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.

COPY

Case 3806 Exhibit #3

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

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 NW¼SW¼ 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 3,620 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 14,600 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 N½ 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 183,200 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 SE¼SE¼NW¼ 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 178,800 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

EY-3-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	41,890
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	47,446	7,491			140,225
		244	54,582	8,677		Pit 8,385	
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	141	-0-			---
		64	5,291	1,121			
43.	Artesia Queen Grayburg San Andres	581	61,130	58,356	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	SWD	---
		84	18,747	13,449		
46.	Penasco Draw San Andres Yesos	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	Pit	---
		52	7,690	4,508		
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	729	1,067		3,137
		1,038	84,703	240,534	SWD 231,724 Pit 8,810	
60.	Monument Grayburg San Andres	487	291,113	810,085	SWD	4,696
	Eunice Grayburg San Andres	316	120,230	206,479	SWD 189,052 Pit 17,427	91,147
		803	411,343	1,016,564		
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.	Scarborough 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	---

112.	North Mason Delaware	40	7,189	8,415	Pit	---
113.	Brushy Draw Delaware	8	1,425	372	Pit	79,875
114.	Pecos Delaware	2	278	606	SWD	---
115.	Welch 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

ILLEGIBLE

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 1,987 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

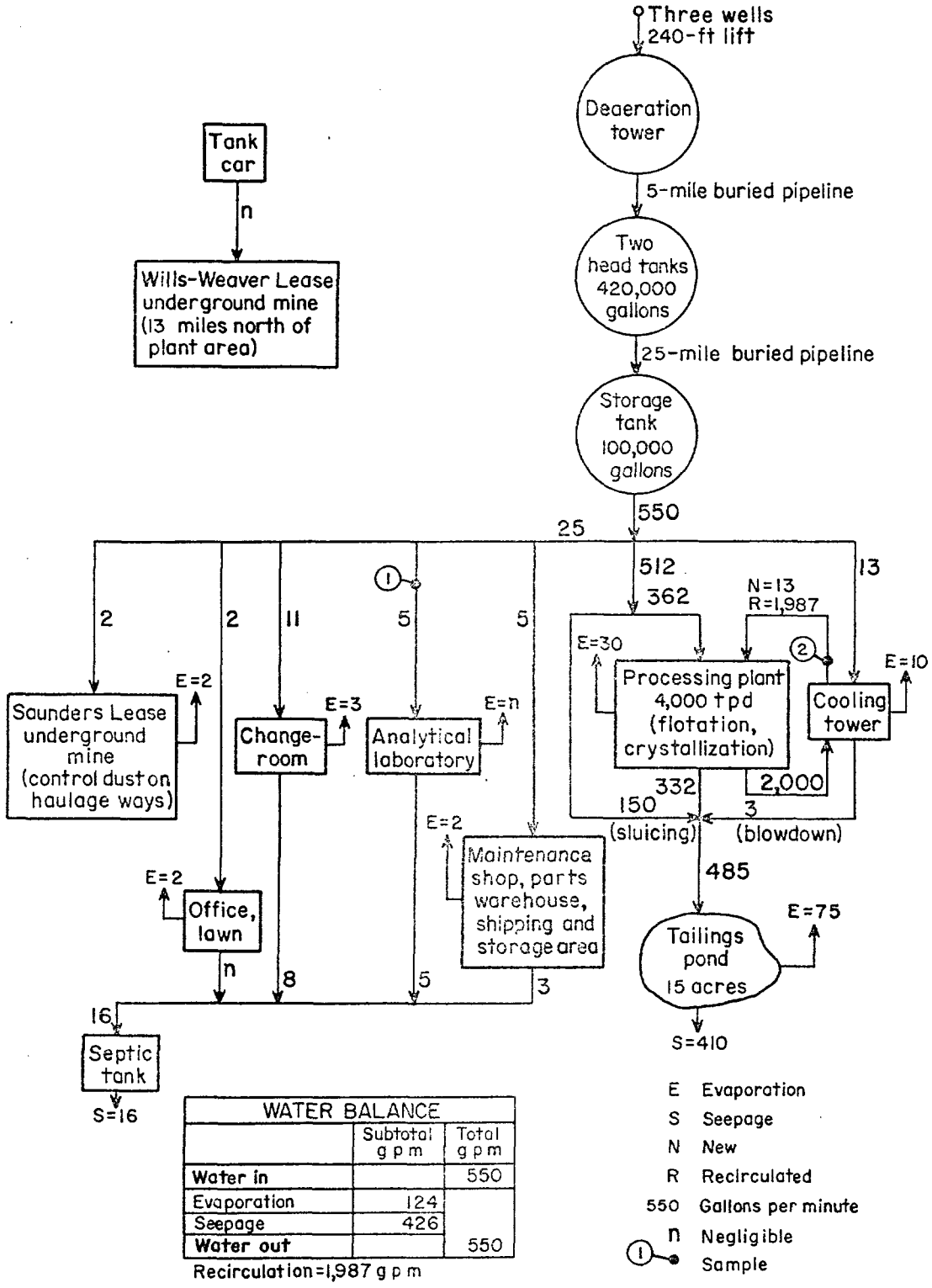


FIGURE 6. - Schematic Waterflow Diagram, Duval Sulphur & Potash Co., Eddy County, N. Mex.

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.

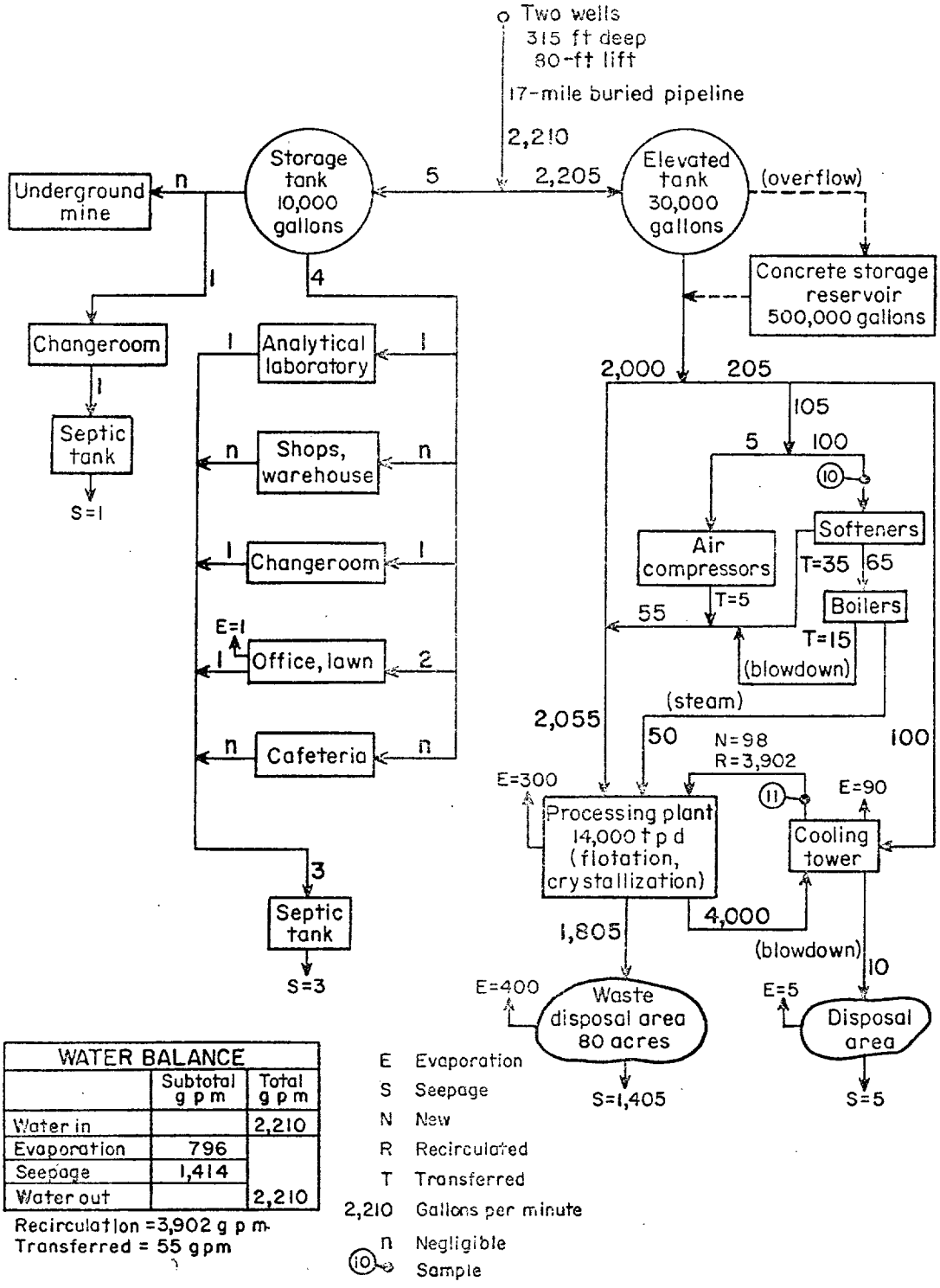
Cost of the new water, for power, maintenance, and treatment, is 15 cents per 1,000 gallons. For the same items, recirculated water costs an estimated 1 cent per 1,000 gallons.

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.

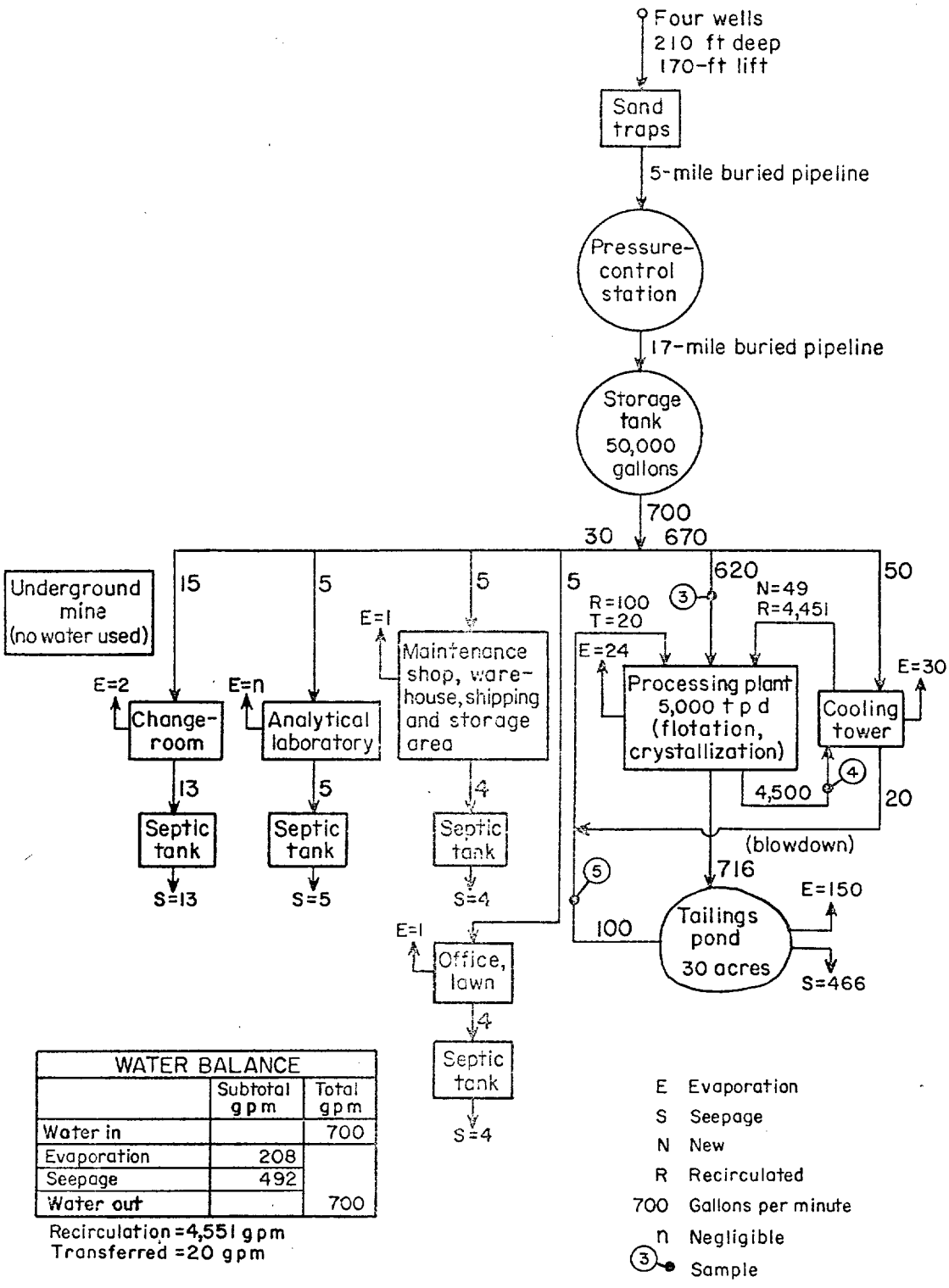
The processing plant is operated three shifts per day, 350 days per year, and the mine, two shifts per day, 260 days per year. Employees in company operations total 195.

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

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.

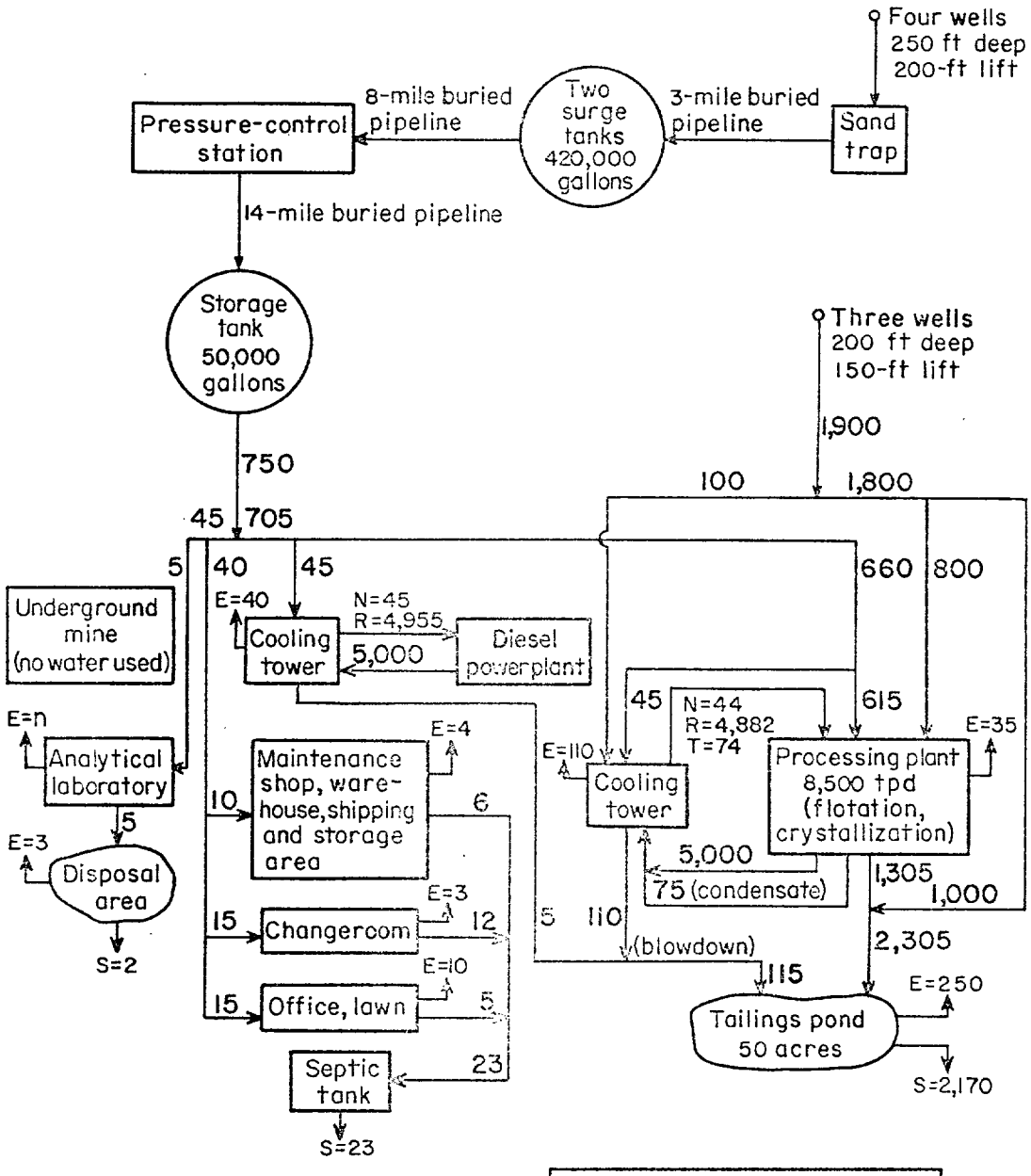
Potash Company of America

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.

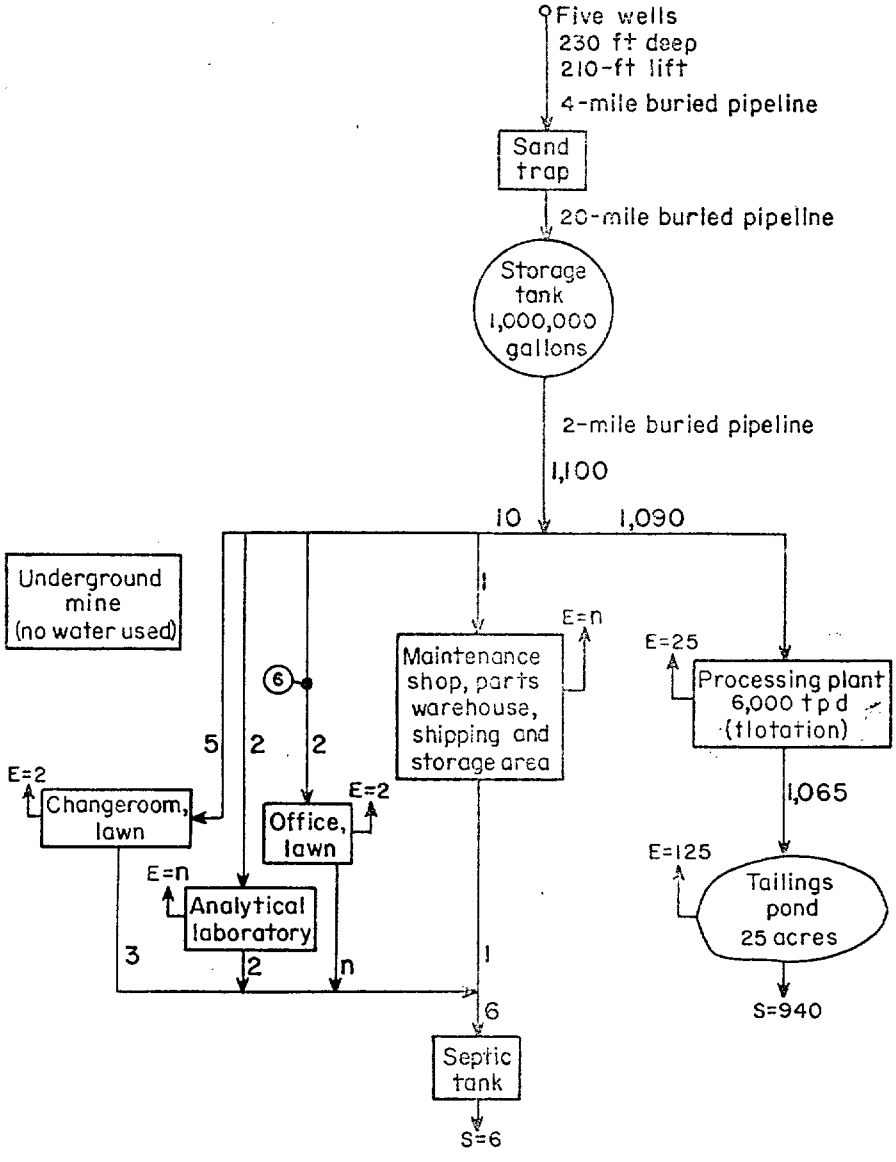


FIGURE 11. - Schematic Waterflow Diagram, Southwest Potash Corp., Eddy County, N. Mex.

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.

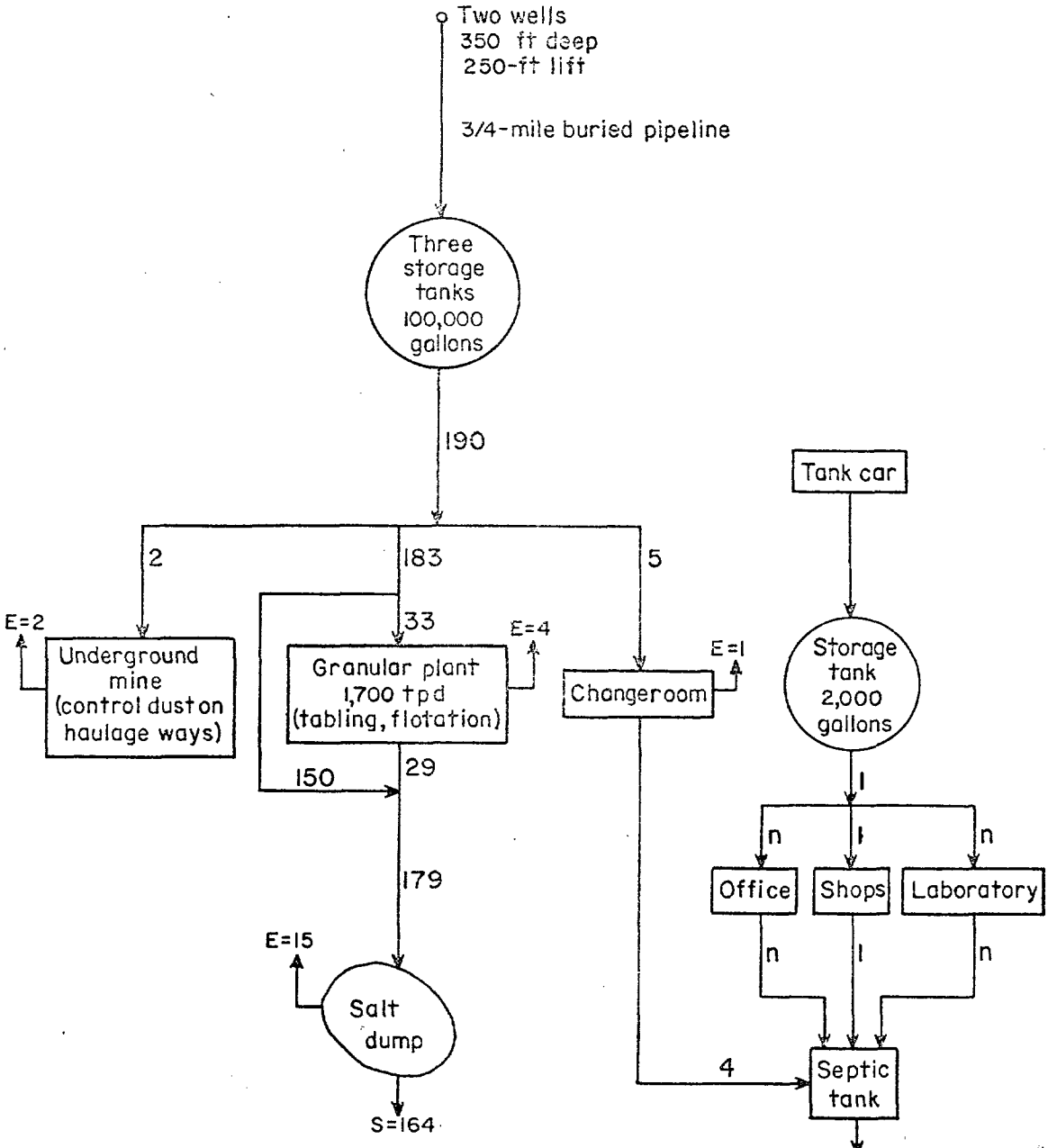
Potash operations of U.S. Borax & Chemical Corp. include an underground mine and 1,700-tpd granular plant 24 miles east of Carlsbad, and a 6,000-tpd refinery 17 miles southeast of Carlsbad (fig. 5). The product is muriate of potash. All operations are three shifts per day, 350 days per year. Employees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

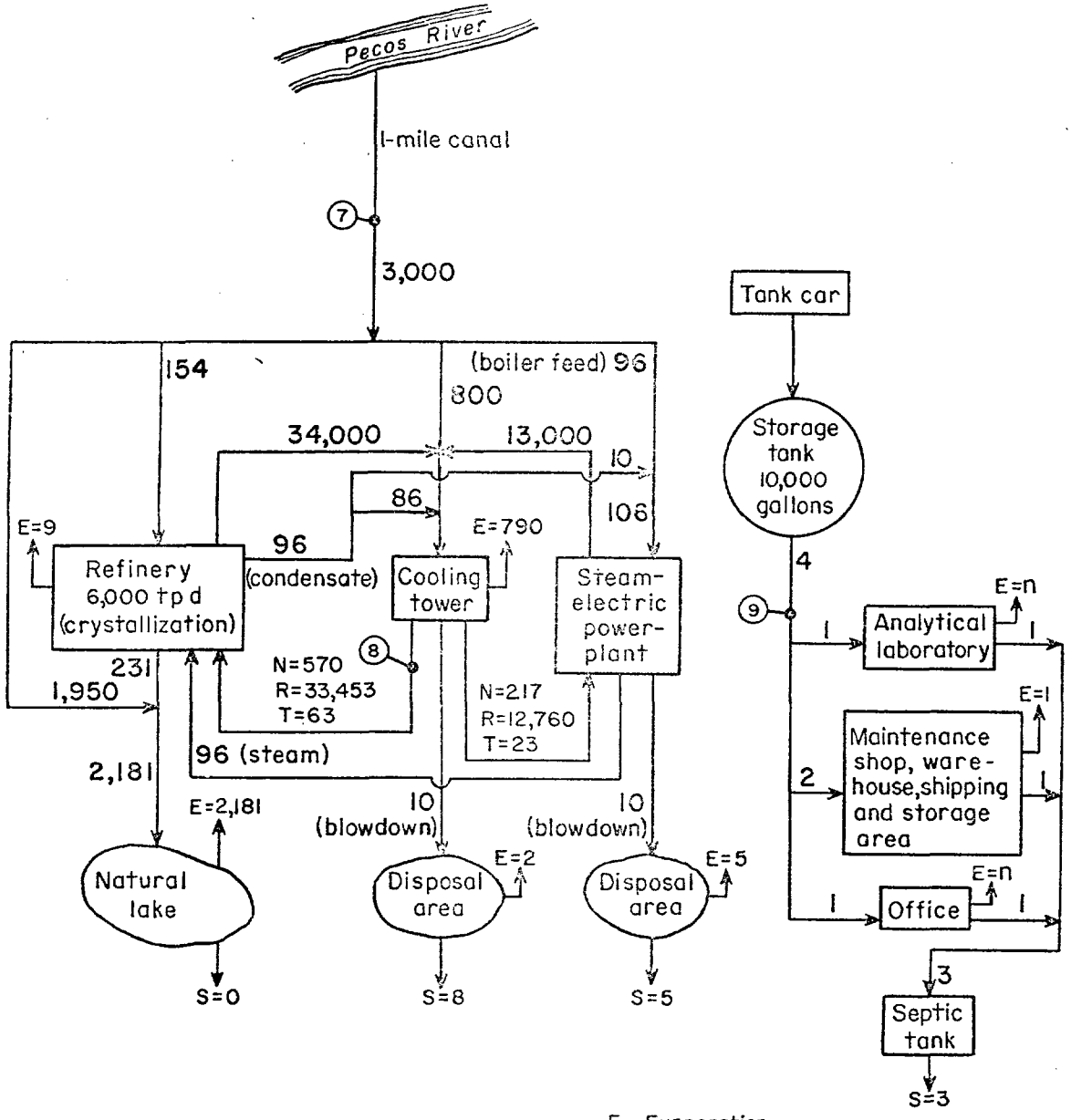
The refinery waterflow diagram illustrates the large-scale conservation of water effected by recirculation. A 6-foot-diameter redwood pipeline (fig. 14) carries all water sent to the 12-unit cooling tower. The total amount recirculated from the cooling tower, 46,213 gpm, includes 33,453 gpm used for 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

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

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

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,

(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

(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:

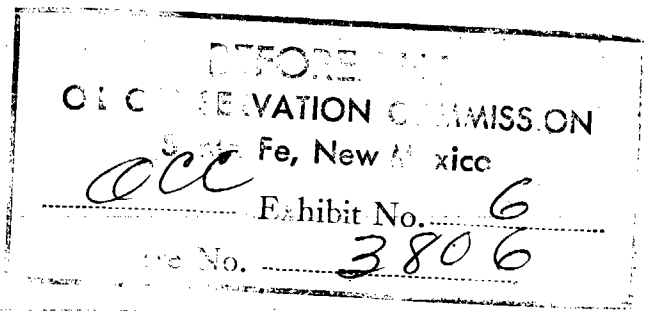
TOWNSHIP 9 SOUTH, RANGE 37 EAST, NMPM
SECTION 25: SE/4

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-



COPY

LEA COUNTY HEALTH DEPARTMENT
303 East Sanger
Hobbs, New Mexico

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
Chlorida 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/rg

BEFORE
NSERVATION MISSION
Santa Fe, N ico
OCC Exhibit No. 7
e No. 3806

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 chlorides, calcium, magnesium and sodium sulfates, 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 noted 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 themselves 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 growth, reproduction and maintenance might be possible if the animal were 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 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

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 Disposal--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

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

One acre-foot per year equals 21.2556 barrels per day

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