

TEXAS BOARD OF WATER ENGINEERS

Durwood Manford, Chairman
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Contamination Report No. 9

Investigation of Contamination Complaint, Clemens
Prison Farm, Brazoria County, Texas

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August 1960

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INVESTIGATION OF CONTAMINATION COMPLAINT, CLEMENS

PRISON FARM, BRAZORIA COUNTY, TEXAS

The Board of Water Engineers on August 4, 1960, received a complaint from Mr. A. G. McCain of the Texas Department of Corrections stating that the quality of water from the well on the Clemens Prison Farm, 10 miles north of Freeport on Highway 36, had been deteriorating for some time. A request was made for an investigation by the Board of Water Engineers to determine: (1) the source of contamination; and (2) the desirability of trying for a deeper source of water.

A field investigation was made on the 11th and 12th of August, 1960 with the following results:

Records of the subject well (number 23 on Plate I) received from Mr. L. G. Bounds, the Warden of the Prison Farm, showed the well to be 565 feet deep with a producing interval from 497 to 540 feet. This well was drilled in 1952 to replace a well to the same depth which was not producing enough water to supply the Farm needs. The present well produces approximately 200 gpm (gallons per minute).

Chemical analyses of water samples from the present well were made when the well was completed in May 1952, in January 1958, and in July 1960. The results of these analyses are shown in the tabulation of chemical analyses. Although the 1958 analysis showed some increase in chlorides and total dissolved solids over the 1952 analysis, the 1960 analysis showed the chlorides to be slightly less and the dissolved solids only slightly more than that of the 1952 analysis. The only noticeable changes between the 1952 and 1960 analyses were: manganese increased from .05 to 2.05 ppm, and sulfates increased from 0.0 to 48 ppm. These changes in quality might account for the increasingly undesirable taste of the water from the well.

There is no indication that the well is being contaminated by brines associated with oil and gas production. The poor quality of the water appears instead to result from the well's having been completed through the fresh and salt water interface. Sands below the present production level will have greater concentrations of chlorides and dissolved solids, and these concentrations will continue to increase with increasing depth.

Water in the area of investigation is obtained from the Beaumont clay formation. The formation consists of medium to fine-grained sand lenses interbedded with clays. The sands are considered as a single aquifer because of lateral and vertical connections.

Although the driller's log on well 23 does not show any thick sands above 300 feet, the electric log on well 25 indicates 100 feet of sand between the casing at 156 feet and 300 feet. There are a number of wells in the area completed above the 300 foot level, and it appears probable that the Prison Farm's best chance for water of desirable quality would be from a well or wells completed above that depth.

From chemical analyses of wells at various depths in the area, Plates II and III were constructed showing the approximate depth to which 1000 ppm or less dissolved solids and 250 ppm or less chlorides will occur below the land surface.

At the Prison Farm location concentrations of 1000 ppm or less dissolved solids should be found down to approximately 300 feet, and of 250 ppm or less chlorides to a depth of approximately 200 feet.

The water in the shallow sands is very hard and would require softening. Also, iron is reported in some of the wells in large enough quantities to require filtering. However, some of the shallow well owners in the area report they have had very satisfactory and inexpensive results from using an iron filter on their entire system and a water softener on water going to the hot water heater.

Shallow wells at Jefferson Lake are reported to produce 200+ gpm. Whether this amount could be produced at the Prison Farm is not known. Depending on the sand thickness in the area drilled, it might be necessary to drill two wells to obtain the desired quantity of water.

Table 1

ANALYSES OF WATER FROM WELLS IN THE VICINITY OF CLEMENS PRISON FARM, BRAZORIA COUNTY, TEXAS *

(Analyses given are in parts per million except Specific Conductance and pH)

New Well No.	Well No. in Bul.	Owner	Depth of well (ft.)	Date of Collection	Silica (SiO ₂)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved solids	Total Hardness as CaCO ₃	Specific Conductance (Micromhos at 25°C)	pH
1	135	Smith Bros. Gin Co.	822	Oct. 14, 1936							268	<10	1,410			2,424			
2	137	Brazoria White School	125	do				73	27	138	531	54	72			625	292		
3	142	H. C. Hayslip	494	Oct. 22, 1936							427	21	525			1,201			
4	143	Hinkle	57	do							470	58	255			865	-		
5	148	Jefferson Lake Sulphur Co.	500±	May 20, 1937				36	13	504	407	<10	645			1,395			
6	153	Clemens Prison Farm	253	Nov. 14, 1946							567	67	398			-	278		
7	155	S. S. Perry	1000±	Oct. 30, 1936							305	<10	1,120			2,001			
8	157	Kate Huntington	487	do							293	<10	640			1,241			
9	158	P. McNeill	505	Oct. 22, 1936							354	<10	605			1,236			
10	209	E. D. Pearson	485	Oct. 27, 1936							348	<10	445			981			
11	210	L. J. McNeill	700±	do							445	12	505			1,171			
12	220	Mrs. Stringfellow	208	July 11, 1941				48	24	228	512	10	202		0.3	764	218		
13	223	do	215	do				59	19	246	585	11	155		0.0	758	176		
14	224	do	250	do				36	19	245	525	18	178	0.4	0.3	771	168		
15	225	do	1100±	do							274	2	1,620			2,820			
16	347	City of Lake Jackson	234	Feb. 14, 1944				83	37	193	419	35	282			-			
17	349	Mrs. Stringfellow	184	July 2, 1941				38	22	168	448	7.9	122	-	4.8	584	186		
18	351	C. L. Cobb	234	May 27, 1939				36	20	275	1,250	12	172	-	-	824	172		
19	444	R. S. Stranger	180	May 29, 1939				89	16	74	678	15	110	-	-	472	290		
20	447	Retrieve Prison Farm	450±	July 1, 1941				78	33	234	440	40	308	-	2.0	912	330		

* See footnotes at end of table.

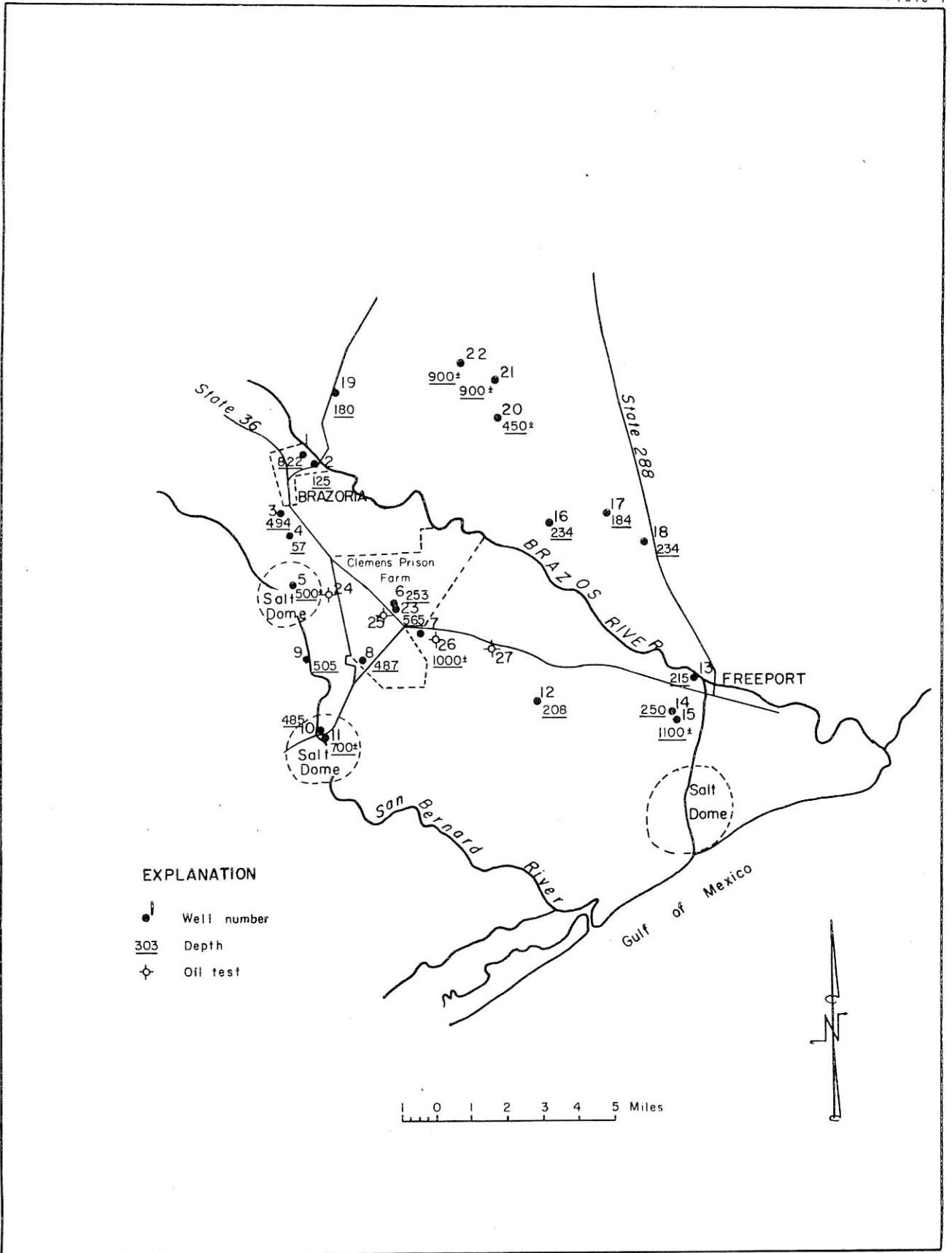
ANALYSES OF WATER FROM WELLS IN THE VICINITY OF CLEMENS PRISON FARM, BRAZORIA COUNTY, CONTINUED

New Well No.	Well No. in Bul.	Owner	Depth of well (ft.)	Date of Collection	Silica (SiO ₂)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Fluoride (F)	Nitrate (NO ₃)	Dissolved solids	Total Hardness as CaCO ₃	Specific Conductance (Micromhos at 25°C)	pH
21	448	do	900±	do						920	376	2	1,350	-	-	2,476	214		
22	449	do	900±	do						843	372	2	1,250	-	-	2,313	237		
a/23		Clemens Prison Farm Well	565	May 2, 1952		1.1	-	27.4	14.4	544.5	343.6	0.0	716.0	-	-	1,702	128	-	8.8
b/23		do	565	Jan. 15, 1958		.08	<.05	28.0	14.0	530.0	345.0	3.0	740.0	0.7	3.8	2,370	130	3,950	7.4
b/23		do	565	July 19, 1960		.19	2.05	27.0	15.0	511.0	334.0	48.0	710.0	0.6	2.4	1,761	130	2,935	7.5
		City of Brazoria	472	April 1951	15	.4	<.05	36	27	315	-	14	391	0.7	<.4	985	201		7.6

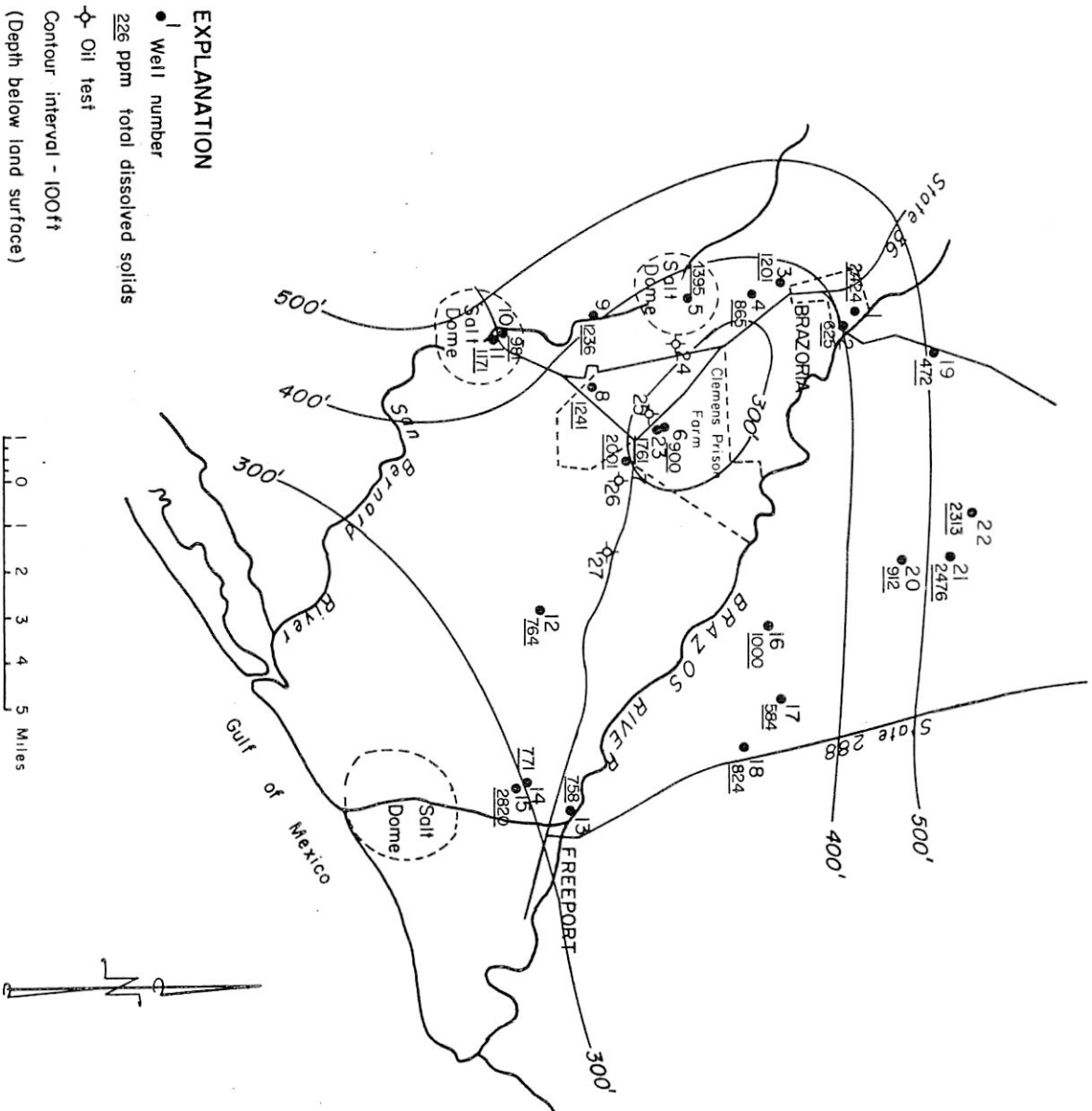
* Taken from Board of Water Engineers Bulletin "Ground-Water Resources of Brazoria County, Texas, 1947"

a/ Curtis Laboratory

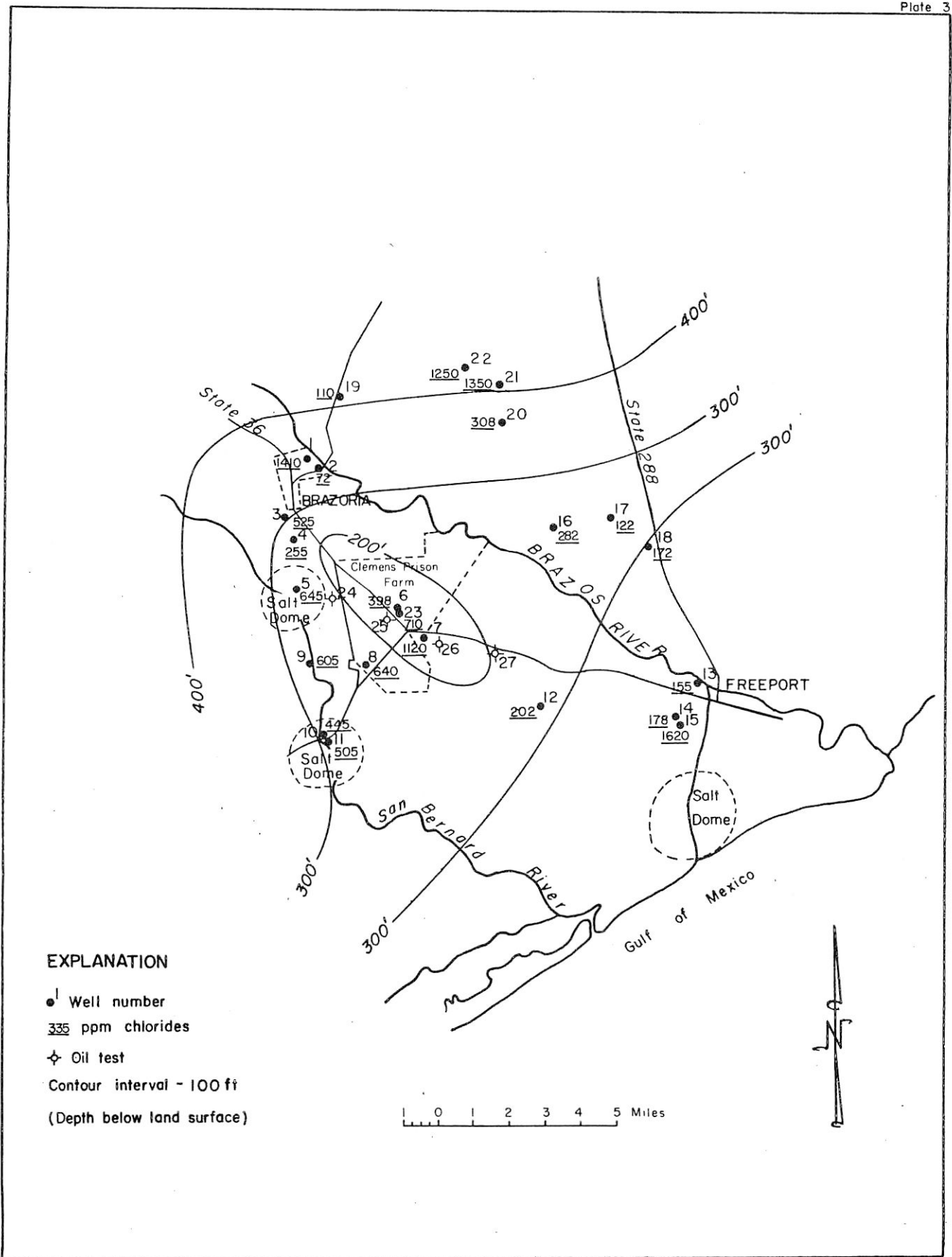
b/ State Health Department



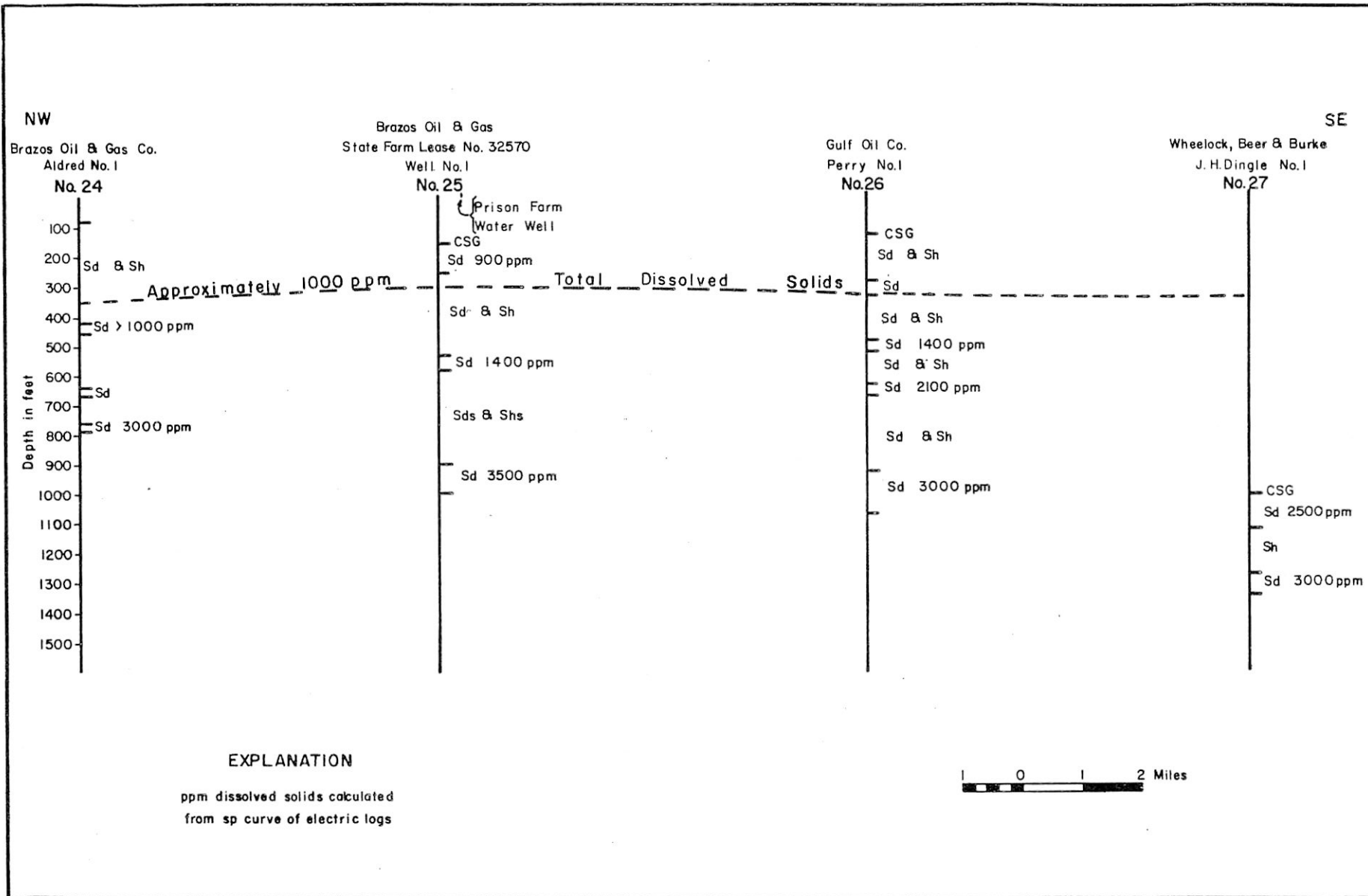
MAP SHOWING LOCATION OF WELLS AND DEPTHS IN VICINITY OF CLEMENS PRISON FARM BRAZORIA COUNTY, TEXAS



MAP SHOWING LOCATION OF WELLS AND CONTOURS ON APPROXIMATE DEPTH OF 1000 PPM DISSOLVED SOLIDS IN VICINITY OF CLEMENS PRISON FARM BRAZORIA COUNTY, TEXAS



MAP SHOWING LOCATION OF WELLS AND CONTOURS ON APPROXIMATE DEPTH OF 250 PPM CHLORIDES IN VICINITY OF CLEMENS PRISON FARM BRAZORIA COUNTY, TEXAS



CROSS-SECTION SHOWING OCCURRENCE OF SANDS AND CONCENTRATIONS OF DISSOLVED SOLIDS