55-44

IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Water Resources Division
Ground Water Branch
2520 Marconi Avenue
Sacramento 21, California

POSSIBILITIES FOR DEVELOPING PRODUCTIVE WATER WELLS AT THE VETERANS ADMINISTRATION HOSPITAL, SEPULVEDA, CALIFORNIA

By L. C. Dutcher

March 1955

Scope of Memorandum

This memorandum has been prepared at the request of the Veterans Administration as contained in a letter dated January 18, 1955, from L. R. Hurt, Director, Design Service, Munitions Building, Washington, D. C., to J. F. Poland, District Geologist, Sacramento, Calif. A copy of the letter request is attached. This memorandum discusses briefly the general geologic features of the area, the character of the water-bearing deposits as penetrated in wells, the occurrence and movement of ground water, yields of wells, well-drilling methods, the chemical character of local ground waters, and the problem of water rights in the San Fernando Valley. Data available to this office on well depths, yields and drawdowns of wells, and ground-water quality in the general vicinity of the Veterans Administration Hospital are meager. The collection of additional information would require a field investigation.

Location

The new Veterans Administration Hospital in the San Fernando Valley is in the city of Los Angeles and about 3.5 miles southwest of San Fernando, Calif. The site is on a low hill about 6 miles north of Ventura Boulevard (U. S. Highway 101, alternate) and 0.5 mile west of Sepulveda Boulevard (State Highway 7). The area includes about 160 acres and is bounded on the north by Lassen Street, on the south by Plummer Street, on the east by Haskell Avenue, and on the west by Woodley Avenue.

General Geologic Features and Character of Deposits

The San Fernando Valley is an alluvial plain 20 miles long in an east-west direction and 4 to 12 miles wide. The eastern half of the valley is underlain in large part by coarse, permeable granitic debris composing the alluvial fans of Tujunga, Bull Canyon, and Pacoima Washes. Most of the valley is an area of active alluvial deposition.

The San Fernando Valley is bounded on the north by the San Gabriel and Santa Susana Mountains and on the south by the Santa Monica Mountains. The valley overlies a part of the earth's crust which structurally has been depressed between the mountain ranges on the north and south. Although the valley is bounded on the north and east by well-known faults, the geologic structure of the valley area is believed to be relatively simple. The axes of several southeast-trending anticlines

are exposed along the south side of the Santa Susana Mountains. These anticlines plunge toward the valley. The new Veterans Administration Hospital is located at the eastern end of a discontinuous row of low hills which are the topographic expression of an underlying upfold or anticline in the older alluvial deposits and older marine sediments at greater depth (Eckis, 1934). The hill on which the new hospital is located is composed of older alluvial materials which have been slightly uplifted by the folding above the depositional surface of the younger alluvium.

The permeable water-yielding deposits at the site consist, from youngest to oldest, of alluvial deposits of Recent age, commonly called younger alluvium; alluvial deposits of Pleistocene age, commonly called older alluvium; and continental and marine deposits of early Pleistocene and Pliocene age, collectively referred to as the Fernando beds. The younger alluvium in large part is above the zone of ground-water saturation. The older alluvium is the principal water-bearing unit of the area.

Little is known about the thickness of pervious fill underlying the valley floor, except in the southwest part of the basin where it is only a few hundred feet. The thickness increases toward the east and may reach 1,000 feet or more near the east end of the basin. Near the new hospital the older alluvium probably exceeds 400 feet in thickness.

Occurrence and Movement of Ground Water

All the ground water beneath the hospital site originates either in the form of precipitation on the mountainous areas bordering the valley or on the valley floor, or is brought into the area through the Los Angeles (Owens Valley) aqueduct. Some aqueduct water is artificially spread on the alluvial fans at the base of the mountains, and a part is used for irrigation in the valley. A part of the precipitation falling on the mountains enters the numerous streams as surface runoff discharged into the valley area, and some of this discharge percolates through the permeable gravel beneath the stream channels to replenish the underlying ground-water body.

Water-level contours can be drawn on points of equal altitude on the surface of the ground-water body contained in the permeable materials which partly fill the San Fernando Valley. On the basis of water-level measurements in observation wells located throughout the valley, the Los Angeles County Flood Control District has prepared annual water-level contour maps for the area (Los Angeles County, 1954, map 9). These contour maps show that the ground water beneath the new hospital site flows in a southeasterly direction from a higher altitude on the north to a lower altitude on the south. Because the new hospital site is on a low hill, the depth to ground water is greatest beneath the area of highest topography. On the basis of the water-level contour maps for April 1953, it is estimated that water levels were probably about 170 to 210 feet below land surface beneath the site, being shallower along Plummer Street at the site of proposed well number 1 where the altitude of the land surface is about 865 feet above sea level.

Yearly measurements of water level have been made at well 4805, at the corner of Haywenhurst Avenue and Plummer Street about 0.5 mile west of the new Veterans Administration Hospital. These measurements are attached herewith and show that the depth to water below the top of the well casing has ranged from 146 feet in 1944 to 235 feet in 1926.

Well Logs and Yields of Wells

The drillers' logs for two water wells and one oil-test well near the new hospital are attached. Water well 4805, at the corner of Haywenhurst Avenue and Plummer Street, was drilled to a depth of 400 feet, and water well 4803, about 1 mile north of the new hospital at the corner of Chatsworth Street and Haywenhurst Avenue, was drilled to a depth of 425 feet. No production records for these nearby wells are available. Well 4835, which is 385 feet deep and located near the intersection of Lassen Street and Sepulveda Boulevard, was reported to produce about 1,000 gallons per minute when tested after completion prior to 1930 and was pumped at a rate of about 450 gallons per minute for many years thereafter. That well is now destroyed and the log is not available. Oil-test well 4805A, at the southwest corner of Lassen Street and Haywenhurst Avenue, was drilled to a depth of 1,011 feet, and the log shows the character of the deeper deposits. Below a depth of about 696 feet the deposits are fine grained and do not appear capable of yielding much water. In general, the yields from wells in the eastern part of the valley are higher than those from wells in the western part.

In the parts of the San Fernando Valley underlain by coarse bouldery debris from the San Gabriel Mountains, such as beneath the alluvial fans of Tujunga and Pacoima Washes, cable-tool methods of drilling have been found to be greatly superior to rotary methods of drilling because the cable-tool drill can make hole much more readily in the coarse bouldery deposits. If the deposits at the site of the new Veterans Hospital were laid down by streams from the Santa Susanna Mountains, they will be finer grained than is the debris from the San Gabriel Mountains and a rotary drill probably could penetrate them without difficulty. If they are in part debris from Pacoima Wash, as appears likely, they may be sufficiently coarse to give trouble to a rotary drill. It is suggested that a driller experienced in constructing wells in the western part of the San Fernando Valley be consulted on this problem.

It will be necessary, of course, to engage a competent well driller so that any test or supply wells drilled will be properly constructed and developed to meet the needs for which they are intended and to supply water free of sand or silt. It is believed that wells 14 or 16 inches in diameter would be suitable. Either size should provide ample room for installing a pump and airline. The size, number, and position of perforations should be based on the materials penetrated during drilling. Machine-cut perforations are generally used in a well drilled by the rotary method; knife or louver cuts are commonly used in a well drilled by the cable-tool method.

Chemical Quality of Water

The chemical analysis of water from irrigation well 4837, depth 385 feet, near the intersection of Noble Avenue and Parthenia Street about 2 miles southeast of the new hospital site, is given below together with analyses of waters from nearby streams and from the Los Angeles (Owens Valley) aqueduct.

Chemical analyses of well, stream, and aqueduct waters[1]

(Analyses in parts per million)

Date analyzed	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Chloride (Cl)	Sulfate (SO_4)	Boron (B)	Sum of determined constituents[2]
Irrigation well 4837 located about 2 miles southeast of hospital								
6-24-32	a186	a52	109	271	41	a601	0.35	1,120
Water from Bull Canyon Creek west of San Fernando[3]								
6-23-32	110	40	93	381	73	211	.52	718
Water from Pacoima Creek northeast of San Fernando[4]								
9-11-31	64	28	21	222	9	116	.31	349
Water from Los Angeles Aqueduct at San Fernando powerhouse[5]								
9-11-31	30	7	b36	149	18	33	.53	199

1. From California Division of Water Resources (1933, Bull. 40-A, p. 1-6).
2. Partial log: Gravel 50-90, 188-203, 231-266, 294-303, 323-342, and 344-383 feet.
3. Discharge at time sampled not known.
4. Discharge 2 second-feet.
5. Discharge 367 second-feet.

a. Concentrations of calcium, magnesium, and sulfate above average for well waters in San Fernando Valley.

b. Calculated.

The analyses tabulated above show that the sum of determined constituents in the well water analyzed was 1,120 parts per million (ppm), the sums for the surface waters from the two streams were 349 and 718 ppm, and the sum for the water of the Los Angeles aqueduct was only 199 ppm. According to the 1936 U. S. Public Health Drinking Water Standards for common carriers, water containing sulfate in excess of 250 ppm is not recommended except where a more suitable supply is not available. This limit does not appear to based on taste or physiological effects other than a laxative action for new users. Public water supplies having a sulfate content somewhat above this limit are used at some places, reportedly without adverse effects. On the basis of the analysis of the well water tabulated above and analyses of waters from several other wells in the San Fernando Valley farther from the new hospital, it is concluded that the sulfate content of ground water at the new hospital site may exceed 250 ppm and may be as high as 600 ppm. The possible effect on hospital patients produced by changing from Los Angeles aqueduct water to well water during times of water shortages should be considered. Competent medical authorities should be consulted regarding this problem. It appears from the limited data available that the ground water is suitable for the irrigation of lawns.

Water Rights

It is understood that the Supreme Court of California has recently ruled that all ground waters in the San Fernando Valley are legally the property of the city of Los Angeles. Accordingly, it is possible that the Veterans Administration will be required to secure a drilling and water-use permit from the city before wells can be drilled and used at the new hospital. Legal advice in that regard should be obtained before a well-drilling program is undertaken.

Conclusions

On the basis of the data summarized in this memorandum, it is believed that properly constructed and developed wells with 14- or 16-inch casings drilled to depths of 500 to 600 feet in the deposits underlying the hospital site would yield water in quantities of 400 to 600 gallons per minute, as desired by the Veterans Administration; that the nonpumping water levels in the wells would be between 170 and 210 feet (1953 data) below the land surface; that the water might not be wholly satisfactory for drinking for hospital patients who had become accustomed to drinking water of considerably lower sulfate concentration; but that the water would be suitable for irrigation of lawns and shrubs.

Prior to the construction of supply wells at the new hospital, the water rights should be investigated because it is understood that the ground waters are the property of the city of Los Angeles.

REFERENCES

Eckis, Rollin, 1934, Geology and ground-water storage capacity of valley fill, South Coastal Basin Investigation: Calif. Dept. Public Works, Water Resources Div., Bull. 45, 275 p.

California Div. Water Resources, 1933, Detailed analyses showing quality of irrigation waters, South Coastal Basin Investigation: Bull. 40-A, 128 p.

Los Angeles County Flood Control District, 1954, Biennial report on hydrologic data, seasons of 1951-52 and 1952-53, 467 p.

C O P Y

VETERANS ADMINISTRATION

WASHINGTON 25, D. C.

Munitions Building

Jan. 18, 1955

In reply refer to: 11EAC

Mr. Joseph F. Poland
District Geologist
2520 Marconi Avenue
Sacramento, California

Dear Mr. Poland:

We are exploring the feasibility of drilling two water wells on the site of the new Veterans Administration Hospital, Sepulveda, California, for the dual purpose of providing adequate water for lawn sprinkling purposes and, also, to provide the hospital with an emergency water supply. We have been informed that it may be possible to develop such a supply on the site, but, before proceeding, we would appreciate your comments and recommendations concerning this matter.

We are enclosing a print showing the hospital reservation, on which we have marked suggested locations of the wells. The object of this project is to develop two wells, each to deliver about 600 gallons per minute. Of course, sand free, potable water is desired, since the water is to be used as an emergency supply for the hospital's domestic requirements.

It will be appreciated if you will let us know what you can regarding the geological formations in this area, the probability of developing productive wells as described above, and any other information concerning this matter, such as recommended type of wells, sizes, depths, etc., which you feel would be of value to us in developing the project.

Please address your reply to this office for the attention, Chief, Sanitary Section.

Very truly yours,

/s/ Lee D. Mork

LEE D. MORK
Director, Design Service

Encl.
Print

Well no.: 4805

Location: Corner Hayvenhurst Avenue and Plummer Street, about half a mile west of new Veterans Administration hospital.

Measuring point: Top casing.

Alt. M.P.: 867 feet; measurements by Los Angeles County Flood Control District.

Date	D/W MP	Date	D/W MP
1926	235	Apr. 8, 1942	161.9
June 19, 1929	198.1	Nov. 4, 1943	153.8
Feb. 7, 1930	199.4	Apr. 22, 1944	146.2
Apr. 22, 1931	213.0	Dec. 8, 1945	154.3
Apr. 4, 1932	203.0	Apr. 10, 1947	157.7
Apr. 21, 1933	204.6	Apr. 5, 1948	166.5
Nov. 27, 1935	195.7	Mar. 17, 1949	174.9
Oct. 27, 1936	193.8	Mar. 22, 1950	183.8
Jul. 8, 1937	193.55	Apr. 2, 1951	191.8
Mar. 29, 1938	184.8	Apr. 3, 1952	194.2
Apr. 10, 1939	194.1	Apr. 3, 1953	198.5
Apr. 17, 1940	181.2	Apr. 22, 1954	198.6
May 14, 1941	175.0		

9-063
(December 1949)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

No. 4805A

OTHER Nos. _____

WELL LOG

State California County Los Angeles Subarea San Fernando Valley

Owner Shell Oil Company

Location Southwest corner of Lassen St. and Haywenhurst Ave.; about ½ mile west of new Veterans Administration hospital.

Drilled by Shell Oil Company Address _____

Date _____ Casing diam. _____ Land-surf. alt. _____

Source of data California Division of Water Resources

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Sand and clay	30	30
	Sand and yellow clay	70	100
	Yellow clay and streaks of sand and gravel	38	138
	Hard sand	7	145
	Sand and yellow clay	69	214
	Hard sand and gravel	66	280
	Hard shell	3	283
	Sand and gravel	85	368
	Shell	4	372
	Hard sand, few streaks of gravel	52	424
	Sand streaks and yellow clay	18	442
	Sand and boulders	10	452
	Sand and gravel, streaks yellow clay	35	487
	Hard sand and gravel	52	539
	Sand, gravel, and clay	24	563
	Hard sand	7	570
	Hard sand and gravel	4	574

RECORD BY _____ DATE _____ SHEET 1 OF 2

9-063
(December 1949)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

14

No. 4805A (Continued)

OTHER NOS. _____

WELL LOG

State _____ County _____ Subarea _____

Owner _____

Location _____

_____

Drilled by _____ Address _____

Date _____ Casing diam. _____ Land-surf. alt. _____

Source of data _____

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Hard sand	28	602
	Blue sh	3	605
	Hard shell	1	606
	Sandy blue sh and fine sand	31	637
	Hard fine sand	2	639
	Blue sh	5	644
	Hard sand and gravel with sh streaks	42	686
	Sand and gravel	10	696
	Yellow brown sh	20	706
	Fine sand	25	731
	Sand with streaks blue sh	40	771
	Yellow brown sh	15	786
	Sand with streaks of shale	25	811
	Sand	12	823
	Sand and blue sh	48	871
	Sandy shale and hard sand	140	1011

RECORD BY _____ DATE _____ SHEET 2 OF 2

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(December 1949)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

No. 4805

OTHER NOS. _____

WELL LOG

State California County Los Angeles Subarea San Fernando Valley

Owner Unknown

Location Corner Haynehurst Ave. and Plummer St. about ½ mile west of Veterans Administration hospital.

Drilled by _____ Address _____

Date _____ Casing diam. _____ Land-surf. alt. _____

Source of data _____

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Soil	8	8
	Coarse gravel	37	45
	Brown clay	28	73
	Cemented gravel	5	78
	Yellow clay	100	178
	Gravel	6	184
	Brown clay	28	212
	Gravel - perforated	4	216
	Brown clay	20	236
	Gravel - perforated	18	254
	Rock	3	257
	Gravel - perforated	19	276
	Brown clay	6	282
	Fine sand	5	287
	Brown clay	73	360
	Gravel - perforated	12	372
	Brown clay	3	375
	Gravel - perforated	5	380
	Brown clay	3	383
	Cemented gravel	6	389
	Brown clay	11	400

RECORD BY _____ DATE _____ SHEET _____ OF _____

9-063
(December 1949)

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

No. 4803

OTHER Nos. _____

WELL LOG

State California County Los Angeles Subarea San Fernando Valley

Owner Unknown

Location Corner of Chatsworth St. and Haywenhurst Ave., about 1 mile north of new Veterans Administration hospital.

Drilled by _____ Address _____

Date _____ Casing diam. _____ Land-surf. alt. _____

Source of data CDWR

(Enter type of well, perforations, yield, and drawdown at end of log)

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	Yellow clay	220	220
	Sandy clay, rocky gravel	15	235
	Yellow clay	90	425

RECORD BY _____ DATE _____ SHEET _____ OF _____