THORPE WELL COMPANY

2340 SIXTH AVENUE
DES MOINES, IOWA

Drilled for City at Storm Lake, Iowa

Well is located ____ miles N-E-S-W and ____ miles N-E-S-W from ____

in the ____ ¼ ____ ¼ Section ____ Township ____ Range ____

Drilling started 7-1 19 58 Completed 1-16 19 59

Well No. 1 Kind of Well Sand Depth 1690 Size hole started 32 in.

Finish 12 G. P. M. 1032 Static Head 289 Pumping level from surface 374

Water was first encountered at ____ in ____ Approx. Amt. ____ Temp. ____

Remarks ____

(GIVE DETAILS OF PERFORATED PIPE AND SEALS)

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
20	404	404	Surface	1/2"	32"	15'
16	120	499	379	3/8"	30"	65'
12	924'-6"	1377	453	3/8"	26"	125'

Driller Zon Brower From Surface to ____ feet

Driller _____ From _____ feet to _____ feet

Driller _____ From _____ feet to _____ feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION (BE SPECIFIC)	TOTAL DEPTH FEET
3	Fill	3
17	Yellow clay (sandy)	20
30	Blue clay - rocky	50
30	Sand & gravel	80
22	Gravel	102
3	Clay	105
293	Shale - gray	398
28	Sand - shary & hard	426
3	Shale - gray	429
26	Sand - hard	455
12	Shale - green	468
73	Limestone - gray	541
29	Sand & lime streaks	570
64	Limestone - gray	634
6	Shale - gray	640
	--over--	

250	Limestone - shale streaks	890
20	Limestone - brown	910
17	Limestone - gray	927
163	Limestone & shale streaks - gray	1090
70	Limestone - gray	1160
90	Shale & lime - gray	1250
39	Shale - bluish green	1289
6	Shale - brown	1295
37	Sandstone - hard	1332
30	Shale - gray	1362
20	Sandstone	1382
58	Sandstone dolomite - brown	1440
20	Dolomite - gray	1460
60	Sandstone - dark	1520
43	Sandstone - white	1563
2	Shale - gray	1565
15	Sandstone	1580
10	Shale - gray	1590
5	Sandstone	1595
22	Shale - gray	1617
5	Sandstone	1622
8	Shale - gray	1630
39	Dolomite - brown	1669
21	Shale - gray	1690

...rporation, Rochester, N. Y. Binder and holes in leav...

July 12, 1944

Storm Lake City (Buena Vista)
NW¼ NW¼ Sec. 4 (notes on our file)
Elev. #1 1406.8 (by altimeter)
Elev #2 1399.3 " "
#2 is 7.5' Below #1

Two city wells at water works #2 drilled in 1939 TD. 109' - Old well 1936 110'

Both produce 700 GPM. Gravel packed 20" screen 45' long Cased with steel pipe to top & cement sealed. Bottom is Sand. Gravel packing 9½" in diam. above 43' are 12' in diam

Note - Dug by hand Topsoil
until sand reached Blue clay to 42'
then bored by machine. Rest in sand.

Sta.	Time	alt.	Temp.
#1 well at plant.	1:25	1118	69°
City water tank	1:40	1144	
#1 well	1:47	1111	
City water tank	1:55	1143	

Elev. of tank 1433.96

IOWA GEOLOGICAL SURVEY

In Cooperation with U. S. Geological Survey

RECORD OF WELL

10125

Location: JUST WEST OF POWER PLANT (NE)

Town: STORM LAKE (SW) County BUENA VISTA (SE)

SE NE NE sec. 5 T. 90 N., R. 37 (W.) ____ Twp

Well name and number ____

Owner CITY OF STORM LAKE DEEP WELL (1959) Address STORM LAKE, IOWA

Tenant ____ Address ____

Contractor THORPE WELL CO. Address DES MOINES, IOWA

Drillers ____

Drilling dates JULY 1958 - JAN 30, 1959

Well data:

Altitudes: Drilling curb ____ feet; Land surface 1400 feet

Determined by ____

Topographic position SHORE OF STORM LAKE

Total depth: Reported 1690 feet; Measured ____ feet

Drilling method CABLE TOOLS

Hole and casing data 404' OF 20" CASING

120' OF 16" LINER 379'-499'

724' OF 12" LINER 453'-1377'

Original depth to water 229 ft. above below ____ Date ____

Source of data ____

Sources of water: Principal PRAIRIE du CHIEN - JORDAN

Others ST. LAWRENCE - FRANCONIA?

PRODUCTION DATA

Date _____

Static water level 229

Pumping water level 360

Yield (g.p.m.) 1250

Measuring point _____

Duration of pumping _____

Specific capacity _____

LABORATORY DATA

WE 7-8
-9
-10
WE 9-1

Well No. W10125 Sample range 3-1690 No. of samples 32/

No. of dupls. and cond. 3/1 Fair Washed range 470-1690

Samples prepared by The Boys Date 2/5/59

Logged by Northup Date 1958 AND 19

Correlations by _____ Date _____

W-10125
090-37W-05AAD
CSJ
ØLP

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Card Q

State: IOWA (1 6) (1–2) County: BUENA VISTA (3–4) Town: STORM LAKE

Well No. Latitude 42 38 40 N (5–11) Longitude 095 13 50 (12–18) Seq. No. 1 (19) Date M 06 D 28 Y 61 (20–25)

Sampling Depth 190 (26–29) Type (30) Kx10^6 2030 (31–35) pH 7.4 (36–38) Temp. °F 60 (39–41)

SiO_2 2. (42–44) Ca 256. (45–49) Mg 5. (50–53) Na 133. (54–58) K 34. (59–61)

HCO_3 349 (62–65) CO_3 0 (66–67) SO_4 853. (68–72) Cl 26. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F .14 (26–28) NO_3 less than −.4 (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe .2 (42–45)

Mn (46–49) Cu (50–52) Pb (53–54) Zn (55–57)

Solids Determined 690 (58–63) Calc. (64–69) Hardness Ca,Mg 908 (70–73) Non-Carb. .22 (74–77)

Color (78–79) No. R (80)

Card S

Duplicate Columns 1-25 from Card Q

Br (26–28) I (29–31) Alk. as $CaCO_3$ 286 (32–35) Free CO_2 (36–38) SAR (39–41)

RSC (42–44) ABS (45–47) (48–50)

Alpha (pc/l) (55–57) Beta (pc/l) (58–60) Ra (pc/l) (61–63) U (ug/l) (64–66)

Verified RMJ No. 5 (80)

Recorded by: R.W. COBLE

Punched by: Punched ERC Date:

Published:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 090-37W-05 AAD
Aquifer Code(s) C355 Ø1LP
Owner's Name STORM LAKE IOWA, CITY OF (1058)
W Number 10125

Card Q

State: IOWA (19) County: BUENA VISTA (111) Town: STORM LAKE, IOWA

Well No. Latitude 42 38 40 N (5–11) Longitude 095 13 50 (12–18) Seq. No. 1 (19) Date M D Y 10 21 68 (20–25)

Sampling Depth 1690 (26–29) Type 1 (30) Kx10⁶ 2200 (31–35) pH 6.9 (36–38) Temp. °F 61 (39–41)

SiO_2 11. (42–44) Ca 288. (45–49) Mg 68. (50–53) Na 160. (54–58) K 46. (59–61)

HCO_3 334 (62–65) CO_3 0 (66–67) SO_4 1040. (68–72) Cl 25. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F 1.5 (26–28) NO_3 .1 (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe 2.8 (42–45)

Mn .08 (46–49) Cu (50–52) Pb (53–54) Zn (55–57)

Determined Solids 1890 (58–63) Calc. (64–69) Ca,Mg Hardness 1000 (70–73) Non-Carb. 726 (74–77)

Color (78–79) No. R (80)

Card S

Duplicate Columns 1-25 from Card Q

Br (26–28) I (29–31) Alk. as $CaCO_3$ 274 (32–35) Free CO_2 (36–38) SAR (39–41)

RSC (42–44) ABS (45–47) (48–50)

Alpha (pc/l) (55–57) Beta (pc/l) (58–60) Ra (pc/l) (61–63) U (ug/l) (64–66)

No. S (80)

Recorded by: D. AARONSON

Punched by: _____ Date: _____

Published: _____

W# 10125

STATE HYGIENIC LABORATORY, DES MOINES BRANCH
WATER LABORATORY DIVISION
MINERAL ANALYSIS

LAB. NO. 1969
MINERAL NO. 7032
27 Jan 19 69 bj

TOWN Storm Lake COUNTY Buena Vista
OWNER OF SUPPLY Municipal
COLLECTOR'S NAME W S O'Dear
DATE COLLECTED 21 Oct 68 DATE RECEIVED 22 Oct 68
REPORT TO: NAME EES
ADDRESS SDH

FIELD DATA

SOURCE: WELL NAME, NUMBER, POINT OF COLLECTION, DEPTH, CONSTRUCTION DATE, ETC., Well #4 (Deep Well) Sampling Tap 1690' 1959

WELL PUMPED 1/2 HRS. AT 750 GPM. DATE OF PREVIOUS SAMPLE 28 Sept 60
WAS SAMPLE FREE OF TURBIDITY WHEN COLLECTED Yes
TEMPERATURE °C 16 ALKALINITY (ppm $CaCO_3$) P None T 290 pH 6.9
IS A POLYPHOSPHATE BEING USED? None

LABORATORY ANALYSIS
(PARTS PER MILLION)

SPECIFIC CONDUCTANCE K AT 25°C 220 x 10^{-5}. TURBIDITY
DISSOLVED SOLIDS 1890 **SOLUBLE IRON (Fe)** 2.8
TOTAL SOLIDS 1890 **SILICA (SiO_2)** 11 TOTAL IRON (Fe) 2.8
ALKALINITY (ppm $CaCO_3$) P None T 274 pH 7.0 DATE 22 Oct 68

POSITIVE IONS		NEGATIVE IONS	
K+	46	NO_3–	< 0.1
Na+	160	F–	1.5
Ca++	288	Cl–	25
Mg++	68.0	SO_4--	1040
Mn++	0.08	HCO_3–	334
Al+++		CO_3--	None

HARDNESS AS $CaCO_3$ 1000 ppm 58.4 gpg
Cloudy and yellow-brown in color on receipt in laboratory.

ANALYST Ryan, Morlan

R. L. MORRIS
JHG PRINCIPAL CHEMIST

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Local Well No. 090-37W-05AAD
Aquifer Code(s) C355 ØILP
Owner's Name STORM LAKE CITY #4 (1959)
W Number 10125

Water Quality
(ppm)

Card Q

State: IOWA [19] (1 2) County: BUENA VISTA [11] (3 4) Town: STORM LAKE, IOWA

Well No. Latitude 42 38 40 N (5–11) Longitude 095 13 50 (12–18) Seq. No. 1 (19) Date M D Y 01 29 59 (20–25)

Sampling Depth 1690 (26–29) Type 1 (30) Kx10^6 1620 (31–35) pH 7.5 (36–38) Temp. °F 57 (39–41)

SiO_2 21. (42–44) Ca 191. (45–49) Mg 69. (50–53) Na 87. (54–58) K 1.5 (59–61)

HCO_3 393 (62–65) CO_3 0 (66 67) SO_4 578. (68–72) Cl 9. (73–78) Source No. 3 (79) Q (80)

Card R

Duplicate Columns 1-25 from Card Q

F .2 (26–28) NO_3 .9 (29–32) PO_4 (33–35) B (36–38) Al (39–41) Fe .62 (42–45)

Mn .21 (46–49) Cu (50–52) Pb (53 54) Zn (55–57)

Determined Solids 1310 (58–63) Calc. (64–69) Ca,Mg Hardness 760 (70–73) Non-Carb. 438 (74–77)

Color (78 79) No. R (80)

Card S

Duplicate Columns 1-25 from Card Q

Br (26–28) I (29–31) Alk. as $CaCO_3$ 322 (32–35) Free CO_2 (36–38) SAR (39–41)

RSC (42–44) ABS (45–47) (48–50)

Alpha (pc/l) (55–57) Beta (pc/l) (58–60) Ra (pc/l) (61–63) U (ug/l) (64–66)

No. S (80)

Recorded by: D. AARONSON

Punched by: T Date:

Published:

UNITED STATES DEPARTMENT OF THE INTERIOR
Geological Survey
Water Resources Division

Water Quality
(ppm)

Local Well No. 090-37W-05AAD
Aquifer Code(s) C355 ØILP
Owner's Name STORM LAKE #4 (1959)
W Number 10125

Card Q

State: IOWA [19] (1 2) County: BUENA VISTA [11] (3 4) Town: STORM LAKE, IOWA

Well No. Latitude [4238404N] (5–11) Longitude [095135 0] (12–18) Seq. No. [1] (19) Date M D Y [092860] (20–25)

Sampling Depth [1690] (26–29) Type [1] (30) Kx10^6 [1770] (31–35) pH [7.1] (36–38) Temp. °F [62] (39–41)

SiO_2 [12.] (42–44) Ca [223.] (45–49) Mg [54.] (50–53) Na [111.] (54–58) K [26.] (59–61)

HCO_3 [366] (62–65) CO_3 [0] (66 67) SO_4 [690.] (68–72) Cl [18.] (73–78) Source No. [3] (79) [Q] (80)

Card R

Duplicate Columns 1-25 from Card Q

F [1.2] (26–28) NO_3 [.9] (29–32) PO_4 [ ] (33–35) B [ ] (36–38) Al [ ] (39–41) Fe [2.6] (42–45)

Mn [.12] (46–49) Cu [ ] (50–52) Pb [ ] (53 54) Zn [ ] (55–57)

Determined Solids [1360] (58–63) Calc. [ ] (64–69) Ca,Mg Hardness [780] (70–73) Non-Carb. [480] (74–77)

Color [ ] (78 79) No. [R] (80)

Card S

Duplicate Columns 1-25 from Card Q

Br [ ] (26–28) I [ ] (29–31) Alk. as $CaCO_3$ [300] (32–35) Free CO_2 [ ] (36–38) SAR [ ] (39–41)

RSC [ ] (42–44) ABS [ ] (45–47) [ ] (48–50) [ ] (51–54)

Alpha (pc/l) [ ] (55–57) Beta (pc/l) [ ] (58–60) Ra (pc/l) [ ] (61–63) U (ug/l) [ ] (64–66)

No. [S] (80)

Recorded by: D. AARONSON

Punched by: T Date:

Published:

GEO. K. McCOLLOUGH
Mayor
H. F. JAKWAY
Clerk
H. L. STRONG
Treasurer
F. S. LOVRIEN
Attorney

CITY OF HUMBOLDT

Incorporated July 14, 1869

HUMBOLDT, IOWA

Councilmen
B. O. GILLETT
E. J. LELAND
B. H. McGEE
A. B. MYLES

May 13, 1935

Storm Lake
Buena Vista County

Iowa Geological Survey
Iowa City, Iowa

Gentlemen:

The Mayor of Storm Lake has asked me to reply to your letter of April 13 in which you request information concerning the well at Storm Lake as recently put down for their city supply.

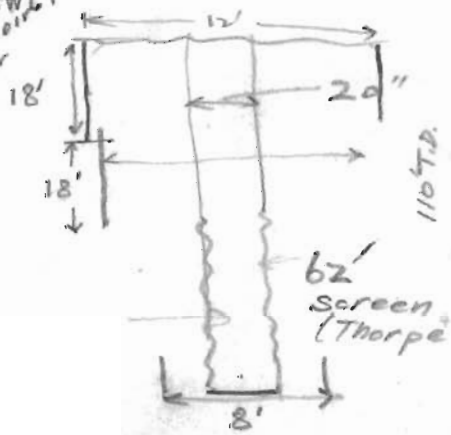
The elevation of the ground was approximately 6 feet higher than the level of the lake on May 1, and the water level in the well was 3 inches lower than the lake level.

In drilling this well they encountered blue clay for approximately 35 feet, at which time they ran into a sand and gravel formation which continued on down to the full depth of 110 feet. No rock was encountered, and the drillers, Thorpe Brothers of Des Moines, state that at about 42½ feet a small vein of water bearing gravel was encountered, but the real flow occurs from 90 feet down. This well is 20 inches in diameter for the full depth.

Yours truly,

Geo. K. McCollough

GKM



May 15, 1935

Mayor
Storm Lake, Iowa

My dear Sir:

Mr. George K. Mc Collough, Mayor of Humboldt, Iowa, advises me that you requested him to answer my inquiry concerning your well at Storm Lake. I am glad to have the information that Mr. Mc Collough furnished me, but there is one additional point I wish to have clear:

Mr. Mc Collough states that "the elevation of the ground was approximately 6 feet higher than the level of the lake on May 1 and the water level in the well was 3 inches lower than the lake level."

Can you give me the difference in elevation between the ground level at the well and either the Milwaukee or Illinois Central Railroad station? In this way we will be able to relate the various levels mentioned to sea level datum.

I thank you in advance for this assistance, and remain,

Yours sincerely,

A. C. Tester

ACT-LCA

Coal
Humboldt Co. 3

May 15, 1935

Hon. George K. McCollough
Mayor
Humboldt, Iowa

Dear Mr. McCollough:

Thank you for your letter of May 13 giving me information concerning the well at Storm Lake. I am writing to the Mayor at that point to relate the elevation of the ground at the well to the level of the lake and to the level of one of the railroad stations so that we can have information relating the water to sea level datum.

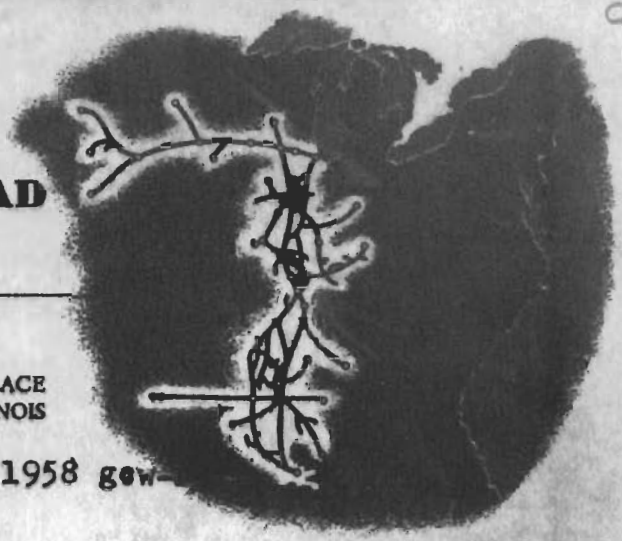
Thanking you again, I remain,

Yours sincerely

ACT-LCA

Allen C. Tester
Assistant State Geologist

2



ILLINOIS CENTRAL RAILROAD

Main Line of Mid-America

J. M. TRISSAL
Vice President and Chief Engineer

135 EAST ELEVENTH PLACE
CHICAGO 5, ILLINOIS

November 20, 1958 gew-

Storm Lake, Ia.
Test well

Mr. W. J. Randolph, Engineer
State Conservation Commission
East 7th and Court Avenue
Des Moines 8, Iowa

Dear Mr. Randolph:

This will have reference to your letter dated November 10 addressed to our Mr. J. W. Dodge, Superintendent, Waterloo, Iowa, concerning license to drill a 6-inch hole to a depth of approximately 100 feet at a point 8 feet south of the right of way line between the Illinois Central Railroad and the State Highway Commission.

It is noted from your letter that the Iowa Geological Survey has made arrangements with other railroads in Southern Iowa to do essentially the same exploratory work. You state that you will be willing to sign a release similar to those entered into between the Iowa Geological Survey and other railroads.

If consistent shall appreciate the opportunity to study one of these agreements in order that we may prepare a similar agreement.

Very truly yours,

J. M. Trissal

HERSCHEL C. LOVELESS
GOVERNOR OF IOWA

State Conservation Commission

EAST 7TH AND COURT AVENUE
Des Moines 8, Iowa

NOV 2 1958

MEMBERS OF THE COMMISSION

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WILBER A. RUSH, CHIEF
DIV. OF LANDS AND WATERS

November 24, 1958

Dr. Charles Brown
Iowa Geological Survey
Geology Annex
Iowa City, Iowa

Dear Charlie:

Please find attached a copy of the contract with M. L. Merkley Company, Schaller, Iowa for the work at Storm Lake and a copy of a letter received this morning from the Illinois Central Railroad regarding the permit to drill the test hole on the railroad right-of-way.

I would say that you could possibly comply with his request in Paragraph 3 to facilitate our Storm Lake project and in turn it would most likely aid in the acquiring of this permit.

I will drop a line to Mr. Trissal informing him of my request to you.

Yours truly,

W. J. Randolph

W. J. Randolph, Engineer
State Conservation Commission

WJR/db
Enc.

THREE GENERATIONS OF UNINTERRUPTED SERVICE

THORPE WELL COMPANY



We dig for our business

WELL DRILLING CONTRACTORS - ALL TYPES OF WELLS • SALES AND SERVICE OF PUMPING EQUIPMENT

CHerry 3-6107

2340 SIXTH AVENUE
DES MOINES 13, IOWA

IOWA GEOLOGICAL SURVEY
MAY 2 1961

May 22, 1961

Iowa Geological Survey
Geology Annex
Iowa City, Iowa

Attention: Dr. Charles Brown

Gentlemen:

Enclosed, please find a copy of the log and pump test record compiled from the well we drilled for the City of Storm Lake in 1958 - 1959.

We trust this is the information you desired. If there is other information you need, please let us know.

Sincerely yours,

THORPE WELL COMPANY

Orian Atcheson map

Orian Atcheson
Field Representative

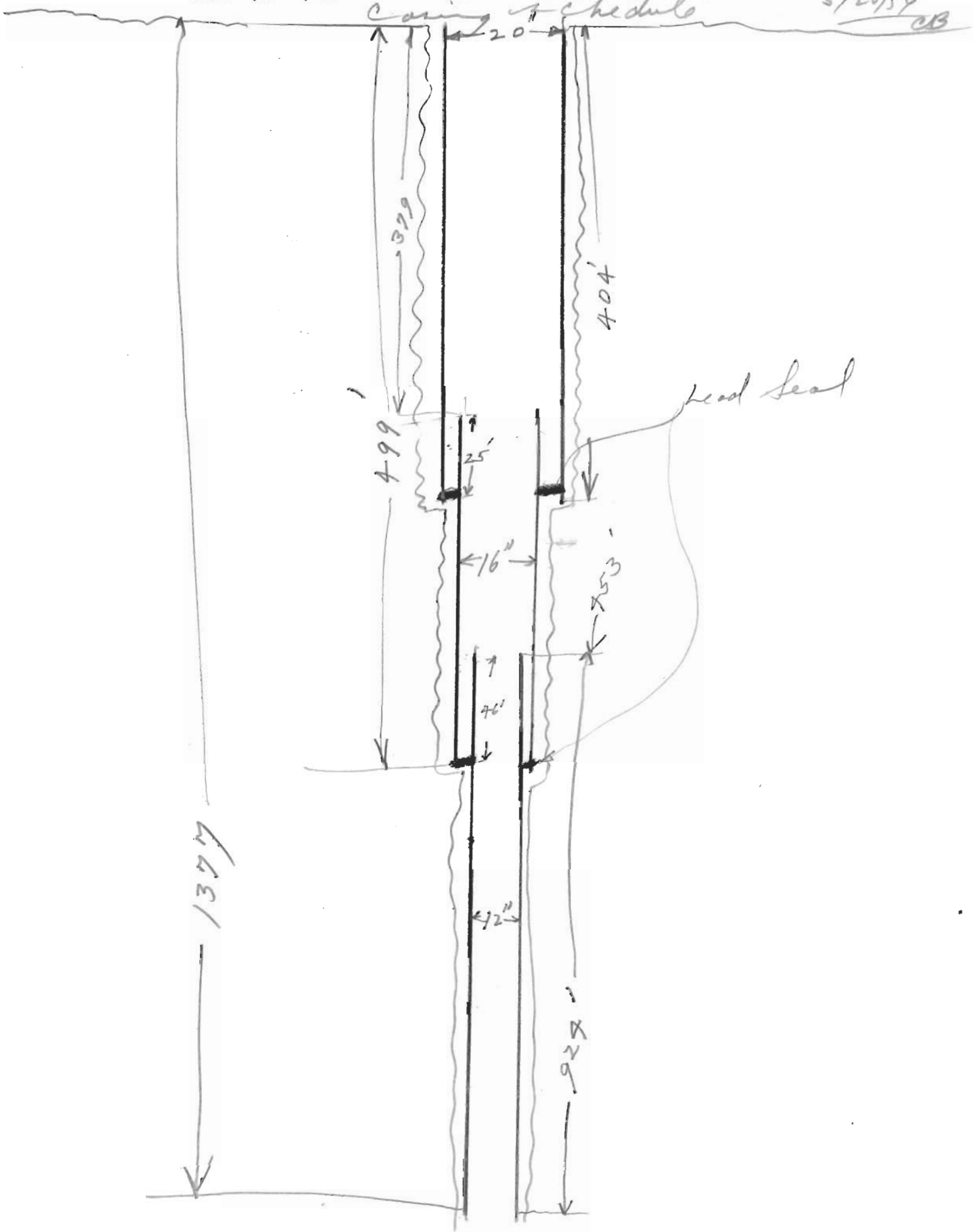
OA/map

Encls.

Storm Lake - Jordon Well

Casing Schedule

Wed Thurs
5/20/59
CB



West Thumb -
Yellowstone Lake. Jordan



Analysis
4000 gal

Casing Schedule
Surf 404 - 20" =
120' of 16" Liner ~~499~~
Top at 379 = 499
929' 6" 12" at 1377
Top at 453

Kd = S.W.L. .220±

499
379
120

S.W.L. = 229
P.W.L. = 360' ±

1377
924
453