Memo
5-22-71

To: Varner Well & Pump Company
Kimm & Veenstra Engr.
From: Don L. Koch, Iowa Geological Survey
Re.: Formation Tops, West Des Moines #2 Well

I have examined drill cuttings from the above-named well and have identified formation tops as follows:

Formation	Depth to top	
Galena	1712'	Gutt. 1863
		Pecatonica 1927
St. Peter	1942'	
Prairie du Chien	1971'	
willow River	1971	
est. Root Valley	2105	
est. Oneota	2200	

Donald L. Koch
Chief of Subsurface Stratigraphy
Iowa Geological Survey

10 3/4" for pump setting

4 1/2" @ 2207'

set 10 3/4" @ 2207'

2395 current depth 6-3-71

2460 to be total depth

Solid string of 10" to be set @ 2200'
(229' into P. du Ch.)

236'

est: Jordan 2392'
est. Ft. Jaw. 2428'

called Jim Tiewell at rig (515-274-4419) and gave him these estimates.

Don:

5/24/71

I talked to Veenstra & Kimm about the West D.M. well and closing out the Root Valley with the 2200-ft. casing.

They were aware of this and have recognized that they may lose some water by casing that deep. However, on the basis of flow meter tests they determined that about 20% of the well volume entered through the Root Valley (in the existing W. D.M. well), and are not overly concerned.

Also found by cement bond log that the bond in existing well is very poor for a distance of 150 feet from lower end of casing. Probably accounts for poor quality of water. It is planned that a bond log will be run after grouting is complete but before plug is drilled out, and again after plug is drilled out.

Also, a longer time is to be allowed for cement to set. Contractor may balk at that.

OE

Cement bond run after cementing 10 3/4" csg. at 2207'; good bond.

1971

1971
1943
28

1942 drill time

1943 est. St. Peter - hit at 1992

33
1976 Top Pleasant Ch.

417
2393 Top Jordan

36
2429 Top St. Lawrence

31' into St. Lawrence
2460

1971
220
2191

2200
1971
229

1971

2460
2429
31

1971
235
2206

1971
137 Top Root Valley
2108
21.95
2203

set 10" @ 2200

Kimm + Veenstra Engr., W. Des Moines

West Des Moines

1712
225
1487

1712
150
1862

1975-90 No. Spectator Ferry - core from / slim. pellets 1700

1863
1712
151

1712 Galena
1863 Gutt
1927 Paca.

C.D = 1930 S.F. →

1863
80
1943 est. St. Peter

Contract Depth = ~2460

forecast top St. Peter 1925
forecast P Duch. 1960

December 19, 1973

Mr. R. F. Erickson
Veenstra & Kimm, Engineers & Planners
924 Fourth St.
West Des Moines, Iowa 50265

Dear Mr. Erickson:

Thank you for sending me the construction plan and pump test data on the West Des Moines city well drilled in 1971. The sample cuttings haven't been studied yet so no log has been prepared to report on possible formation changes. I'll make a note that this information should be sent to you when the log is prepared by our subsurface staff.

I note that you did not mention how much and what kind of acid was used in developing the well, and the procedure used in treatment. If possible, I would also like to have this information for our files. I certainly appreciate your cooperation.

Sincerely,

Paul Horick
Chf. Groundwater Geol.

PJH:mph

V&K
VEENSTRA & KIMM
ENGINEERS & PLANNERS
924 FOURTH STREET, WEST DES MOINES, IOWA
ZIP CODE — 50265 • PHONE — 515-277-6161

December 13, 1973

Iowa Geological Survey
16 West Jefferson Street
Iowa City, Iowa 52240

Attn: Mr. Paul J. Horick

West Des Moines, Iowa
Water System Improvements
Contract 4 - Deep Well No. 2

Gentlemen:

Enclosed are copies of Well Test Data Sheets compiled before and after acidizing for the above project.

Also enclosed is a copy of Drawing No. 1574-1, showing construction and formation forecast the Contractor bid upon. Construction was substantially as shown on the drawing.

Samples of cuttings were taken from the rotary drill operation by Varner Well & Pump Co. and these samples were to have been submitted to Iowa Geological Survey for analysis.

X We would like a copy of any changes in location of formations encountered.

Yours very truly,

VEENSTRA & KIMM

By R. F. Erickson

RRJ:m
1574
Encls.

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested July 21, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well 16" x 10" — Pump used: Driver 16-V G.M.C.

Depth of well — Column and shaft 10 x 2 3/16"

Length of airline 395' — Bowls 14" HX - 6 Stage

Non-pumping level 107' — Manufacturer Peerless

Orifice size 10 x 6 — Serial No.

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP	REMARKS
	0	0	125'		0		0			START OF TEST
8:30	12.5"	500	114	132	25'					
8:45	12.5	500	114	132	25					Water clear
9:00	13.5	520	112	136	29					
9:05	13.5	520	112	136	29					
9:10	17.5	595	110	141	34					
9:15	17.5	595	109	143	36					
9:25	17.5	595	110	141	34					
9:35	17.5	595	110	141	34					
9:45	17.5	595	110	141	34					
10:00	17.5	595	110	141	34					
10:02										Increase flow
10:05	27.5	741								
10:08	27.5	741	102	159	52					
10:20	27.5	741	102	159	52					
10:30	27.5	741	102	159	52					
10:33										Increase flow
10:35	35.5	842	98	169	62					
10:45	35.0	836	98	169	62					
11:00	35.0	836	98	169	62					
11:02										Increase flow
11:10	49.0	972	90	187	80					
11:15	49.0	972	90	187	80					
11:30	49.0	972	89	189	82					
11:45	49.0	972	89	189	82					
11:50										Increase flow

VARNER WELL & PUMP CO
DUBUQUE, IOWA

WELL TEST DATA SHEET

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Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well 16" x 10" — Pump used: Bowls 16-V G.M.C.

Depth of well — Columns and shaft 10 x 2 3/16"

Length of airline 395' — Bowls 14" HX - 6 Stage

Non-pumping level 107' — Manufacturer Peerless

Orifice size 10 x 6 — Serial No.

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0		0			START OF TEST
11:55	63.5	1096	80'	210	103					
12:00	63.5	1096	80	210	103					
12:15	63.5	1096	80	210	103					
12:30	63.0	1092	80	210	103					
								Change to	8" orifice	
12:37	12.0	1120	85	199	92					
1:00	12.0	1120	85	199	92					
1:15	12.0	1120	85	199	92					
1:30	12.0	1120	85	199	92					
										Increase flow
1:35	15.5	1248	77	217	110					
1:45	15.5	1248	76	219	112					
2:00	15.0	1230	76	219	112					
2:15	15.0	1230	76	219	112					
2:30	15.0	1230	76	219	112					
										Increase flow
2;40	18.0	1336	70	233	126					
2:45	17.5	1319	70	233	126					
3:00	17.5	1319	70	233	126					26° C. water temp.
3:15	17.0	1302	70	233	126					
3:30	17.0	1302	69	236	129					
3:45	17.5	1319	69	236	129					
										Increase flow
3:55	21.0	1438	58	261	154					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested July 21, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well 16" x 10" — Pump used: Driver 16-V G.M.C.

Depth of well — Column and shaft 10 x 2 3/16"

Length of airline 395' — Bowls 14" HX - 6 Stage

Non-pumping level 107' — Manufacturer Peerless

Orifice size 10 x 6 — Serial No.

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0		0			START OF TEST
4:00	21.0	1438	58	261	154					
4:15	21.0	1438	57	263	156					
4:30	21.0	1438	57	263	156					
4:45	21.0	1438	57	263	156				Increase pumping	
4:55	25.5	1571	45	291	184					
5:00	25.0	1557	45	291	184					
5:15	25.0	1557	45	291	184					
5:30	24.5	1543	40	303	196					
5:45	24.5	1543	42	290	191					
5:50	24.5	1543	41	300	193					
5:55	28.5	1655	32	321	214					
6:00	28.0	1641	31	323	216					
6:15	28.0	1641	30	326	219					Change gauge
6:30	28.0	1641	30	326	219					
6:45	27.5	1627	30	326	219				Increase pumping	
6:48	31.5	1739	22	344	237					
7:00	30.0	1697	22	344	237					
7:15	30.0	1697	21	346	239					
7:30	30.0	1697	21	346	239				Increase pumping	
7:35	36.0	1865	10	372	265					
7:45	34.0	1809	9	374	267					
8:00	33.5	1795	8	376	269					
8:15	33.5	1795	8	376	269				Increase Pumping	
8:20	36.0	1865	3	388	281					
8:30	35.5	1851	3	388	281					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested July 21, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well 16" x 10" — Pump used: Driver 16-V G.M.C.

Depth of well — Column and shaft 10 x 2 3/16"

Length of airline 395' — Bowls 14" HX - 6 Stage

Non-pumping level 107' — Manufacturer Peerless

Orifice size 10 x 6 — Serial No.

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	O	O			O		O			START OF TEST
8:45	35.5	1851	3	388	281					
9:00	36.0	1865	5	383	276					
9:15	36.0	1865	5	383	276					
9:30	36.0	1865	5	383	276					
10:00	36.0	1865	5	383	276					
10:30	35.5	1851	5	383	276					
11:00	35.5	1851	5	383	276					
11:30	35.5	1851	5	383	276					Increase pumping
11:35	38.0		0	395	288					
12:00	37.5		0	395	288					
12:30	37.5		0	395	288					
1:00	37.5		0	395	288					
1:30	37.5		0	395	288					Increase pumping - break suction.
1:35	39.5									Decrease
1:35	31.5		12	367	260					
2:00	33.0	1791	11	370	263					Increase flow
2:05	34.0	1804	10	372	265					
2:30	33.5	1795	10	372	265					Increase flow
2:35	34.0	1809	9	374	267					
3:00	34.0	1809	10	372	265					
3:05	35.0	1837	6	383	274					
3:30	35.0	1837	6	383	274					
4:00	35.0	1837	6	383	274					Increase flow
4:30	35.5	1851	4	286	279					Increase flow
5:00	35.5	1851	4	286	279					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines
Location West Des Moines, Iowa

Date tested July 21, 1971
Tested by J. Shireman

Dia. of well 16" x 10"
Depth of well
Length of airline 395'
Non-pumping level 107'
Orifice size 10 x 6

Pump used: Driver 16-V G.M.C.
Column and shaft 10 x 2 3/16"
Bowls 14" HX - 6 Stage
Manufacturer: Peerless
Serial No.

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0		0			START OF TEST
5:30	35.5	1851	4	386	279					
6:00	35.5	1851	4	386	279					
6:30	35.5	1851	4	386	279					
7:00	35.5	1851	4	386	279					
7:30	35.5	1851	4	386						
8:00	35.5	1851	4	386						
8:30	35.5	1851	4	386						

In three min. water level went to 132 and stayed there.

VARNER WELL & PUMP CO.

DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested August 5, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well — Pump used: Driver V-16

Depth of well — Column & shaft 10" x 2 3/16"

Length of airline 395' — Bowls

Non-pumping level 125 — Manufacturer Peerless

Orifice size 10" x 8" — Serial No.

AFTER ACID

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	O	O			O		O			START OF TEST
AM 8:30	6	727	115	130	5					
8:31	8	838	110	141	16					
8:32	6½	758	110	141	16					
8:33	6½	758	111	139	14					
8:34	6½	758	111	139	14					
8:35	6½	758	111	139	14					
8:36	7	785	111	139	14					
8:37	7	785	111	139	14					
8:38	7	785	111	139	14					
8:39	7	785	111	139	14					
8:40	7	785	111	139	14					
8:50	7	785	111	139	14					
9:00	7	785	110	141	16					
9:10	7	785	110	141	16					
9:20	7	785	110	141	16					
9:30	7	785	110	141	16					
9:40	7	785	110	141	16					
9:50	7	785	110	141	16					
10:00	7	785	110	141	16					
10:10	7	785	110	141	16					
10:20	7	785	110	141	16					
10:30	7	785	110	141	16					
11:00	7	785	110	141	16					Water sample #1
11:30	7	785	110	141	16					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested August 5, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well — Pump used: Driver V-16

Depth of well — Column and shaft 10" x 2 3/16"

Length of airline 395' — Bowls

Non-pumping level 125 — Manufacturer Peerless

Orifice size 10" x 8" — Serial No.

AFTER ACID

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0		0			START OF TEST
AM 11:30	Change		102							
11:31	18	1258	101	162	37					
11:32	18	1258	101	162	37					
11:33	18	1258	101	162	37					
11:34	18	1258	101	162	37					
11:35	18	1258	101	162	37					
11:36	18	1258	101	162	37					
11:37	18	1258	101	162	37					
11:38	18	1258	101	162	37					
11:39	18	1258	101	162	37					
11:40	18	1258	101	162	37					
11:50	18	1258	101	162	37					
12:00	18	1258	101	162	37					
12:10	18	1258	101	162	37					
12:20	17.5	1240	101	162	37					
12:30	17.5	1240	101	162	37					
12:40	17.5	1240	100	164	39					
12:50	17.5	1240	100	164	39					
1:00	17.5	1240	100	164	39					
1:10	17.5	1240	100	164	39					
1:20	17.5	1240	100	164	39					
1:30	17.5	1240	100	164	39					
2:00	17.5	1240	100	164	39					
2:30	17.5	1240	100	164	39					
3:00	17.5	1240	100	164	39					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested August 5, 1971
Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well — Pump used Driver V-16
Depth of well — Column and shaft 10" x 2 3/16"
Length of airline 395' — Bowls
Non-pumping level 125 — Manufacturer Peerless
Orifice size 10" x 8" — Serial No.

AFTER ACID

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0					START OF TEST
3:30	17.5	1240	100	164	39					
4:00	17.5	1240	100	164	39					
4:30	17.5	1240	100	164	39					
5:00	17.5	1240	100	164	39					
5:30	17.5	1240	100	164	39					
6:00	17.5	1240	100	164	39					
6:30	17.5	1240	100	164	39					
7:00	17.5	1240	100	164	39					
7:30	17.5	1240	100	164	39					
8:00	17.5	1240	100	164	39					
8:30	17.5	1240	100	164	39					
9:00	17.5	1240	100	164	39					
9:30	17.5	1240	100	164	39					
10:00	17.5	1240	100	164	39					
10:30	17.5	1240	100	164	39					
11:00	17.5	1240	100	164	39					
11:30	17.5	1240	100	164	39					
PM 12:00	17.5	1240	100	164	39					
12:30	17.5	1240	100	164	39					
1:00	17.5	1240	100	164	39					
1:30	17.5	1240	100	164	39					
2:00	17.5	1240	100	164	39					
2:30	17.5	1240	100	164	39					
3:00	17.5	1240	100	164	39					
3:30	17.5	1240	100	164	39					

VARNER WELL & PUMP CO.
DUBUQUE, IOWA

WELL TEST DATA SHEET

Job City of West Des Moines — Date tested August 5, 1971

Location West Des Moines, Iowa — Tested by J. Shireman

Dia. of well — Pump used: Driver V-16

Depth of well — Column and shaft 10" x 2 3/16"

Length of airline 395' — Bowls

Non-pumping level 125' — Manufacturer Peerless

Orifice size 10" x 8" — Serial No.

AFTER ACID

TIME	PIZOMETER READING (IN.)	G. P. M.	AIR GAUGE READING (FEET)	PUMPING LEVEL	DRAWDOWN	DISCH. PRESSURE LBS.	DISCH. PRESSURE FEET	TOTAL PUMPING HEAD	TEMP.	REMARKS
	0	0			0		0			START OF TEST
4:00	17.5	1240	100	164	39					
4:30	17.5	1240	100	164	39					
5:00	17.5	1240	100	164	39					
5:30	17.5	1240	100	164	39					
6:00	17.5	1240	100	164	39					Water sample #2
6:30	46	2010	74	224	99					Increase pumping
7:00	46	2010	74	224	99					
7:30	46	2010	74	224	99		Approx. 20 gal. per foot of drawdown.			
8:00	46	2010	74	224	99					
8:30	46	2010	74	224	99					
			85	Readings taken every 15 seconds.						
			105							
			107							
			113							
			115							
			115							

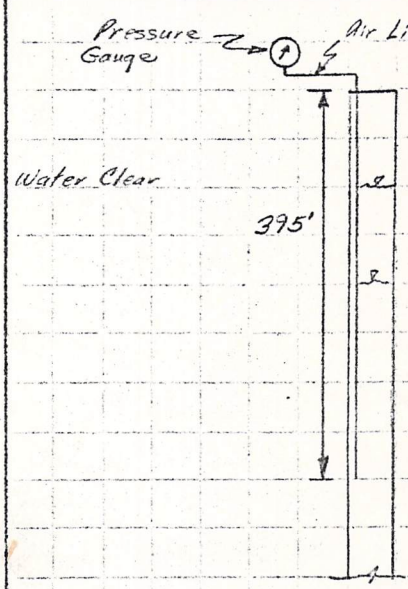
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VEENSTRA & KIMM
ENGINEERS & PLANNERS
924 FOURTH STREET, WEST DES MOINES, IOWA
ZIP CODE — 50265 • PHONE — 515-277-6161

Computed by APM Date 9-23-71
Checked by ..... Date .....
Reviewed by ..... Date .....
Approved by ..... Date .....

Job No. 574 Page No. .....
Subject West Des Moines, Iowa
Deep Well #2
Well Test Summary
Sheet No. 1 of 3

Time	Pressure Gauge Reading	Pumping Level	Draw Down	Inches of Water	GPM	Remarks
				6" orfice / 10" Pipe		
July 21, 1971						
8:30 AM	125	107	—	Started	Pumping	
8:45	114	132	25	12.5	500	Water Clear
8:55 to	112	136	29	13.5	520	
9:05						
9:10 to	110	141	34	17.5	600	
10:00						
10:05 to	102	159	52	27.5	740	
10:30						
10:35 to	98	169	62	35.5	840	
11:00						
11:10 to	89	189	82	49.0	970	
11:45						
11:55 to	80	210	103	63.5	1,100	
12:30						
	Changed Orfices			8" orfice / 10" Pipe		
12:37 to	85	199	92	12.0	1,120	
1:30						
1:35 to	76	219	112	15.0	1,230	
2:30						
2:40 to	70	233	126	17.5	1,320	
3:15						
3:30 to	69	236	129	17.0	1,300	
3:45						
3:55 to	57	263	156	21.0	1,440	
4:45						
4:55 to	45	291	184	25.0	1,560	
5:15						
5:30	40	303	196	24.5	1,540	Changed Pressure Gauge
5:45	42	298	191	24.5	1,540	Changed Pressure Gauge
5:50	41	300	193	24.5	1,540	



Pumping Level = 395' − (Pressure Gauge Reading converted to ft. of water)

Drawdown = Pumping Level − Static WL (107)

1574 - Tests

VEENSTRA & KIMM
ENGINEERS & PLANNERS
924 FOURTH STREET, WEST DES MOINES, IOWA
ZIP CODE — 50265 • PHONE — 515-277-6161

Job No. [redacted]74 Page No.

Subject West Des Moines, Iowa
Deep Well #2
Well Test Summary

Computed by AEM Date 7-22-71
Checked by Date
Reviewed by Date
Approved by Date

Sheet No. 2 of 3

Time	Pressure Gauge Reading	Pump Level	Draw Down	Inches of Water	GPM	Remarks
				8" orifice		
July 21, 1971				10" Pipe		
5:55 to 6:45	30	326	219	28.0	1,640	
6:48 to 7:30	21	346	239	30.0	1,700	
7:35 to 8:15	8	376	269	33.5	1,800	
8:20 to 8:45	3	388	281	35.5	1,850	
9:00 to 11:30	5	383	276	35.5	1,850	
11:35 to 1:30	0	395+	288+	37.5	1,900+	
July 22, 1971						
1:35	0	395+	288+	39.5	1,900+	Started to break suction
1:35	12	367	260	31.5	1,740	
1:45 to 2:00	11	370	263	33.0	1,790	
2:05 to 2:30	10	372	265	33.5	1,800	
2:35 to 3:00	10	372	265	34.0	1,810	
3:05 to 4:00	6	383	274	35.0	1,840	
4:30 to 8:00	4	386	279	35.5	1,850	
8:20	4	386	279	35.5	1,850	
8:22						Shut pump down
8:22½	35	314	207	—	—	
8:23	65	245	138	—	—	
8:23½	92	182	75	—	—	

VEENSTRA & KIMM
ENGINEERS & PLANNERS
924 FOURTH STREET, WEST DES MOINES, IOWA
ZIP CODE — 50265 • PHONE — 515-277-6161

Computed by ARM Date 7-22-71
Checked by ..... Date .....
Reviewed by ..... Date .....
Approved by ..... Date .....

Job No. [redacted]-74 Page No. .....
Subject West Des Moines, Iowa
Deep Well #2
Well Test Summary
Sheet No. 3 of 3

Time	Pressure Gauge Reading	Pump Level	Draw Down		GPM	Remarks
July 22, 1971						
8:24	104	155	48	—	—	
8:24½	112	136	29	—	—	
8:25 to	115	129	22	—	—	
8:45						
10:00	115	129	22	—	—	Note: The pressure gauge
12:50	117	125	18	—	—	used at the end of test was not the same one as used at start of test.

MEMORANDUM June 4, 1971

To: Orv Van Eck and Don Koch

From: Paul Horick

Jim Tewell of Varner brought in samples from West Des Moines city well now drilling from 2225-2435'. He wanted us to pick the top of the Jordan and St. Lawrence. Don had made predictions of 2392' and 2428' respectively. I examined the sample range 2380-2435' and made tentative top selections of:

Top Jordan 2390-95'
Top St. Lawrence 2430-35' (less sure about this)

I told Jim that I would contact Don as soon as he got back and he would look at the samples and make definite top selections. Don is to call the rig phone 515-274-4419 and give the information to Tewell or other drilling crew member there.

Tewell also brought in the attached drilling report.

Charlie is washing and drying the samples now and will have them on Don's desk by 5:00 p.m.

6-5-71
2393 Jordan
2429 St. Law.

2482 TD
29
53 into St. Lawrence

Remaining samples in brick shed nearest new well.

SWL 119' 6-5-71

DAILY DRILLING REPORT

☐ J. P. MILLER ARTESIAN WELL CO.
BOX 359 BROOKFIELD, ILL.

☐ MILLER WELL AND PUMP CO.
161 W. WISCONSIN AVE.
MILWAUKEE, WIS.

☒ VARNER WELL AND PUMP CO.
BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

40

Date MAY 21 - 1971
Job WEST DES MOINES
Hole No. 2
Rig No. BREWSTER
Tour M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
1950	51	6:43	6:50	7			SAND	
	52		6:56	6	41			
	53		7:28	32		BROKEN	?	
	54		7:33	5				
	55		7:38	5				
	56		7:42	4				
	57		7:50	8				
	58		8:00	10	42			
	59		8:07	7				
	1960		8:14	7			SAND	
	61		8:20	6				
	62		8:26	6				
	63		8:33	7				
	64		8:40	7				
	65		8:47	7			SAND	
	66		8:55	8	43			
	67		9:02	7				
	68		9:10	8				CONN @ 1968'
	69	9:22	9:26	4				
	1970		9:33	7				
P. du Chien	71		9:58	25				
	72		10:32	34	44			
	73		11:05	33				
	74		11:30	25	45			
	75		11:45	15				
	76		12:07	22				
	77		12:27	20	46			
	78		12:57	30				
	79		1:30	33	47			
	80		2:00	30	47			

ADDITIONAL REMARKS, ETC.

APPROVED BY _____ DRILLER

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☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date MAY 21 1971
Job West Des Moines
Hole No. 2
Rig No. Bucyrus #1
Tour M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
1920	21	1:45	2:35	50	27 9#			
	22		3:20	45				
	23	4:45	4:10	25	28 12#	✓		Weld leak in mud line & Air pump
	24		4:47	35				
	25		5:10	23	29 16			
	26		5:30	20				
	27		5:55	25	30 0#			
	28		6:15	20				
	29		6:37	22	Clean Water			
	1930	6:47	7:08	21	31 0#			
	31		7:50	42				45 11#
	32		8:40	50	Sec R16 & Weld Mud Line.			
	33	9:25	10:15	50	Reack Stem on Stand Pipe Valve 3'			
	34	11:53	11:22	29				
	35		12:03	41	34 39			
	36		12:47	44				
	37		1:25	38		Coun @ 1937'		
	38	1:43	2:40	57			Change WA-Tch	
	39		3:46	66				
	1940		4:49	63			LM + Shale - very broken	
	41		5:15	26				
St. Peter	42		5:30	15				
	43		5:38	8				
	44		5:49	11			ST. PETE	
	45		6:00	11				
	46		6:11	11				
	47		6:22	11	40 31			
	48		6:29	7				
	49		6:37	8				
	1950		6:43	6	40 52			

ADDITIONAL REMARKS, ETC.

APPROVED BY _____ DRILLER

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MILWAUKEE, WIS.

☐ WARNER WELL AND PUMP CO.
BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date June 2, 1971
Job West Des Moines
Hole No. # 2
Rig No. Brewster
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2230	2231	9:40	9:46	6				
	32		9:54	8				
	33		10:01	7				
	34		10:07	6				
	35		10:13	6				
	36		10:19	6				
	37		10:27	8				
	38		10:35	8			D.Lo.	
	39		10:43	8			CONN. @ 2239	
	2240	10:58	11:03	5				
	41		11:08	5				
	42		11:13	5				
	43		11:17	4				
	44		11:20	3				
	45		11:24	4				
	46		11:30	6				
	47		11:35	5				
	48		11:40	5				
	49		11:48	8		VISCOSITY 27		
	2250		11:57	9				
	51		12:06	9				
	52		12:15	9				
	53		12:23	8				
	54		12:34	11			GRAY SDY DOLO.	
	55		12:41	8				
	56		12:49	8				
	57		12:56	7				
	58		1:03	7				
	59		1:08	5			LOSING FLUID FAST.	
	2260		1:12	4				

ADDITIONAL REMARKS, ETC.

APPROVED BY _____ DRILLER

Let's just call the tops about like Don had them estimated. The engineers just wanted an idea how far to go in the St. Lawrence.

DAILY DRILLING REPORT

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BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date June 2, 71
Job West W. M.
Hole No. #2
Rig No. Brewster
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2260	2261	1:12	1:17	5				
	62		1:22	5				
	63		1:34	12				
	64		1:44	10				
	65		1:53	9				
	66		2:02	9				
	67		2:17	15				
	68		2:33	16			Conn @ 2268	-Tight
	69	3:35	3:42	7				-Circ 20 min
2270			3:50	8				Circ Again
	71		3:58	8				
	72		4:07	9				
	73		4:15	8	vis 27			
	74		4:23	8				
	75		4:30	7				
	76		4:40	10				
	77		4:49	9				Losing Fluid
	78		4:59	10				bad.
	79		5:05	8				Show every
2280			5:11	6				thing down.
	81		5:18	7				
	82		5:24	6				
	83		5:44	20				
	84		6:05	21				WAIT ON WATER.
	85	6:48	7:05	17				
	86		7:18	13	Mix 50#		Poly-Phos	
	87		7:29	11				
	88		7:35	6				
	89		7:43	8				
2290			8:00	17				

ADDITIONAL REMARKS, ETC. _____

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BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date JUNE 2-1971
Job WEST D. M.
Hole No. 2
Rig No. BREWSTER
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2290	91	8:00	8:08	8			LM.	
	92		8:30	22				
	93		8:40	10				
	94		8:50	10				
	95		8:59	9				
	96		9:10	11				
	97		9:22	12				
	98		9:36	14				
	99		9:55	19				CIRC. TO MAKE
	2300	10:45	10:52	7				CONN. C.P.S.
	1		11:02	10				MAKE CONN @
	2		11:12	10				ALLEYS.
	3		11:21	11				
	4		11:32	11				
	5		11:42	10				
	6		11:58	16				
	7		12:10	12				
	8		12:26	16				
	9		12:39	13				
	10		12:57	18			Sdy Lm & Dolo	
	11		1:20	23				
	12		1:36	16				
	13		1:45	9				
	14		1:46	1				VERY LITTLE RETURN.
	15	2:20	2:25	5				SHUT DOWN TO TRY TO SEAL
	16		2:30	5				LOST CIRC. ZONE.
	17		2:35	5				
	18		2:42	7				
	19		[illegible]	44				
	2320		3:06	10				

ADDITIONAL REMARKS, ETC. _____

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MILWAUKEE, WIS.

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BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date June 3, 1971
Job West Des Moines
Hole No. #2
Rig No. Brewster
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2320	2321	3:06	3:08	2				
	22		3:11	3			Losing Fluid FAST	
	23		3:16	5				
	24		3:19	3				
	25		3:23	4			sdy. LM. CHERT - BROKEN	
	26		3:30	7				
	27		3:35	5				
	28		3:40	5				
	29		3:46	6				
	2330	4:50	4:56	6			sdy-LM-CHERT	WAIT ON WATER
	31		5:00	4				CONN. CIRC. TO MAKE
	32		5:03	3				CONN.
	33		5:08	5				
	34		5:14	6				wait on water
	35	7:00	7:05	5			sdy-LM-CHERT	
	36		7:10	5				
	37		7:18	8				
	38		7:26	8			WAIT ON WATER.	
	39	8:40	8:47	7				
	2340		8:55	8				
	41		9:02	7				Mud Pump #2
	42		9:08	6				2360
	43		9:15	7				2365
	44		3:21	6				
	45		9.25	4			OUT OF Fluid - W. O. WATER	
	46	10:44	10:50	6			Dolomite	
	47		10:53	3				
	48		11:00	7				
	49		11:05	5				
	2350		11:12	7				

ADDITIONAL REMARKS, ETC. _____

APPROVED BY _____ DRILLER

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MILWAUKEE, WIS.

☐ VARNER WELL AND PUMP CO.
BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date June 3 1971
Job West Des Moines
Hole No. #2
Rig No. Brewster
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2350	2351	11:12	11:20	8				
	52		11:30	10				
	53		11:39	9				
	54		11:48	9				
	55		11:57	9			Dolo - Cherty	
	56		12:07	10				
	57		12:17	10				
	58		12:30	13				
	59		12:40	10			Dolo - Cherty.	
	2360		12:47	7		Circ	20 Min. + Conn @ 2360	
	61	12:25	1:32	7				
	62		1:40	8		Mix 50# Poly Phos.		
	63		1:47	7				
	64		1:54	7	Vis. 27			
	65		2:03	9				
	66		2:12	9				
	67		2:20	8				
	68		2:30	10				
	69		2:39	9				
	2370		2:48	9			Dolom. Tr	
	71		2:53	5				
	72		2:58	5				
	73		3:06	8				
	74		3:16	10				
	75		3:35	19				
	76		3:48	13				
	77		4:08	20				
	78		4:16	8				
	79		4:21	5				
	2380		4:29	8				

ADDITIONAL REMARKS, ETC. _____

APPROVED BY _____ DRILLER

DAILY DRILLING REPORT

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MILWAUKEE, WIS.

☐ HOLLAND WELL SERVICE CO.
BOX 73 BROOKFIELD, ILL.

Date JUNE 3-1971
Job WEST DES MOINE
Hole No. 2
Rig No. BREWSTER
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2380	2381	4:29	4:40	11				
	82		4:49	9				
	83		5:00	11				
	84		5:13	13				
	85		5:29	16			sdy lm	
	86		5:37	8				
	87		5:45	8				
	89		5:52	7				
	89		6:00	8				
	2390		6:10	10			sdy lm	
	91		6:18	8				Circ. + make
	92	7:08	7:15	7				Conn. Stuck.
Jordan	93		7:19	4				Circ. on Hole.
	94		7:23	4				
	95		7:28	5			sd	
	96		7:34	6				
	97		7:40	6				
	98		7:48	8				
	99		7:59	9				
	2400		8:04	7			sd.	
	01		8:13	9				
	02		8:23	10				
	03		8:32	9				
	04		8:46	14				
	05		8:56	10			sd	
	06		9:03	7				
	07		9:12	9				
	08		9:20	8				
			9:26	6				
			9:36	10			dolo	

ADDITIONAL REMARKS, ETC. _____

APPROVED BY _____ DRILLER

DAILY DRILLING REPORT

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MILWAUKEE, WIS.

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BOX 237 DUBUQUE, IOWA

☐ HOLLAND WELL SERVICE CO.
BOX 79 BROOKFIELD, ILL.

Date JUNE 3-1971
Job WEST DES MOINE
Hole No. 2
Rig No. BUCYRUS
Tour M M

DEPTH FROM	DEPTH TO	TIME START	TIME FINISH	MINUTES	MUD VISCOSITY	MUD WEIGHT	FORMATION	REMARKS
2410	11	9:36	9:45	9				
	12		10:01	16				
	13		10:19	18				
	14		10:34	15		Sand &	Delo.	
	15		10:41	70				
	16		10:08	47				
	17		11:22	2				
	18		11:29	7				
	19		11:43	14				
	20		12:04	21				
	21		12:19	15		dix 30 min		Cond.
	22	12:59	1:02					
	23		1:20	18				
	24		1:50	30				
	25		2:00	10				
	26		2:23	23				
	27		2:40	17				
	28		3:00	20				
St Louis	29		3:11	11				
	30		3:30	19				
	31		3:44	14				
	32		4:04	20				
	33		4:20	11				
	34		4:40	18				
	35		4:56	20				
	36		5:06	10				
	37		5:25	19				
	38							

ADDITIONAL REMARKS, ETC. _____

APPROVED BY _____ _____ DRILLER

Jim Tewell

He would like the top of Jordan & top of St. Law. verified.

515 274 4419 The rig phone on DES MOINES.

There would probably be about a 45 min lag in the samples

W. Des Moines
Deepwell #2
(1971)

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ____ / District ____

Veenstra & Kimm Eng & Planners 924 4th St W Des Moines 50265

NE, SE, SE NW 15-78-25

Elevation 820

Time	Press Gauge	PL	DD		GPM						
	July 21,	1971			395' of air line						
				6" orifice 10" pipe							
8:30	125 psi	107				(Well not acidized)					
8:40				12.5	500						
8:45	114	132	25	12.5	500						
8:55	112	136	29	13.5	520						
9:05	112	136	29	"	520						
9:10	110	141	34	17.5	595						
9:15	109	143	36	"	"						
9:25	110	141	34	"	"						
9:35	110	141	34	"	"						
9:45	110	141	34	"	"						
10:00	110	141	34	"	"						
10:02											
10:05				27.5	741						
10:08	102	159	52	27.5	"						
10:20	102	159	52	"	"	Water temp 25°C = 77°F					
10:30	102	159	52	"	"						
10:33											
10:35	98	169	62	35.5	842						
10:45	98	169	62	35.0	836						
11:00	98	169	62	35.0	"						
11:10	90	187	80	49.0	972						
11:15	90	187	80	"	"						
11:30	89	189	82	"	"						
11:45	89	189	82	"	"						
11:50											
11:55	80	210	103	63.5	1096						
12:00	80	210	103	63.5	1096	← specific capacity = 10.64					
	Test to run until 8:30 AM July 22, 1971										

Data collected by Filmore 7-21-71

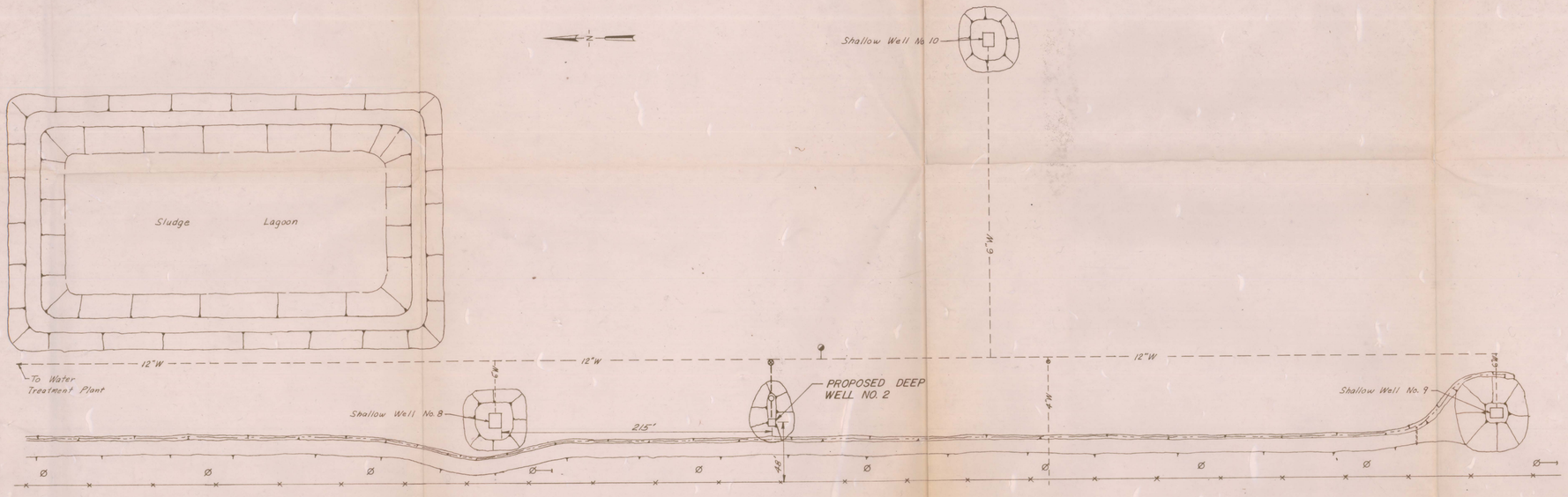
Copy of Test pump & construction data to be mailed by Veenstra & Kimm

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

West Des Moines #2

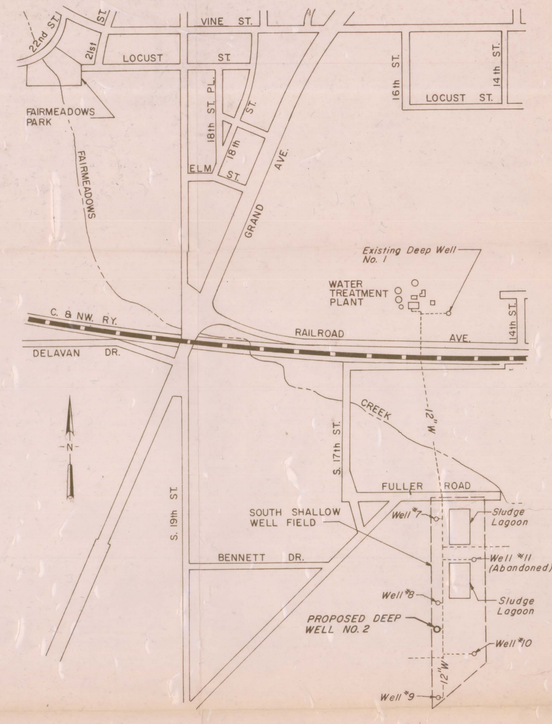
2 blk E, 4 blocks South of old well (1967)

NW of SE NE SW, SW ~ 1200' E, 900' N of SW cor Sec 6 83N-24W



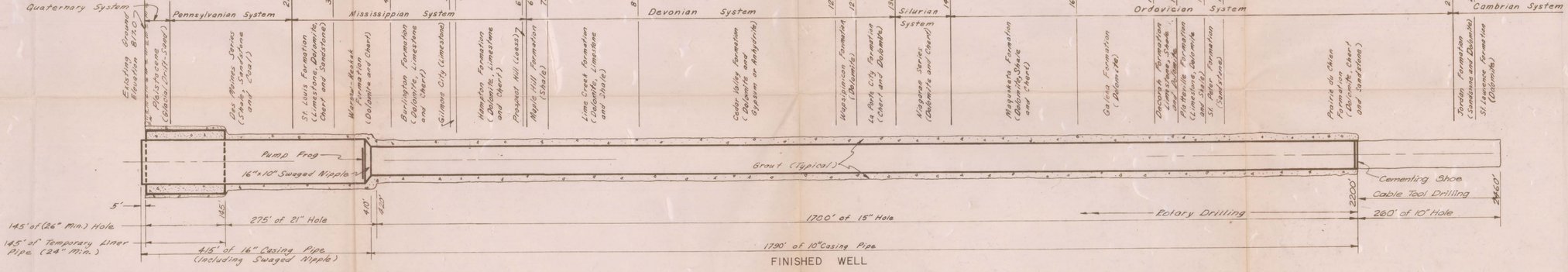
SITE PLAN

Scale 1"=50'



VICINITY MAP

Scale 1"=600'



FINISHED WELL

WELL LOGS

CONTRACT 4 - DEEP WELL NO.2

DATE	REVISIONS
10-1-70	Rev. 1 - Deleted First Stage Construction RVM HED
	and lengthed temporary liner pipe. RVM JWK

WEST DES MOINES, IOWA

WATER SYSTEM IMPROVEMENTS

CONSULTING ENGINEERS Veenstra & Kimm West Des Moines, Iowa

DRAWN ARM | CHECKED AOB | APPROVED JWK | DATE 5-13-70

VICINITY MAP, SITE PLAN AND WELL LOGS

SHEET 1 OF 2 | DWG NO 1574-1

Rev. 1