Polk County GW File
Runnells Town Well

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

Jean: For your files
--Runnells subsidence

MEMORANDUM

To: Don Koch and Orv Van Eck

Date: August 4, 1982

From: Mary Howes

Re: Runnells Mine Subsidence

Background

I visited the town of Runnells, IA on Friday, July 23, 1982 in southeastern Polk County to investigate reports of a mine subsidence crater in the northeastern part of Runnells. Also present at that time were Jim Ellerhoff, Division of Mines and Minerals; Jim Gulliford, Director of the Department of Soil Conservation; Dave Nelson and Gene Rouse, Garden Associates of Oskaloosa; and Dave Colson, Runnells Water Commissioner. Jim Ellerhoff contacted IGS concerning the crater after he had been contacted by Garden Associates (asking for information about mining in the area). Garden Associates is the engineering firm that designed and is constructing a sanitary sewer system for the town of Runnells.

We originally believed that the mine causing the problems was the Diamond Jo #1, the only mine in the area which we have a map for. Cross-checking locations showed that the Diamond Jo #1 was not the mine in the area where the crater had appeared. The subsidence was occurring over an unmapped area. At the request of the city government of Runnells, I took them a copy of the map we have on file for the Diamond Jo #1.

Runnells has compiled a history of the town in the Runnells Centennial Volume which includes a section on coal mining. They locate an unmapped mine called the McKinney somewhat south of the subsidence area. Other possible mine names include Lockwood, Camp Creek, and Independent. Other names for mines in the area gleaned from IGS Annual Reports and the State Mine Inspector's files include Acme, Runnells, and Stoughtenburg. It cannot be ascertained if any of the mines are interconnected. Several older residents of the area and retired coal miners have stated that most of the northern part of the town is undermined. Further confirmation of undermining is provided by an affidavit which appears in the abstract for property adjacent to the subsidence crater belonging to Dave Colson. The affidavit, dated 1905, is by a coal miner who states that the property is undermined.

The State Mine Inspector's files and reports yielded evidence that most of the mining occurred from about 1895 to 1920 and sporadically thereafter until 1944.

I visited a retired coal miner, Virgil Howard, who lives in Runnells, after meeting with the persons listed above. He had worked in the Diamond Jo #1 pulling pillars in the 1920's. He also stated that there was only one mineable coal seam in the area, that most of the town was undermined, and that few of the mines were ever mapped.

Available information about the geology of the Pennsylvanian in the area indicats that the coal occurs as a single bed, and is probably the same as the coal mined across the Des Moines River at Ford in Warren County. The coal is reported to be consistently 3.5 to 4 feet thick in the Runnells area but is locally cut out by Pleistocene gravel-filled channels. Records also indicated that it is relatively flat lying in the vicinity, but is locally undulatory. I believe the coal belongs to the Laddsdale Coal Member in current nomenclature and would, therefore, be characteristically irregular. The coal seam is said to outcrop in the bluff above the Des Moines River east of Runnells.

Finally, the Runnells town well passes through an underground coal mine. The well location is indicated on the attached map which is a portion of the Runnells 7.5' topographic map. No samples were collected from the depth interval 80 to 190 feet which contains the mined horizon.

The elevation of the coal seam can be deduced from information available for the Diamond Jo #1 mine. The map clearly locates the shaft which is 29 feet deep. The elevation at the entrance is 790 feet, therefore the elevation of the coal is 760 ($\pm$ 20). The 20 foot error factor is added to accommodate local irregularities in the coal seam.

Subsidence Crater

The request for a representative from IGS originated because of the appearance of a crater in Runnells that was believed to be related to mine subsidence. At the time I visited Runnells the crater was measured at 4.5 feet deep by 18 feet in diameter. It is situated near the center of a T-intersection and blocks all traffic to the west of the intersection, but the other streets are still accessible. No material had been removed from the crater; what was missing had disappeared downward presumably into the underlying mine void. According to Dave Colson the crater appeared suddenly on Sunday, July 18, 1982 at about noon as a hole in the street about 1.5 feet in diameter and had rapidly enlarged to near its present dimensions by Sunday night. Colson had painted a circle on the pavement to show the size of the opening during the early stages of its collapse. Remnants of the paint were visible on the fragments of pavement on the bottom of the crater. He also reported that there was water in the crater when it originally appeared. Colson had barricaded it in the meantime when the intersection was no longer passable. At the time of the field visit there was no water standing in the crater, although it appeared to be muddy. The crater was bell-shaped, that is it was wider at the bottom than at the top. The depth to the mine at this location is estimated to be 70 feet ($\pm$ 20).

The shape of the crater and the speed with which it developed are typical of crater-type subsidence such as has been observed in Des Moines and other areas by myself and others. There is little question that this crater is mine related.

In addition, local residents report that a similar crater appeared in the yard of the residence on the southwest corner of the intersection about six years ago (1976) and was subsequently filled by the landowner. That site is approximately 75 feet to the southwest of the recent crater. (Both sites are indicated on the map.) It is clearly located by a patch of large plants, put there by the owner.

The homes in the area are mostly wood frame type with concrete footings. None show evidence of any settling beyond what might normally be expected. One house did show some hairline cracks in the mortar joints between cinder blocks in an outside wall, but this is not definitive evidence of mine subsidence.

Meeting with DSC, Garden Assoc., and Runnells Personnel

Before inspecting the crater I met with those persons listed above to review the problem and the information that had been gathered to that point at the Runnells town hall.

We reviewed the plans for the sewer system and the geologic information and mining history of the area. A 20 foot deep manhole was to be installed at the site of the crater. The route of the sewer line is shown in red on the attached map.

After looking at the crater we returned to the town hall to discuss alternatives and recommendations. Garden Assoc. has an alternative route for the sewer that would move the east-west segment on the map one half block north to the back of the lots on that street (the dotted line on the map). This would remove the manhole from the immediate area of the subsidence crater. I stated that I believed that area was also undermined and would be an area of possible future subsidence. Nelson inquired about the possibility of locating underground mines using resistivity or seismic techniques. I replied that these had not been found to be reliable in urban areas, and that drilling was the best method to locate the mine openings. It was eventually agreed that the locations of the drop boxes and manholes would be tested by drilling to attempt to site them over pillars in the coal mine since these are the most expensive structures in the sewer line. Patzig Texting of Des Moines was suggested by Nelson. It was unclear to me who would pay for the drilling. A second alternative that was brought up by Nelson was to use steel pipe rather than concrete since the steel pipe is in 20 foot lengths and the concrete pipe is in 6 foot lengths. The steel pipe might bridge a small collapse where the concrete pipe would not. Steel pipe, however, is much more expensive.

One of the Garden, Associates engineers had talked to some of the retired coal miners living in the area who knew about the coal mines, and they were aware that the water well passed through a coal mine. They had encountered similar problems in working in the Oskaloosa area.

Office of Surface Mining

Two representatives of the Office of Surface Mining from the Kansas City office visited the site on Wednesday, July 21, 1982. They talked to Ellerhoff who relayed their discussion to me. The OSM representatives agreed that the crater was mine related and that OSM would fill it and repair the street under their emergency response provisions. When Colson and Garden Associates expressed concern about the danger future subsidence might pose for the sewer line OSM's response was that they couldn't help since it wasn't an emergency. When asked if there was anyone at OSM's Washington office, who they could appeal to, the city was told that if they went over their heads (the Denver regional office?) they could be sure they would not get any help. That last is quoted indirectly, third hand.

While I was in Runnells, someone from the Kansas City office of OSM called the city hall twice wanting to know the cost of the damages to repair the crater. Nelson tossed out a figure of $15,000. I am not certain that OSM was ever told that.

The city of Runnells would like to have OSM pay for the drilling to site the sewer line and will probably approach them to do so.

Sewer Construction

The sewer line in the area under discussion will be constructed along a north-south road and turn west near the site of the recent subsidence crater. See the attached map. Construction was under while I was there, but was well to the south of the subsidence crater. The engineering firm intends to proceed to stay with their schedule. They are slightly concerned about the possibility of injury to the workers or liability for damage to property if they cause a subsidence crater to develop during construction.

The Runnells Town Well

The Runnells town well was drilled through a coal mine, as previously stated. A copy of the upper part of the strip log from the file is attached. The mine opening lies within the unsampled interval from 80 to 190 feet. The well is 2402 feet deep into the Jordan sandstone and is cased to 1970 feet. The casing record indicates that triple casing was installed from 0 to 37 feet and double casing was installed from 0 to 212 feet, and the remainder is single casing. The well was very carefully grouted in an attempt to seal off the mine opening and required a total of 2044 sacks of cement. This information was supplied by one of Varner Well Co.'s employees who had worked on the Runnells town well when it was drilled in 1967. This information was not in the technical file but has since been added. Jean Prior and Paul Horick have reviewed this information and agree that the well is adequately constructed. There is a minimal possibility that the city well could become contaminated by

sewage if subsidence under the sewer line allowed sewage to leak into the underlying coal mines. The disappearance of the water that was in the subsidence crater suggests that the subsidence structure may act as a channel way of allowing surficial and ground water to enter the mines. There is no way of knowing if the mines are actually interconnected, but it is likely that at least some of them are. If the well casing should deterioriate sufficiently to allow the water in the mine or the sewage to enter the well then it will become contaminated. This is highly unlikely, but it is a possibility that should not be disregarded. Another less serious, but perhaps more likely occurrence is the contamination of private wells by sewage. The city has had a central water system since 1967 so there may yet be a number of shallow wells in use. Recalling the gravel filled channels that are said to cut into the coal seam, it seems possible that these could become contaminated. Finally, Runnells is situated on the bluff immediately above the Des Moines River. The coal is reported to outcrop in the bluff east of Runnells, although I believe these outcrops have been mined out since. It is possible that if sewage is allowed to drain into the mines that it will eventually seep out at the outcrop line and drain into the river. It is possible that the mines have subsided sufficiently to seal them off at various points, but this cannot be relied upon.

Conclusions

Subsidence will probably continue to occur in the area of the recently developed subsidence crater. The two craters which developed in the area have shown it to be prone to subsidence and there is no reason to believe it will not continue to be. Several other factors that are believed to contribute to subsidence are also present including a depth of less than 150 feet to the mine opening, a water saturated zone near the mined interval (the Pleistocene gravel-filled channel) and poor roof conditions reported in some of the mines.

Subsidence events which remove support from the sewer line will probably cause the line to break with the attendent possibility of spilling sewage into the underlying mines. It is, of course, impossible to predict when or where the next crater will appear, however, it is possible that a break could occur and go undetected until the collapse reached the surface.

The crater was to be filled Friday afternoon, although the barricades were left in place until it is certain that the crater is stable. If this crater follows the pattern of similar occurrences both here and in Illinois, this is appropriate action. Subsidence craters develop rapidly and stabilize soon after they appear with minor additional settling. They can be filled and usually assumed safe.

The type of subsidence described by workers in Illinois or sag-type subsidence may be present also. It is typically difficult to detect. It differs from the crater-type in that it is a slow failure of the mine roof that is propagated upward creating zones of stress on the surface. A structure located in

one of these zones can be severely damaged. The streets in the town are in poor condition which may or may not be related to mine subsidence. Otherwise there is little evidence of this type of subsidence.

It is uncertain what effect the construction activities may have on the stability of this area. From past observations it appears that altering local hydrologic conditions may trigger subsidence. In particular, there was the development of craters in Des Moines following heavy rains and in What Cheer, Keokuk Cunty, after the water level of a nearby strip pit had been lowered by pumping.

I have written a letter to Jim Ellerhoff summarizing the information I was able to gather and expressing the opinion that the area would probably continue to experience subsidence. Copies were sent to Jim Gulliford, Dave Nelson, and the mayor of Runnells. A copy is attached.

I talked with Jim Ellerhoff on July 29, 1982 when he informed me that OSM was tentatively considering drilling test holes for the sewer line in Runnells. The crater had been repaired when he last visited the site on Wednesday, July 28, 1982.

MRH/lek

Attachments

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

Robert D. Ray
Governor of Iowa

Donald L. Koch
Director and State Geologist

Orville J Van Eck
Associate State Geologist

July 30, 1982

Mr. James Ellerhoff
Division of Mines and Minerals
Department of Soil Conservation
Wallace State Office Building
Des Moines, Iowa 50319

Dear Jim:

I have checked all the information available regarding the geology and coal mining history of the Runnells area. A synopsis of the information follows.

Enclosed is a copy of a portion of the Runnells 7.5' topographic map. The location of the town well is indicated and a copy of the part of the geologist's log which includes the Pennsylvanian strata is enclosed. The well passes through an underground mine which is in the unsampled interval from 80'-190'. Also shown are the probable location of the Diamond Jo #1 shaft, the recent subsidence crater, and the subsidence crater which developed approximately six years ago.

1. The elevation of the coal seam which was mined in the Runnells area is 760 ft. (±20). Therefore, the coal mine at the site of the collapse which appeared on July 18, 1982 lies approximately 70 ft. (±20) below the surface, elevation 830 ft. This information was deduced from the records of the Diamond Jo. #1 mine which lies to the northeast of the village of Runnells. The shaft elevation 790', is known to be 29 ft. deep at the location plotted on the enclosed map.

All available records indicate that only one coal seam in the area reached mineable thickness so the liklihood of multiple seam mining is very small. The coal is probably the same one that was mined at Ford across the Des Moines River in Warren County and is believed to be the coal referrred to as Laddsdale in nomenclature currently in use by the Iowa Geological Survey. Most available records indicate that the coal is fairly flat lying in the area of Runnells, but is locally undulatory, hence the error factor of twenty feet. Such local irregularities are characteristic of the Laddsdale Coal. The coal is known to be cut out in several locations by Pleistocene gravel filled channels which may serve as local aquifers supplying abundant water to the coal seam and causing flooding problems in the coal mining operations.

2. Approximately the northern half of Runnells is known to be extensively undermined. According to records on file at the Iowa Geological Survey, the mines were room and pillar type and small, although one may have reached forty acres. Mining was carried out sporadically from about 1890 to 1944. A large

number of names were found both in IGS files and by the compilers of the Runnells Centennial Volume that seem to apply to the mines in the area in question. The only mine for which a map was filed with the State Mine Inspector was the Diamond Jo #1. This is not the mine which underlies the area where the subsidence crater developed. The city well which is indicated on the enclosed map was drilled in 1967 through an unmapped coal mine. No samples were collected from the 80 ft. to 190 ft. depth interval which includes the mine opening.

Conversations with retired coal miners and older residents of the area confirmed that much of the town was undermined and that only one mineable coal seam was known in the area, and perhaps most important that pillars were removed from some of the mines, notably the Diamond Jo. #1.

Further, the abstract of property owned by Dave Colson of Runnells contains an affidavit by a coal miner stating the the property had been undermined before 1905. Colson's property is adjacent to the recent subsidence crater.

3. The subsidence crater which developed on Sunday, July 18, 1982 was approximately 75 to 100 ft. northeast of a crater which appeared in the yard of the residence on the southwest corner of the intersection about six years ago. The general shape of the crater and the rapidity with which it developed are consistent with crater-type subsidence that has been described in Illinois and with other incidents of crater-type subsidence that have occured in Iowa.

It is my opinion, based on the information available, that subsidence will continue to occur in the northeastern part of the village of Runnells. The area has a history of subsidence which appears to be the most reliable predictor of future subsidence. Several other factors are present which seem to have a high correlation with mine related subsidence including depth of less than 150 ft., locally thin mine roof rocks and the presence of water saturated zones (gravel-filled channels) near the mine openings. Therefore, it is safest to assume that the area will continue to be unstable for an unknown period. Unfortunately, it is not possible to predict where or when the next subsidence crater will appear.

As previously mentioned, the town well at Runnells passes through a coal mine. The drilling and construction records show that the well has double casing through the mined horizon and that it was thoroughly grouted. There is a very slight possibility of contamination of the well by sewage if:

1.) subsidence of the mines underlying the sewer line causes the line to break spilling sewage into the network of coal mines under the town which may or may not be interconnected.

2.) the well casing deteriorates to allow the water sewage that may be in the mine to enter the well.

It must be stressed that the chances of this occurring are minimal, but it should not be disregarded. It is possible as well that in the event sewage is allowed to enter the mines that seeps could develop at the outcrop line in the river bluff and drain into the Des Moines River. Again, the chances are small that

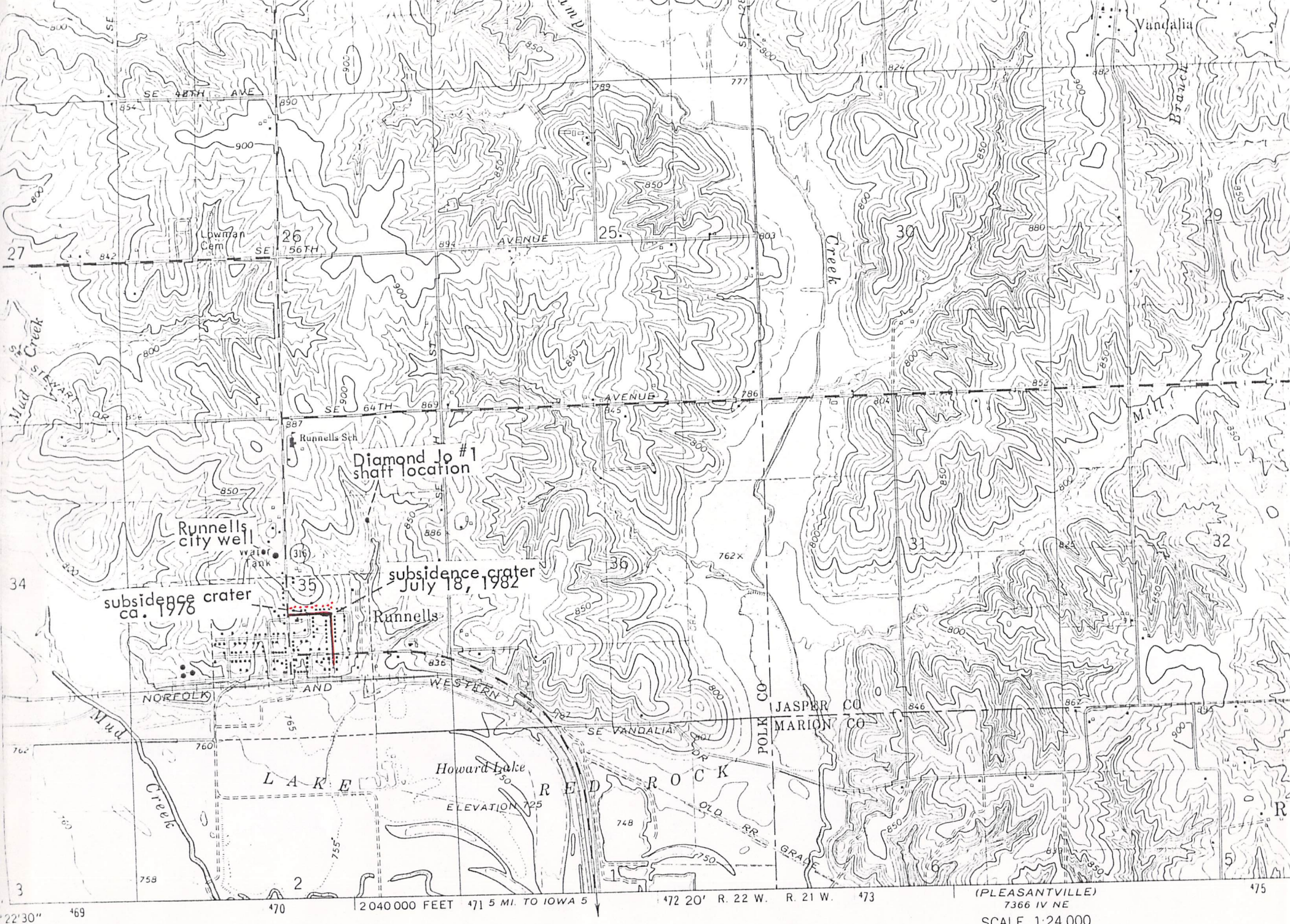
this will happen, but the possibility should not be ignored.

Please keep our office appraised of any further developments in this situation. As you know, all the information we are able to gather about abandoned coal mines in Iowa and about subsidence related to these mines will be added to our file and is much appreciated.

Sincerely,

Mary R. Howes
Research Geologist I

MRH/mph
Enclosure
cc: James Gulliford
Garden Associates
Mayor of Runnells



Mapped, edited, and published by the Geological Survey

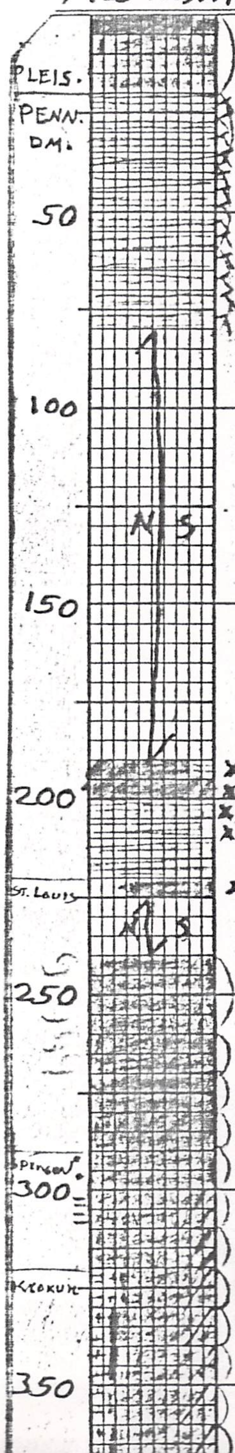
Control by USGS and USC&GS

Topography by photogrammetric methods from aerial

SCALE 1:24 000

1 KILOMETER

STATE IOWA	RUNNELLS (POLK)
NE SE SE NW	RUNNELLS CITY WELL
SEC. 35	(1967)
TWP. 78N RGE. 22W	COMMENCED FEB 1967 — COMPLETED JUNE 6, 1967
	VARNER WELL CO.
	CASING RECORD 37' OF 24" CSG. 0-37'
	478'2" OF 12 3/4" CSG. 0-478'2"
	1491'10" OF 8 5/8" CSG. 478'2"-1970'
	LOGGED JUNE 1967 BY NORTHUP
EL 870'	REMARKS 10' ROTARY SAMPLES
TD 2402'	SWL 162'
	PL 188' @ 1050 GPM.
(S)	ELECTRIC LOG RUN
PLG-970,971	



SOIL DK. BRN, SILTY
LOESS YELLOW, NON CALC.

SH. DK. GRY, LAM., SLI. MICA.

SH. M. TO DK. GRY, LAM., SLI. MICA.

NO SAMPLES 80'-190'
DRILL RAN INTO OLD COAL
MINE WORKINGS

X. SS. LT. GY. f. - CALC.; SOME GY. SOFT - CONSIDERABLE CEMENT
X SS. AA - PYRITE & CEMENT
X SH. LT. TO DK. GY., LAM.
X SH. GY. - SPLS. VERY "JUNKY" - MUCH CEMENT

X LS. CRM. f. + PARTLY OOLITIC - TR. OSTRACODS

LS. CRM. f. - BRACH FRAGMENTS

SS. LT. GY. f. - R, FROSTED
LS. CRM. f.; SS. AA
DOL. LT. TO DK. BRN. f. - FEW SPKS. GLAUCONITE

DOL. LT. TO DK. BRN. f. - FEW EMBEDDED SD. GRAINS
QTZ. TRANSL. (TRACE); DOL. AA
DOL. LT. TO DK. BRN. f.

QTZ. COLORLESS; CHT. MILKY TO PINK;
DOL. LT. TO DK. BRN. f. SUBSAC., ARG.
CHT. WH. TO COLORLESS; CHT. DK. BRN, SMOOTH, MOT.; DOL. AA
CHT., CHT., DOL. AA

CHT., DOL. AA

CHT. AA; CHT. LT. GY. + BRN. SMOOTH, MOT. OP.;

Runnells Town Well 7/28/82

Mary Hawes, IGS, in conversation w/ Varner about the casing record on the Runnells well, learned that there is also a string of 18" csg. from 0-212', and that they cemented between the 24" csg. & 18" csg., and between the 18" csg. & the 12" csg. This info. has been added to the strip-log.

Jean C. Prior

Runnells Problem

7/27/82

Comments by P.S. Horick;

I don't see how Runnells can "win" this "argument". They hope to hold OSM accountable for coal mine subsidence to (either fill the holes help pay costs of test drilling to site sewer "drop boxes" or divert the sewer lines) around the holes and get a federal handout. A similar situation would be if a rural homeowner in Clayton County woke up to find his house half swallowed up by a newly formed sinkhole.

The old mine workings were opened many years ago probably by long defunct coal mining companies. These subsidences are beginning to occur all around DesMoines - maybe under the State Capitol and the Ruan Building, etc. Who is to say where the next will occur?! Unless the OSM is a federal agency set up to make grants especially for this purpose I don't think Runnells has any chance to get anything in

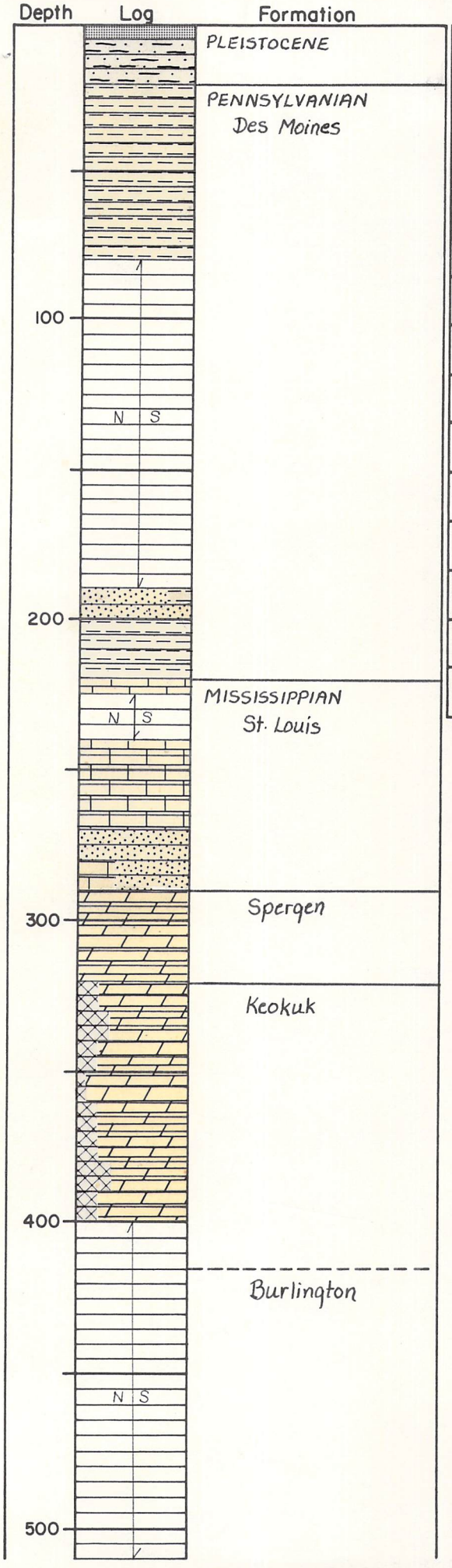
the way of financial help. This problem is occurring elsewhere in U.S. In Texas where enormous quantities of groundwater have been pumped from deep aquifers the land surface has dropped many feet in places causing much damage - who is responsible? This problem may or probably will compound in the future in the Runnells area.
I don't know of anyone has a simple answer.

The Jordan well casing was supposed to be cemented in from 1940' back to the surface (from upper Rch. or up) according to the notice of the public hearing for the bid on the well construction. However, we don't have any record that this work was done. You can call Varner Well Co. to find out. It would be highly desirable to have the well grouted between two casing sizes through the old coal mine workings. That

would make a good seal to prevent contaminated water from getting into the well. The driller may have decided it was impractical to cement the casing because of the old coal mine shafts. If this is the situation the Jordan well casing eventually may corrode and open the well to sewage leachate.

But the Pennsylvanian shale might be thick and widespread enough to comprise a good aquiclude above the coal mine workings. It is difficult to be sure if sewage will move through the shale — probably not - but it will move down old mine shafts left open.

R Horick

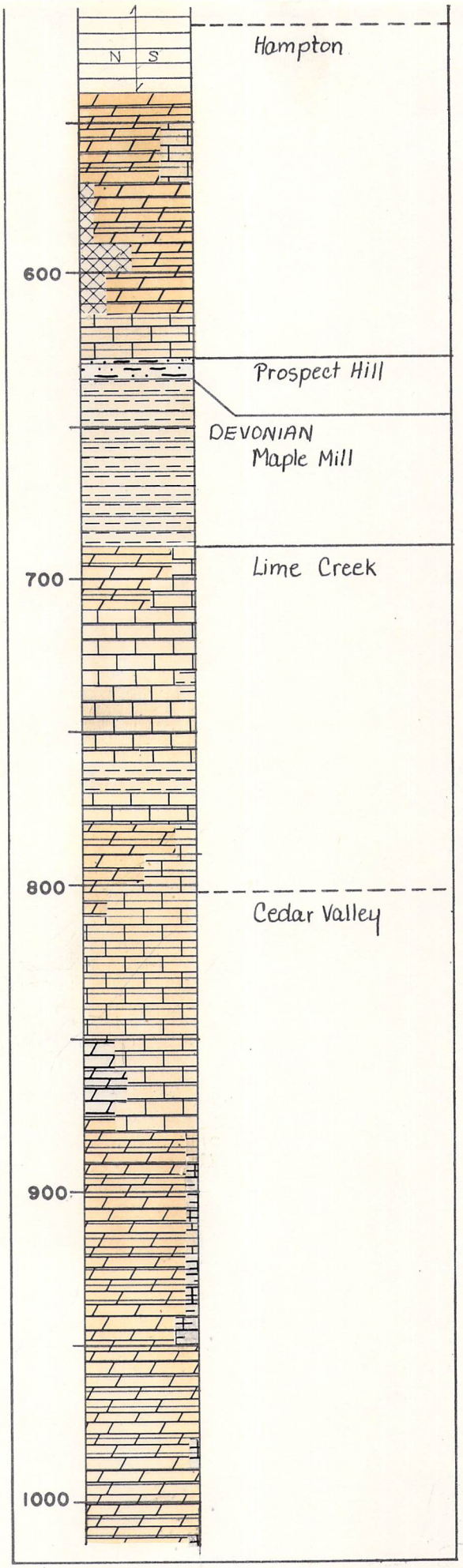


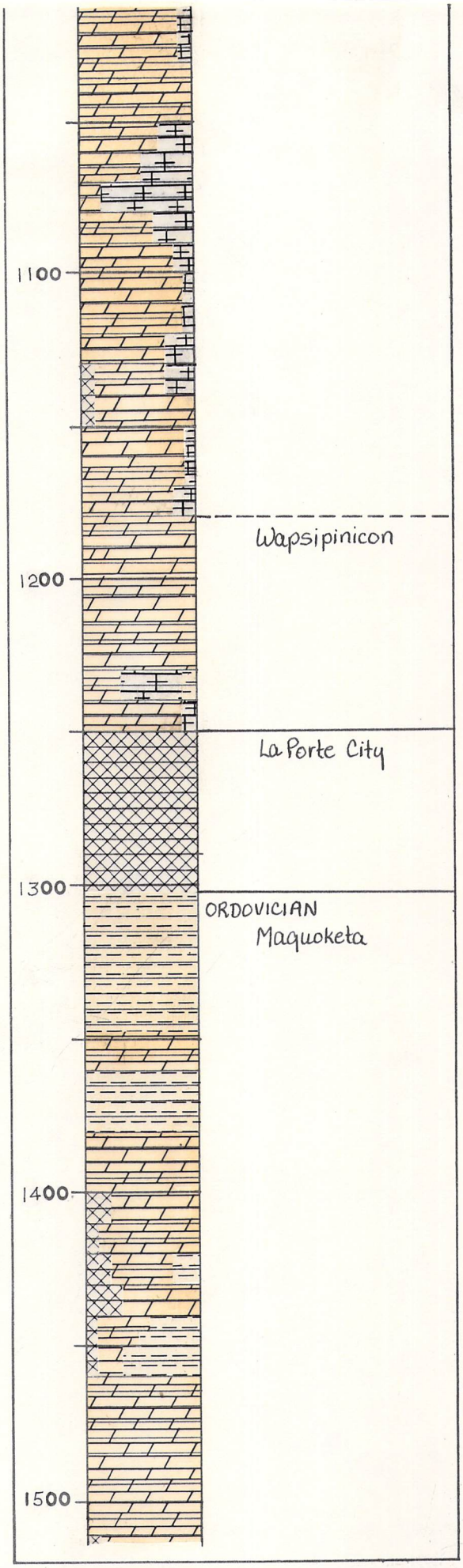
IOWA GEOLOGICAL SURVEY
In Cooperation with
U. S. GEOLOGICAL SURVEY
Iowa City, Iowa

Name Runnells City Well (1967)	State Iowa
Town Runnells County Polk	Loc. SE SE NW
Contractor Varner Well Co. Driller	Sec. 35
Drilling Dates Feb. 1967 - June 6, 1967	T. 78 N., R. 22 W.
Casing Record 37' of 24" csg. 0-37'	
478'2" of 12¾" csg. 0-478'2" 1491'10" of 8⅝" csg. 478'2"-1970'	
212' of 18" csg., 0-212' Cemented between 24" & 18"; 18" & 12";	
S.W.L. 162' G.P.M. 1050 D.D. 26'	
Remarks 10' Rotary Samples Electric Log Run	Elev. 860'
	T.D. 2402'
Logged By Northup June 1967	I.G.S. No. W-19417

Explanation of Colors

- Soil
- Loess, ~~Silt on~~ Siltstone
- Drift
- Sand & Gravel
- Shale
- Sandstone
- Limestone
- Dolomite
- Chert
- Gypsum or Anhydrite
- N↕S No Samples


N
S
Hampton
600
Prospect Hill
DEVONIAN
Maple Mill
700
Lime Creek
800
Cedar Valley
900
1000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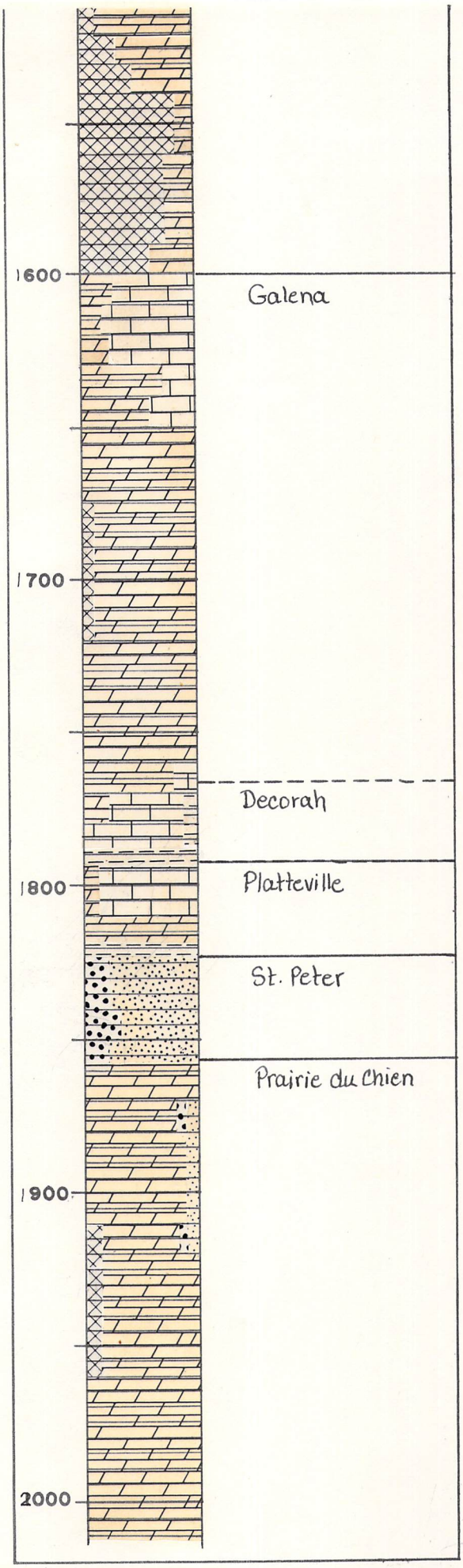
1200
1300
1400
1500
Wapsipinicon
La Porte City
ORDOVICIAN
Maquoketa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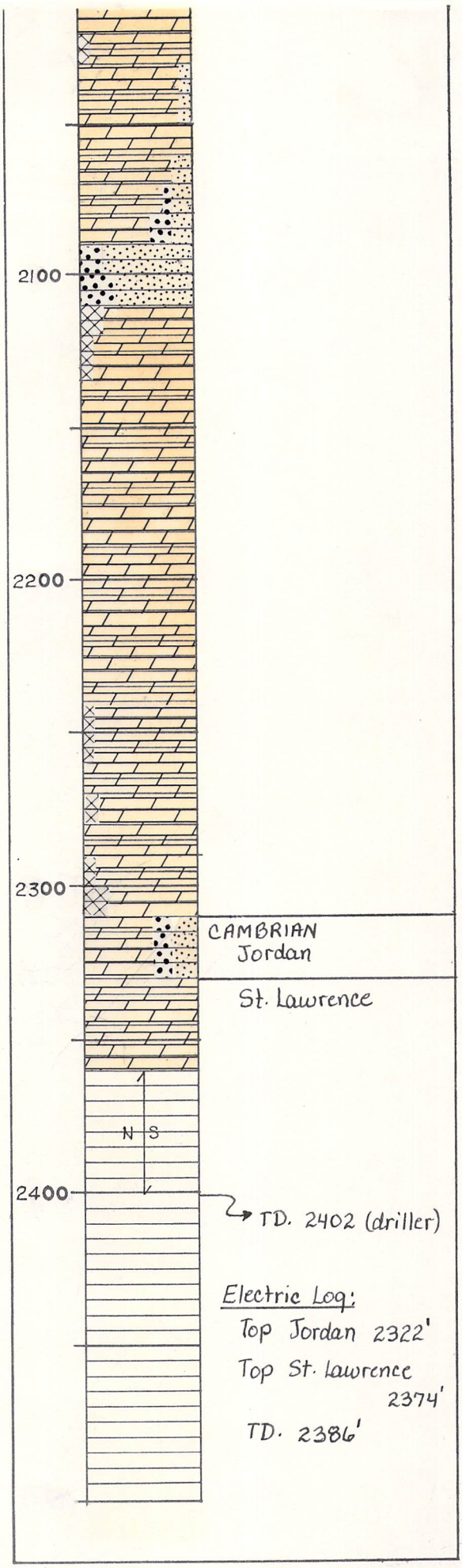
Galena
1700
Decorah
Platteville
1800
St. Peter
Prairie du Chien
1900
2000


2100
2200
2300
2400
CAMBRIAN
Jordan
St. Lawrence
N
S
TD. 2402 (driller)
Electric Log:
Top Jordan 2322'
Top St. Lawrence 2374'
TD. 2386'

GW Runnells Gen Data
Polk Co.

October 13, 1966

Mr. John Hesling
Garden Engineering Service
Post Office Box 451
Oskaloosa, Iowa

Dear Mr. Hesling:

The difference in elevation of about 70 feet between the newly selected well site and the site for which the forecast for the Jordan well at Runnels was prepared should have very little basic influence on the forecast.

It is expected the difference will be found either in an increased thickness of glacial drift, or the top of bedrock will be somewhat higher, and thus the thickness of the Pennsylvanian System will be somewhat greater. Because the top of the Pennsylvanian System is a highly eroded surface in this area, it is difficult to predict the altitude of the bedrock surface without closely spaced control. It is for this reason that the original forecast allowed for considerable variation in the Pleistocene and Pennsylvanian thicknesses. The depth below the base of the Pennsylvanian System can be increased by approximately 70 feet, and this should be reasonably accurate.

If I can be of any other help please let me know.

Very truly yours,

H. G. Hershey

HGH-OVE/1

GARDEN ENGINEERING SERVICE
PHONE 673-7637 P.O. BOX 451
OSKALOOSA, IOWA
CONSULTING ENGINEERS

MERRILL L. GARDEN, P.E.
JOHN W. HESLING, P.E.
JOHN W. N. STEDDOM, P.E.

Polk Co.

OCTOBER 11, 1966

DR. H. G. HERSEY
IOWA GEOLOGICAL SURVEY
GEOLOGICAL SURVEY BUILDING
IOWA CITY, IOWA 52240

DEAR SIR:

SOMETIME AGO WE REQUESTED AND RECEIVED FROM YOUR OFFICE INFORMATION ENTITLED "GROUND WATER CONDITIONS IN THE JORDAN AQUIFER AT RUNNELLS, IOWA". THIS INFORMATION YOU SENT WAS BASED ON A STARTING ELEVATION OF 804 FEET AT A SITE JUST NORTHEAST OF THE BUSINESS DISTRICT. BECAUSE OF THE LOCATION OF CERTAIN SANITARY SEWER AND SEPTIC TANK LINES AND OUTHOUSES, WE HAVE DECIDED TO MOVE THE WELL SITE TO A POINT NEAR THE TOP OF THE HILL ON THE NORTH SIDE OF TOWN WITH A STARTING ELEVATION OF APPROXIMATELY 876 FEET.

WOULD YOU PLEASE SEND ME A REVISED FORECAST OF DEPTHS OF STRATAS TO BE ENCOUNTERED, BASED ON THIS STARTING ELEVATION.

THIS PROJECT IS SCHEDULED FOR A LETTING IN THE LATTER PART OF NOVEMBER SO I WOULD APPRECIATE THE INFORMATION AS SOON AS IT IS CONVENIENT.

YOURS TRULY,

GARDEN ENGINEERING SERVICE

JOHN W. HESLING, P. E.

MB

GARDEN ENGINEERING SERVICE
PHONE 673-7637 P.O. BOX 451
OSKALOOSA, IOWA 52577
CONSULTING ENGINEERS

MERRILL L. GARDEN, P.E.
JOHN W. HESLING, P.E.
JOHN W. N. STEDDOM, P.E.

July 18, 1967

Iowa Geological Survey
Geological Survey Building
Iowa City, Iowa 52240

Gentlemen:

Please find enclosed Rate of Flow vs. drawdown Curve for the Runnells, Iowa deep water well, for your records.

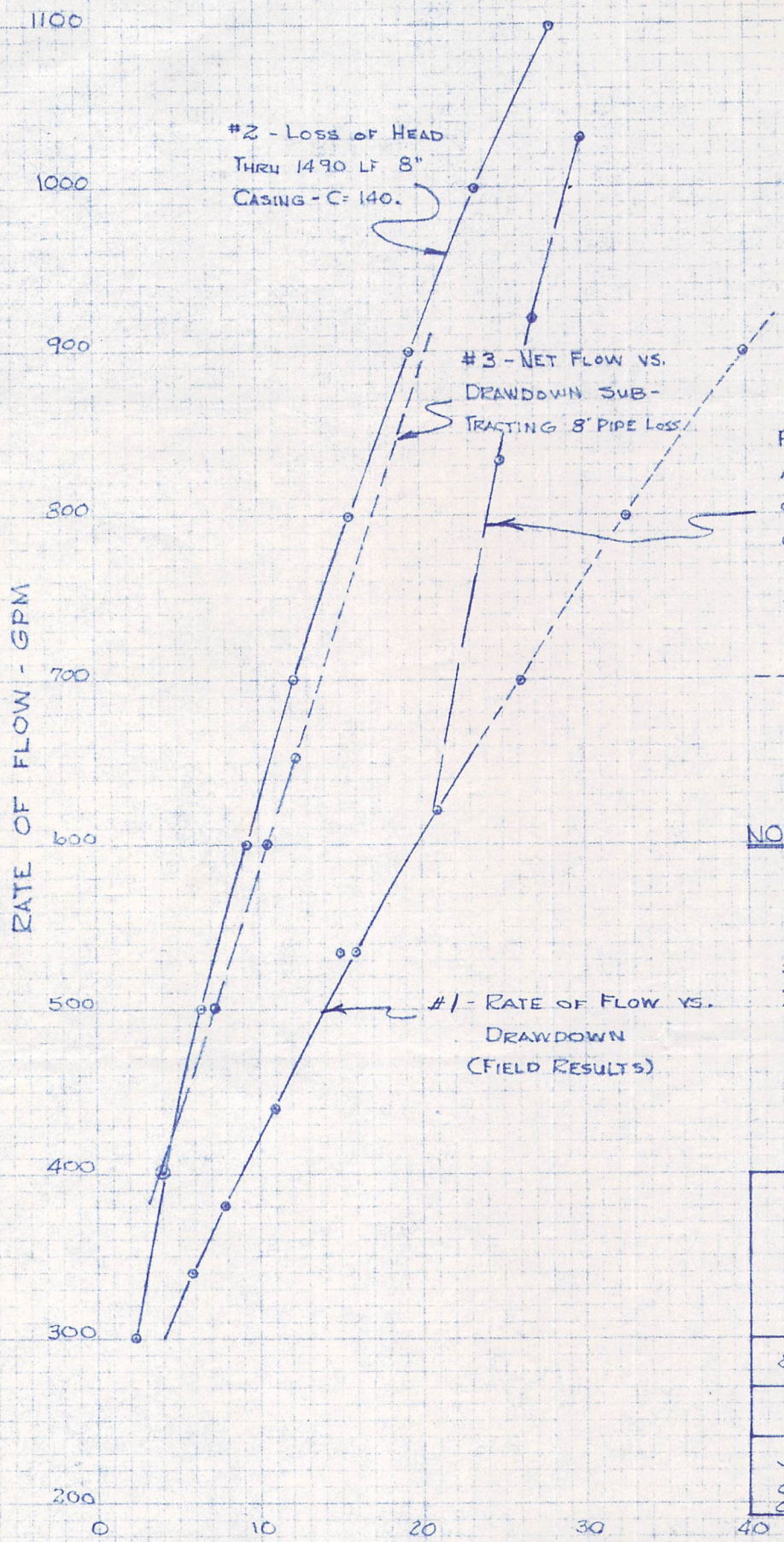
Yours truly,

GARDEN ENGINEERING SERVICE

John W. Hesling, P. E.

jmb

Enclosure


1100
1000
900
800
700
600
500
400
300
200
0
10
20
30
40
50
60
RATE OF FLOW - GPM
#2 - Loss of Head Thru 1490 LF 8" Casing - C = 140.
#3 - Net Flow vs. Drawdown Subtracting 8' Pipe Loss
#1 - Rate of Flow vs. Drawdown (Field Results)
Field Results above 620 GPM are erroneous due to lack of air pressure to properly operate drawdown gage. Gage readings did not show actual drawdown above 620 G.P.M.
---------- Indicates Extrapolation
NOTE: Curve #3 shows specific yield to be constant of 30.8 gallons per foot of drawdown, when pipe loss is subtracted, up to 900 G.P.M. It is estimated that the well will produce 1100 G.P.M. at approximately 58' of Drawdown.
Rate of Flow
vs.
Drawdown
8" - 2402' Deep Well
Runnells, Iowa
July 17, 1967 J. Harding
Garden Engr. Service
Oskaloosa, Iowa.
Drawdown - Feet
Head Loss In 8" Casing - Feet
July 17, 1967

GW Runnells deepwell 1967 folder (Polk Co.)

June 19, 1967

MEMORANDUM

TO: Dr. H. G. Hershey

FROM: Richard Northup

RE: Pumping Test at Runnells

At the request of Mr. John Hesling, Garden Engineering Co., Oskaloosa, and Varner WEll Company, Dubuque, the writer attended a pumping test at Runnells on Friday, June 16th. This is a Jordan well, financed by the Corps of Engineers to replace the old shallow sand and gravel wells which will be under water upon completion of the Red Rock Dam and Reservoir.

Runnells turned out to be an excellent well. Static water level was 162' and yielded 1050 gpm, with drawdown of only 30 feet. The well started at 1000 to 1050 gpm, and pumping rate was then reduced 100 gpm each half hour until it reached 200 gpm. The rate was then increased back to 1000 gpm, the rate being increased each half hour. It was then to run at 1000 gpm for the remainder of the test.

Readings were taken until 4:00 pm when the well had been cut back to 200 gpm. Garden Engineering Company will see that we get all figures for the remainder of the test.

A water sample was taken at 1:30 pm in time for it to reach the water lab in Des Moines before closing time.

All cuttings are now at the survey, and copies of our log will be sent to Garden Engineering Company and also to Varner.

I phoned Orv. while the test was in progress to alert Don Koch who wants to run a Gamma Ray-Neutron log on the hole. Arrangements have been tentatively made to run the log tomorrow (Tuesday). Varner is to pull the pump today and we can run the log before the hole is capped, as it must be pending installation of the permanent pump.

GW Runnells Town well folder
Polk Co.

January 24, 1969

Town Clerk
City Hall
Runnells, Iowa

Dear Sir,

Enclosed is a report on the mineral analysis of water from the municipal well in the Town of Runnels in Polk County, Iowa, as shown by a sample collected by Mr. W. F. Lee, on December 23, 1968.

If you have any questions concerning this report, please do not hesitate to let me hear from you.

Very truly yours,

H. G. Hershey

HGH/RCN:wg
Enclosure-1

IOWA PRESS
CLIPPING BUREAU
Des Moines, Iowa

Herald
Altoona, Iowa

OCT 27 1966

PUBLIC HEARING

Notice of Public Hearing on proposed form of contract for the construction of a municipal deep well for the Town of Runnells, Iowa, and the taking of bids for such construction.

Notice is hereby given that the Town Council of the Town of Runnells, in Polk County, Iowa, will meet at the Town Hall, in said Town, on the 28th day of November, 1966, at 8 o'clock p.m. C.S.T. at which time and place or at such later time as the Council may then fix, said Council proposes to adopt plans and specifications and form of contract and to receive bids and take action for the construction of a municipal deep well in and for said Town of Runnells, Iowa, including all equipment and incidentals.

The extent of the work involved is the construction of a deep well into the St. Lawrence Dolomite Formation approximately 2425 feet below ground surface, the finished well to be 8" diameter on the bottom.

The kinds of materials and types of contruction for which bids will be received shall be as follows:

Deep Well Construction

A. Cable tool contruction starting with a 20" hole and finishing with an 8" hole, or

B. Rotary contruction starting with an 18" hole and finishing with an 8" hole.

Well to be cased from 1940 feet to 400 feet with 8" steel casing and to be cased with 12" casing from 400 feet to 8 feet above ground surface. After casing, well to be thoroughly grouted from 1940 feet to ground surface.

Alternate bids will be received for cable tool and rotary construction.

Proposals received will be acted upon by the Town Council on the date and at the place above specified or at such later time and place as may then be fixed.

All work is to be done in strict compliance with plans and specifications prepared by Garden Engineering Service, Inc., of Oskaloosa, Iowa, which have heretofore been approved by the Town Council, and are now on file for public examination in the office of the Town Clerk.

All proposals and bids in connection therewith shall be submitted to the Town Clerk of said Town of Runnells, Iowa, on or before the time herein set for hearing and letting. All pro-

posals shall be made on official proposal forms furnished by the Town of Runnells, Iowa, or Garden Engineering Service of Oskaloosa, Iowa, Engineer for said Town, and must be enclosed in a separate, sealed envelope and plainly addressed to Town Clerk, Runnells, Iowa. Each proposal shall be accompanied by a certified check in a separate sealed envelope in an amount not less than ten per cent (10%) of the total amount of the proposal, drawn on a responsible bank in the State of Iowa, and made payable to the Treasurer of the Town of Runnells, Iowa, as security that if awarded the contract by resolution of said Town Council, the bidder will enter into a contract at the prices bid and furnish required bond and proof of insurance coverage. The certified check of the successful bidder shall be returned upon execution of the contract documents. If, however, the successful bidder fails to execute a contract or file an acceptable bond or produce proof of specified insurance coverage within ten (10) days after the acceptance of his proposal by resolution of the Town Council, his certified check may be cashed and the proceeds retained by the said Town as agreed liquidated damages. The checks of the unsuccessful bidders shall be promptly returned to such bidders by the Town Clerk and a receipt therefore obtained and placed on file in his office. No bidder may withdraw a proposal within twenty (20) days after the date set for opening bids.

At said hearing the Town Council will consider the plans and specifications and proposed form of contract for the project the same now being on file in the office of the Town Clerk,

file in the office of the Town Clerk, reference to which is made for a more detailed and complete description of the proposed improvements, and at said time and place the said Council will also receive and consider any objections to said plans, specifications and form of contract made by any interested party.

Payment for said improvements above described will be made in cash received from the U. S. Government, Corps of Engineers.

Payment to the contractor will be based on monthly estimates equivalent to ninety per cent (90%) of the contract value of the work completed during the preceding calendar month. Estimates will be prepared on the first day of each month by the contractor, subject to the approval of the engineer, who will certify to the Town and to the Corps of Engineers for payment of each approved estimate so that payment may be made promptly thereafter. Such payments shall in no way be construed as an act of acceptance for any part of the work partially or totally completed. No such partial or final payment will be due until the contractor has certified that materials, labor and services involved in each estimate have been paid for in accordance with the requirements stated in the specifications. The balance of the ten per cent (10%) due the contractor will be made not earlier than thirty-one days from the final acceptance of the said work by the Town, subject to the conditions and in accordance with the provisions of Chapter 573 of the Code of Iowa.

The work under the proposed contract shall commence on or before December 19, 1966, and shall be fully completed and ready for operation by July 19, 1967.

By virtue of statutory authority preference will be given to products and provisions grown and coal produced within the State of Iowa, and to Iowa domestic labor.

Plans and specifications, form of contract and proposal form are now on file at the Town Hall in the office of the Town Clerk of the Town of Runnells, Iowa, and copies may be obtained from the Town's Engineer, Garden Engineering Service of Oskaloosa, Iowa, by making a deposit of $25.00 all of which will be refunded to bidders if the same are returned in good order within thirty days after the date of receiving bids.

Each successful bidder will be required to furnish a bond in an amount equal to One Hundred Per Cent (100%) of the contract price, said bond to be issued by a responsible surety approved by the Town Council, and shall guarantee the faithful performance of the contract and the terms and conditions therein contained and shall guarantee the prompt payment of all materials and labor and protect and save harmless the Town from claims and damages of any kind caused by the operations of the contractor, and shall also guarantee the maintenance in good repair of said improvement for a period of two years.

This improvement is being constructed pursuant to authority granted the municipality by Chapter 397 of the Code of Iowa.

Published upon order of the Town Council of Runnells, Iowa.

Town of Runnells, Iowa
By Mrs. Richard Thomas
Town Clerk

Published in The Altoona Herald, Altoona, Iowa, October 20 and 27, 1966.