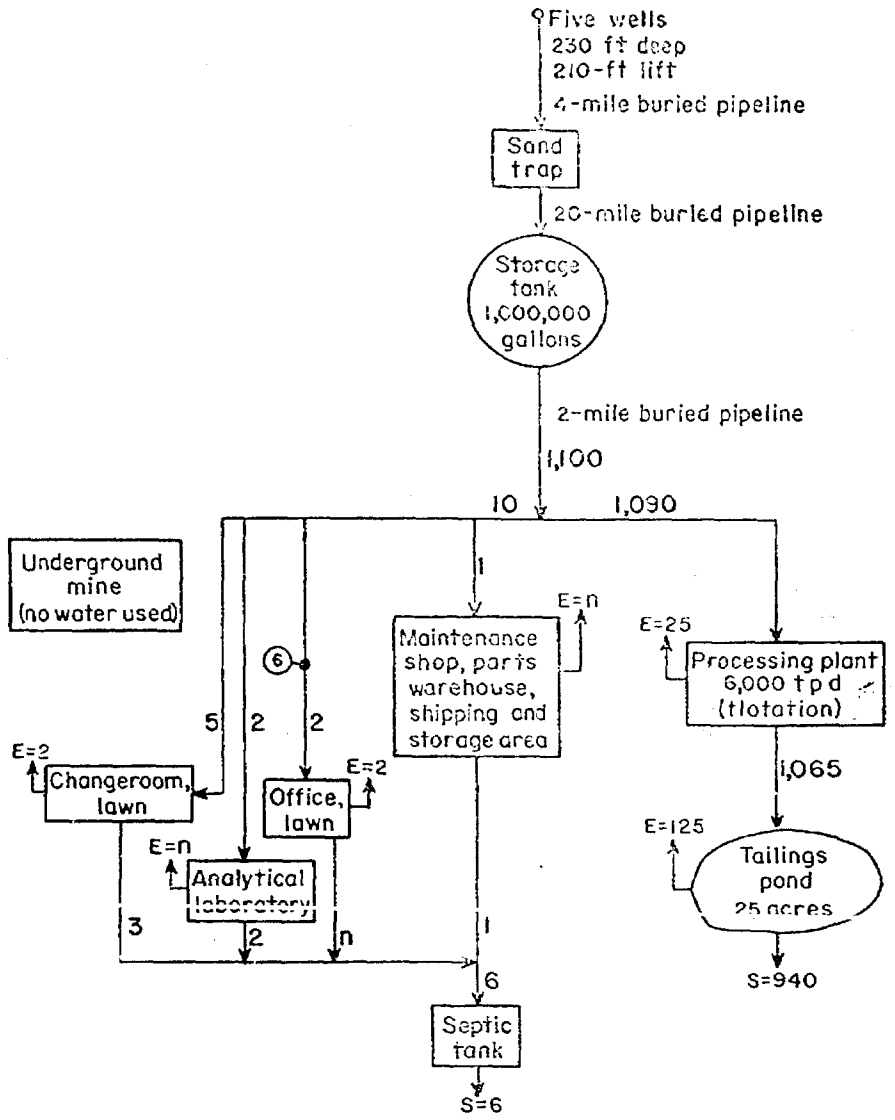
Southwest Potash Corp.

An underground mine and 6,000-tpd processing plant are operated by Southwest Potash Corp. 27 miles northeast of Carlsbad (fig. 5). About 2,000 tons of muriate of potash is produced daily. The operating schedule is three shifts per day, 363 days per year. Employees total 410.

All water for the operation, 1,100 gpm, is piped 26 miles from five wells (fig. 11). The wells, in the Cap Rock area, have an average lift of 210 feet. Pumped the first 4 miles to a sand trap, the water then flows by gravity 20 miles to an elevated 1-million-gallon storage tank 2 miles from the plant. To the storage tank, the pipeline consists of 12-inch asbestos-cement pipe; for the final 2 miles the line consists of 14-inch cast-iron pipe. The entire pipeline is buried 3 feet. Water pressure at the plant is 80 pounds per square inch.

No water is used in the mine nor in the crushing plant.

Processing takes 1,090 gpm, nearly all of the water used in the operation. Water loss within the plant totals 25 gpm and includes an estimated 8 gpm directly evaporated and 17 gpm lost in kiln drying of product. Most of the 8 gpm is evaporated from several thickeners having a combined area of about 1½ acres. The loss in product drying is computed from a moisture content of 5 to 6 percent. Flotation tailings at about 38 percent solids are pumped to the tailings pond. Evaporation from the 25-acre pond is 125 gpm, and seepage is 940 gpm. An attempt to conserve water by recirculation from the tailings pond proved infeasible because of pumping difficulties and the detrimental effect of slimes returned to flotation.



WATER BALANCE		
	Subtotal g p m	Total g p m
Water in		1,100
Evaporation	154	
Seepage	946	
Water out		1,100

E Evaporation
S Seepage
1,100 Gallons per minute
n Negligible
(6) Sample

FIGURE 11. - Schematic Waterflow Diagram, Southwest Potash Corp., Eddy County, N. Mex.

Other units of the operation use about 10 gpm, mostly for domestic purposes. One-half of this goes to the changeroom, where lawn-sprinkling in summer accounts for much of the 2 gpm evaporated. The laboratory, office, and miscellaneous units take only 5 gpm. Approximately 6 gpm discharged to a septic tank seeps into the ground.

All new water is chlorinated. Also treated is about 2 gpm of makeup to boilers that provide steam for heating reagents and shower water. (The 2 gpm is included in the 1,090 gpm going to the plant.) This treatment consists in adding a patented compound to prevent scaling and corrosion.

Cost of the water for power and maintenance is 5.0 cents per 1,000 gallons. Results of analysis of the new water (sample 6) are given in the appendix.

U.S. Borax & Chemical Corp.

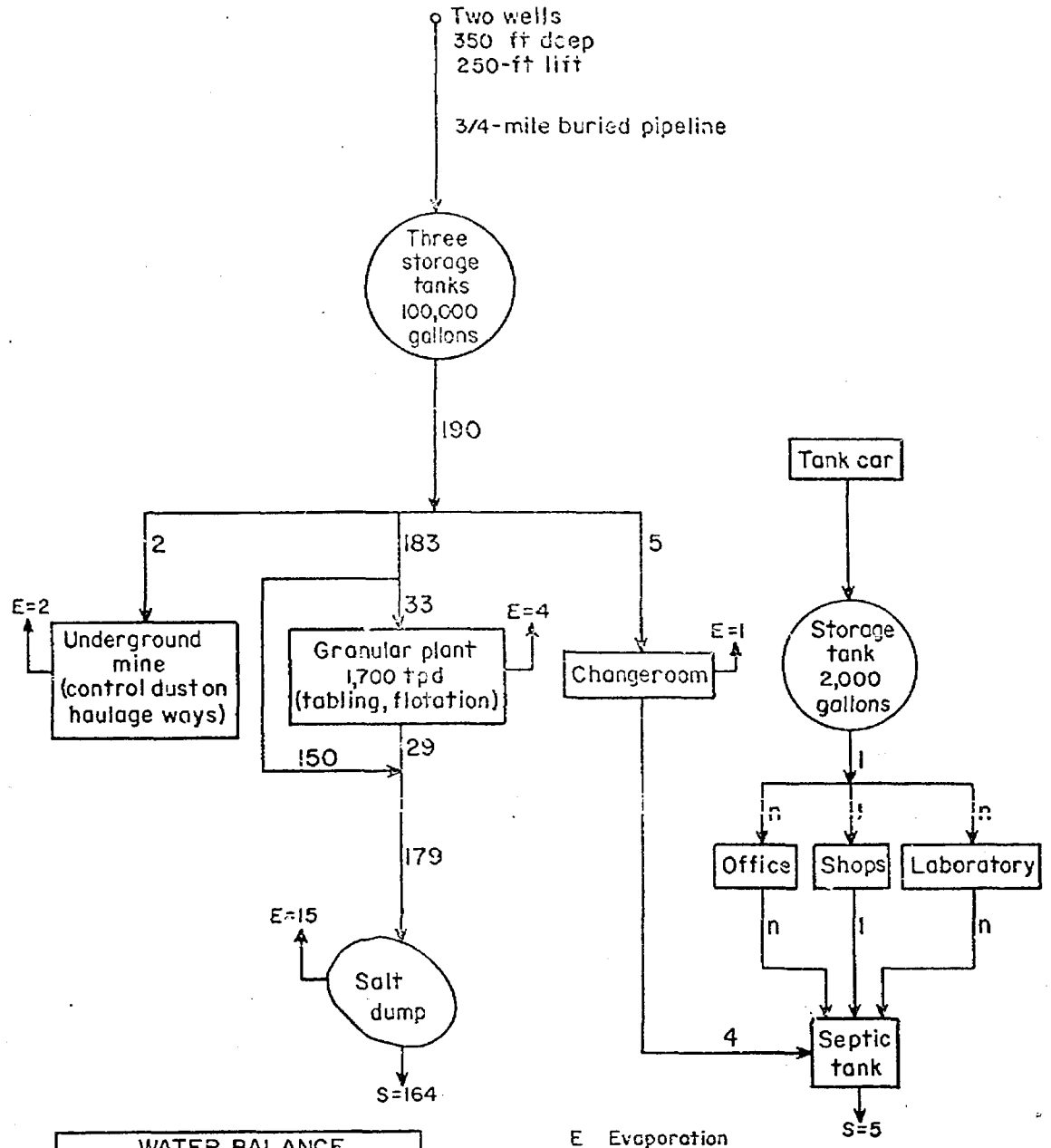
Potash operations of U.S. Borax & Chemical Corp. include an underground mine and 1,700-tpd granular plant 24 miles east of Carlsbad, and a 6,000-tpd refinery 17 miles southeast of Carlsbad (fig. 5). The product is muriate of potash. All operations are three shifts per day, 350 days per year. Employees total 1,000.

As shown in figure 12, water for the mine, granular plant, and changeroom is obtained from two wells in the plant area. The wells, 350 feet deep, have a lift of 250 feet. The water is pumped to three storage tanks having a combined capacity of 100,000 gallons. The mine takes only 2 gpm, all for dust control on haulage ways. Total water required for the processing system is 183 gpm; 33 gpm is used in tabling and flotation, and 150 gpm is added to the pland discharge to transport waste to the salt dump. Evaporation includes 2 gpm at the mine, 4 gpm in product drying and direct evaporation in the granular plant, 15 gpm at the salt dump, and 1 gpm in the changeroom. Seepage from the dump is 164 gpm. Purchased domestic water, hauled in by tank car and used in the office, shops, and laboratory, totals less than 2 gpm. A septic tank receives the small quantity discharged from these three units, as well as 4 gpm from the changeroom.

At the refinery industrial water is obtained from the Pecos River (fig. 13). A canal, about 1 mile long, delivers the 3,000 gpm of new water needed in processing operations, tailings disposal, and power generation. About two-thirds of this is required to transport waste, mainly sodium chloride, to the natural lake disposal area. To conserve water, the amount added to the refinery discharge is controlled by a countercurrent cone salt dissolver. All tailings water is evaporated from the spring-fed natural lake; because of the artesian head seepage from the lake is zero. An estimated 5 gpm is evaporated as a result of washing operations in the refinery, and 4 gpm is lost by other direct evaporation and in the drying of product, a total of 9 gpm.

The refinery waterflow diagram illustrates the large-scale conservation of water effected by recirculation. A 6-foot-diameter redwood pipeline (fig. 14) carries all water sent to the 12-unit cooling tower. The total amount recirculated from the cooling tower, 46,213 gpm, includes 33,453 gpm used for cooling in the crystallization operation and 12,760 gpm for condensing steam in the powerplant. Ten gpm of vacuum-crystallizer condensate returns to the boilers in the powerplant. Makeup for the cooling tower includes 800 gpm of new water and 86 gpm of condensate transferred from vacuum crystallizers. By proportional distribution, 63 of the 86 gpm is used in process cooling and 23 in powerplant cooling. Purchased water, mainly for domestic uses, is drawn from a 10,000-gallon storage tank. The analytical laboratory, miscellaneous units, and office require a total of 4 gpm, of which 3 gpm seeps into the ground from a septic tank.

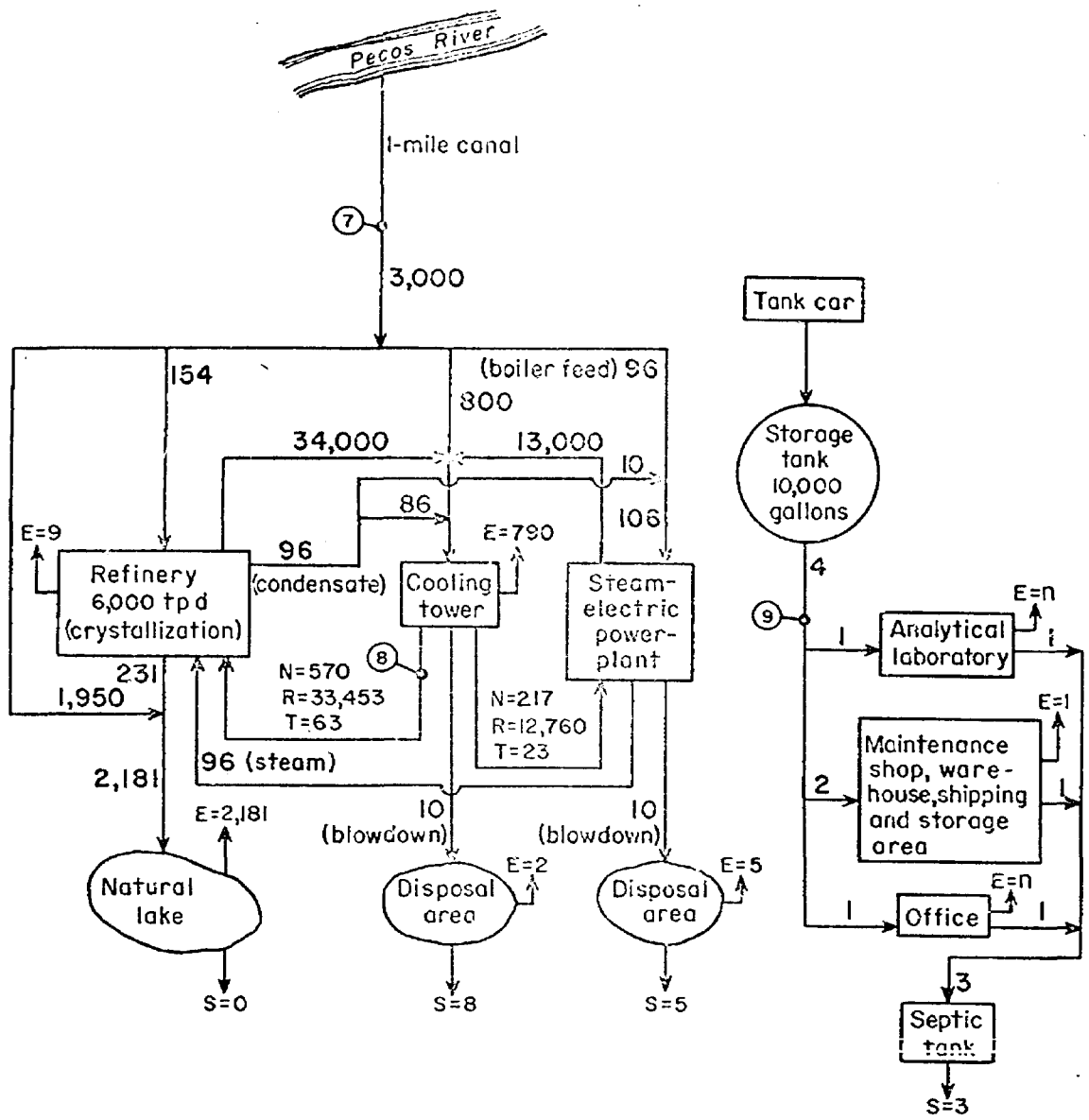
Cost of the granular-plant well water, for power and maintenance, is about 10 cents per 1,000 gallons. At the refinery, water from the Pecos River costs less than 1 cent per 1,000 gallons. The average price of purchased water per 1,000 gallons delivered is $2.14, of which railroad freight charges constitute approximately 90 percent.



WATER BALANCE		
	Subtotal g p m	Total g p m
Water in		191
Evaporation	22	
Seepage	169	
Water out		191

E Evaporation
S Seepage
190 Gallons per minute
n *Negligible*

FIGURE 12. - Schematic Waterflow Diagram, Granular Plant, U.S. Borax & Chemical Corp., Eddy County, N. Mex.



WATER BALANCE		
	Subtotal g p m	Total g p m
Water in		3,004
Evaporation	2,988	
Seepage	16	
Water out		3,004

Recirculation = 46,213 gpm
Transferred = 86 gpm

E	Evaporation
S	Seepage
N	New
R	Recirculated
T	Transferred
3,000	Gallons per minute
n	Negligible
(7)	Sample

FIGURE 13. - Schematic Waterflow Diagram, Refinery, U.S. Borax & Chemical Corp., Eddy County, N. Mex.

OIL, GAS & WATER PRODUCTION, POTASH MINING AREA, APRIL, 1968

OIL POOLS	No. of Prod.wells	Bbls. Oil Production	Bbls. Water Production	Bbls of Water Per Day	ppm Chlorides	Pools created or Discovered
Barber-Yates	9	3914	181296	6043	17466	Early 1937
East Benson-Yates	3	271	68	2		6-11-60
Big Eddy-Delaware	1	816	587	20		1-2-68
Big Eddy-Strawn	4	19202	14981	499	59640	3-18-66
Cabin Lake-Strawn	1	1636	8035	268		2-13-67
Dos Hermanos-Y-SR	12	3056	227419	7581	15925	7-1-55
*North Hackberry-Y-SR	24	4614	5484	183		10-16-53
Halfway-Yates	3	684	6162	205		10-6-39
PCA-Yates	4	742	34369	1146		Late 1939
Parrallel-Delaware	2	357	901	30	186020	6-24-53
Red Hills-Yates	1	33	30	1		2-20-56
Remuda-Wolfcamp	1	126	0	0		12-15-60
OIL TOTAL	66	35451	479332	15978		

GAS POOLS	No. of Prod. wells	Bbls. Cond. Prod.	MCF Gas Prod.	Bbls. Water Prod.		
Dos Hermanos-Morrow	1	54	4681	NR	0	5-1-65
Golden Lane-Strawn	1	5126	69327	NR	0	11-8-66
Los Mendanos-Atoka	1	1377	106434	218	7	3-1-58
GAS TOTAL	3	6577	180442	218	7	
GRAND TOTAL	69	42008		479550	15985	

*Only that portion of the pool in 19-30 is shown. 2271 Barrels of water to be in Gulf Waterflood.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
OCC Exhibit No. 2
Case No. 3806

Case 3806 Exhibit #2

Docket No. 21-68

DOCKET: REGULAR HEARING - WEDNESDAY - JULY 17, 1968

OIL CONSERVATION COMMISSION - 9 A.M. - MORGAN HALL, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

ALLOWABLE: (1) Consideration of the oil allowable for August, 1968;

(2) Consideration of the allowable production of gas for August, 1968, from thirteen prorated pools in Lea, Eddy, and Roosevelt Counties, New Mexico. Consideration of the allowable production of gas from nine prorated pools in San Juan, Rio Arriba and Sandoval Counties, New Mexico, for August, 1968.

CASE 3806: In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to permit the exemption of certain presently existing and future pools in Eddy and Lea Counties, New Mexico, from certain requirements of said order. The Commission will consider exempting from Order No. (3) of Commission Order No. R-3221 those pools which are within the following-described area:

Township 19 South, Range 30 East: Sections 8 through 36
Township 20 South, Range 30 East: All
Township 20 South, Range 31 East: All
Township 20 South, Range 32 East: W/2
Township 21 South, Range 29 East: All
Township 21 South, Range 30 East: All
Township 21 South, Range 31 East: All
Township 22 South, Range 29 East: All
Township 22 South, Range 30 East: All
Township 23 South, Range 29 East: E/2
Township 23 South, Range 30 East: Sections 1 through 19

and which are in and near Clayton Basin and Nash Draw and those pools within the above-described area which are within three miles of a potash tailings pond.

CASE 3807: In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to provide an administrative procedure whereby lined evaporation pits may be utilized for salt water disposal, provided that they are designed, constructed, and maintained in accordance with certain minimum standards which shall be established by the Commission. All interested parties,

including but not limited to, oil producers, lining materials vendors, consulting engineers, water disposal companies, etc., are requested to attend the hearing and to present evidence relative to the minimum standards which the Commission should adopt.

Further, to consider the amendment of Order No. (4) of Commission Order No. R-3221 to make the provisions of said Order No. (4) apply to those areas and pools affected by Commission Orders No. R-1224-A, R-2526, and R-3164.

Further, to consider the amendment of Order No. (8) of Commission Order No. R-3221 to provide for temporary storage or disposal of water in surface pits for up to 30 days during such contingencies as injection system failures and the evaluation of newly completed wells, subject to approval by the Commission District Supervisors.

CASE 3808: Southeastern nomenclature case calling for an order for the contraction, abolishment and extension of vertical and horizontal limits of certain pools in Lea and Eddy Counties, New Mexico:

(a) Contract the Square Lake Grayburg-San Andres Pool in Eddy County, New Mexico, described as:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
SECTION 11: SE/4
SECTION 15: NW/4

(b) Extend the Grayburg-Jackson Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
SECTION 11: SE/4
SECTION 15: NW/4 and NW/4 SW/4

(c) Extend the Arkansas Junction-San Andres Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 36 EAST, NMPM
SECTION 12: SW/4

(d) Extend the North Bagley-Lower Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 11 SOUTH, RANGE 33 EAST, NMPM
SECTION 14: NW/4
SECTION 20: SW/4

(e) Extend the East Brunson-Ellenburger Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 24: SW/4

(f) Extend the East Brunson-Granite Wash Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 24: S/2

TOWNSHIP 22 SOUTH, RANGE 38 EAST, NMPM
SECTION 19: SW/4

(g) Extend the East Brunson-McKee Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 22 SOUTH, RANGE 37 EAST, NMPM
SECTION 23: N/2 SE/4

(h) Extend the Drinkard Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 23 SOUTH, RANGE 38 EAST, NMPM
SECTION 7: E/2

(i) Extend the Penasco Draw San Andres-Yeso Pool in Eddy County, New Mexico, to include therein:

TOWNSHIP 18 SOUTH, RANGE 25 EAST, NMPM
SECTION 36: N/2 NE/4

(j) Extend the Sawyer-San Andres Gas Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 9 SOUTH, RANGE 37 EAST, NMPM
SECTION 25: SE/4

(k) Extend the Simanola-Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 10 SOUTH, RANGE 34 EAST, NMPM
SECTION 20: SE/4

(l) Extend the Vada-Pennsylvanian Pool in Lea County, New Mexico, to include therein:

TOWNSHIP 9 SOUTH, RANGE 34 EAST, NMPM
SECTION 21: SE/4
SECTION 32: NE/4

(m) Extend the vertical limits of the Moore Permo-Pennsylvanian Pool in Lea County, New Mexico, to include the Wolfcamp Formation from 8042 feet to 8297 feet. Vertical limits redefined as being from the top of the Wolfcamp at 8042 feet to the top of the Mississippian at 9974 feet as in the Amerada Petroleum Corporation State "MA" Well No. 1, located in Unit M of Section 24, Township 11 South, Range 32 East, NMPM.

(n) Abolish the Moore-Wolfcamp Gas Pool in Lea County, New Mexico, described as:

TOWNSHIP 11 SOUTH, RANGE 32 EAST, NMPM
SECTION 23: E/2
SECTION 24: SW/4
SECTION 25: W/2

Water Sample Data Sheet

Sample Unit	Location S.T.R.	Date of Collection	Collected & Described By	Parts Per Million Sulfate SO_4	Chloride Cl	Dissolved Solids
M	28-19-31	5-1-50	USGS	398	55	855
"	"	5-31-68	OCC	764	93	1604
D	33-19-31	5-1-50	USGS	2160	60	3340
A	3-20-30	"	"	1540	29	2400
*I	"	"	"	1670	255	2930
I	16-20-30	5-1-50	"	1860	380	3370
"	"	5-31-68	OCC	172	1846	6696
E	20-20-30	5-1-50	USGS	1590	388	3050
"	"	4-30-68	OCC	NA	2417	NA
B	31-20-30	5-31-68	"	272	781	5673
P	33-20-30	5-1-50	USGS	1960	620	3860
P	13-20-31	12-22-48	"	4280	635	7080
H	16-20-31	"	"	1190	785	3220
F	11-21-29	6-12-68	OCC	424	724	3464
E	18-21-29	5-30-50	USGS	2220	1060	4880
H	33-22-29	?-12-48	"	602	406	1660
N	6-22-30	5-20-49	"	2880	9920	20,200
L	10-22-30	4-30-50	"	1470	8	2280
H	30-22-30	"	"	2150	123	3290
P	2-23-30	"	"	2150	510	3940
Lake	6-23-30	6-12-68	OCC	1320	17750	139500
C	21-23-30	?-12-48	USGS	2160	630	4150
A	7-23-31	"	"	1560	410	3330

*Rancher reports that Chlorides in this well have increased from 524 to 1055 ppm in last eight years.

Case No. 3806 Exhibit -6-

LEA COUNTY HEALTH DEPARTMENT
340 East Sanger
Hobbs, New Mexico

COPY

February 14, 1961

Mr. Lea Clemmons
Oil Conservation Commission
Box 2045
Hobbs, New Mexico

Dear Mr. Clemmons:

Enclosed please find the list of recommended standards for potable water:.

RECOMMENDED STANDARDS
(Adopted by the Public Health Service 1946)

Turbidity, not to exceed 10 ppm
Color, not to exceed 20 ppm
No objectionable taste or odor
Iron and Manganese together should not exceed 0.3 ppm
Magnesium should not exceed 125 ppm
Flourides should not exceed 1.5 ppm
Chloride should not exceed 250 ppm
Sulphate should not exceed 250 ppm

Total solids not to exceed 500 ppm for a water of good chemical quality. However, if such water is not available, a total solids content of 1,000 ppm may be permitted.
Permissible pH about 10.6 at 25°C

If we can be of more assistance please let us know.

Yours truly,

James Burt, R.S.
Lea County Sanitarian

cc: Dr. L. C. Duryea, D.H.O.

JB/rs

BEFORE
...SERVATION ...MISSION
...Fe, N... ...ico
Case No. 3806 Exhibit No. 7

Case 3806 Exhibit # 7

NEW MEXICO STATE UNIVERSITY
COLLEGE OF AGRICULTURE AND HOME ECONOMICS
EXPERIMENT STATION • EXTENSION SERVICE • RESIDENT INSTRUCTION

DEPARTMENT OF ANIMAL, RANGE AND WILDLIFE SCIENCES LAS CRUCES, NEW MEXICO 88001

July 11, 1968

Mr. R. L. Stamets
NMOCC
P. O. Box DD
Artesia, New Mexico 88210

Dear Mr. Stamets:

In reply to your telephone request for information regarding the tolerance by farm animals of saline water, I am sending the enclosed items.

Should you desire more specific information or technical documentation of legal standards of tolerance, I suggest that you communicate directly with Mr. C. D. Leedy at the Soils and Water Laboratory here in the College of Agriculture.

Sincerely,

G. S. Smith

G. S. Smith
Associate Professor
Animal Nutrition

bs
cc: C. D. Leedy, Soils and Water Laboratory
encl: Photostats: Maynard and Wagnon texts, Heller paper;
Pamphlets: Soil and Water Lab leaflets

THE EFFECT OF SALINE AND ALKALINE WATERS ON DOMESTIC ANIMALS

V. G. HELLER

SUMMARY AND CONCLUSIONS

1. Analyses of hundreds of samples of water from Oklahoma and adjoining states show that many waters are heavily saturated with sodium, calcium and magnesium chloride, calcium, magnesium and sodium sulfate, minor quantities of carbonates, bicarbonates and other ions in smaller amounts. These waters come from naturally occurring springs, deep wells, and from oil well pollutions.
2. Carefully controlled experiments with rats, chickens, hogs, sheep, and cattle have proved that animals compelled to drink solutions sufficiently saturated with these salts are injured.
3. In no case has it ever been found that any animal ever chose to drink a water that was harmful if good waters were accessible.
4. The damage seemed not to depend so much on the kind but the amount of the salt present, the total soluble salts present being the important factor. It made little difference if the quantity was made up of a single salt or a number of them.
5. The limit of tolerance depended upon the kind of animal, age, season of the year, whether in milk production, etc. The inability to suckle young was found before any injury to the mother was apparent.
6. Sheep were more resistant than cattle and cattle more so than hogs. The fact that the sheep were raised in a hard water country might have been a factor. Sheep have been able to exist on 2.5 percent solution of sodium chloride and 2 percent magnesium sulfate. Cattle not in milk production have maintained their values on 2 percent sodium chloride solution. As a safe rule, however, it can be said that 1.5 percent total salts should be considered the upper limit under which maintenance can be expected. For lactating animals the limit is lower.
7. Sodium chloride is somewhat less active than calcium chloride and magnesium chloride is the most injurious, the injury coming evidently in the limited amount of water the animal will consume. The alkali solutions are more injurious than saline waters, the injury being more direct as a chronic enteritis is apparent. An alkaline water should be used with care. However, saturated calcium hydroxide solutions have been used through three generations of rats.
8. Animals can become accustomed to drinking waters not possible to consume at first. Egg and milk production are decreased during the adjustment period and there is a limit, as designated above, beyond which no further adjustment is possible.
9. Blood analyses fail to demonstrate any marked changes in the composition of the blood that might be responsible for such an adjustment, although it has been found that just previous to death some changes do take place in the concentration of sodium and chlorine. Whether these changes were due to the approach of death or death was produced by the inability of the body to maintain longer the constant composition is a debatable question.
10. It is not the purpose of this article to recommend saline waters, as a water supply free from all salt contaminations should be obtained if possible, but rather to determine under what extreme conditions g[illegible] reproduction and maintenance might be possible if the anim[illegible] compelled to use such a water as a sole source of drinking supply.

SFOCC

Attn. George Hatch

(3) That within the area described as:

EDDY AND LEA COUNTIES, NEW MEXICO

TOWNSHIP 19 SOUTH, RANGE 30 EAST, NMPM
Sections 8 through 36

TOWNSHIP 20 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 32 EAST, NMPM
Sections 4 through 9; Sections 16 through 21; and Sections 28 through 33

TOWNSHIP 21 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 21 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through [illegible]

TOWNSHIP 21 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 23 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 3; Sections 10 through 15; Sections 22 through 27; and Sections 34 through 36

TOWNSHIP 23 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 19

exist a number of oil and gas pools which produce varying amounts of salt water.

(4) That the major portions of Clayton Basin and North Draw, broad depressions caused by the slumping of the surface due to the

Nash Draw ??

RLS

Tabulation of Potash Brine Disposal from Exhibits 3 & 4, Versus Oil Field Brine Disposal from Exhibit 2

All figures shown are in barrels of water per day.

COMPANY		Bureau of Mines Data Water Dispcsal--Seepage to ground		State Engineer Data Water Disposal
U. S. Borax & Chemical Co. (Lump Total)	(1931)	80914	5623	88742
Ideal Basic Industries Inc. (PCA)	(1935)	79029	74400	24656
International Mineral & Chemical Co.	(1940)	61886	48171	44380
Duval Sulphur & Potash Co.	(1952)	16629	14057	25592
Southwest Potash Corp.	(1952)	36514	32229	63468
National Potash Co.	(1957)	24549	15977	22828
Kermac Potash Co.	(1966)			31882
TOTAL		299521	190457	301548

One gallon per minute equals 34.2857 barrels of water per day

One acre-foot per year equals 21.2556 barrels per day

Oil field brine disposal of 15985 barrels would equal 5.34% of reported potash brine disposal.

Oil field brine disposal of 15985 barrels would equal 5.3% of reported potash brine disposal

Recent closing of the U. S. Borax & Chemical Company mines and cut back production at some others may have reduced total potash brine disposal by as much as one third.

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
OCC Exhibit No. 5
Case No. 3806

Case 3806 Exhibit #5

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO CONSIDER THE AMENDMENT OF ORDER No. R-3221, THE COMMISSION'S SALT WATER DISPOSAL ORDER, TO PERMIT THE EXEMPTION OF CERTAIN PRESENTLY EXISTING AND FUTURE POOLS IN EDDY AND LEA COUNTIES, NEW MEXICO, FROM CERTAIN REQUIREMENTS OF SAID ORDER.

CASE No. 3806
Order No. R-3221-B

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on July 17, 1968, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 25th day of July, 1968, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That effective January 1, 1969, Order (3) of Commission Order No. R-3221, dated May 1, 1967, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(3) That within the area described as:

EDDY AND LEA COUNTIES, NEW MEXICO

TOWNSHIP 19 SOUTH, RANGE 30 EAST, NMPM
Sections 8 through 36

TOWNSHIP 20 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 32 EAST, NMPM
Sections 4 through 9; Sections 16 through 21; and Sections 28 through 33

TOWNSHIP 21 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 21 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 21 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 23 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 3; Sections 10 through 15; Sections 22 through 27; and Sections 34 through 36

TOWNSHIP 23 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 19

exist a number of oil and gas pools which produce varying amounts of salt water.

(4) That the major portions of Clayton Basin and North Draw, broad depressions caused by the slumping of the surface due to the

removal of the underlying salt by solution, lie within the above-described area.

(5) That the general direction of movement of both ground water and surface water in the subject area is toward and into said basins, thence southwest in Nash Draw toward Malaga Bend.

(6) That a substantial amount of water is produced in conjunction with the production of oil or gas, or both, by the oil and gas wells located in the above-described area.

(7) That said produced water is presently being disposed of in surface pits located in the above-described area.

(8) That a number of large surface ponds, or lakes, containing extremely high concentrations of chlorides are located in the above-described area.

(9) That in relation to said surface lakes, said disposal pits are inconsiderable in volume of water received and seepage underground.

(10) That the aforesaid disposal pits and surface lakes are located within the same surface and subsurface drainage system, as described in Finding (5) above.

(11) That the purpose of Order No. R-3221, to afford reasonable protection against contamination of fresh water supplies by surface disposal of produced water, would not be advanced by the enforcement of said order as to the above-described area.

IT IS THEREFORE ORDERED:

(1) That all oil and gas wells, both existing and prospective, located in the following-described area are hereby excepted from the provision of Order (3) of Order No. R-3221, to authorize the operators of said wells to dispose of water produced in conjunction with the production of oil or gas, or both, from said wells in unlined surface pits located in said following-described area until further order of the Commission:

EDDY AND LEA COUNTIES, NEW MEXICO

TOWNSHIP 19 SOUTH, RANGE 30 EAST, NMPM
Sections 8 through 36

TOWNSHIP 20 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 20 SOUTH, RANGE 32 EAST, NMPM
Sections 4 through 9; Sections 16 through 21; and Sections 28 through 33

TOWNSHIP 21 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 21 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 21 SOUTH, RANGE 31 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 36

TOWNSHIP 22 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 36

TOWNSHIP 23 SOUTH, RANGE 29 EAST, NMPM
Sections 1 through 3; Sections 10 through 15; Sections 22 through 27; and Sections 34 through 36

TOWNSHIP 23 SOUTH, RANGE 30 EAST, NMPM
Sections 1 through 19

(2) That the Commission may by administrative order rescind such authority as to any or all such wells whenever it reasonably appears to the Commission that such rescission would serve to afford reasonable protection against contamination of fresh water supplies.

(3) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

esr/

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION COMMISSION ON ITS OWN MOTION TO CONSIDER THE AMENDMENT OF ORDER No. R-3221, THE COMMISSION'S SALT WATER DISPOSAL ORDER, TO PERMIT THE EXEMPTION OF CERTAIN PRESENTLY EXISTING AND FUTURE POOLS IN EDDY AND LEA COUNTIES, NEW MEXICO, FROM CERTAIN REQUIREMENTS OF SAID ORDER.

CASE No. 3806
Order No. R-3221-B-1

NUNC PRO TUNC ORDER

BY THE COMMISSION:

It appearing to the Commission that due to clerical error, Order No. R-3221-B, dated July 25, 1968, does not correctly state the intended finding of the Commission in one particular,

IT IS THEREFORE ORDERED:

(1) That the phrase "North Draw" is hereby stricken from the first line of Finding (4) on Page 2 of Order No. R-3221-B, dated July 25, 1968, and the phrase "Nash Draw" is hereby substituted in lieu thereof.

(2) That this order shall be effective nunc pro tunc as of July 25, 1968.

DONE at Santa Fe, New Mexico, on this 13th day of August, 1968.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

DAVID F. CARGO, Chairman

GUYTON B. HAYS, Member

A. L. PORTER, Jr., Member & Secretary

esr/

BEFORE THE
NEW MEXICO OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
July 17, 1968

REGULAR HEARING

IN THE MATTER OF:

The hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to permit the exemption of certain presently existing and future pools in Eddy and Lea Counties, New Mexico, from certain requirements of said order.

Case No. 3806

BEFORE: Honorable David Cargo
Mr. A. L. Porter
Mr. Guyton B. Hays

TRANSCRIPT OF HEARING

MR. PORTER: We will take up next Case 3806.

MR. HATCH: Case 3806. In the matter of the hearing called by the Oil Conservation Commission on its own motion to consider the amendment of Order No. R-3221, the Commission's Salt Water Disposal Order, to permit the exemption of certain presently existing and future pools in Eddy and Lea Counties, New Mexico, from certain requirements of said order.

If the Commission please, George Hatch appearing on behalf of the Commission and its staff and I will have one witness.

MR. PORTER: Does anyone else desire to make an appearance in Case 3806?

MR. WHITE: David White; Pan American would like to make a statement.

MR. PORTER: No testimony?

MR. WHITE: No, sir.

MR. PORTER: Anyone else desire to make an appearance and present testimony? Mr. Gray.

MR. GRAY: Ralph Gray. I represent William A. and Edward R. Hudson and Windfohr Oil Company, and I would like to make a statement.

MR. PORTER: When the testimony is concluded you would like to make a statement?

MR. GRAY: I don't want to present any testimony,

just make a statement.

(Witness sworn.)

R. L. STAMETS

called as a witness, having been first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HATCH:

Q Would you state your name and position for the record?

A R. L. Stamets, geologist with the New Mexico Oil Conservation Commission in the Artesia District Office.

Q Mr. Stamets, in your position as geologist, District Number II, do you undertake studies and make recommendations concerning the disposal practices in District II?

A Yes, sir, I do.

Q Are you familiar with the purpose of Case 3806?

A Yes, sir.

Q Would you briefly state for the Commission the background and purpose of this case?

A On April 19, 1967, the Commission met at Hobbs, New Mexico to consider issuance of an order prohibiting the disposal of oil field brines in surface pits in Lea, Chaves, Roosevelt and Eddy Counties. At that hearing it was determined

that large amounts of water produced in conjunction with the production of oil or gas, or both, was being disposed of on the surface of the ground by means of unlined disposal pits, and that this produced water contained high concentrations of chlorides.

It was further determined that fresh water supplies as designated by the State Engineer exist in substantially all areas where there is surface pit disposal and in substantially all the area encompassed by Lea, Eddy, Chaves and Roosevelt Counties.

As a result of the hearing the Commission issued Order No. R-3221 which prohibits the disposal of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which will constitute a hazard to any fresh water supplies.

The effective date of Order R-3221 was different for different areas and for secondary and primary production. The effective date for the area here in question is January 1, 1969.

Then later, on May 15, 1968, Case Number 3758 was heard by the Commission here in Santa Fe. In this case the

operator, William A. and Edward R. Hudson, sought an exception to Order Number 3 of Commission Order R-3221 for their leases in the Dos Hermanos Yates Seven Rivers Pool. What they sought exception to was the no-pit provisions of this order. The findings in Case 3758 were that substantial amounts of oilfield brines were being produced and disposed of in unlined pits in the pool. However, that in relation to the disposal of unregulated potash brines in the immediate and mediate area, the volumes of water and concentrations of chlorides was small. Further, it was found that as the oilfield pits and potash tailings ponds overlie the same general surface and subsurface drainage system, the enforcement of Order 3 of Order No. R-3221 would not appreciably reduce the hazard to fresh water and would be an unnecessary expense upon the operator. Order R-3424 approved the applicant's request.

As a result of the evidence presented in Case 3758, it was determined that the Commission staff should check into the general situation in the potash mining area to see if other pools in that area warranted a similar exception. As a consequence of the investigation, this hearing has been called.

Q Will you describe in particular the area that you have studied and that is under consideration here today, and would you point it out on the map?

(Whereupon, Exhibit No. 1 was marked for identification.)

A Yes, sir. The area is essentially, well, it is exactly the same as described in the docket for this case and it is shown on what I have labeled Exhibit No. 1 in this case, which is a map of the potash mining area. Here the area under consideration is outlined by a dark green line. Also on this map are shown the oil and gas pools in various colors; the highways, the windmills, lakes, the location of the potash refineries and tailings ponds and the general outline of Clayton Basin and Nash Draw. Clayton Basin and Nash Draw are broad depressions in eastern Eddy County which are caused by the slumping of the surface beds over an area where the salt has been mined by ground water. Ground water flowing through this area from north to south has dissolved the salt which underlies the surface and is carrying that salt down to the Pecos River through springs near Malaga and the surface is kind of slumped over where the salt has been eroded.

This area includes portions of Lea and Eddy Counties. The Lea-Eddy County line runs between Ranges 31 and 32 East, actually only the West Half of Township 20, 32 is under consideration in this case.

Q Now, the areas outlined in green there on your

map, why did you pick those particular boundaries?

A Well, after a field study of the area we tried to include all of that portion of Clayton Basin and Nash Draw because that's where the majority of the potash mines are and that represents the drainage system in this area. Water drains from the margins of these basins toward the center and from the centers of the basins toward the river. However, there are no permanent streams in this area. Water does not flow past this salt lake. There is a ditch which goes between the Pecos River and Nash Draw and there is no permanent stream across this ditch.

Q Where did you get the information that you have put on the map concerning the windmills?

A The base map itself was drawn with the use of U.S. Coast and Geodetic Survey topo sheets. The outlines of Clayton Basin and Nash Draw were taken from these same topo sheets. The windmills were spotted using a county highway map and also spotted from my own field observations. There were a few windmills not shown on the county highway map and I have put these on as I saw them. I did find that quite a few of the wells spotted on the highway map were still there. Some of them apparently have been abandoned.

Q Are those maps that you use in performing your

duties, did you find them accurate?

A Yes, sir.

Q What oil and gas pools that may be in the area might be affected by an order dealing with this particular area?

(Whereupon, Exhibit No. 2 was marked for identification.)

A If you will refer to Exhibit Number 2, this is a list of producing oil and gas pools inside the defined area. I would like to name these off, if I may. The oil pools are the Barber-Yates, East Benson-Yates, Big Eddy-Delaware, Big Eddy-Strawn, Cabin Lake-Strawn, Dos Hermanos-Yates-Seven Rivers, North Hackberry-Yates-Seven Rivers, Halfway-Yates, PCA-Yates, Parallel-Delaware, Red Hills-Yates, Remuda-Wolfcamp.

The gas pools are the Dos Hermanos-Morrow gas, Golden Lane-Strawn gas and Los Mendanos-Atoka gas.

This Exhibit Number 2 shows the number of wells in each pool, producing wells, the barrels of oil production, the barrels of water production, the water production converted to barrels of water per day, parts per million chlorides where we have samples on the produced water, and the dates that the pools were created or discovered.

If you'll notice on the map there are a few pools

which I did not show. These pools are plugged and abandoned such as the Benson-Yates, the West Lusk-Strawn, the Maroon Cliffs-Tansil-Delaware, so on. In every case the pools have either been plugged and abandoned or notice of intention to abandon has been filed.

Q Are there pools shown on that map that are not on your list?

A There are pools outside the area which are not shown on this list and which I have not mentioned. I merely have shown those so as to complete the map of the area.

Q Are most of those pools within the Nash Draw and Clayton Basin depressions?

A Yes, they are. Either that or they lie more or less between potash mines at two extremes.

I would like to point out that only a portion of the North Hackberry-Yates-Seven Rivers Pool is shown. Just that portion which lies in and immediately at the edge of Clayton Basin. The reason I have done this is in Section 28 of 19, 31 is one of the few wells sampled which has fairly good water in the area, and further, these wells in the eastern portion of this pool, part not included, report very little water production, and from my observations on the ground this seems to be correct. So I have not included those.

Q Does your Exhibit 2 show the total volume of water produced by those pools?

A I feel that this is pretty good representation.

Q What is that total volume?

A The total volume on a barrel per day basis is 15,985 barrels.

Q Does that exhibit also show the range of the chloride content?

A Yes, sir, it does. There are not samples shown for each pool, however, I believe that the samples shown are representative of pools completed in the same formation. You can see here how close the Barber-Yates Pool and the Dos Hermanos-Yates-Seven Rivers Pool are. So I believe these samples probably could be expanded to cover the entire area.

Q What is the range?

A They range from about 16,000 parts per million to a high of 186,000 parts per million in the Parallel-Delaware. I believe this is actually a little bit high. I took this sample from the pit and so it's probably evaporated water and concentrated to salt. Delaware usually runs to about 110,000 parts per million.

(Whereupon, Exhibits 3, 4 and 5 were marked for identification.)

Q Will you describe to the Commission what this

area is like, starting with the potash mines in the area?

A You mean would I like to go into this discussion of Exhibits 3, 4 and 5 at this time?

Q Yes.

A I would like to refer, then, to Exhibits 3, 4 and 5 and describe the exhibits briefly and then show you on the map what they mean. Exhibit 3 is a copy of a report by Mr. E. C. Barry of the Roswell Office of the State Engineer. This report shows the potash mines then in operation, the source of their water supply and the volumes of water to the tailings pond, parts per million chlorides in the tailings water.

Exhibit Number 4 is a similar report prepared by the United States Bureau of Mines and published in 1965, some two years prior to Exhibit Number 3. This report is much more detailed and it is presented here because it shows not only the volumes to the tailings pond but the tailings ponds' sizes and an estimate of seepage from these tailings ponds into the ground.

Exhibit Number 5 is a tabulation of the data from Exhibits 2, 3 and 4 and for convenience I have converted all figures on this Exhibit Number 5 to barrels of water per day. Exhibit Number 5 is a list of the potash mines. First, we have U. S. Borax, which is the oldest mine in the area listed.

There are two locations. They have one in 18, 23, 29 and another in 12, 21, 29. Both of these operations have been closed down at the present time. They may be started back later by a different company but I'm not sure about that. There are figures here shown for the Bureau of Mines data and the State Engineer data. I feel that the State Engineer's data being some two years later probably represents more closely the actual volumes of water being disposed of.

MR. PORTER: At this point, Mr. Stamets, where these mines have been abandoned are there still mounds of salt left on the site?

THE WITNESS: Yes, sir.

MR. HAYS: They're not pumping any water now?

THE WITNESS: No, they are not.

A This particular operation had very little seepage of water because they went into a natural salt lake here. Their seepage was something like 6.8 percent for the two mines. The second mine is Ideal Basic Industries, Inc., which is the old PCA mine. That is located in Section 4 of 20, 30, and its tailings pond area is located.

I would like to point out that these tailings ponds are, as I show them on the map, are probably considerably larger than the actual water that you'll find standing there

at any one time, but I am sure that rains in the area fill these things up occasionally, so you find salt encrustations over a good sized area. It's not too reliable standing out on a hill sketching this thing in on a topo map. You can make mistakes. This is the general area of each one --

MR. HAYS: How do you measure seepage?

THE WITNESS: In Exhibit Number 4 the seepage is estimated by the Bureau of Mines, and what he has done there, he uses a figure of evaporation, five gallons per minute per acre, if I'm not mistaken, and what he does is take the acreage in each one of these ponds, estimate the number of barrels or the number of gallons of water which will evaporate. He takes the number of barrels or gallons which go in and takes the difference as the seepage into the ground. I checked one or two of these using his figures and I agreed with him in each case.

MR. HAYS: How big are these lakes?

THE WITNESS: I would have to refer back to Exhibit 5 to give you an acreage figure.

MR. HAYS: You have seen them, give me a guess, or are you afraid to?

THE WITNESS: That's a little hard; well, PCA here on my map, I would say it covers about a section and a half,

probably there's a half a section of water standing when I was there. They vary quite a bit.

MR. HAYS: When were you there?

THE WITNESS: Within the last two months. I could give you the exact date if you need it.

MR. HAYS: No, it isn't necessary.

A Moving on then to International Mineral and Chemical Company, that is located here in the lower part of Nash Draw in 12, 22, 29. It has one of the largest tailings piles and ponds. I feel that the size of this pond is due to its location in the central part of Nash Draw. In all likelihood there's a great deal of rain water funnels into this lake and makes it quite big. It runs on here for two or three miles.

The water standing in this lake is located in the southernmost portion of the area.

The Duval Sulphur and Potash Company is located in 35, 20, 30 and it has a small tailings pond which extends out tc the west. Southwest Potash Corporation is located in 9 of 19, 30 in the northern part of this area and its tailings pond is shown.

National Potash Company is located outside of the limits of either Clayton Basin or Nash Draw. It is located in Lea County in 18, 20, 32, actually located in the edge of a

very large natural sink. I feel sure that this sink connects with Nash Draw, that being the lowest point in the area, and in all likelihood water runs from this sink into this low area.

Then the last potash mine to be developed in the area is Kermac Potash Company, located in 4, 21, 31. They're a pretty new company but they also have a very large pit. I believe they have more water in their pit than anybody else.

Going back, the parts per million chloride taken from the State Engineer's reports, the U. S. Borax, an in-plant sample now, I presume that he picked up a sample somewhere inside the plant area and not in this tailings pond area. The in-plant sample there was 131,000 parts per million.

Ideal Basic or PCA, 10,050 parts per million. Now, this is the low. International Minerals, the parts per million were 11,220. Duval Sulphur, 90,200. Southwest, 188,200. National, 14,680; and Kermac, sample that he took from their tailings pond, 178,800. I'm not sure why some of these are so low. I feel that they should be higher and I'm certain that the water in these ponds is essentially saturated.

We've stopped here at PCA and seen some water coming off of this big mound they have got out there and it's just solid with salt. The water itself is kind of a red. You can just practically see the salt crystals in it as it's flowing.

The comparison of the volumes of potash brine against the volumes of oilfield brine are shown on the bottom portion of this exhibit.

Q (By Mr. Hatch) What exhibit is that?

A That is Exhibit Number 5. The oilfield brines represent about five percent of the total disposal in the area which I have outlined here.

Q Did you ever give the total potash brine disposal?

A The total potash brine disposal as shown in the State Engineer's report represents 301,548 barrels of water per day. The closing of the U. S. Borax Chemical Company mills and the cutback in production in some others may have cut this as much as one-third. However, it's possible that some of these others may have had some increase since that time. It's still a substantial quantity and represents about five percent, or the oilfield brines represent about five percent of the total, potash mines about ninety-five percent.

One thing I failed to mention earlier, National Potash Company has a rather limited size pit and I understand when it rains they have to pump some of their water over here into this natural lake Laguna Plata; however, the volume would represent no more than about 3,000 barrels a day if you average it out over a year, and that is about one percent of what the potash mines dispose of, so it's not a significant

figure now. I was hesitant to take this area in for that small volume and I'm not certain what the drainage is from this lake. When you move just a little bit east from here the drainage is toward depressions to the east, and I feel --

MR. PORTER: Away from the potash area?

THE WITNESS: Away from the potash area, so I haven't included this at this time.

Q What's the water situation in this area?

A Well, to discuss the fresh, and I put brackets around fresh water because a lot of it isn't, I would like to use Exhibits 6, 7 and 8.

(Whereupon, Exhibits 6, 7 and 8 were marked for identification.)

A Exhibit 6 is a tabulation of water samples which were taken in this area over quite a long period of time. The samples were taken in the area in 1948 and 1950 and in 1968. The samples as shown on Exhibit 6, marked U.S.G.S., were reported in the Ground Water Report Number 3 "Geology and Ground Water Resources of Eddy County, New Mexico" by G. E. Hendrickson and R. S. Jones in 1952. The samples marked OCC were collected by myself and tested by John Runyon of our Hobbs Office in 1968.

If you look on this exhibit, there are several

samples bracketed by red lines. I believe these samples to be from the same well and each one of these shows a deterioration in the quality of the water from that well. The sample shown as being in Unit letter "I" of 16, 20, 30 looks like it's haywire somewhere. The sulphates and chlorides appear to be reversed in one of these samples. However, we double checked our sample and it is correct, the analysis, so I am not too sure who went wrong where, but in any event, the total dissolved solids is up in this sample and indicates a deterioration in the quality of the water.

Exhibit Number 7 is a two-part exhibit; the first page is a letter from the Lea County Health Department to our Hobbs Office which outlines the recommended standards for potable water as adopted by the Public Health Service in 1946.

If you'll refer to this exhibit, especially the section in parts per million chlorides, parts per million sulphates and total dissolved solids, it can be seen that just about all of the water sampled even twenty years ago was not fit for human consumption.

Then the second part of Exhibit Number 7 consists of a cover letter from Dr. Smith at the New Mexico State University, and an excerpt from a pamphlet entitled "The Effect of Saline and Alkaline Waters on Domestic Animals". I am

informed that this is the definitive work on this subject and that anybody who says anything goes back to this work for support.

Essentially what this says, there are ten parts to it, is that cattle can maintain themselves on waters which contain up to 1.5 percent salts, which is equivalent to 15,000 parts per million. It also says that they can't do this if they are suckling young, so for cows with calves it would be somewhat less than this.

I also presume that by maintenance they mean that they are not going to improve a whole lot. They're just going to be out there. Very little of the water sampled --

MR. HAYS: What about sheep?

THE WITNESS: Sheep can get along with a little bit worse water.

MR. PORTER: Does it indicate in here that cattle would kind of have to grow up with this kind of water situation, that they couldn't be transferred from one pasture to another and go to this concentration?

THE WITNESS: That's right, they have to be kind of brought up with this.

GOVERNOR CARGO: But it is debilitating while they are adjusting to it?

THE WITNESS: Right, it is. And some of them don't adjust.

MR. HAYS: Can you testify as an expert in that field?

THE WITNESS: No, sir, I'm afraid not. I have to rely on the State University.

MR. PORTER: By the way, I notice this letter is addressed to Mr. Lee Clemmons, can you tell us who that is?

THE WITNESS: I'm not sure who Lee Clemmons is. I am afraid he may be Les Clemmons. They may not recognize him over there for all I know.

MR. PORTER: I thought we had some new Commission personnel that I did not know about.

A I might point out the map here, there's some twenty-three windmills located on this map and I personally know about fourteen or fifteen of those which are being used either for domestic purposes or for stock water. I believe this well right here is being used for domestic purposes. That's the only one that I know definitely is.

There are numerous intermittent lakes in this whole area. Every time it rains they'll fill up with water and I've seen cattle using a lake right in here on my first trip out there and the next trip about a week later it was completely

dry, so they come and go.

Also this little lake right here, I took a sample of water from it and I really didn't need to because it smelled just like being out on the Gulf Coast; when I got the sample back it was one hundred seventy some thousand parts per million chloride. So not all of these lakes in this area can be used, all of this seems to be pretty bad.

MR. HAYS: The lakes, are they about the highest you have ever seen them?

THE WITNESS: I haven't been back by since this last rain. I did all of my field work before that time.

GOVERNOR CARGO: They had four and a half inches last week.

Q (By Mr. Hatch) There is water in the area and being used for domestic purposes and for stock purposes?

A Right, and I believe in Exhibit 5 it shows that PCA is using, or at the time of that report was using about nineteen hundred gallons per minute of low quality water from wells in the plant area to supplement the water they pipe in from the Caprock. I believe the water is coming from the Rustler.

Q Do you know of any other industrial use for water in that area?

A No, I don't, and neither is there any irrigation. As far as I know the only other use is for stock water. I would

like to point out that the reservoirs in there are shown on Exhibit Number 8. Exhibit Number 8 is a map, a copy of a map from this Ground Water Report Number 3 which I have previously mentioned. The map is entitled "Wells and Springs and Availability of Ground Water in Eddy County, New Mexico".

I have taken a red marker and marked off the area which we're considering here. If you refer, then, to the left-hand column of this map, it breaks the county down into five areas. We're in Area Number 5. If you'll look over here in Area 5 you can see that the area we're considering in this hearing is divided up into 5-b and 5-c. 5-b is described as stock water generally obtainable at depths less than 250 feet in Rustler formation, generally impotable and locally unfit for livestock. 5-c is stock and domestic supplies available at less than 300 feet in Triassic redbeds, generally fair but locally impotable. I agree with that. I have reviewed well logs and scout tickets for wells in this area and they find water just about everywhere but the lack of development would lead me to believe that this is correct in its description of the ground waters.

Q Would you briefly summarize for the Commission what you have found and what you have testified?

A Yes, sir. I find that there are several oil and

gas pools in the defined area which produce varying volumes of water. These volumes ranging from zero to 7500 barrels of water per day total 15,978 barrels of water per day. This can be compared with the reported potash brine disposal of 301,548 barrels of water per day.

I find that the oilfield brine disposal pits and potash tailings ponds overlie the same surface and subsurface drainage system and in my opinion the enforcement of Order 3 of Order R-3221 would not appreciably reduce the hazard to fresh water and would be an unnecessary expense upon the operators in this area.

Q You have testified that Exhibits 1, 2, 5 and 6 were prepared by you?

A Yes, sir.

Q And that Exhibits 3, 4, 7 and 8 are various papers and reports prepared by other agencies and persons and used by you in performing your duties?

A Yes, sir.

MR. HATCH: I would like to move the introduction of Exhibits 1 through 8.

MR. PORTER: Any objection to the admission of these exhibits? Any questions concerning them? The exhibits will be admitted to the record.

(Whereupon, Exhibits 1 through 8 were offered and admitted in evidence.)

MR. PORTER: Does anyone have a question of Mr. Stamets? Mr. Lovelace.

CROSS EXAMINATION

BY MR. LOVELACE:

Q You testified that the U.S.G.S. estimated five gallons per minute per acre evaporation in trying to determine the amount of the rate of seepage out of those ponds?

A Yes, sir.

Q Is that an average annual figure or was that an observation taken at the time of measurements?

A That is an average annual figure and is not necessarily applicable to each pond in the area.

MR. LOVELACE: Thank you.

MR. PORTER: Does anyone else have a question? The witness may be excused.

(Witness excused.)

MR. PORTER: Does anyone else desire to present testimony in the case? If not, we will hear any statements that anybody has concerning this case. Mr. Gray.

MR. GRAY: I represent William A. and Edward R. Hudson and the Windfohr Oil Company. We would just like to

support the Commission's proposal to set up this area as advertised as an exception to the no-pit order. We would further like to commend the Commission on initiating this hearing on their own motion rather than have each individual operator to have to appear separately at separate hearings. We think the industry should be appreciative of this action.

MR. PORTER: Thank you, Mr. Gray. Mr. White.

MR. WHITE: David White on behalf of Pan American. Pan American has supported this Commission in their efforts to eliminate pit disposal where it is felt that it is a contamination hazard. In the case of this hearing we again concur with the Commission and feel that this is a just cause for an exception to the no-pit order. We feel that it would be an unreasonable expense on the part of oil and gas producers in this area to dispose of produced water in a manner other than which other industries are required to dispose of it.

We also feel, based on the evidence presented, that the pollution hazard presented by the oil and gas industry in this area is very minor, if any at all. For those reasons we support the Commission in this hearing and request that this area be approved for an exception to the no-pit order.

MR. PORTER: Thank you. Anyone else have a comment to make concerning this case? The Commission will take the case under advisement. Before calling the next case we will have a very short recess.

I N D E X

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Notary Public in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Hearing before the New Mexico Oil Conservation Commission was reported by me; and that the same is a true and correct record of the said proceedings, to the best of my knowledge, skill and ability.

Witness my Hand and Seal this 3rd day of August, 1968.

Ada Dearnley
NOTARY PUBLIC

My Commission Expires:

June 19, 1971.