SHIVE-HATTERY & ASSOCIATES
CONSULTING ENGINEERS

HIGHWAY 1 & I-80 P.O. BOX 1050
IOWA CITY, IOWA 52240
TELEPHONE: (319) 354-3040

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Donald P. Hattery, P.E. & L.S.
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David L. Johnson, P.E.
Donald A. Thomas, L.S.
Ronald J. Saddoris, L.S.
David H. Comann, P.E.

May 4, 1978

City of Maxwell
City Hall
Maxwell, Iowa 50161

Re: Water Supply Well No. 3
Maxwell, Iowa

Attention: Mr. Donald Ferguson, Mayor

As a result of discussions with the Contractor on the water supply project on May 2, 1978, we were informed that the completed test boring work at the proposed site indicated that there is no water available to a depth of 150 feet. Further, it was indicated to us that the initial test boring to be drilled to a depth of 135 feet was terminated at the 90-foot level as a result of encountering a boulder at that depth. At that time, the Contractor proceeded to conduct a second test boring located 10 feet directly west of the initial boring. The second boring was drilled to a depth of 150 feet, which also indicated that water was not present in any of the overlaying strata. Accordingly, we were informed by the Contractor that the test rig would be pulled out and utilized on another job until such time as further direction was received from us and the City. All test boring work at the proposed site was conducted during the period of April 24 through May 1, 1978.

The test boring log data was secured from the Contractor by phone and is presented in the attached summary for your review and information. Following our discussions with the Contractor and evaluation of the data, the overall situation was discussed with personnel of the Iowa Geological Survey to obtain their input as to possible alternate locations to conduct additional boring explorations to obtain a suitable water supply. In our discussions with the Iowa Geological Survey, it was suggested that a water supply could perhaps be secured at a location in the area west and/or northwest of the proposed site in the vicinity of "Old Park Road". It would appear that the chances of obtaining a suitable water supply would increase in a direction closer to Indian Creek, which the Iowa Geological Survey indicates is underlain by the old river channel at a depth of 100 to 150 feet. However, it should be cautioned that the Iowa Geological Survey has conflicting background data concerning the exact location of the underlying river bed, although they are very certain that it is in the vicinity of Indian Creek.

Based upon the above information, it is recommended that the City authorize the Contractor to initiate an exploratory boring program in the locations and in the sequence presented on the attached drawing. This program and sequence of possible sites has been concurred with by the Iowa Geological Survey in conference with them on May 3, 1978. As an initial step, it is recommended that the City contact the various property owners affected to obtain their clearance to the City to allow exploratory drilling, with the understanding that if the results prove positive, the City would be in a position to negotiate with the owner for appropriate site purchase.

Although an attempt was made to contact the Farmers Home Administration this week regarding this situation and required procedures to proceed with the exploratory work and necessary contract document revisions after a suitable supply has been located, it was found that due to several conferences the FmHA officials would not be available to discuss the situation until the week of May 8th. I will contact them at that time and further appraise the City of our findings at the earliest possible date.

Once a suitable water supply is located, it will be necessary to obtain revised clearances from the Iowa Natural Resources Council and Iowa DEQ; as well as to revise the Engineering design and contract documents; and to provide revised surveys and the site purchase agreement and legal description. The cost concerning these extra items of work can be better ascertained after the exact site is determined through test borings. In this regard, it may be well to consider application to the Farmers Home Administration for loan funds to compliment the funding already secured on the project.

It is requested that the City inform us as to the acceptability of the program presented herein, as well as the availability of the alternate well sites. This situation has been discussed with the Contractor and by copy of this letter we are so informing them of the proposed program for continuation of the project.

Should you have any questions or comments regarding this matter, please contact our offices at your earliest convenience.

Yours very truly,

SHIVE-HATTERY & ASSOCIATES

Francis L. Hallada, P.E.
Project Manager

FLH/llh
#176366-2
attachments
cc: Ed Zeiser, City Clerk w/att.
Lloyd Scott, FmHA w/att.
John Vasey, City Attorney w/att.
David Claypool, Bonding Attorney w/att.
Paul Horick, Iowa Geological Survey w/att.

SHIVE-HATTERY & ASSOCIATES
Civil & Structural Engineers

PROJECT: Maxwell JOB. NO. Page of Pages

SUBJECT: Well #3 DATE: 5-2-78 COMP. BY DDC OK'd BY

Selected site location — NW Cor. S 27-T82N-R22W

Selected site test drilling —

Started drilling : 4-24-78

Finished drilling : 5-1-78

Testhole log data per Thorpe Well 5-2-78

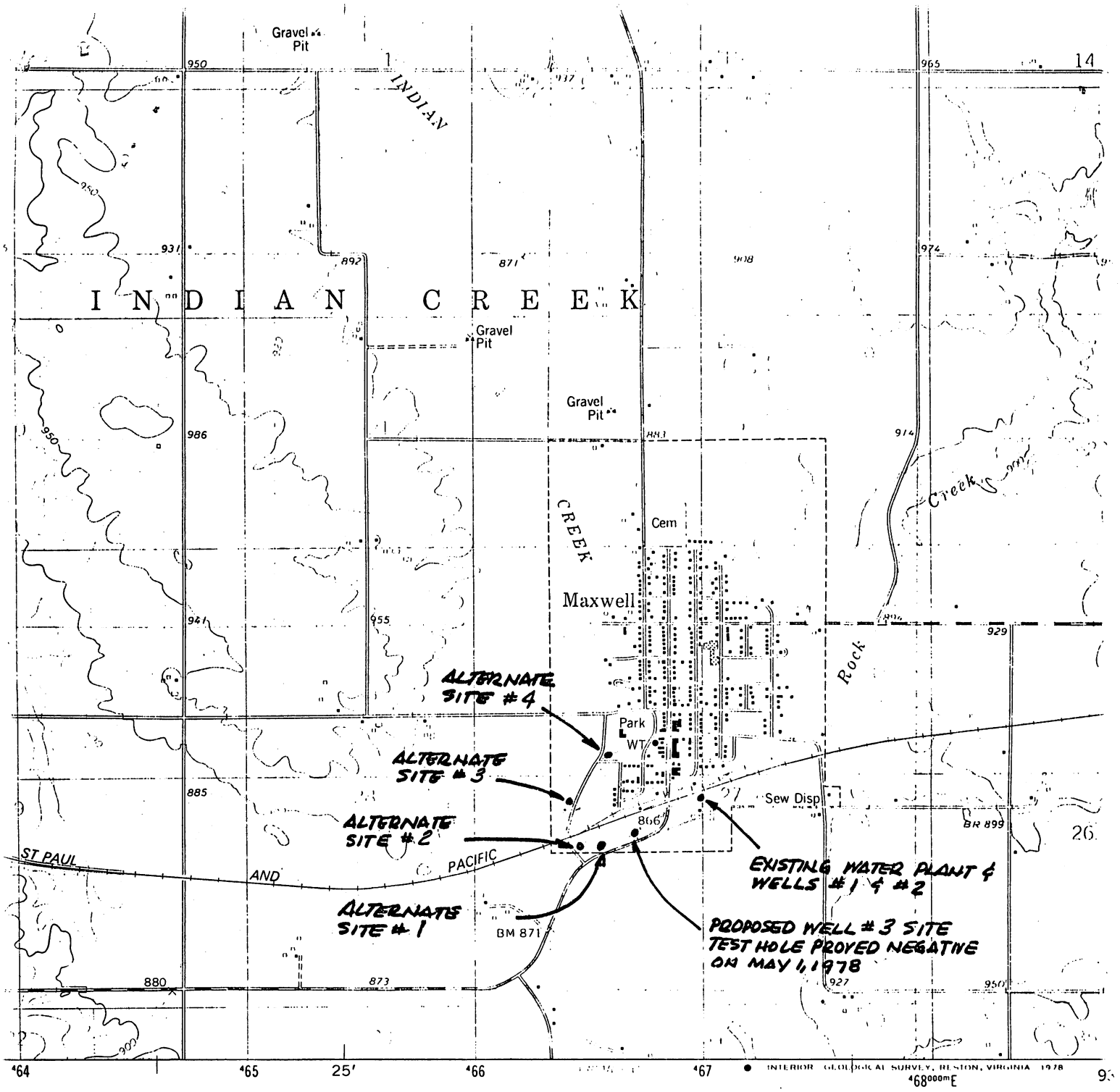
#1

0		EL 860±
		Grey clay
12		
18		Grey clay w/ sand streaks
29		Coarse sand
		Dark grey clay w/ gravel streaks
58		
69		Coarse sand w/ clay lenses
		Lite grey clay
86		
90		Dark grey clay

Hit Boulder

#2

0		
		Grey clay
14		
18		Clay & sand
		Coarse sand
33		Clay
34		Fine gravel
37		
43		Gravel w/ clay streaks
		Grey clay
59		
		Sand & clay
72		
82		Lite grey clay
		Dark grey clay
111		Black clay & shale
113		Grey clay
114		Hard L.S. & dolomite
119		
128		Grey clay
131		Grey clay & rock
		Sandstone w/ clay in it
147		
150		Grey clay



)0

1 MILE

4000 5000 6000 7000 FEET

1 KILOMETER

10 FEET
DATUM OF 1929

ROAD CLASSIFICATION

Primary highway, hard surface

Secondary highway, hard surface

Light-duty road, hard or improved surface

Unimproved road

Interstate Route U. S. Route State Route

IOWA

QUADRANGLE LOCATION

MAXWELL, IOWA
N4152.5—W9322.5/7.5

1975

AMS 7367 IV NW -SERIES V.

AP ACCURACY STANDARDS
RADO 80225, OR RESTON, VIRGINIA 22092
Y, IOWA CITY, IOWA 52240
YMBOLS IS AVAILABLE ON REQUEST

Shive-Hattery and Associates
Consulting Engineers
Cedar Rapids-Davenport-Des Moines
Dubuque-Ft. Madison-Iowa City-Vinton

WATER SUPPLY EXPLORATION
ALTERNATE WELL SITES
MAXWELL, IOWA

5-4-78

Memo

Re: Maxwell Town exploration drilling 5/3/78

Doc Holiday of Shive-Hattery came in with driller's log of two holes put down by Thorpe 4/24 - 5/1/78 for the town west of the existing well. They did not find a suitable sd & gravel and we talked about additional drilling sites — Generally reviewed the whole situation.

Now plan to move farther west and possibly NW for additional exploration. Tests will go to top of bedrock.

He will keep me informed of results. They hope for 210 gpm so plan on a 10-inch screen and 6-inch pump. Probably they would be satisfied with only 100 gpm.

Paul J Horick

SHIVE-HATTERY & ASSOCIATES
Civil & Structural Engineers

PROJECT: Maxwell JOB. NO. Page of Pages

SUBJECT: Well #3 DATE: 5-2-78 COMP. BY Doc Holiday OK'd BY

Selected site location — NW Cor. S 27-T 82 N-R 22 W

Selected site test drilling —

Started drilling : 4-24-78

Finished drilling : 5-1-78

Test hole log data per Thorpe Well 5-2-78

#1 ← 20'± → #2

#1

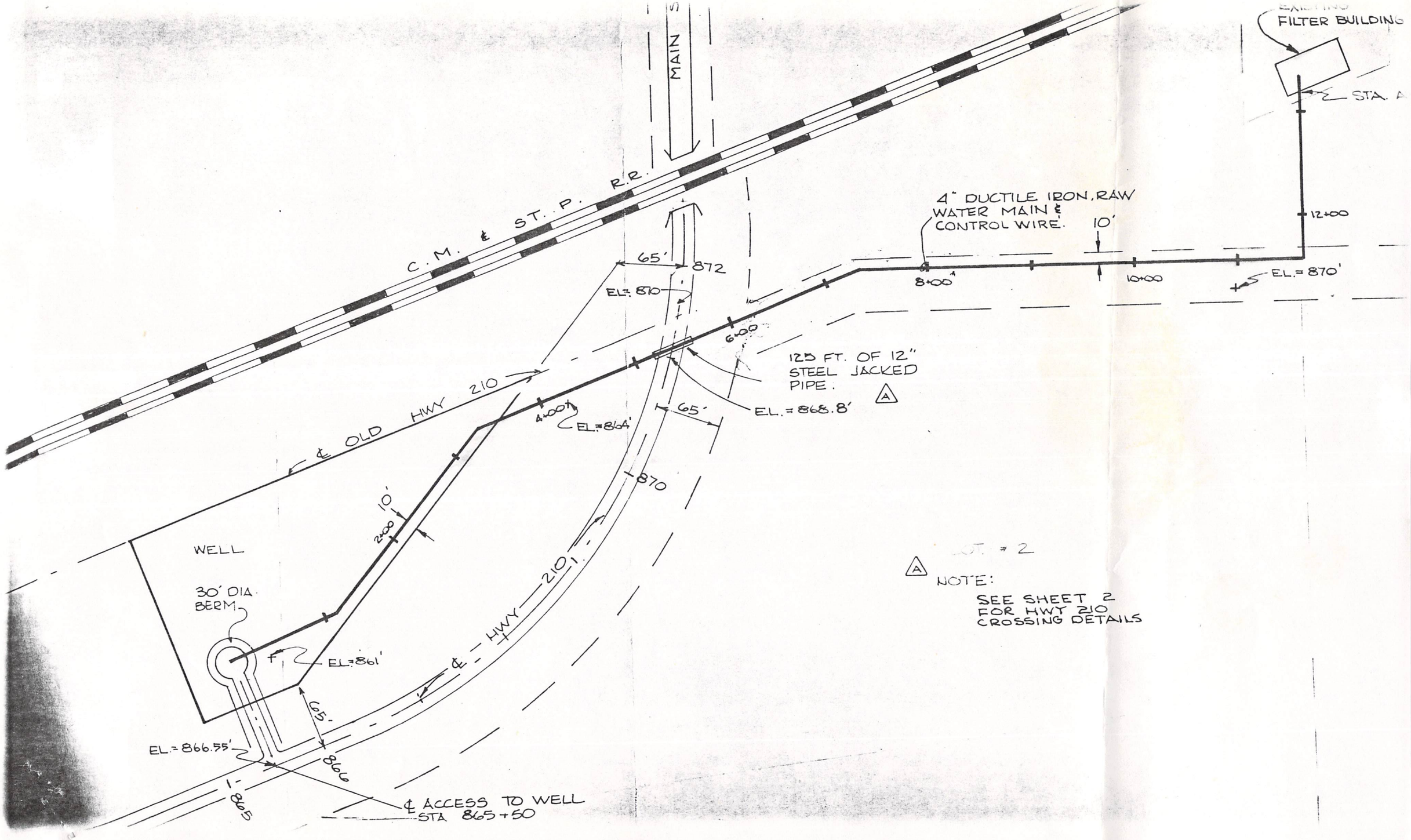
EL 860±

0	
	Grey clay
12	
18	Grey clay w/ sand streaks
	Coarse sand
29	
	Dark grey clay w/ gravel streaks
58	
	Coarse sand w/ clay lenses
69	
	Lite grey clay
86	
90	Dark grey clay

Hit Boulder

#2

0	
	Grey clay
14	
18	Clay & sand
	Coarse sand
33	
34	Clay
37	Fine gravel
43	Gravel w/ clay streaks
	Grey clay
59	
	Sand & clay
72	
82	Lite grey clay
	Dark grey clay
111	
113	Black clay & shale
114	Grey clay
119	Hard L.S. & dolomite
128	Grey clay
131	Grey clay & rock
	Sandstone w/ clay in it
147	
150	Grey clay


MAIN
C. M. & ST. P. R.R.
FILTER BUILDING
℄ STA. A
4" DUCTILE IRON, RAW WATER MAIN & CONTROL WIRE.
10'
12+00
8+00
10+00
EL.= 870'
65'
872
EL.= 870
6+00
125 FT. OF 12" STEEL JACKED PIPE.
A
EL.= 868.8'
65'
4+00
EL.= 864'
℄ OLD HWY 210
870
10'
2+00
WELL
30' DIA BERM
EL.= 861'
℄ HWY 210
65'
EL.= 866.55'
866
1-865
℄ ACCESS TO WELL
STA 865+50
SHT. # 2
A
NOTE:
SEE SHEET 2 FOR HWY 210 CROSSING DETAILS

GW Story Co. GS.

GEOLOGICAL BOARD

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STATE OF IOWA
IOWA GEOLOGICAL SURVEY
123 NORTH CAPITOL STREET
IOWA CITY, IOWA 52242
Phone: (319) 338-1173



Iowa
a place to grow

Stanley C. Grant
Director and State Geologist

Orville J Van Eck
Associate State Geologist

Donald L. Koch
Assistant State Geologist

February 2, 1977

Mr. John E. Connell
Shive-Hattery & Associates
Highway 1 & I-80 P.O. Box 1050
Iowa City, Iowa 52240

Dear Mr. Connell:

I am glad to reply to your letter of January 21 concerning general aquifer conditions and prospects for a new town well at Maxwell, Iowa.

As you know, the town presently relies on two wells finished in unconsolidated sand and gravel at about 119 and 122 feet. Well No. 1 constructed about 1914 is an old railroad well. A copy of our geologic log of well No. 2(1946) is enclosed. Also enclosed are the latest water analyses from these wells. At the time of collection of the water samples the wells were pumped at a rate of 90 to 210 gpm for 1 to 2 hours. Unfortunately, no data are available on water levels other than the original capacity test data shown on the log of well No. 2.

The town formerly had a well finished in the Mississippian-age carbonates at a depth of 382 feet. No log was provided although we have an old mineral analysis. Observe the high concentration of fluoride and that the water is unusually soft. No data were supplied on the yield and water levels of this well. The well probably has been abandoned and plugged for many years.

There are indications that a small bedrock channel runs beneath the Maxwell vicinity although the exact trend of the channel isn't known. One interpretation has it running southeastward, another southwestward. The existing town wells probably are completed in these channel-fill deposits. An abbreviated log of the formational units anticipated to underlie Maxwell down through the Devonian-age Cedar Valley Formation at the site of well No.2 is outlined as follows (all depths are refered to a starting elevation of 873 feet above sea level):

Geologic Unit	Depth Range (ft.)
Pleistocene Series (glacial drift clay containing sands and gravels interbedded and at the base)	0 - 135±
Pennsylvanian System (mostly shale may include thin sandstone and limestone)	135± - 190

Geologic Units	Depth Range (ft.)
Mississippian System (several formations that are primarily limestone and dolomite, containing minor chert, slightly sandy and shaly in upper part)	190 - 460
Devonian System	
Maple Mill - Aplington - Sheffield Formations (shale with thin dolomite in middle)	460 - 560
Lime Creek Formation (limestone and dolomite, thin shale at base)	560 - 710
Cedar Valley Formation (limestone and dolomite, contains gypsum - anhydrite in lower half)	710 - 1060

These depth predictions are subject to adjustments owing to local structural and thickness variations of the strata.

The various groundwater sources in the Maxwell vicinity appear to be: 1) sands and gravels in the glacial drift, presumably channel-fill deposits such as now used, 2) limestones and dolomites in the upper part of the bedrock down into the Lime Creek or upper Cedar Valley Formation, and 3) The Prairie du Chien sandy dolomite-Jordan Sandstone sequence at great depth, perhaps as deep as 2,350 feet.

Taking everything into account, the present source may be the best for the town unless they are willing to construct a long pipeline to the Skunk River Valley about 5½-6 miles to the west where the alluvium appears to be thicker and more extensive, or drill a deep well to the Jordan aquifer, either of which will be quite expensive. Most data indicate the upper and intermediate bedrock formations will yield only small to moderate supplies of questionable quality water. The high fluoride content of the water from the Mississippian rocks definitely is unsuited for a public supply. Colo developed a good well in the Lime Creek Formations at 775 feet. The construction record isn't available but the Mississippian section may have been left open with a liner through the Maple Mill-Sheffield interval. According to the driller the well tested at 250 gpm with only 10 feet of drawdown from a static head of 152 feet below ground level. However, Colo is north of the area of high fluoride in the Mississippian rocks so the water is acceptable there. I cannot predict what you would find in the Lime Creek-upper Cedar Valley interval at Maxwell should you drill this deep and case out the Mississippian. The presence of gypsum in the lower Cedar Valley does not look promising and will have a negative effect on water quality.

Drilling several test wells on the bottomland of Indian Creek west and southwest of Maxwell would appear to be the most plausible initial exploration. All test holes should extend as far as the top of the bedrock surface to explore the full potential of the surficial materials. Enclosed find xerox reproductions of portions of our topographic maps of this area. With a red pencil I have circled some promising drilling sites for shallow drilling as far as a mile downstream. The results can't be guaranteed of course. Poor results may occur, especially if the bedrock channel doesn't follow Indian Creek or the alluvium consists mostly of clay and silt.

The Skunk River alluvial and channel sands and gravels six miles west of Maxwell might be the best source for large supplies of good quality water for the town. Cambridge apparently derives its supply from channel sands at 80-85 feet. They have two wells capable of pumping 100-110 gpm each. Except for excess iron, the water is of good quality and similar to the existing Maxwell Supply.

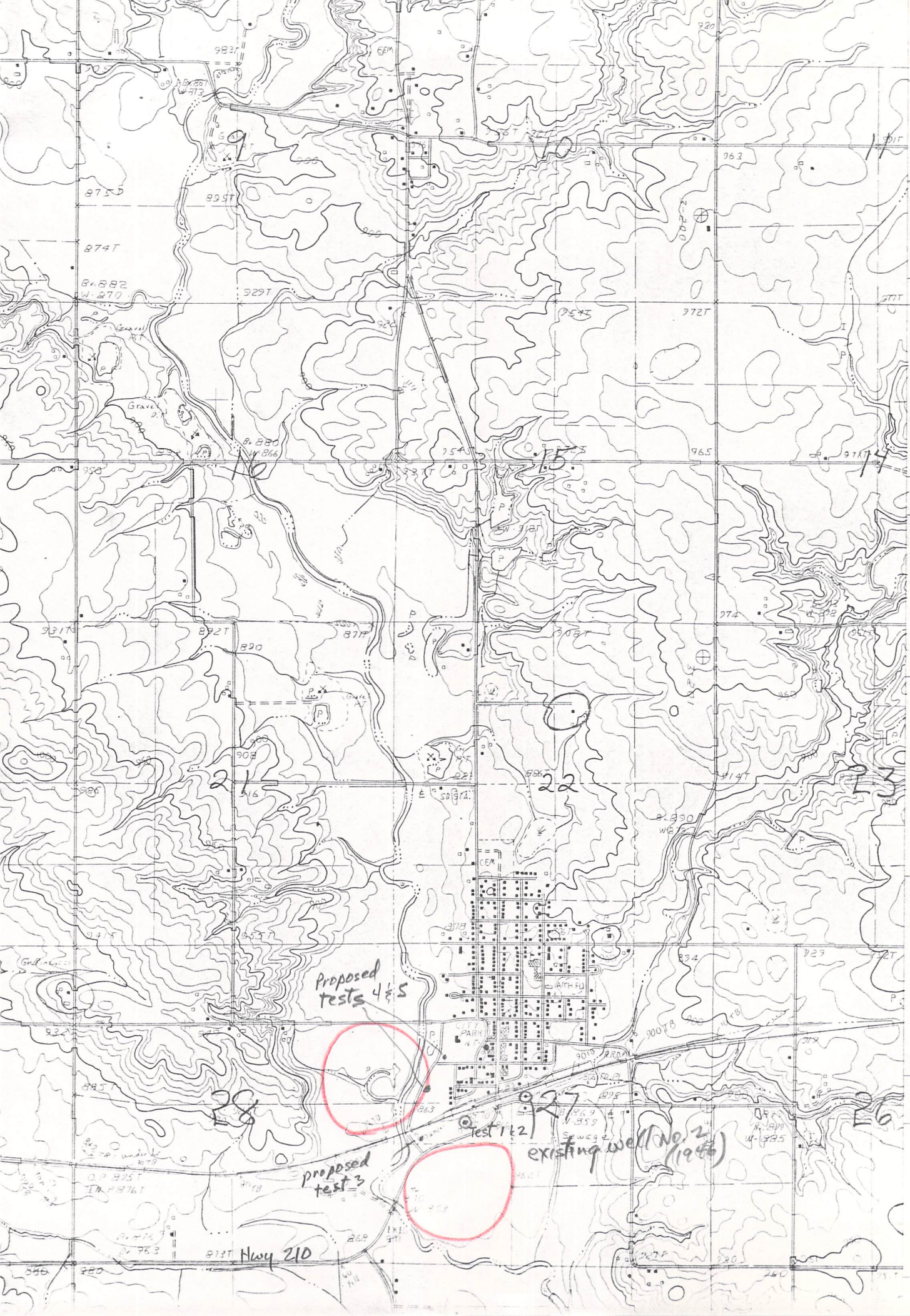
A well to the Jordan aquifer to about 2,350 feet should produce a minimum of several hundred gallons a minute based on municipal wells at Ankeny, Nevada, and State Center. However, the water will have about twice the concentration of dissolved solids as the present Maxwell water. The radioactivity will also be excessive and require zeolite softening or other treatment to meet EPA standards.

I hope this is the information you wanted. As you can see, Maxwell may encounter problems in developing a completely satisfactory watersupply. If this discussion poses any questions or if I can be of additional assistance in this matter, please let me know.

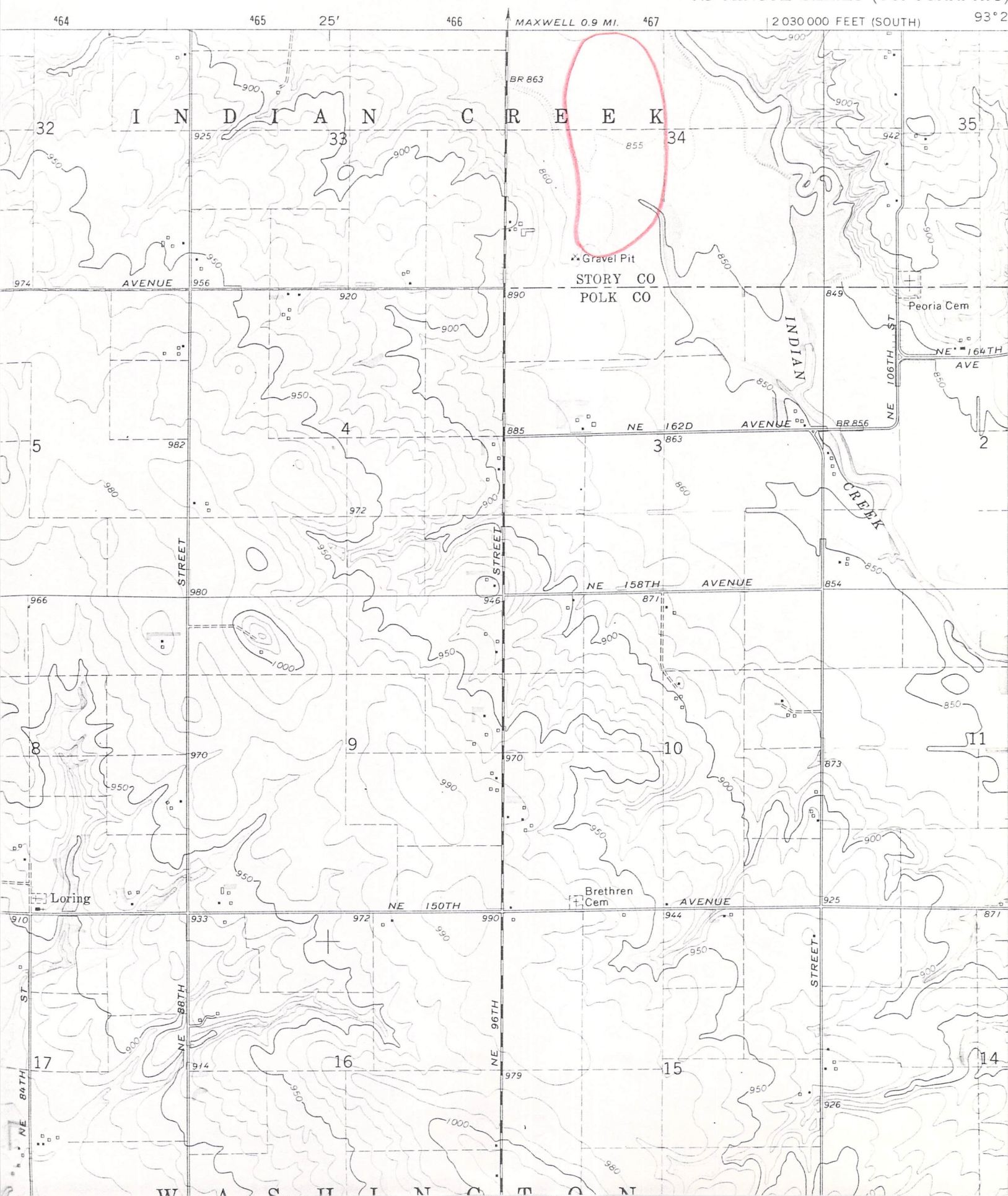
Very truly yours,

Paul J. Horick
Chief,Ground Water Division.

PJH:rlh


Proposed tests 4 & 5
test 1 & 2
existing well (No. 2) (1946)
proposed test 3
Hwy 210
9
10
11
14
15
16
21
22
23
26
27
28

LORING QUADRANGLE
IOWA
7.5 MINUTE SERIES (TOPOGRAPHIC)



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

LAB. NO. 6213
MINERAL NO. 8686
21 Jun 19 71 bj

TOWN Maxwell COUNTY Story
OWNER OF SUPPLY Municipal
COLLECTOR'S NAME Russell Sparks
DATE COLLECTED 10 May 71 DATE RECEIVED 11 May 71
REPORT TO: NAME EES
ADDRESS SDH

FIELD DATA SPECIAL MINERAL SURVEY

SOURCE: WELL NAME, NUMBER, POINT OF COLLECTION, DEPTH, CONSTRUCTION DATE, ETC., Well #2 Regular use At pump 126'

WELL PUMPED 1 HRS. AT 210 GPM. DATE OF PREVIOUS SAMPLE
WAS SAMPLE FREE OF TURBIDITY WHEN COLLECTED Yes
TEMPERATURE °C ALKALINITY (ppm $CaCO_3$) P T pH
IS A POLYPHOSPHATE BEING USED? No

LABORATORY ANALYSIS
(PARTS PER MILLION)

SPECIFIC CONDUCTANCE K AT 25°C 72 x 10^{-5}. TURBIDITY
DISSOLVED SOLIDS 401 SOLUBLE IRON (Fe) 1.2
TOTAL SOLIDS 401 SILICA (SiO_2) 14 TOTAL IRON (Fe) 1.2
ALKALINITY (ppm $CaCO_3$) P None T 348 pH 7.3 DATE 11 May 71

POSITIVE IONS		NEGATIVE IONS		Trace Metals	
K+	3.6	NO_3—asN	0.5	Arsenic	< 0.01
Na+	36	F—	0.8	Barium	0.1
Ca++	88.0	Cl—	11	Cadmium	< 0.01
Mg++	24.3	SO_4--	34	Chromium	< 0.01
Mn++	< 0.05	HCO_3—	426	Copper	0.03
Al+++		CO_3--	None	Lead	< 0.01
				Zinc	0.03
				L Farmer	

HARDNESS AS $CaCO_3$ 320 ppm 18.7 gpg

Slightly cloudy with pale yellow color on receipt in lab.

ANALYST Ryan, Calkins

R. L. MORRIS
JHG PRINCIPAL CHEMIST

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

LAB. NO. 6212
MINERAL NO. 8685
21 Jun 19 71 bj

TOWN Maxwell COUNTY Story
OWNER OF SUPPLY Municipal
COLLECTOR'S NAME Russell Sparks
DATE COLLECTED 10 May 71 DATE RECEIVED 11 May 71
REPORT TO: NAME EES
ADDRESS SDH

FIELD DATA SPECIAL MINERAL SURVEY

SOURCE: WELL NAME, NUMBER, POINT OF COLLECTION, DEPTH, CONSTRUCTION DATE, ETC., Well #1 Regular Use At pump 119'

WELL PUMPED 1 HRS. AT 210 GPM. DATE OF PREVIOUS SAMPLE
WAS SAMPLE FREE OF TURBIDITY WHEN COLLECTED Yes
TEMPERATURE °C ALKALINITY (ppm $CaCO_3$) P T pH
IS A POLYPHOSPHATE BEING USED? No

LABORATORY ANALYSIS
(PARTS PER MILLION)

SPECIFIC CONDUCTANCE K AT 25°C 72 x 10^{-5}. TURBIDITY
DISSOLVED SOLIDS 402 SOLUBLE IRON (Fe) 1.3
TOTAL SOLIDS 402 SILICA (SiO_2) 14 TOTAL IRON (Fe) 1.3
ALKALINITY (ppm $CaCO_3$) P None T 360 pH 7.3 DATE 11 May 71 bj

POSITIVE IONS		NEGATIVE IONS		Trace Metals	
K^+	3.6	NO_3—asN	1.1	Arsenic	< 0.01
Na^+	60	F^-	0.8	Barium	0.1
Ca^{++}	72.0	Cl^-	8	Cadmium	< 0.01
Mg^{++}	23.3	SO_4^{--}	33	Chromium	< 0.01
Mn^{++}	< 0.05	HCO_3^-	439	Copper	< 0.01
Al^{+++}		CO_3^{--}	None	Lead	< 0.01
				Zinc	< 0.01
				L Farmer	

HARDNESS AS $CaCO_3$ 276 ppm 16.1 gpg

ANALYST Ryan, Calkins

R. L. MORRIS
JHG PRINCIPAL CHEMIST

SHIVE-HATTERY & ASSOCIATES
CONSULTING ENGINEERS
HIGHWAY 1 & I-80 P.O. BOX 1050
IOWA CITY, IOWA 52240
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John E. Connell, P.E.
Wayne A. Reed, P.E.
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Ronald G. Haugland, P.E. & L.S.
Dennis E. Osipowicz, P.E. & L.S.
Donald A. Thomas, L.S.

January 21, 1977

U.S. Geological Survey
16 West Jefferson Street
Iowa City, Iowa 52242

Re: Maxwell, Iowa
Water Supply
#176366-0

Attention: Mr. Paul J. Horak,
Chief of Groundwater Geology

Dear Mr. Horak:

Shive-Hattery and Associates have been retained to study the water supply, treatment, and distribution system for the City of Maxwell. We are interested in any information which you may have concerning groundwater prospects for a new municipal well at Maxwell.

The City presently has two wells. Well 1 was given to the City by the railroad in 1940. There is no background information on this well; however, it is thought to be 106' in depth and produces approximately 90 gallons/minute. Well 2 was constructed in 1946; a copy of the drilling record is attached for your information. The second well produces approximately 60 gallons/minute. The two wells are located approximately 15 feet apart.

Preliminary estimates indicate that a new well of 70-100 gallons/minute would be sufficient to meet the future demands of the City of Maxwell.

We will greatly appreciate any assistance you can provide us in this matter.

Yours very truly,

SHIVE-HATTERY & ASSOCIATES

John E Connell

John E. Connell

JEC/eb
enclosure