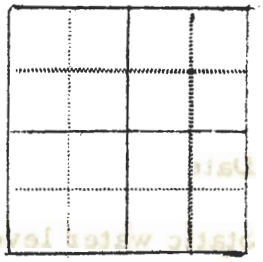
W 9894

~~W 9884~~

IOWA GEOLOGICAL SURVEY
In Cooperation with U.S. Geological Survey
RECORD OF WELL

Location:



Town: GARDEN GROVE (NE) (SW) County DECATUR

NE NE sec. 33 T. 70 N., R. 24 W. Twp

Well name and number

Owner GARDEN GROVE TOWN WELL #1 (1958) Address

Tenant Address

Contractor SUNBERG WELL CO. Address AUDUBON, IOWA

Drillers

Drilling dates JUNE - August, 58

Well data:

Altitudes: Drilling curb feet; Land surface 1104.3 feet

Determined by

Topographic position

Total depth: Reported 1130 feet; Measured feet

Abandoned

Drilling method ROTARY

Hole and casing data

LOST HOLE @ 1130 - NEW HOLE STARTED

Original depth to water ft. above/below Date

Source of data

Sources of water: Principal

Others

PRODUCTION DATA

Date _____

Static water level _____

Measuring point _____

Pumping water level _____

Yield (g.p.m.) _____

Duration of pumping _____

Specific capacity _____

LABORATORY DATA

W 9894
~~W 9884~~

Well No. _____ Sample range 0 - 1130 No. of samples 207

No. of dupls. and cond. 164 Poor Washed range 600-1130

Samples prepared by Darland, Dow, Thomas Date 7/10/58 8/14/58

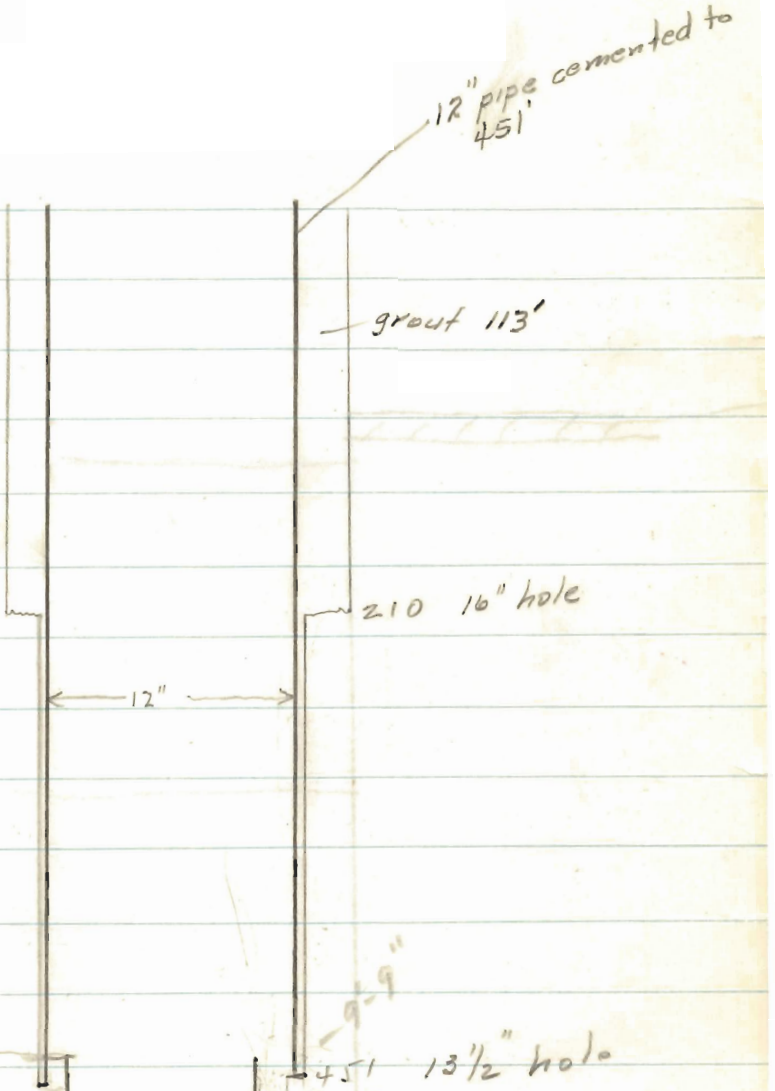
Logged by _____ Date _____

Correlations by _____ Date _____

GARDEN GROVE

Dec - 21 - 1959

Completion SWL = 440' or 320'
Top solid on clean out = 985 5½" bailer
SWL before clean out = 225 Dec 17, 1959
Pump set 440' of pipe + pump to 450'



Dec. 17 985 - 1068
Dec. 18 1068 second bailer
Water dirty at 480' on first bailer

Dec 18 1068' 1110'
Dec 19 1110' 1142' 946

extra copy 3

Ground-Water Conditions in the Consolidated Formations at Garden Grove, Iowa

A generalized log of the formations expected to underlie the vicinity of Garden Grove is summarized in the following table. The starting site for this log is the location of the Municipal Test Well No. 1 (1948) in the NW¼ NE¼ NW¼ sec. 34, T. 70 N., R. 24 W. near the center of the town. All depths are referred to a ground elevation of 1112 feet above sea level.

Formation	Thickness (ft.)	Depth Range (ft.)
Quaternary system		
Pleistocene series (glacial till)	210	0- 210
Pennsylvanian system		
Desmoinesian series (chiefly shale, some sandstones in lower part)	690	210- 900
Mississippian system		
St. Louis formation (limestone, sandy)	55	900- 955
Warsaw formation (dolomite and shale)	45	955-1000
Keokuk-Burlington formations (limestone, cherty)	190	1000-1190
Wassonville cherty dolomite	60	1190-1250
North Hill limestone	15	1250-1265
Maple Mill shale	25	1265-1290
Devonian system		
Lime Creek formation (limestone)	175	1290-1465
Cedar Valley formation (dolomite)	195	1465-1660
Wapsipinicon formation (dolomite, cherty in lower part)	185	1660-1845
Ordovician system		
Maquoketa formation (dolomite cherty in lower part)	265	1845-2110
Galena formation (dolomite)		
Decorah-Platteville formation (dolomite, some shale)	75	2110-2185

Formation	Thickness (ft.)	Depth Range (ft.)
Ordovician system (continued)		
St. Peter sandstone	30	2185-2215
Prairie du Chien formation (dolomite, sandy and cherty)	485	2215-2700
Cambrian system		
Jordan sandstone		2700-

Data obtained from the deep municipal wells at Leon, Lineville, and Lamoni are the chief source of information on the water supply possibilities of the bedrock aquifers in this part of the State. These data indicate that sufficient water for a town of the size of Garden Grove might be available from the sandstones in the lower part of the Pennsylvanian rocks down to a depth of about 900 feet or from the underlying limestones and dolomites of Mississippian age down to the top of the Maple Mill shale. When the Leon Town Well (1949) had just entered the top of the St. Louis limestone a pumping test of 4 hours duration reportedly obtained 50 gallons a minute with a drawdown of 76 feet. The non-pumping water level was given as 400+ feet. According to the driller most of the water was derived from sandstone beds in the Pennsylvanian section. The casing was perforated opposite these sandstones. Drilling was then continued through the Mississippian strata and down into the top 5 feet of the Lime Creek formation. The interval representing the Maple Mill shale may have been plugged back or let to fill in the bottom of the well as it was never reported to have been cased. The final well development produced 180 gallons a minute at a pumping water level of 680 feet. The static water level was reported to be 402 feet. Mineral analyses of the water from the Pennsylvanian rocks when the well was 956 feet deep and from the combined waters of the Pennsylvanian and Mississippian strata when the well was 1396 feet deep are given on a separate sheet. Note that the water from the Pennsylvanian sandstones seems to be of better quality than the water from the deeper limestones. Perhaps a well could be finished in these sandstones at Garden Grove that will yield adequate water for the town. However, the presence of these sandstones cannot be predicted with much accuracy owing to their lenticular form and irregular distribution.

If the yield from the Pennsylvanian rocks is not adequate drilling may be continued as far as the top of the Maple Mill shale with the idea of developing a supply similar to the town well at Leon. This would

call for a well about 1265 feet deep. Based on the results at the Leon well the chances seem promising for obtaining sufficient water at Garden Grove.

Additional water-bearing zones will occur in underlying formations. Most data indicate that the water from these deeper reservoirs will not be suitable for domestic purposes. The old Lamoni town well, 2193 feet deep, yielded water highly mineralized in sodium, sulfate, and chloride. It was also extremely hard water.

No information can be found on wells in the surrounding area which will indicate the quantity and quality of water available from the Jordan sandstone and associated aquifers. The Indianola city well and Morrell Packing Company wells at Ottumwa are the nearest successful Jordan wells. Only drilling and test pumping will reveal the water-bearing characteristics of these deep sources at Garden Grove.

Summing up, these data indicate the sandstones in the Pennsylvanian section and the limestones of Mississippian age are the most promising sources for a deep well at Garden Grove. The water may be rather highly mineralized for a municipal supply. If this water can be used at Leon it probably will be acceptable at Garden Grove also. The deeper aquifers down to the St. Peter sandstone probably contain water too highly mineralized for a public supply well. Insufficient data are available on the Jordan and associated aquifers to predict what results will be found below the St. Peter sandstone.

A more detailed study of other logs and our maps will probably give a closer approximation for the section below the Devonian, but I think that the above figures will turn out to be reasonably close.

We will have the more detailed forecast for you sometime next week. In the meantime, please let me know if we can be of further service

Very truly yours

H. G. Hershey

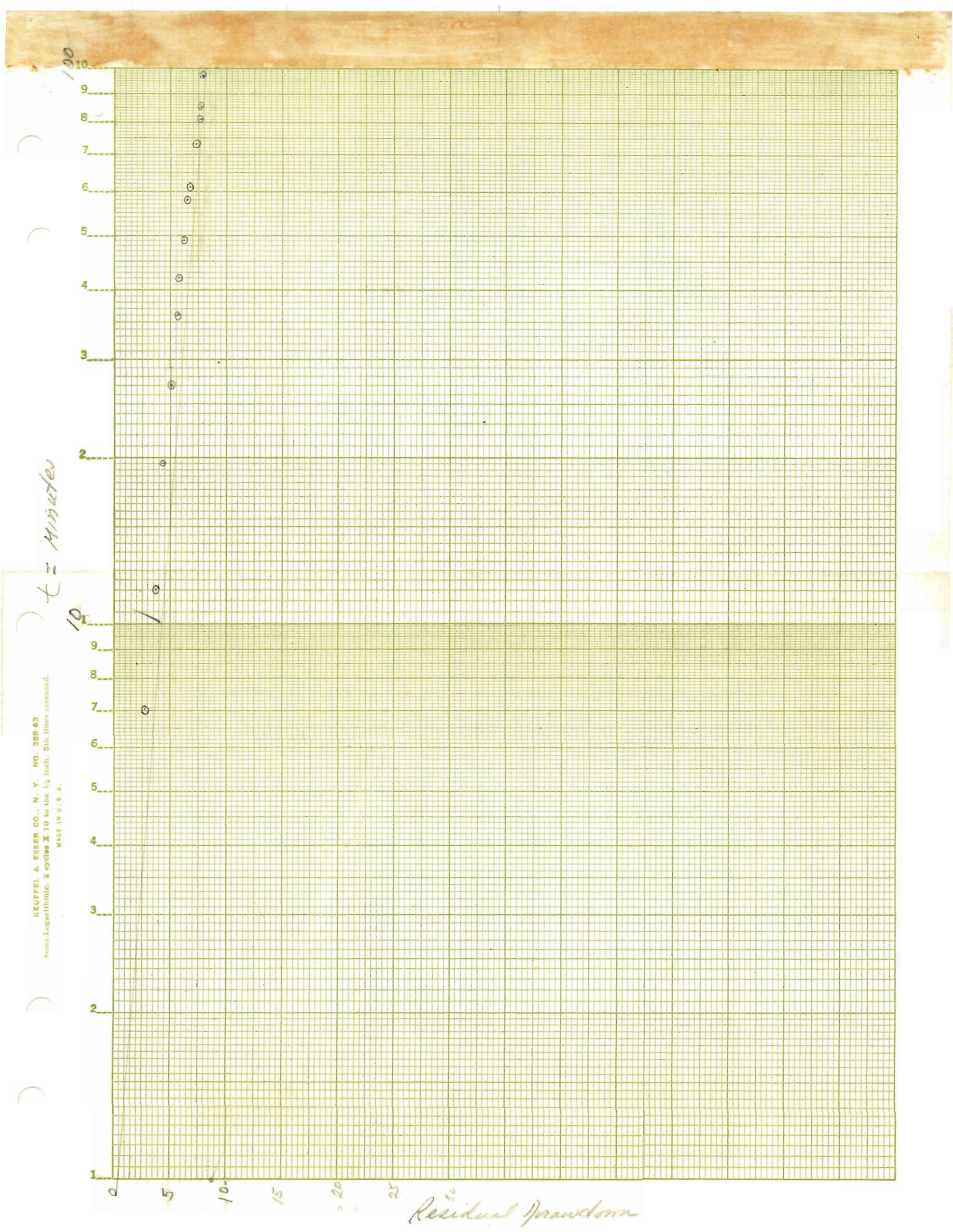
Mr. Orian Atchison
Thorpe Well Company
2340 Sixth Avenue
Des Moines 13, Iowa

Dear Mr. Atchison:

RCN:ni

With reference to your phone call yesterday, we are pleased to enclose a brief general formational forecast for the anticipated geologic section at Lineville, Iowa. We hope this will help for the time being, as it will take a couple of days to work out a more complete one. The following data are based on the present city well down to 1285' (total depth), the Russell and Moulton town wells, and the L. B. Jackson oil test in Decatur County.

Top Elevation	1095'
Top Pleistocene	0-345'
Top Pennsylvanian	345'
Top St. Louis	830'
Top Warsaw	895'
Top Keokuk	945'
Top Burlington	1025'
Top Hampton	1120'
Top Chouteau	1140'
Top Maple Mill	1240'
Top Devonian	(Undifferentiated)
Top Maquoketa	1800'
Top Galena	1945'
Top Decorah-Platteville	2070'
Top St. Peter	2150'
Top Prairie du Chien	2175'
Top Jordan	2620'
Top St. Lawrence	2660'


100
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t = Minutes
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4
3
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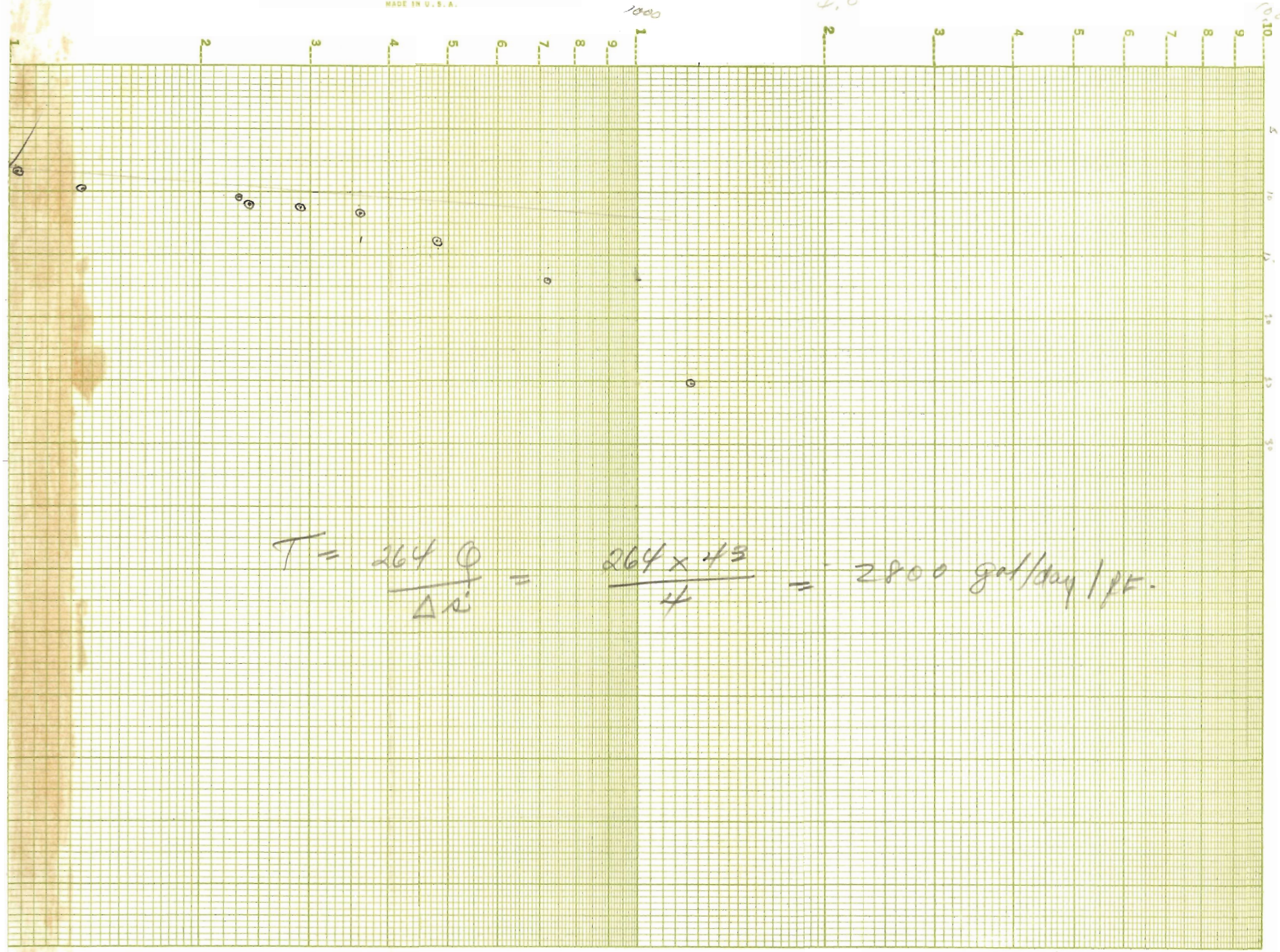
30
Residual Drawdown
KEUFFEL & ESSER CO., N. Y. NO. 358-63
Semi-Logarithmic, 2 cycles X 10 to the 1/2 inch, 5th lines accented.
MADE IN U.S.A.

8.2
4.2
4.0



$$T = \frac{264\,Q}{\Delta s} = \frac{264 \times 43}{4} = 2800 \text{ gal/day/ft.}$$

6

IOWA GEOLOGICAL SURVEY
TABULATION OF WATER ANALYSIS
(Dissolved constituents in parts per million)

Town - Well No Owner	Date of coll.	Depth (ft.)	Geol. source	°F	Diss. solids	Fe	Mn	Ca	Mg	K	Na	CO_3	HCO_3	SO_4	Cl	F	NO_3	Hardness cal. as $CaCO_3$ tot.	carb.	non-carb.	pH	Micro-mhos at 25°C Cond
Leon Town Well	7/30/49	956*	Penn.		1535	0.7	.29	34	10		448		259	723	95	2.4	0	126	126	0	8.3	2250
Leon Town Well	9/8/49	1396	Penn. Miss.	66°	2960	3.9	0.0	80	25		783		310	1445	175	2.8	0	303	254	49	7.7	4230
Lamoni Town Well	4/24/35	2193			7160	0.1	0.6	313	80		1862		336	3271	1105	1.0	0	1111	275	836	7.1	----

NOTES: *Still drilling

IOWA GEOLOGICAL SURVEY
TABULATION OF WATER ANALYSIS
(Dissolved constituents in parts per million)

Town - Well No. Owner	Date of coll.	Depth (ft.)	Geol. source	°F	Diss. solids	Fe	Mn	Ca	Mg	K	Na	CO_3	HCO_3	SO_4	Cl	F	NO_3	Hardness cal. as $CaCO_3$ tot.	carb.	non carb.	pH	Cond
Lineville Town Well (1954)	8/8/55	1285	Devonian Penn. Miss.		2576	0.7	0	35	14	14	846	9.6	561	1167	195	2.9	8.4	145	145	0	8	3808
Leon Town Well No. 3 (1949)	6/16/51	1396	Penn. Miss.	67	2862	0.4	0	80	25	818		--	425	1453	170	2.7	3.5	303	303	0	7.9	3850
Lamoni Town Well (1927)	7/19/34	2193	Dev. Ord. ?		6358	18	0.8	149	69	1902		--	146	2650	1417	Tr	0.0	656	120	536	7.1	----

NOTES: Tr. = Trace

Pumping Test at Garden Grove, Iowa
May 24, 1960
Well No. 2

A pumping test was made of the No. 2 well by personnel from the Iowa Geological Survey.

The well was pumped at an average of 43 gallons per minute for a period of 24 hours. The data obtained shows a drawdown of 28 feet from a static water level of 345.6 feet to a pumping level of 373.5 feet. This is a specific capacity of 1.5 gallons a minute per foot of drawdown at a pumping rate of 43 gallons per minute.

TABLE I

Pumping Test at Garden Grove, Iowa
May 24, 1960
Well No. 2

Location: NE NE sec. 33, T. 70 N., R. 24 W.

Total Depth: 1144.62'

Elevation: 1104.31' -- land surface above sea level
1105.93' -- top of 12-3/4" casing - (curb)

Contractor: Sunberg Well Company, Audubon

Date drilled: Completed December, 1958

Casing record: 12-3/4" B.E. 51 lbs. welded - 0'-452.62"
538' of 8-5/8" B.E. 28.55 lbs. welded liner from 439.62' to 977.62'.
Note: (15.39' of 8-5/8" pipe was attached to the liner at 439.62" and annulus cemented from 444' - back up to 426.86' May 3, 1960) Present top of 8-5/8" is 424.23' 6-5/8" open hole from 977.62' to 1144.62'

Water level: S.W.L. 345.6' below top of casing.

Aquifer: Burlington and Keokuk

Measurements: Water level measurements (Table No. 2) made with an electric line. Discharge rate was determined by periodic measurements of flow into a receptacle with a 5-gallon capacity.

Pump: A Reda Submergible Electrical Turbine pump with a rated 50 gallons per minute capacity was set with water inlet at 468'. Bottom of air line at 461'. Pump on test delivered 42.85 gallons per minute.

Observer: M. A. J. Smith

TABLE II

Pumping Test at Garden Grove, Iowa
May 24, 1960
Well No. 2

Time (min.)	Electric Line Depth	Drawdown (ft)	GPM	Temp. F. Air	Temp. F. Water	Remarks
0	345.6 SWL					Test started May 24 at 9:00 a.m.
1	354.4	8.8				
2	360.0	14.4				
3	363.25	17.65				
4	366.00	21.4				
5	367.50	21.9				
6	369.0	23.4				
7	369.30	23.7				
8	369.92	24.32				
9	370.25	24.65				Slight odor
10	370.45	24.85				
11	370.55	24.95				
12	370.65	25.05		78	64	
13	370.65	25.05	43			
14	370.70	25.10				
15	370.75	25.10				
16	370.75	25.15				
17	370.75	25.15				
18	370.75	25.15				
19	370.80	25.20				
20	370.80	25.20				
21	370.80	25.20	43	82	64	Slight yellow color
22	370.80	25.20				
23	370.80	25.20				
24	370.80	25.20				
25	370.80	25.20				Slight yellow color
26	370.80	25.20				
27	370.85	25.25				
28	370.85	25.25				
29	370.85	25.25				
30	370.85	25.25				
31	370.83	25.23				
32	370.83	25.23				
33	370.85	25.25				
34	370.80	25.20				

Garden Grove, Iowa Table II -- page 2

Time (min.)	Electric Line Depth	Drawdown (ft)	GPM	Temp. F. Air	Temp. F. Water	Remarks
35	370.92	25.32	43	85	66	
36	370.97	25.37				
37	371	25.4				
38	371	25.4				
39	371	25.4				
40	371	25.4				
41	371	25.4				
42	371.50	25.9				
43	371.10	25.5			66	
44	371.10	25.5				
45	371.10	25.5				
46	371.10	25.5				
47	371	25.4				
48	371	25.4				
49	371	25.4				
50	370.95	25.35				
51	370.90	25.30				
52	370.92	25.32				
53	370.90	25.30				
54	370.92	25.32				
55	370.90	25.30				
56	370.90	25.30				
57	370.90	25.30				
58	370.90	25.30				
59	370.88	25.28				
60	370.88	25.28	43	85	66	Clear
65	370.88	25.28				
70	371	25.40				
75	371	25.40				
80	371	25.40				
85	371.50	25.9	43	85	66	Water discolored drilling mud
90	371.10	25.5				
95	371.15	25.55				
105	371.20	25.60				
115	371.25	25.65	43	76	66	
125	371.35	25.75				
135	371.50	25.90		71	66	Water clear
295	372.00	26.4	43	68	66	Water clear
315	372.05	26.45				
375	372.10	26.6				

Garden Grove, Iowa Table II -- page 3

Time (min.)	Electric Line Depth	Drawdown (ft)	GPM	Temp. F. Air	Temp. F. Water	Remarks
435	372.20	26.6			66	Clear
495	372.40	26.8	43			
615	372.50	26.9				
692						Power off, pump stopped 8:32 p.m.
706						Power on, pump started 8:46 p.m.
720	372.30	26.7				
840	372.65	27.05				
960	372.90	27.3				
1110	373.10	27.5				
1200	373.25	27.65				
1380	373.38	27.78	43	69	66	Clear
1440	373.50	27.9				Stopped pump
1441	370.85					Recovery
1442	362.80					
1443	360.00					
1444	358.30					
1445	357.20					
1446	356.58					
1447	356.10					
1448	355.98					
1449	355.52					
1450	355.20					
1451	354.90					
1452	354.58					
1453	354.15					
1454	354.28					
1455	353.48					
1456	353.42					
1457	353.35					
1458	353.22					
1459	352.95					
1460	352.85					
1461	352.65					
1462	352.47					
1463	352.40					
1464	352.30					
1465	352.15					
1466	352.04					
1467	351.95					
1468	351.88					
1469	351.78					
1470	351.70					
1471	351.62					

Garden Grove, Iowa Table II -- page 4

Time (min.)	Line Depth	Drawdown (ft)	GPM	Temp. F. Air	Temp. F. Water	Remarks
1472	351.48					
1473	351.48					
1474	351.47					
1475	351.42					
1477	351.29					
1479	351.00					
1481	351.10					
1483	351.00					
1485	350.95					
1490	350.82					
1495	350.60					
1500	350.45					
1505	350.35					
1510	350.22					
1520	350.04					
1540	349.72					
1560	349.45					
1620	348.83					
1680	348.43					Final reading 1:00 p.m. May 25, 1960

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington .... 1 / District ....

2

City Well #2 - Garden Grove -

Hole Size 21" ELEVATION - 1104.31

Csg 16" - 62.5#

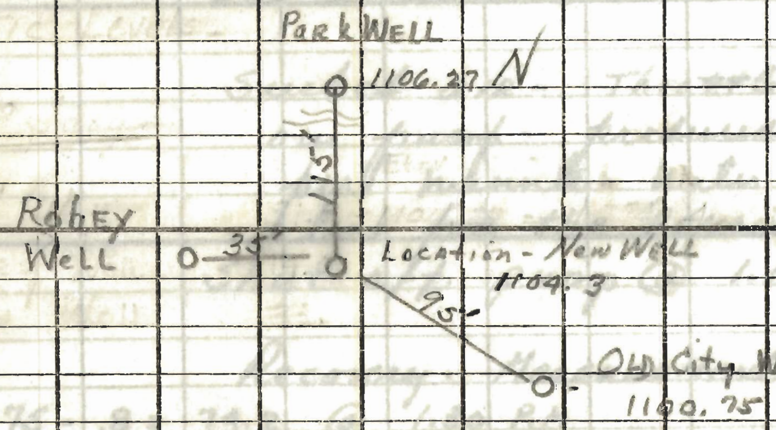
Csg. shoe @ 113'.

Perforated from 83' - 81' with 4 - 3/8" holes

Gravel packed with 8000# of Platte River - (mine run)

Pump suction @ 85'

Air Line @ 77'



Elevation was determined by Levels run on base of Rail (1114") site of depot

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ..... / District .....

3

Levels on Observation Wells 24 July 1958

Time	Altitude surface	SWL	Pumping Level	SWL Sea Level		Pumping Level Sea Level		Change in Level	Depth Well			
7.30 AM												
Park	1106.27	32.05		1074.22					90			
Robey	1103.63	14.17		1089.46								
OLD TOWN	1100.75	30.8		1069.95					58'			
NEW TOWN	1104.3	40.		1064.3								
8.30 A.M.												
PARK			32.'			1074.22		.05				
Robey	"		14.8 *			1088.83		.63		*		
OLD TOWN			30.8			1069.95		0				
10.30 A.M.												
PARK			32'					0				
Robey			14.25			1089.38		.55				
OLD City			30.75			1070.00		.05				
				Next Sheet								

U. S. GOVERNMENT PRINTING OFFICE 16—48721-1

9-230 Garden Grove

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ____ District ____

4

Levels on Observation Wells 24 July 58

Time	Altitude Surface	Sub	Pumping Level			P.L. Sea Level		Change in Level				
1.00 PM.												
Packard	1106.27		31.98			1074.29						
Robey	1103.63		14.2			1089.43		.05				
OLD TOWN	1100.75		30.7			1070.05		.05				
New well	1104.3											

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ..... / District .....

5

Garden Grove — Level on Observation Wells — 19 July 58

Time		SWL		SWL S. Level								
9.00AM.												
Park	1106.27	31.8		1074.47								
Robey	1103.63	14.7		1088.93								
Old Cit	1100.75	33.5		1067.25								

Decatur

1

April 2, 1956

Mr. John M. Fairall
Brown Enginering Company
322-334 K P Building
Des Moines 9, Iowa

Dear Mr. Fairall:

We are replying to your letter of March 23 concerning additional information on the geology and ground-water conditions at Garden Grove, Iowa which will aid in developing a municipal water system. The following pertinent data and comments are based on records in the files of the investigations of the Iowa and U. S. Geological Surveys.

Important facts on the construction and production of the deep municipal wells at Lineville, Leon, and Lamoni are given on separate sheets included here. Mineral analyses of the waters from these wells are also included. We find no information on a deep well drilled at Lamoni since our letter of May 10, 1947 discussing the Garden Grove supply problem.

On the basis of the results obtained in these three deep drillings the chances for a good supply well from the consolidated formations at Garden Grove do not seem very promising. The mineral analyses indicate the waters to be of poor quality being highly mineralized in sulfate, sodium, chloride, and fluoride. However, both Lineville and Leon apparently use these waters for public supply. Lamoni currently obtains its water from a surface reservoir. The deep well may be kept in reserve for emergency use only.

For a town the size of Garden Grove (1950 population 417 persons) a well yielding between 50 and 75 gallons a minute would probably be adequate for their needs. Whether this much water can be obtained from sandstones in the Pennsylvanian section or deeper limestones of Mississippian and Devonian age underlying Garden Grove is difficult to predict in the absence of well records from this vicinity. But based on the results at Lineville, Leon, and Lamoni and otherwells from south central Iowa this much water may be obtained readily enough. The chief difficulty will be the highly mineralized condition of the water making it objectionable for domestic use.

To sum up, this additional information on deep drilling in the region of Garden Grove does not appreciably change our forecast of 1947 that the most favorable source of water is from sands and gravels in recent alluvial deposits (Weldon River valley) or within or at the base of the glacial drift. As you know, the three town test holes drilled in May 1948 did not encounter thick water-bearing sands and gravels in the glacial drift. Therefore, drilling several test holes on the Weldon River valley floor west of town would seem to be justified to ascertain the possibilities of the alluvium as a source of water. If the yield of these deposits is insufficient a deep well may then be considered.

We hope this information will assist you in developing a municipal water system at Garden Grove. If there are any questions remaining or if we can provide you further information in this regard, please feel free to write.

Very truly yours,

H. G. Hershey

HGH:PJH:L
Enclosures

Name: Lineville Town Well (1954)
Location: sec. 20, T. 67 N., R. 23 W., Wayne County, Iowa
Drilling dates: Aug. - Nov. 1954
Contractor: Thorpe Well Company
Depth: 1285 feet
Casing: 8-inch casing from 0 to 1000 feet perforated at water-bearing zones including glacial sand, Pennsylvanian, and Mississippian rocks.
Production: Static water level 150 feet below ground surface. Pumping water level unknown. A submergible type pump was set 800 feet below the ground when pumped at 35 gallons per minute did not break suction.

Name: Leon Town Well No. 3 (1949)
Location: NE¼ SW¼ NW¼ sec. 33, T. 69 N., R. 25 W., Decatur County, Iowa
Elevation: Drilling curb 1074 feet
Drilling dates: May-Sept., 1949
Contractor: Thorpe Well Company
Depth: 1396 feet.
Casing: 22-inch from 0-553 feet
20-inch from 520-601 feet
16-inch from 572.5 - 956 feet perforated 572-645, 775-795, 800-815, 824-834, 860-870, 872-892, 945-955 opposite Pennsylvanian rocks. Open hole in Mississippian rocks
Production: Static water level 402± feet. Pumping water level 680 feet at 180 g.p.m. A turbine pump with 50 h.p. was used and set at 778 feet.

Name: Lamoni Town Well (1927)
Location: NW¼ SE¼ sec. 3, T. 67 N., R. 27 W., Decatur County, Iowa
Elevation: 1123 feet
Drilling date: 1927
Contractor: Thorpe Well Company
Depth: 2,193 feet
Casing: 16-inch from 0-99 feet
12-inch from 0-552 feet
10-inch from 510-781 feet
8-inch from 635-1135 feet
6-inch from 1070-1631 feet
Production: Static water level 340 feet (1927), 374 feet (1935). Pumping water level unknown. Yield originally 100 g.p.m. An aquifer yielding 55 g.p.m. was reported at 1080 feet. The main aquifer probably in Devonian strata occurred at 2100 feet.

National water well Association
MEMBER

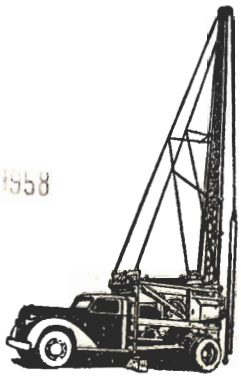
HOEG & AMES, Inc.

WELL CONTRACTORS WELL SUPPLIES

☆ ★ ☆

LINCOLN, IOWA

May 17, 1958



MAY 19 1958

Iowa Geological Survey

Iowa City, Iowa

Gentlemen,

Will you please send us the forecast for a Jord on well at Garden Grove, Iowa?

No doubt you have been contacted by Brown Engineering Co. on this already.

The letting is coming up soon and a forecast will help us in preparing our bid.

Yours very truly,

S. R. Ames

SRA:HCS

May 20, 1958

Mr. Sylvan R. Ames
Hoeg & Ames, Inc.
Lincoln, Iowa

Dear Mr. Ames:

In response to your letter of May 17 we are sending you a copy of the Garden Grove forecast which was sent to the Brown Engineering Company on July 31, 1956.

The data and interpretations in that forecast are still valid except that additional information has been obtained on the Jordan aquifer from the successful deep wells at Russell and Albia. The Russell and Albia wells indicate that large supplies of water of acceptable quality probably are available from the Jordan aquifer over much of southern Iowa, including, perhaps, the Garden Grove area. This leads to a more optimistic attitude concerning the areas west and south of Russell, but we also feel that anyone contemplating a Jordan well in these areas should understand that some chance exists for finding water in insufficient amount or of unacceptable quality.

In planning a Jordan well at Garden Grove, provision should be made for drilling 50 to 100 feet or so into the underlying St. Lawrence dolomite to take advantage of any large crevices that might yield additional water. The casing should extend from the surface for some distance below the base of the St. Peter sandstone to shut out all overlying highly mineralized water beds that will contaminate the well. In the Indianola, Russell, and Albia wells the casing was set 45 to 70 feet below the St. Peter.

We have included the mineral analysis of the water from these deep Jordan wells.

We trust this is the information you wished. If there are any questions remaining or if we can provide you further information on this matter, please let me know.

Very truly yours,

H. G. Hershey

PJH:dh
Enc.

GW Garden Grove Gen. Pot
Decatur Co

1

September 23, 1969

Mr. Richard G. Bullard
Iowa Natural Resources Council
James Grimes Building
Des Moines, Iowa 50319

Dear Mr. Bullard:

This is in response to your recent note requesting information about the Garden Grove town well.

The drilling of the town well during 1958 encountered considerable difficulty. The first hole was drilled to 1,130 feet, but before casing could be set the hole was plugged by caving materials and the well was abandoned. The rig was moved 10 feet north and the new hole was drilled to a total depth of 1,144 feet. No samples were saved during the drilling of the second hole, but a generalized log of hole 1 follows:

	Depth (ft.)
Quaternary System	
Pleistocene Series (glacial drift)	0-235
Pennsylvanian System	
Des Moines Series (shale, sandstone)	235-855
Mississippian System	
Meramec Series (St. Louis Limestone)	855-905
Osage Series (Warsaw, Keokuk, and Burlington Formations; some shale, mostly limestone with chert)	905-1130

At a depth of 1,144 feet, hole 2 was completed in the Burlington Formation. The well was cased with 12-inch casing from surface to 452.62 feet, and 538 feet of 8 5/8 inch liner was set from 439.62 feet to 977.62 feet. When the well was completed the static water level was 345.6 feet, and the pumping level was 373.5 feet at 43 gpm. During January 1969 the well was cleaned and the static water level at that time was reported to be 390 feet, and the pumping level was 397 feet at 50 gpm. The aquifer that provides water to the well is the Keokuk-Burlington Formations.

I trust this is the information you needed. If I can be of any other help please let me know.

Very truly yours,

H. G. Hershey

HGH/OVE:cs

GW Garden Grove Gen Data
Decatur Co.

January 5, 1972

Water Superintendent
Garden Grove, Iowa 50103

Dear Sir:

I am working on a hydrologic study of the Mississippian rocks of Iowa and find I lack some pertinent data on the Garden Grove deep municipal well drilled in 1958.

Can you send me the total annual pumpage from this well for the past 2 or 3 years? If you have monthly or quarterly figures available I will be happy with these.

Thank you for such information as you can send and I appreciate your help.

Very truly yours,

Paul J. Horick
Chief, Groundwater Geology

PJH:gh

Reply — 360,000 gpy max
12,000 gpd

file: Garden Grove
Decatur Co

1

Memorandum

TO; Dr. H. G. Hershey Date: May 27, 1958
From: Charles N. Brown
Regarding: Garden Grove

Mr. Farrel of Brown Engineering Co. called relative to the bids opened last night for the contemplated well to a TD of 1360'. Mr. Thorpe bid $18994.00 for a cable tool hole. Mr. Sunberg bid $18749.00 for a rotary hole. They anticipate 20" casing for the first 20', 16" to 210', 12" to 900'.

Mr. Farrel had two questions to ask: the integrity ~~and~~ of the drillers and their ability to successfully complete the well. ~~H~~ I have discussed both of these matters personally with you.

Upon questioning, it appeared that Mr. Farrel had not contemplated casing out the Pennsylvanian shales while drilling to the 900' depth. I told him that the chances were good ~~but~~ that there would have to be a casing reduction to take care of this matter.

Decatur

File: Garden Grove

2

Memorandum

To: Dr. H. G. Hershey
From: M. A. J. Smith
Regarding: Garden Grove

Date: May 27, 1958

A log distance call was received from John Sunberg at 5:15 pm regarding proposed well at Garden Grove.

Sunberg is the low bidder on the Garden Grove town well. Mr. Farrel, engineer for the Brown Engineering Company, had raised a few questions about the rotary method of well drilling. Sunberg asked if I would talk with Farrel and explain some of the things which Farrel was in doubt about.

Q 1. Would the mast on the Fehling 1500 handle 1000' - 12" - 55 No. pipe.

A 1. Under proper drilling practice a mast does not support the entire weight of the casing. Float collars are inserted in the string which increases the natural buoyancy of the pipe in the drilling fluid.

Q 2. Would not a rotary tool pass thru water sands without leaving any indication of a possible water source.

A 2. Most rotary drillers watch closely the weight and viscosity of the drilling mud. Any lowering of the vicosity is indicative of water entering the drilling fluid.

Q 3. Are not cable tools samples more representative of the formation.

A 3. Proper mud pits - of a size which permits cuttings to settle out prevents too a large degree recirculating of cuttings which gives fairly accurate control over the quality of the samples. Most rotary drillers are aware of the importances of large mud pits - particularly when drilling thru sand as continous recirculation of sand soon wears the pump liners.

MAR 26 1956

5

Brown Engineering Company

TELEPHONE ATLANTIC 2-8141

CONSULTING ENGINEERS

REGISTERED
PROFESSIONAL ENGINEERS

K. R. BROWN J. V. GEBUHR G. C. HAVENS
J. M. FAIRALL C. L. WARDLOW C. D. GIBBS
O. GLAUBERG M. T. McDONALD R. E. BUTTS
E. S. BOUDINOT J. S. VETERSNECK M. D. ANDERSON
G. P. PRITCHETT C. E. BENNETT C. R. POE
H. J. JOBSE

322-334 K P BUILDING
DES MOINES 9, IOWA

March 23, 1956

Dr. H. G. Hershey
Iowa Geological Survey
Geology Annex
Iowa City, Iowa

Re: Garden Grove
Source of Water

Dear Dr. Hershey;

The current Town Council at Garden Grove, Decatur County, is interested in developing a municipal water system and have asked is to review the project.

The Council members tell us that municipal wells have been drilled to depths of about 1200 feet at Lineville, Leon, and Lamoni since your letter of May 10, 1947 was prepared. Would this additional information or other information acquired in the meantime change your previous suggestions as to possible sources of water? We are of course interested in the quantity and quality of the water obtained from the above wells.

We have discussed a test drilling program, in the Weldon River Valley directly west of the town, with the Town Council.

Very truly yours,

BROWN ENGINEERING COMPANY

John M. Fairall

JMF/fu

December 18, 1956

Mr. E. S. Boudinot
Brown Engineering Company
326 K P Building
Sixth and Locust Streets
Des Moines, Iowa

Dear Mr. Boudinot:

Reference is made to your telephone call of December 13 in which you requested our opinion on the feasibility of a deep well for Garden Grove.

The comments to follow are made with reference to our forecast for Garden Grove mailed to your company July 31, 1956. The data and interpretations in that forecast are still valid except that the successful Jordan well since drilled at Russell adds to our knowledge of the Jordan aquifer.

The Russell well indicates that acceptable waters from the Jordan are available over much of southern Iowa, including, perhaps, the Garden Grove area. The success at Russell inevitably leads to a more optimistic attitude concerning the areas to the west and south, but we feel that anyone contemplating a Jordan well in these areas should carefully weigh the chances that water in insufficient amount or of unacceptable quality may be encountered.

Should a well be drilled at Garden Grove it would seem advisable to carefully note the presence or absence of a basal Pennsylvanian sandstone. If one is present, such as at Leon, a pumping test should be run and a water sample analysed because of the chance of securing an adequate supply at this relatively shallow depth.

If we can be of any help please let us know. We will be grateful if we are kept informed of developments in Garden Grove.

Very truly yours,

H. G. Hershey

HGH:CNB:L

Office Memorandum

12/13/56

To: C. N. Brown

From: P. J. Horick

Subject: Garden Grove

The appended forecast (7/21/56) seems to be valid for the information on the Pennsylvanian - Mississippian reservoirs. Because of the new information at Russell, Iowa I am including some comments regarding the possibilities for a Jordan well at Garden Grove. The possibilities for a Jordan well there seem more promising than before when we had to make predictions on the basis of the Indianola and Ottumwa wells.

don't type CB

Comment re Garden Grove

Jordan prospects

The recent successful Jordan well at Russell, Iowa indicates that acceptable quality water for municipal use may be available from this formation ~~at this~~ over much of the southern part of the state including Garden Grove. We are more optimistic about the results in wells east of Russell than to the west because good wells have been drilled at Ottumwa, Keosauqua, Richland, Mt. Pleasant, and North English. The results at Albia are expected very soon. It will give additional valuable information. These wells are cased from the surface for a considerable distance into the upper part of the Wilow River dolomite to shut out overlying waters which are highly mineralized.

The success of a Jordan well west of Russell is more difficult to predict mainly because we lack deep well records in that region. I think that if they do not find acceptable water in the Mississippian I.G.G. they should go ahead and try for the Jordan. They should clearly understand that the available information is not conclusive as to what results will occur there. The modest results at Russell seem to be promising for equally good results in the surrounding region. However, we should be cautious - particularly to the west.

Alcoton

June 2, 1960

TO: H. G. Hershey
FROM: M. A. J. Smith
RE: Garden Grove Pumping test

May 23, 1960

Arrived in Garden Grove at 3.35 p.m. and found everything ready for the test except a means to provide air to the air line.

May 24, 1960

A small portable air compressor was hooked up to take reading on the air line. It was discovered that the new electric line recently purchased by the Survey is 500 feet in length which was more than adequate for this test. Test was started at 9.00 a.m. with everything functioning perfectly until 8.32 p.m. when power went off in the area until 8.46 p.m. Reading was taken throughout the remainder of the night. The maximum draw was 27 feet--93% of this value occurred in the first 9 minutes. The S.W.L. at the start was 345.6' -- a change of 5' from the former reading of 350' which I recorded on May 16. It is believed that this was brought about by Sonberg cleaning the well thru the use of dry ice.

May 25, 1960

The pump was stopped at 9.00 a.m. and the last recorded reading on drawdown was 373.50'. Recovery readings were taken every minute for the first 41 minutes. 18' of the 27' of recovery was recorded within the first 9 minutes. The final reading of 348.43' was taken at 1.00p.m.

The rate of discharge was 43 g.p.m. (42.85) with a constant temperature of 66° F. Water clear with slight odor. At 9.35 a.m. the water became discolored with drilling mud. This condition remained for about 40 minutes.

MAJSmith

Decatur ~~Lucas~~ County
Garden Grove

TO: Dr. H. G. Hershey
FROM: Charles N. Brown
SUBJECT: Garden Grove

John Fairall, via phone, stated that the people of Garden Grove have been drinking the water from their new Mississippian well and like the water.

They have requested that Brown Engineering Co. proceed with plans to develop the well and construct the distribution system.

This water has the highest SO_4 content of any Municipality in Iowa in constant use -

The critical constituents in p.p.m.

Fe = 2.9	Na = 992	Hardness = 1007
Fl = 2.8	SO_4 = 2510	

CB

File 88A

G W
Decatur Co
Garden Grove

2

To: Dr. H. G. Hershey

Subj. Garden Grove well.

Mr. John Sunberg of Audubon the contractor for this well called me long distance Sunday 10/1/60 for information on how to procede with a workover on ~~this~~ the well.

The town of Garden Grove have employed an Osceola law firm to either sue him and the bonding company or he is to perform the following remedial work.

a. Center the 85/8" casing within the 12" surface casing and,

b. Add another joint to the present 85/8" string which places the top of the liner at 418'.

c. Grout from a point below the present top of the 85/8" (438') back up to somewhere near 423'.

Sunberg wished to be informed on how to join the additional joint of 8 5/8" to the liner without pulling.

A die collar was suggested.

1. Die collar fits over the pipe and cuts threads on the outside.
2. Collars are made from case hardened tool steel which make them too brittle to withstand spudding or driving. They will standup under considerable tension.
3. May be left as a permanent coupling in a string of pipe.
4. Because of the vertical grooves machined in the cutting threads for the escape of metal cuttings - a die collar is not water tight.
5. If the die collar is to be left permanently in the string care must be exercised to have the inside diamentions large enough to pass pump, bit, and tools.

Operation.

Die collar is lowered on bottom of pipe which is the same size as that which is being lached onto - 8 5/8". When the tool rests on the upper end of the column - turn the string slightly until the pipe with the collar drops into position and is ready for pipe tongs or spinning rope. A second pair of tongs are used to prevent back spin. A reference mark is made on the pipe near the table to note the distance the pipe settles before threading commences - this being a measure of the lenght of the thread cut.

A safety joint was recommended as the only safe means by which the tools can be disengaged in the hole.

M. A. J. Smith

Note: A 7 7/8" bit was run in the 8 5/8" - which has a clearance of 5/16".

G-W
Garden Grove

Decatur Co

December 11, 1959

TO: H. G. Hershey
FROM: C. N. Brown
RE: Garden Grove Deep Well
DATE: December 10, 1959

In telephone conversation with George Havens of Brown Engineering Co., the following facts were ascertained:

Mr. Sunberg has definitely refused to have anything to do with the well or to aid in its repair at all.

Subsequent to your talk with Art Bruinekool, Mr. Havens talked to him and got Art to agree to try to put a ~~ledge~~ lead seal in the annulus between the two casings. Art's only proviso was that he be not held responsible for the well and some ~~needs~~ means of assuring him pay be obtained.

The Mayor of Garden Grove is extremely angry and wants to sue Sunberg. She has definitely told Brown Engineering to start suit.

If the inside casing is leaning at an angle against the outside casing, Art may not be able to place a seal. In that case pressure grouting will have to be resorted to.

I told Mr. Havens that he should bear in mind that a good seal might cut off some of the water. Also, in answer to a question from him I said that I did not know whether they had cause for legal action against Sunberg or not.

cp

Decatur
Garden Grove

December 2, 1959

TO: H. G. Hershey
FROM: W. L. Steinhilber
RE: Garden Grove Town Well

Mr. Wardlow, Brown Engr. called this morning and said the pump on the Garden Grove well was pulled. The pump was full of mud and he wanted to know possible explanation.

I checked the log and ~~coming~~ Casing schedule and it looks like the mud is from the Penn. section. Casing sched: 12" to 451' and 8" from 430 to 946. This leaves about 2" annular space between 12" and 8" from 451 to 430 ft. The pump bowls were set at 440. Therefore, it appears that pump creates turbulence just at the critical zone of well, and shale slurry probably comes thru annular space and directly to pump. Of course, its possible the Warsaw Sh. is coming in at bottom of hole --- but not likely.

I told him best bet now would be to seal the joint between 12" & 8" casing. He will send a sample of mud to us --- maybe we can tell if it's Penn. or Warsaw shale.

Decatur County
Garden Grove

June 27, 1958

MEMORANDUM

TO: H. G. Hershey
FROM: C. N. Brown
SUBJECT: Garden Grove well

George Hanen, Brown Engineering Company called me last night regarding the well being drilled in Garden Grove by Sundberg. Present depth, 50 feet. Driller reports fine angular sand from 30 to 50 feet. He wanted to know if we thought they should case and test this sand. I indicated the negative, subject to a review this morning.

I reviewed the data on Garden Grove and called the Mayoress at 11 a. m. I suggested that if they continued in sand much farther or if the sand became coarser they should spend the money for a test.

Our information from test holes by Bruinekool and Rasmussen and the verbal reports on the capacity of this sand indicate a very meager supply.

Decatur
Garden Grove

December 4, 1959

TO: H. G. Hershey
FROM: Richard C. Northup
RE: Well problem at Garden Grove
DATE: December 2, 1959

Mr. Carl Caspers of Brown Engineering Co. called on Wednesday morning in regard to the Garden Grove well. They have been pumping clay and mud since last summer some time, and the sample brought in seems to be a mixture of silt and finely divided clay. Two strings of casing were set: 12" at 451' and an 8" string was run from 438' to 946'. No seal was set between the two strings and with a pump set at 440', I believe that the material entering the hole to be coming from the Pennsylvanian. At present time, the pump has been pulled, and they will probably set a packer and test the section from 438' to 451' hoping that this will prove to be the part causing the trouble. There is also the possibility that the material is coming from around the bottom of the casing as only the first 200' at the top of the hole were cemented; or possibly there could be a break in the casing. It is a bit difficult to know what to advise just yet, and I told Mr. Caspers and Mr. Havens that probably you would want to go over the whole matter together with Charles, Walt, and myself. Walt had talked with me about it briefly before leaving with you for Wisconsin, but I don't know how much about it, if anything, he has discussed with you. This has been a problem well from the start. It was drilled with a small rotary rig and the samples extremely poor throughout.

At Walt's request, I left the jars of clay and silt on the table in his office, as he apparently wants to look at them too.

The town is in somewhat of a hurry to get the well in commission again as soon as possible as work is being rushed to complete the town water system and pumphouse before winter sets in. Moreover, the driller's work will impede progress on the pumphouse until it can be removed.

Mr. Caspers says that Brown Engineering Co. will keep us informed. A copy of the geologic log was made and sent to them.

On "the good side of the ledger" Mr. Caspers reports that the water (until the well silted up) has been satisfactory in spite of a very high sulphate content. You may recall that we were quite concerned about this after the well was completed. The townspeople have had no difficulty with the water and he reports that a large turkey farm near Garden Grove has also used it to good advantage.

Garden Grove
Decatur County

MEMORANDUM

TO: HGH
FROM: CNB
SUBJECT: Garden Grove's new well
July 7, 1958

Mrs. V. Channing, mayoress, called twice, both times regarding advice on installing temporary casing and testing hole, at its present T.D. of 200'. I talked to Sundburg and he called this log:

Thickness	Total	Description
5'	50'	Sand
16'	66'	Clay (glacial?)
9'	75'	Dk. Gr. Sd - fine
8'	83'	" " " coarse water
10'	93'	" " " very hard
3'	96'	Pea Gravel (No water ?)
16'	112'	Shale = 1" Stringers Ls
1½'	113½'	Extremely hd - L.S. = (Agate!)
113½'	200'	Shale - thin Ls

20" hole has been drilled to T. D. They want to set temporary casing to 66' and see what the basal glacial sands will produce .

I agreed with them and, after a great deal of urging, said M.A.J.S. would be there if possible. Fairall and Haven of Brown Engineering will be there also.

Note - RCN studied the samples and came to conclusion that w hole section in glacial Till — but samples very bad.

AUG -3 1956

Brown Engineering Company

TELEPHONE ATLANTIC 2-8141

CONSULTING ENGINEERS

REGISTERED
PROFESSIONAL ENGINEERS

K. R. BROWN J. V. GEBUHR G. C. HAVENS
J. M. FAIRALL C. L. WARDLOW C. D. GIBBS
O. GLAUBERG M. T. McDONALD R. E. BUTTS
E. S. BOUDINOT J. S. VETERSNECK M. D. ANDERSON
G. P. PRITCHETT C. E. BENNETT C. R. POE
H. J. JOBSE

322-334 K P BUILDING
DES MOINES 9, IOWA

August 2, 1956

Dr. H. G. Hershey
Iowa Geological Survey
Geology Annex
Iowa City, Iowa

RE: Garden Grove, Iowa

Dear Sir:

Your letter of July 31, indicates a possibility of an adequate supply of water for Garden Grove in the Pennsylvanian sandstone down to a depth of about 900 feet, or if not sufficient, in the Mississippian limestones and dolomites down to a depth of 1265 feet. We are particularly interested in noting that the water from the Pennsylvanian at Leon was of slightly better quality than the water they are now using from both the Pennsylvanian and Mississippian formations. However, a sample obtained from Garden Grove Test Well No. 2 at the top of the Pennsylvanian was worse in some respects than the present water at Leon.

It appears to the writer that it may be feasible to plan a well to be drilled to a depth of 1265 feet, with adequate provisions for testing aquifers as the drilling proceeds in order to select the best quality of water available. If sufficient volume is obtained in the Pennsylvanian and of considerably better quality than that to be expected in the Mississippian then we would stop somewhere short of 900 feet.

Assuming that you would find such a program advisable we would like to have your suggestions as to casing size and where casing size would have to be reduced for proper well construction. Additional suggestions with regard to carrying out the program in the above paragraph would be appreciated.

Very truly yours,

BROWN ENGINEERING COMPANY

John M. Fairall

John M. Fairall

JMF/ps

MEMORANDUM

To: H. G. Hershey
From: C. N. Brown
Re: Garden Grove July 12, 1956

Mr. Boudinot, Brown Engineering Company, call to state that the tests at GardenGrove have been negative, He asked where to go next. I told him either surface impondment or a Mississippian well with high SO_4. He stated that he would tell the city there would have to be a halt to the investigations.

They (the town) would be interested in going to the Jordan. Neither Boudinot nor myself can assure them of success in this.

CB

Decatur

1956

MEMORANDUM

To: H. G. Hershey
From: C. N. Brown
Re: Garden Grove, Decatur County

The search for a municipal supply in the alluvium of Weldon River failed. Four holes across the valley went in to unoxidized till without encountering sands or gravels.

The 1948 test drilling program by Bruinekool failed to show any englacial or subglacial aquifers.

We are now preparing a forecast for bedrock supplies for a council meeting in August.

Note! The school well inside the town is 20 feet deep and produces 15 gpm. This is in variance with Bruinekool test wells.

CNB

file

MEMORANDUM

TO: HGH
CNB
FROM: MAJS
SUBJECT: GARDEN GROVE TOWN WELL - July 8, 1958

John Sunberg, well contractor, encountered water bearing sand at 66 feet. He suggested setting 16 inch casing at 112 feet, slotting from 66 feet thru 84 feet and gravel packing. A recent mineral analysis on the original town well gave a nitrate content of 15 p.p.m. The well under construction is located 150 feet from and 5 feet higher in elevation than the original town well. The measured depth of this well is 58 feet however an elderly individual who worked the windless said that the well was completed at 60 feet in a dark muddy sand similar to samples marked 60-65 feet. Note the difference in elevation between the two wells. The writer called the attention of the driller and the mayor to the possibility of a hydraulic connection between these wells and advised waiting on a more precise determination before setting casing for a production test. They were both agreeable to this suggestion.

Paton town well — Production test
S. W. L. 75'
P. L. 175'
94 G.P.M. over 8-hour period
Recovered after 8 min. 108'

Garden Grove City well — NE NE 33-70N-24W

Pleis. - clay	0-45'	
Pleis.- sand	45'-110'±	
Penn. shale	110'±-160'	
XXXXXXXXXXXXXXXXXXXXXX		Penn. limestone? 160±-165'
" shale	165'-200'	Present TD

2

Dr. Hershey:

This was proposed as a 12-inch well about 1,000 feet deep, or deeper if water was not obtained at this depth.

We do not have information on the finished well. We would appreciate information concerning the depth and the aquifer from which the water is secured, as they were required to send you in the terms of the permit granted August 22, 1958.

R. G. Bullard

Re the Gardner Grove farm well