Hydrogeological investigation of VOC contaminated private wells near Hudson, Wisconsin. [DNR-031b] 1985

Evans, William J.

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Wisconsin Groundwater Management Practice Monitoring Project No. 32

GROUNDWATER
Wisconsin's buried treasure

Wisconsin Department of Natural Resources

Hydrogeological Investigation of VOC Contaminated Private Wells Near Hudson, Wisconsin

submitted by:

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November 22, 1985

ILLUSTRATIONS

INTRODUCTION

The purpose of this project was to compile hydrogeologic and geologic information for an area approximately five miles east of Hudson. This area has a signicant number of private wells contaminated with volatile organic compounds (VOC's). As shown in Figure 1, a VOC contamination plume (Trichloroethylene levels used) exists around the Junker Landfill area and extends to the northwest. Concentrations are highest in wells south of the landfill and decrease toward the northwest. With the regional groundwater flow moving in a west-northwest direction (Borman, 1976) and a localized gradient which appears to approximate the regional flow, the landfill appears to be a contamination source. The plume illustrated in Figure 1 does not take into consideration the vertical dimension involved. There is variation not only horizontally from place to place as Figure 1 shows, but also vertically according to the depths at which the wells are installed. An index map with well locations is provided in Appendix A.

Less likely sources for the VOC contamination are spillage or dumping that may have occurred along the railroad tracks adjacent to the landfill or contamination from a 20 acre parcel which is the abandoned Town of Roberts landfill, located 0.9 miles due east of Junker's. Although these potential sources exist, they appear to be secondary sources. Because of these potential sources, further investigation is necessary to identify the Junker Landfill as the sole source of contamination. Nor-Lake, Inc. located 2 miles west of Junkers was also considered as a possible source of VOC contamination in the study area but has recently been ruled out following a hydrogeological investigation at Nor-Lake (Soil Exploration Co., Nor-Lake Report, 1985).

METHODS

This report is based on interpretation of existing data and field work. The existing data came primarily from well drilling reports and certified well logs. Background information and other data was obtained from references listed at the end of this report and from water quality test results. Field work performed included reconnaissance, exploratory borings, and survey work. Jim Anklam, from the Department of Natural Resources, assisted in all phases of the field work and provided valuable review of all interpretive efforts. Borings were made at four locations. Field logs for these are located in Appendix B. Most wells in the study area were surveyed to obtain approximate elevations for purposes of correlation and interpretation of the local geology. The bulk of the study was concentrated just south of the landfill and the area west-northwest of the landfill bounded by La Barge, McCutcheon, and Alexander Roads.

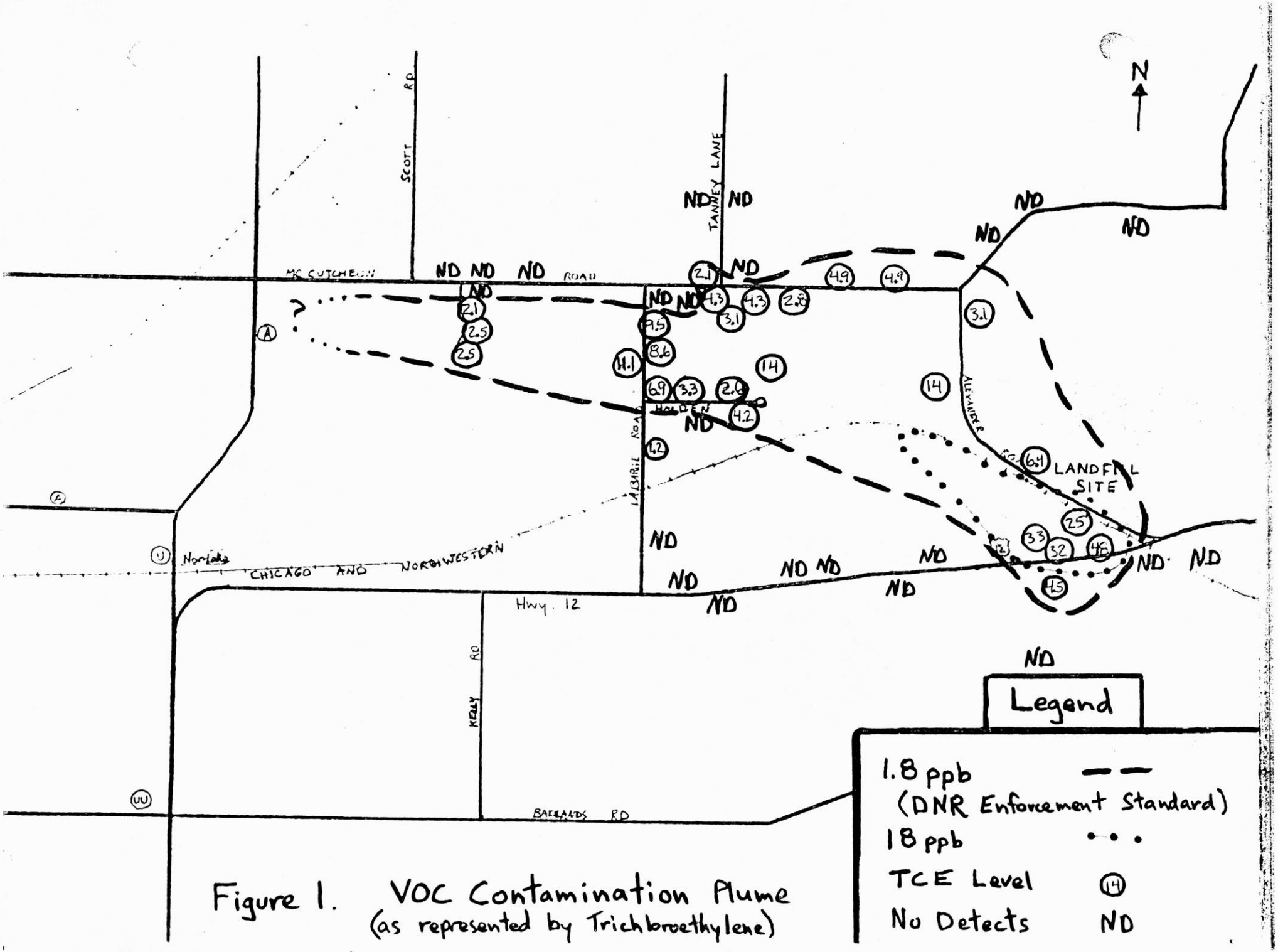


Figure 1. VOC Contamination Plume
(as represented by Trichbroethylene)

GEOLOGICAL BACKGROUND

A brief overview of the geological setting is needed to illustrate the relationship between geologic formations and their respective aquifers, and to understand the behavior of groundwater movement through different materials. A regional bedrock geology map, which illustrates the bedrock surface immediately below unconsolidated materials, is provided in Figure 2.

The study area is underlain by (in descending order); glacial drift (outwash sands and gravels), the Prairie du Chien Group (primarily dolomite), the Jordon Sandstone, the St. Lawrence Formation, the Franconia Sandstone, followed by lower Cambrian formations (mostly sandstones), and Precambrian sedimentary and/or crystalline basement rock. The St. Peter Sandstone overlies the Prairie du Chien Group and is preserved in topographically high areas where it has not been removed by erosion. It is found in the study area but is not of significance since it does not serve as a local aquifer.

Bedrock surface elevations appear to drop off to the north and then more to the west, analogous to surface topography. The structural dip of bedrock formations is 3 to 5 degrees and towards the west (Borman, 1976). A schematic representation of the stratigraphic column for the region is shown in Figure 3.

AQUIFER CONDITIONS

The geological units represented in Figure 3 serve as groundwater sources which can be grouped into three general aquifers. Glacial drift (outwash) provides an uppermost sand and gravel aquifer. These stratified sands and gravels blanket the area and range in thickness from 45 to 90 feet. The outwash generally consists of loose, medium to coarse sands with some gravelly horizons. Water is easily conducted through this aquifer which is recharged locally from precipitation. The sand and gravel unit yields useful quantities of water only where it is very thick due to the presence of former river channels. In adjacent areas the water table lies below the upper surface of the Prairie du Chien formation. However, in the buried river channels the water table elevation may be higher than that in the adjacent Prairie du Chien, indicating the channels may be groundwater recharge areas.

The Prairie du Chien Group and Jordon Sandstone comprise what can be considered the next major groundwater aquifer. The Prairie du Chien provides well-water for most private homes in the area. This formation consists primarily of dolomite, but contains much sandy dolomite and some sandstone. Thickness of the Prairie du Chien is extremely variable, which causes difficulty in predicting the subsurface conditions of an area. The highly irregular bedrock surface was caused by an intense period of erosion during the end of Early Ordovician time (Paull and Paull, 1977). Further erosion of the Prairie du Chien occurred during Pleistocene glaciation wherever the overlying (younger) sedimentary rocks are absent. River channels cut into the Prairie du Chien and now filled with glacial outwash provide dramatic evidence of such erosion, although these channels may have actually originated

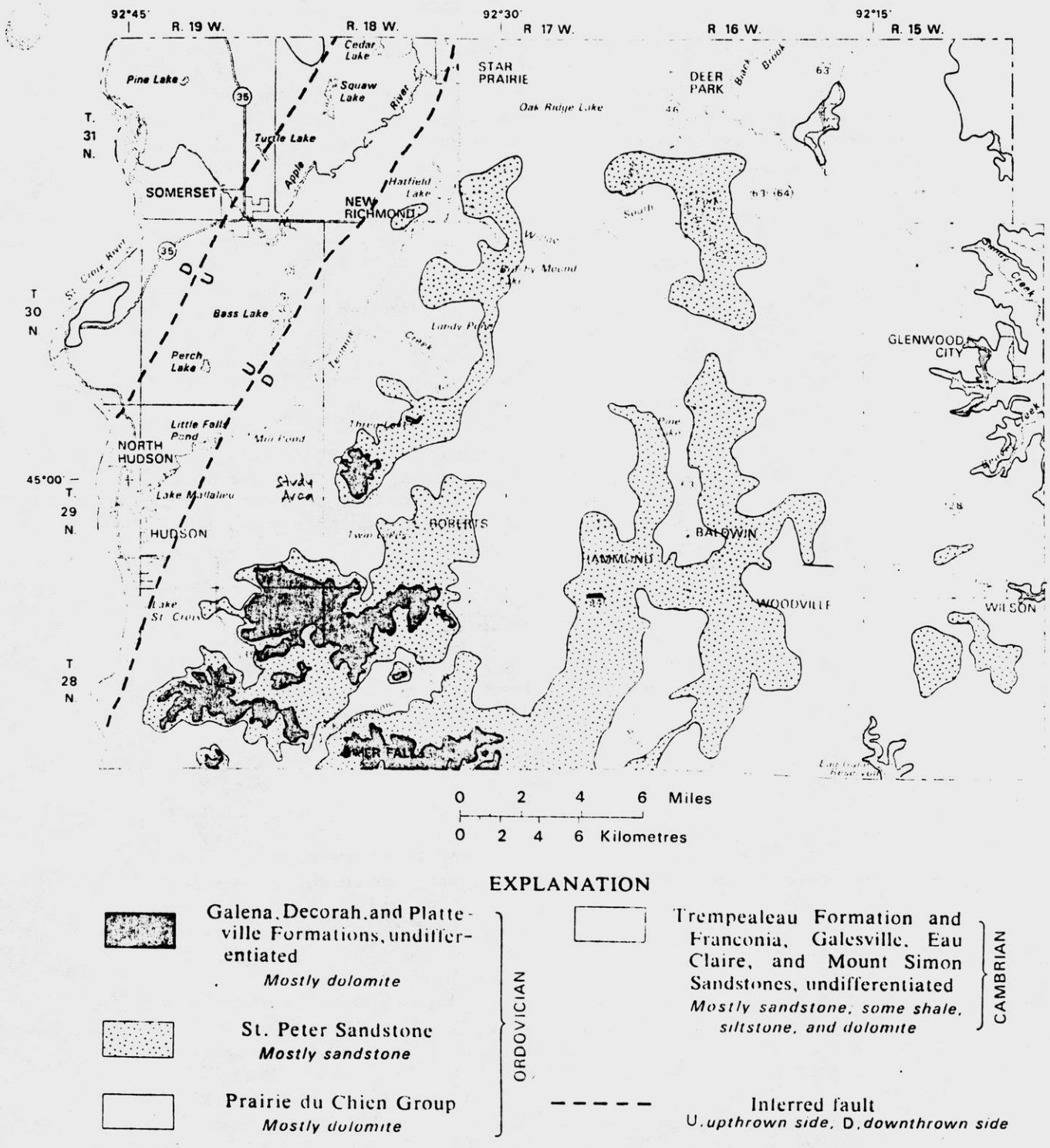
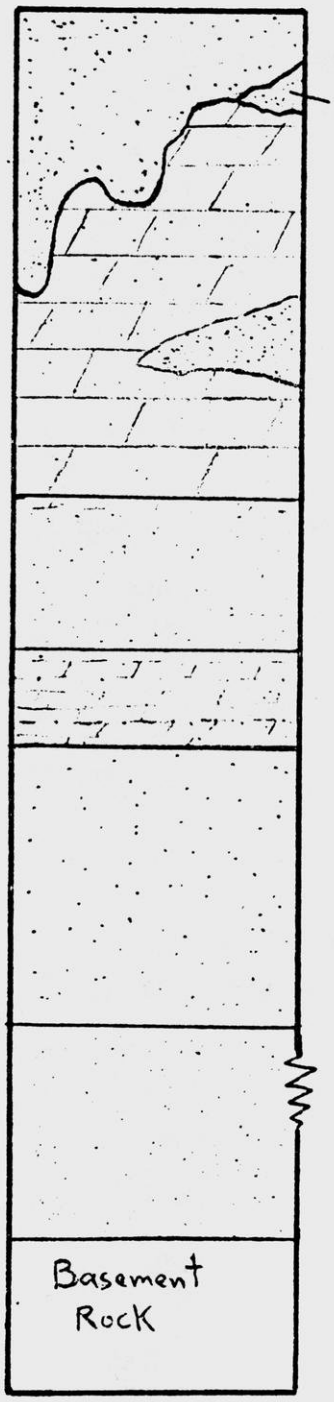


Figure 2. Bedrock geology.
(From Barton, 1976)



Vertical Scale: 1 in ≅ 100 ft

Glacial Drift
- mostly outwash sands and gravels

Prairie du Chien Group
- mostly dolomite, with sandy dolomite and sandstone layers

Jordon Sandstone
- mostly sandstone

St. Lawrence Formation
- dolomitic siltstone, sandy dolomite and dolomite

Franconia Sandstone
- mostly sandstone, dolomitic, with some silty and shaly layers

lower Cambrian formations
- mostly sandstones
- includes Ironton, Galesville, Eau Claire, Mt. Simon members (approx. 355' thick)

Precambrian Sedimentary or Crystalline Rock

Figure 3. Generalized Stratigraphic Column

during Ordovician time. The Prairie du Chien can be highly fractured with the ability to conduct groundwater at high rates because of the presence of solution channels. It is difficult to speculate on just how extensive solution channels have developed at this location. Evidence suggest that they are well developed, considering the area the contamination has covered to date. Study of topographic maps for this region reveal many closed depressions, a possible indication of karst topography (i.e., extensive solution of carbonates forming sinkholes and networks of solution channels). Alternatively, these depressions may reflect a pitted outwash terrain having a poorly developed drainage system.

The Prairie du Chien is recharged directly from the overlying outwash deposits. Immediately below and interconnected with the Prairie du Chien is the Jordon Sandstone. Although the two formations can "communicate," groundwater in the Jordon would be transmitted at a slower rate and the Jordon is probably recharged on a regional basis.

Below the Prairie du Chien-Jordon aquifer there is another major aquifer composed of thick sequences of lower Cambrian sandstones. Separating these two aquifers is a confining bed (aquiclude) called the St. Lawrence Formation. Composition of the St. Lawrence is variable depending on sediment supply conditions that existed where it was deposited. These lower Cambrian sandstones, along with the sand and gravel aquifer, provide the main source of groundwater to wells west of the fault-line (see Fig. 2).

DISCUSSION OF RESULTS

At the onset of this study it was hoped that the drilling rig owned by the Department of Natural Resources would be able to reach the water table and bedrock surfaces. This would provide data fundamental to a geological and hydrological investigation. Unfortunately, we were unable to reach dolomite or the water table with the number of auger flights available (60 feet). It was also intended that this information would verify the accuracy of local well drilling reports. Well drilling reports for 14 of 21 of the wells surveyed were not available. This made it more difficult to correlate the local stratigraphy and water table levels. For those wells without construction reports, there was no way to determine well depth or termination points in the aquifer. Nonetheless, with the information obtained it was still possible to assess aquifer conditions, infer groundwater flow direction, describe bedrock topography, and determine well replacement possibilities.

The hydrogeological setting in the study area presents a complex and highly variable situation. The surface of the Prairie du Chien varies more than 150 feet, surface topography varies more than 100 feet, and the water table drops approximately 65 feet within a distance of about 1.5 miles. Three geologic cross-sections were constructed using data obtained from well drilling reports and two soil boring logs. Locations of the cross-sections are shown on Figure 4. The cross-sections are illustrated in Figures 5, 6, and 7.

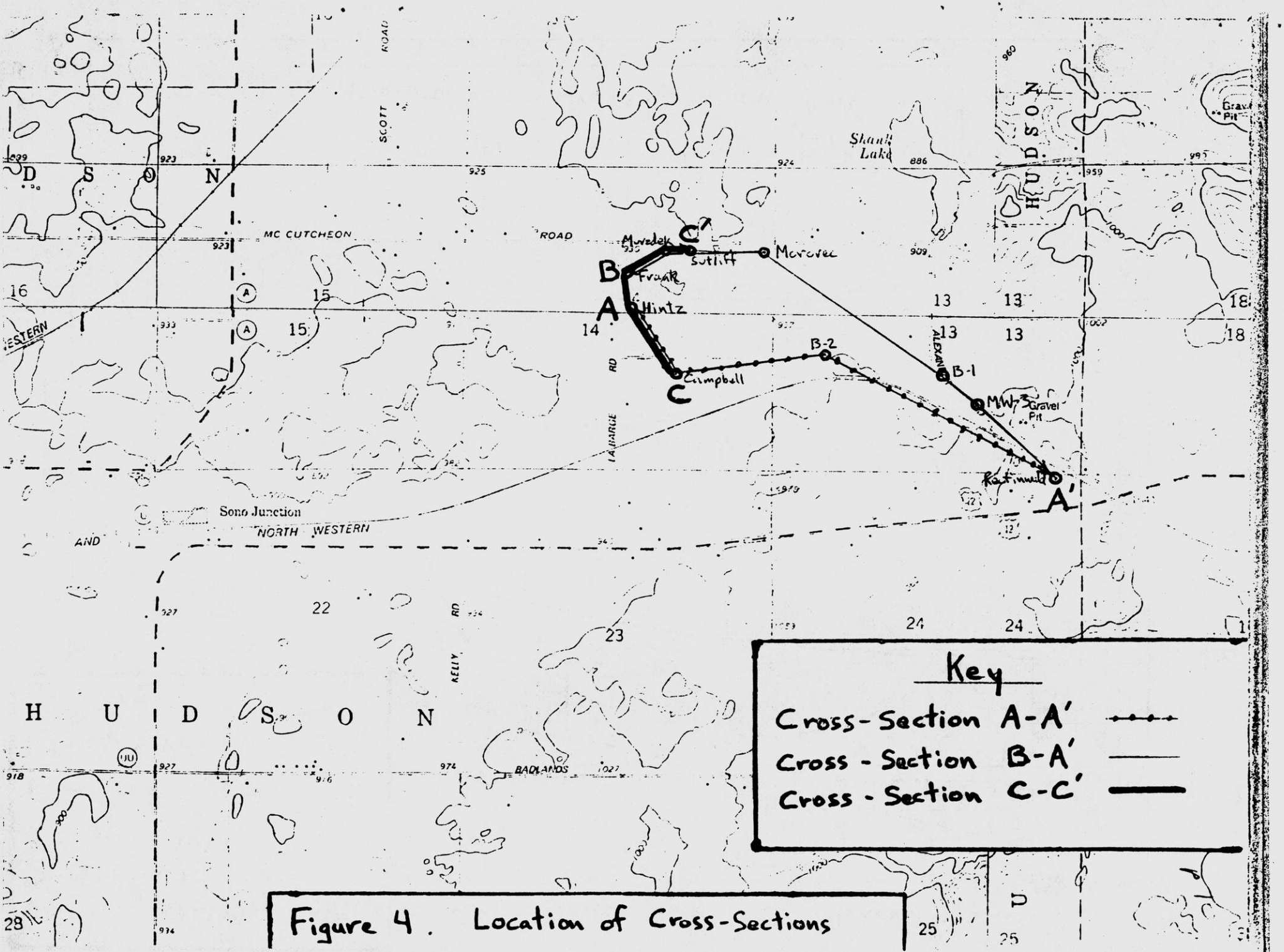


Figure 4. Location of Cross-Sections

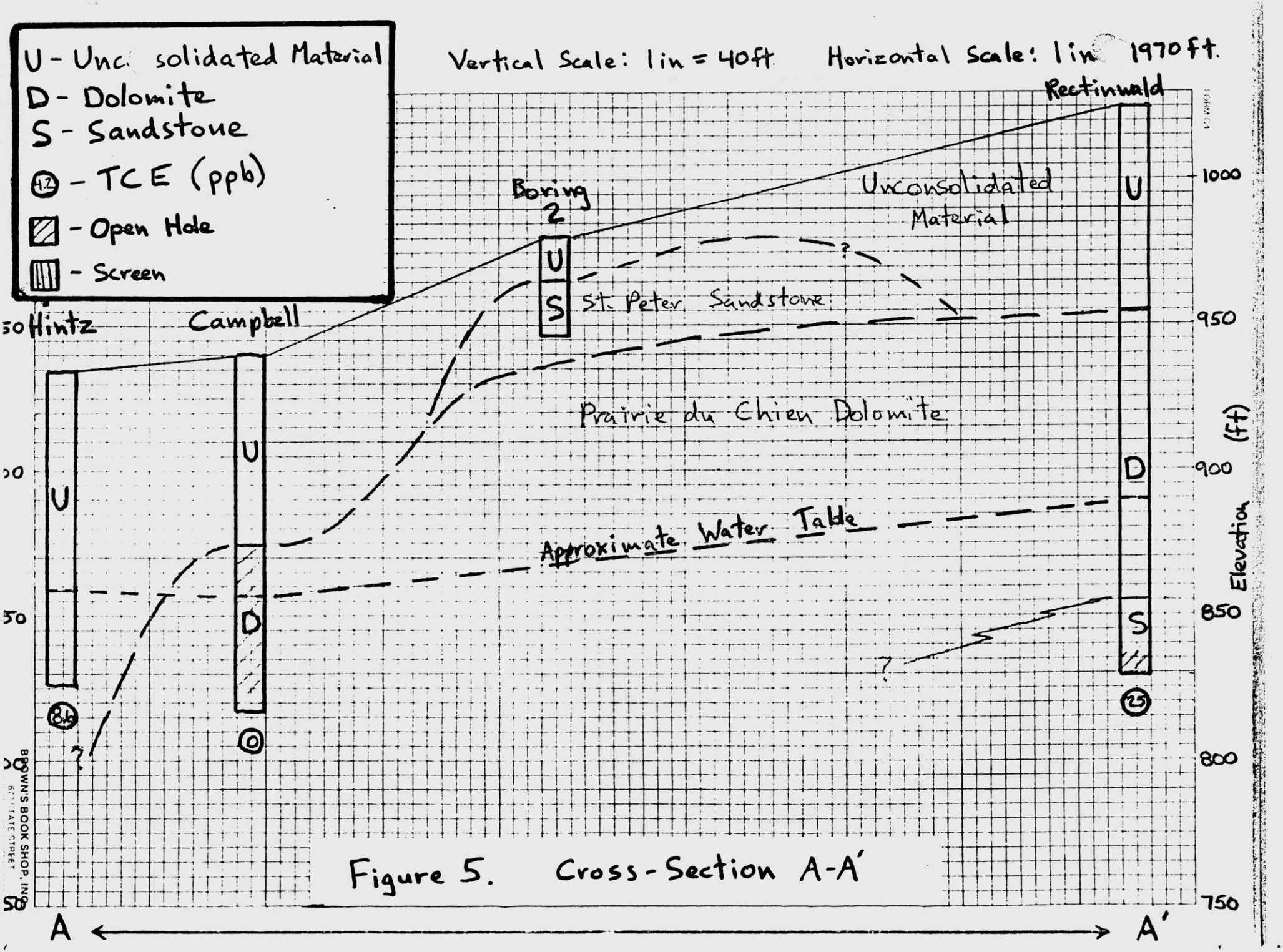


Figure 5. Cross-Section A-A'

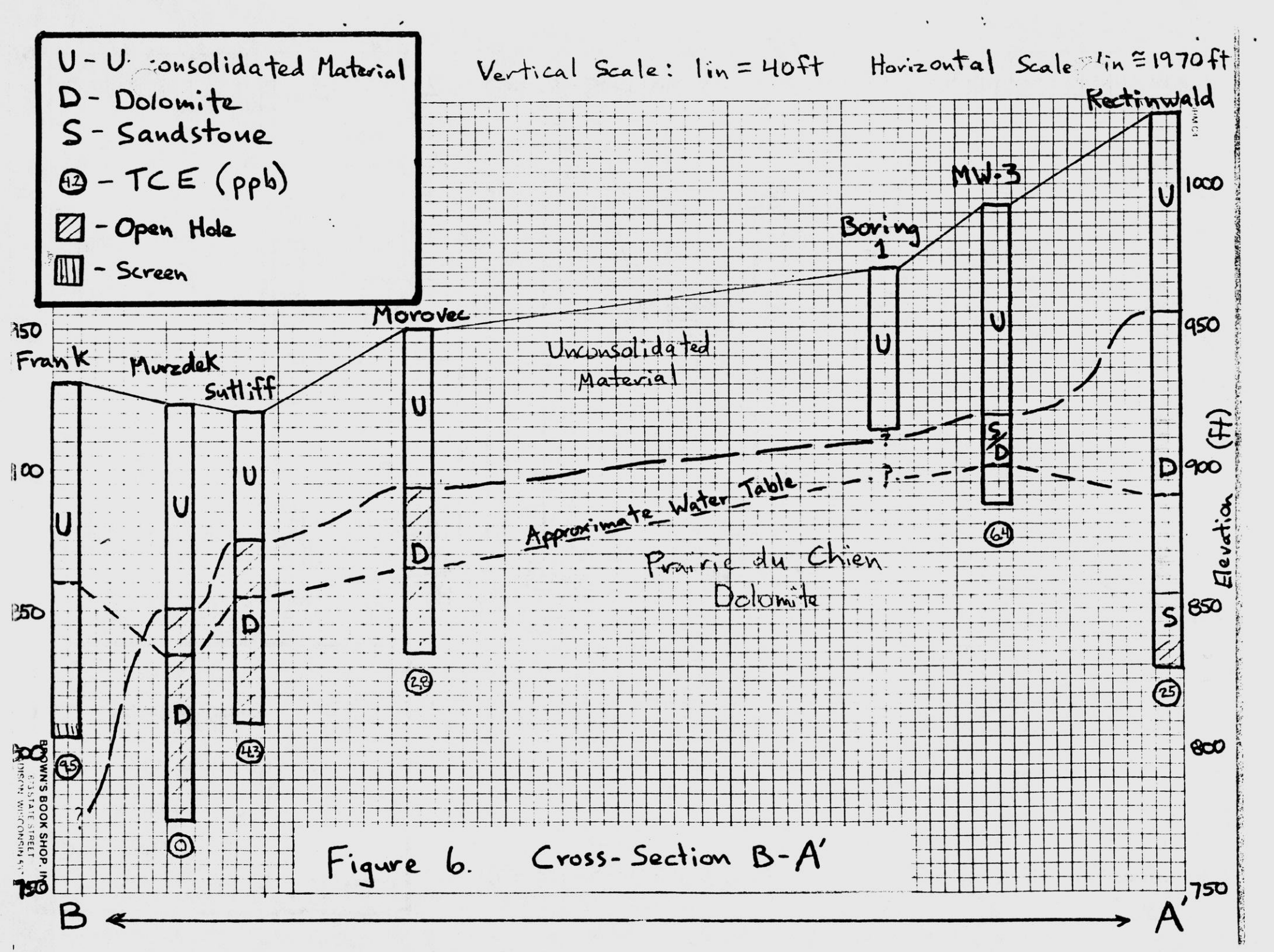


Figure 6. Cross-Section B-A'

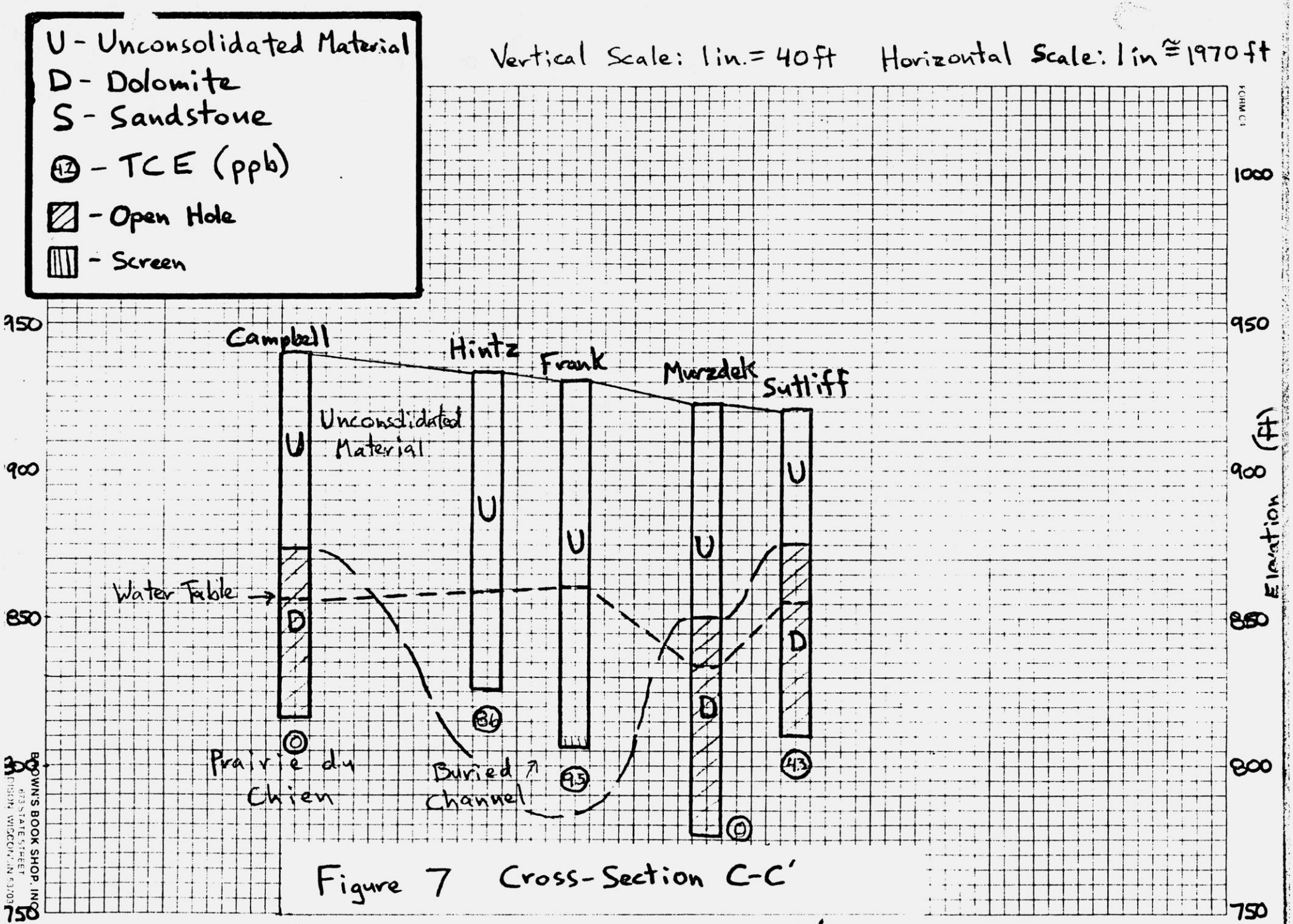


Figure 7 Cross-Section C-C'

Survey results, in conjunction with available well construction reports, revealed wells in the study area to be generally terminated at similar elevations. It appears very likely that contaminated wells are confined to the surficial aquifer and the Prairie du Chien Group, and do not penetrate into lower formations. A deep exploratory well is now required to verify these findings and to determine if an acceptable water source is available for replacement wells in this area. Such a well is necessary to ascertain if a confining layer exists either within the Prairie du Chien or in underlying formations. Without any existing well logs, it is difficult to speculate with certainty about depths to the base of the Prairie du Chien and to lower formations.

Contamination North and South of Landfill

Proceeding on the assumption that the Junker Landfill is the primary source of contamination in the area, an anomalous situation exists because wells north and south of the landfill are contaminated. In order to accurately explain why groundwater contamination has occurred north and south of the landfill site, while regional groundwater flow is to the west-northwest, a more intensive groundwater investigation of the immediate landfill area is needed. A possible reason for this situation could be explained by a major north/south trending joint system occurring in the region. Solution channels within dolomite (or limestone) tend to develop along joints and bedding planes. While a westward dip of the bedding planes influences the regional groundwater flow, north/south trending joints may provide the means for localized transport of contaminated groundwater to sites north and south of the landfill.

Both bedrock and ground surface drop off as you proceed north of the landfill. A decreasing water gradient could follow this slope, which may explain contamination in a northerly direction. Although there is insufficient information at present to allow documentation, it appears that bedrock and surface elevations drop off not only to the northwest at the landfill site, but possibly to the southeast as well. There appears to be a bedrock high near the center of the landfill which could influence groundwater flow in both directions. However, this is based on a single monitoring well located at the southeastern extreme of the landfill and may be an isolated situation. A look at Figure 6 reveals an apparent drop in the water table from monitoring well #3 to Rectinwalds (south of Junkers). On the other hand, according to water table depths at Junkers there is no horizontal gradient to the south. Further work is necessary to confirm or revise these assertions.

The well construction reports for Rectinwald's well and the Girl Scout camp (to the north of the landfill) indicate they are screened in sandstone. Although this complicates an interpretation of the local geology, it also provides another mechanism which could explain a deviation from the regional groundwater flow pattern. On the wells that were surveyed, these sandstone layers are absent at the same depths and at least 75 feet lower in wells located to the west. This presents some interesting possibilities. Assuming accurate drilling reports, in this short distance there is either an abrupt facies change or some fault displacement along a north/south trend.

Unfortunately, insufficient deep well information is available to make positive interpretations. No work has been done to show any faulting in this immediate area. It is known, however, that major block faulting has occurred to the west and minor faults related to this event could exist in the area (Borman, 1976, see Fig. 2).

A second possibility is that a facies change exists between these wells, and the sandstone was not deposited to the area further west (see Fig. 8). Once contaminated groundwater has reached these sandstone layers below the landfill it could readily move through the formation. Assuming a sequence of sediments which become finer toward the west, it is possible that groundwater flow beyond the sandstone could be restricted to some degree due to the lower hydraulic conductivity of the finer sediments. Lower hydraulic conductivity would continue into the dolomite, which has a lower permeability than the sandstone, at least until solution channels become developed downgradient. By restricting downgradient movement beyond the sandstone, contaminated groundwater could effectively become distributed in a north/south direction along the sandstone deposit. The diagram below illustrates this concept:

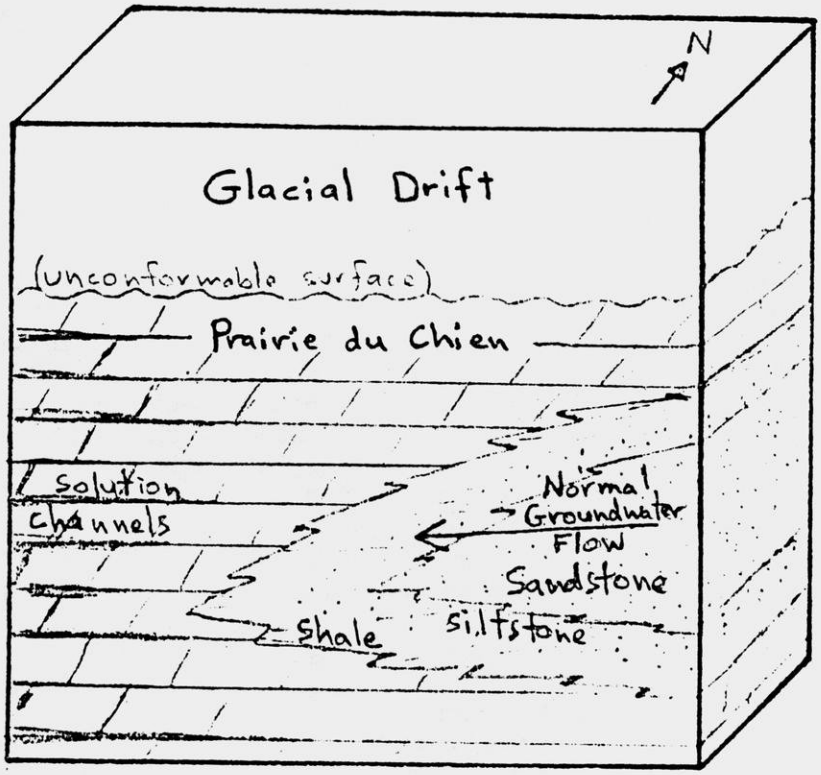


Figure 8. Illustration of Facies Change

The above scenario could also help explain why wells just south of the landfill have much higher concentrations of VOC's. In addition to their close proximity to the landfill, these wells may have higher concentrations than those downgradient because aquifer flushing is reduced due to the absence of solution channels.

Replacement Wells

There is no evidence that any confining layers exist within the Prairie du Chien Group. On the contrary, vertical jointing and the sandy nature of the rock would make it unwise to install replacement wells lower in the formation. However, rapid groundwater flow through the solution channels of the Prairie du Chien should flush contaminants through the dolomite before it reaches the Jordon Sandstone. In addition, because the contact is a conformable, upward fining transition, the upper sequences of the Jordon are likely to contain minor confining layers which would help protect that aquifer from downward migration of the contaminants. Two drilling logs from wells approximately 6 miles to the south indicate this may be the case. It is also unlikely that the Jordon is locally recharged, with the probable source being far beyond the landfill. Therefore, it is highly probable that wells can be installed safely within the Jordon Sandstone. The use of lower Cambrian Sandstones (Franconia and lower) for replacement wells in this area should not be necessary. This aquifer of lower Cambrian Sandstones would only be used as a last resort in the event that the Jordon Sandstone is contaminated.

A reasonable estimate for the elevation of the Prairie du Chien base could be about 705 feet (above mean sea level). This would mean replacement wells in the area may need to be drilled from about 250 to 360 feet deep (i.e., to an elevation of approximately 670 ft.), depending on present surface elevation. Wells near Rectinwald's would be the deepest because of their higher elevations. Again, without additional deep borings or an existing deep well log from the immediate vicinity, we cannot know the elevation of the base of the Prairie du Chien.

RECOMMENDATIONS

1. Additional intensive hydrogeologic investigation is necessary in and around the Junkers Landfill proper. Such an investigation could explain highly localized flow patterns that appear to have dispersed contaminants locally in all directions.

2. Additional investigation of the railroad right-of-way and the abandoned Town of Roberts Landfill is needed to determine if they might be contributing to the contamination in the area.

3. The extent of solution channel development present locally in the Prairie du Chien dolomite should be determined. Dr. Sam Huffman from the University of Wisconsin-River Falls suggests that dyes could be introduced into local wells and detection periods downgradient monitored to determine these hydraulic conductivity rates.

4. Prior to or in conjunction with replacement of contaminated private wells in the area, one or more deep borings should be completed to provide accurate geologic and hydrogeologic data in the area. Note: Proceeding with more than a few replacement wells initially is not recommended. Water quality for the first replacement well should be determined and found acceptable prior to further drilling.

5. Ideally, a comprehensive hydrogeologic study of the entire affected area is necessary. Such an investigation might provide detailed groundwater elevation, flow, and quality information which would allow for better well replacement and resource management decisions in the future.

DST808

GLOSSARY OF TERMS

Aquiclude - a unit of low permeability that forms an upper or lower boundary to a groundwater flow system.

Aquifer - a geologic formation which is saturated and capable of transmitting usable quantities of water for wells.

Anomalous - irregular, abnormal.

Dolomite - a sedimentary carbonate rock [$Ca\ Mg(CO_3)_2$] often improperly referred to as limestone [$Ca\ CO_3$].

Facies change - a lateral variation in types of sedimentary rock.

Fault - a fracture zone along which displacement has occurred.

Formation - a body of rock with features that distinguish it from overlying and underlying rock units.

Glacial Drift - a general term for all types of glacial deposits.

Hydraulic conductivity rate - refers to the rate at which water can move through a permeable medium.

Hydrogeology - the study of water below the earth's surface, the relationship of geologic materials and the control that these materials exert on water movement and storage.

Joint - a surface of fracture in a rock along which no appreciable movement has occurred. A joint system or pattern is a group of joints with a similar geometry.

Ordovician time - an early Paleozoic geological period, from approximately 435 to 500 million years ago.

Pitted outwash terrain - a landscape characterized by depressions (kettles) formed by the melting of large, detached blocks of glacial ice. These ice masses became surrounded by glacial drift and the final melting away of the ice left holes where the ice lay.

Pleistocene glaciation - a period of time in which continental ice sheets expanded over much of North America (approx. .01-2.5 million years ago). Often thought of as the "Ice Age."

Recharge area - where a net downward component of infiltration occurs into deeper levels within an aquifer.

Stratigraphic column - classification of rocks into separate, distinguishable units, with the older strata below and the younger above.

Structural dip - the angle at which bedding planes of a formation are inclined from the horizontal.

Unconsolidated material - sediments which are not cemented and not consolidated to rock. Would include glacial, river, and lake deposits, weathered bedrock, etc.

VOC - volatile organic compound/chemical

REFERENCES

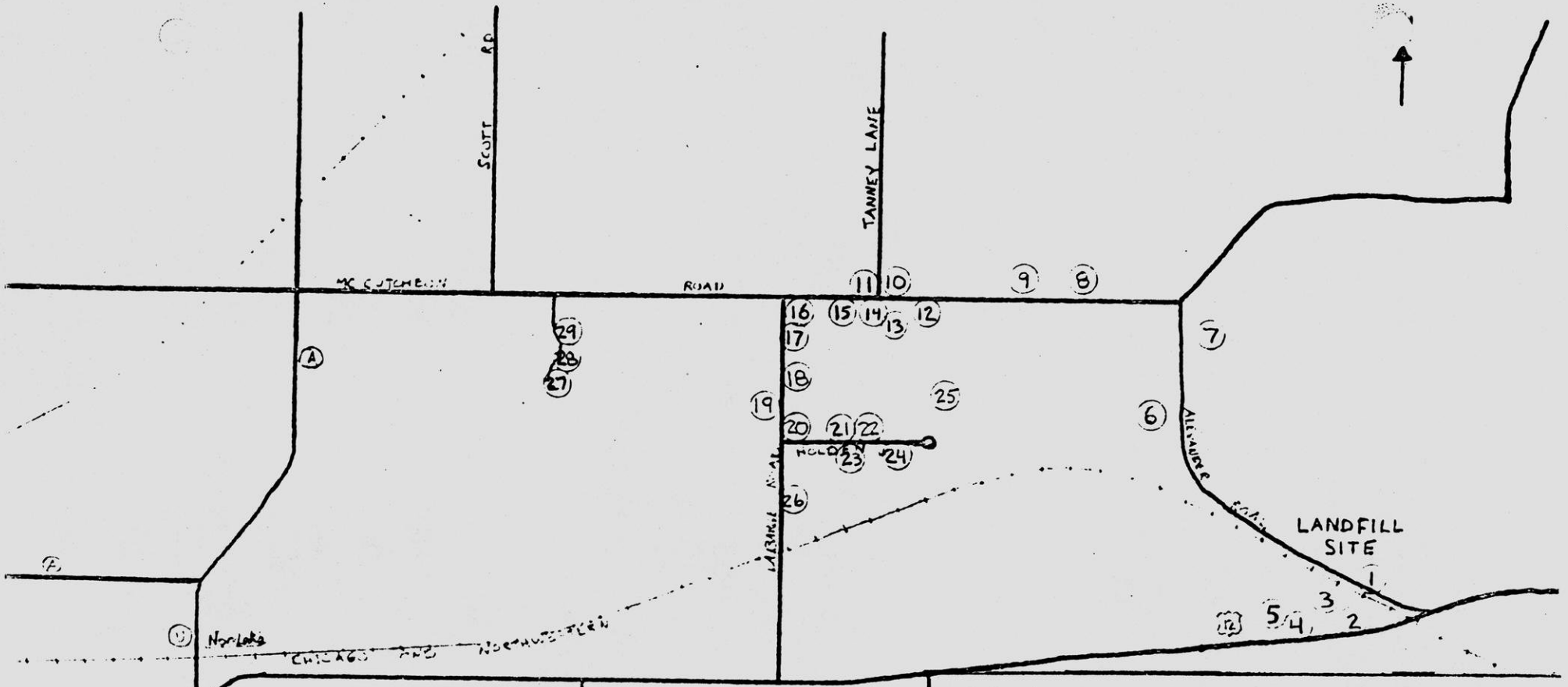
Borman, R. G., "Groundwater Resources and Geology of St. Croix County, Wisconsin," Geologic and Natural History Survey, Information Circular No. 32, 1976.

Soil Exploration Co., "Phase II Remedial Investigation Report, Nor-Lake, Inc. Facility Hudson, Wisconsin," #120-12745, June 3, 1985.

Paull, R. K. and Paull, R. A., "Geology of Wisconsin and Upper Michigan", Kendal/Hunt Publishing Co., 1977.

APPENDIX A

- Index Map of Well Locations
- Elevation Information Relating to Well Data



Index Map of Well Locations

Well # - Owner

1	Malvey	16	Hilman
2	Stockey	17	Frank
3	Rectinwald	18	Hintz
4	Geitner	19	Speer
5	Ernst	20	Jones
6	Spott	21	Ceaglske
7	Rolling Ridges Troop House	22	Iverson
		23	Campbell
8	Windy Acres Scout House	24	Krech
		25	Thompson
9	Raymond	26	Grass
10	Nelson	27	Bakken
11	Asher	28	Schurtz
12	Moravec	29	Skoviera
13	Starkey		
14	Sutliff		
15	Murzdek		

Elevation Information Relating to Well Data

Name	Relative Depths (ft. - from surface)			Elevations (ft.)			
	Well Base	Water Table	Bedrock	Surface	Well Base	Water Table	Bedrock S
Rectinwald	196 *Sandstone[1]	135	70	1025.2	829.2	890.2	955.2
Morovec	115 *Dolomite	85	57	950.2	835.2	865.2	893.2
Campbell	123 *Dolomite	83	66	940.3	817.3	857.3	874.3
Murzdek	147 *Dolomite	89	73	923.8	776.8	834.8	850.8
Sutliff	110 *Dolomite	65	45	920.5	810.5	855.8	875.
Frank	125 *Sand	70	>125	931.5	806.5	861.5	<806.
Hintz	108 *Sand	75	>108	934.3	826.3	859.3	<826

* Indicates formation well is terminated in

[1] Within Prairie du Chien

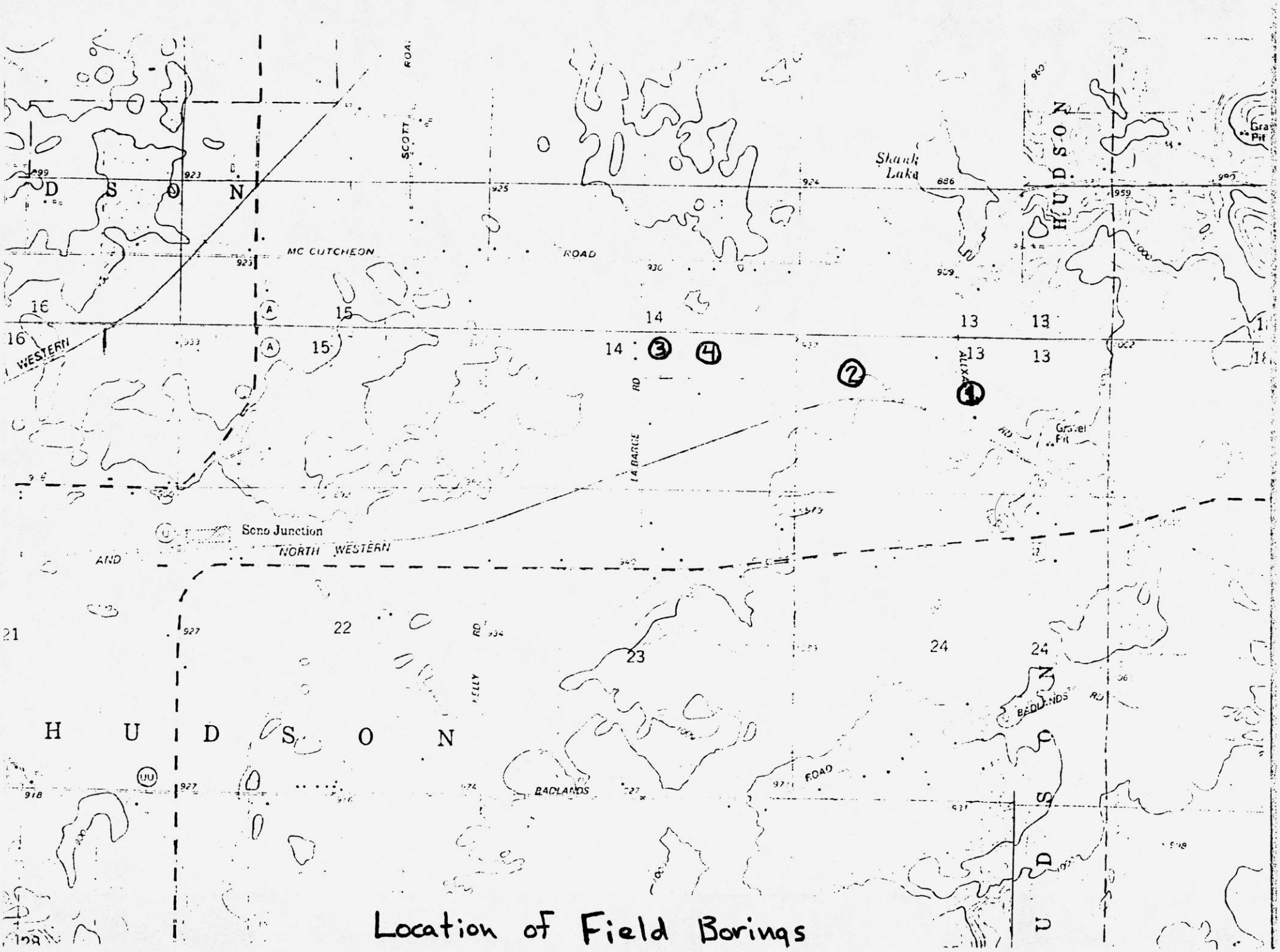
Surface Elevations for Other Wells (No Drilling Reports Available):

Malvey	1023 (ft.)	Nelson	906.6
Stockey	1035	Asher	903.8
Thompson	939.9	Hilman	929.2
Krech	943.2	Starkey	918.7
Iverson	929.4	Windy Acres	959.9
Zglske	936.2	Raymond	952.3
Jones	933.7		
Spaer	939.2		

APPENDIX B

- Boring Location Map

- Boring Logs (3)



Location of Field Borings

BORING LOG

Boring #1 - Alexander Road in ditch. 9/24/85.

Depth	Description
0-3 ft.	-Sand, light brown, coarse, loose -Elev. approx. 971 ft. @ surface
3-7 ft.	-same
7-12 ft.	-same
12-17 ft.	-same
17-22 ft.	-same
22-27 ft.	-sand, brown, coarse w/some fine gravel, slightly moist
27-32 ft.	-same
32-37 ft.	-same
37-42 ft.	-same
42-47 ft.	-same
47-52 ft.	-same
52-57 ft.	-sand, yellow-brown, medium texture, moist, weathered sandstone? Approaching top of water table

Note: The material indicated on last recording was found stuck to the auger flight after it was pulled up (would not come up on its own). Unfortunately, we ran out of flights at this transition zone.

BORING LOG

Boring #2 - Spott's field by hill. 9/24/85

Depth	Description
0-1 ft.	-topsoil, dark brown loam -elev. approx. 981 ft. @ surface
1-4 ft.	-sand, light brown, fine
4-7 ft.	-sand, tan to white, fine, loose
7-12 ft.	-sand, light tan to white, fine, moderately dense, dry, probably residual sandstone
12-17 ft.	-sand, grayish white, fine, probably into sandstone, friable, dry -same as formation just north of boring exposed on hillside, which is St. Peter Sandstone
17-22 ft.	-same, except encountering very thin layers of fine silt w/some clay (St. Peter Sandstone)
22-27 ft.	-same, except no silt layers
27-32 ft.	-same, except more dense and more strongly cemented
32-34 ft.	-same, abandoned drilling to avoid equipment failure

BORING LOG

Boring #3 - Near NW corner of Jeff Jones yard. 10/8/85

Depth	Description
0-2 ft.	-topsoil, silt loam, black, moist
2-3 ft.	-clay loam, brown, loose, dry
3-5 ft.	-same
5-8 ft.	-sand, brown, coarse, loose, dry
8-13 ft.	-same, with some coarse gravel and cobble
13-18 ft.	-same, but more coarse
18-23 ft.	-same
23-28 ft.	-sand, coarse, dirty fine gravel, loose, dry
28-33 ft.	-same, but more gravel
33-37 ft.	-clean sand, some gravel
37-42 ft.	-same
42-47 ft.	-same
47-52 ft.	-same
52-55 ft.	-same

BORING LOG

Boring #4 - Behind Iverson property at bottom of depression. 10/8/85

Depth	Description
0-1 ft.	-topsoil, silt loam, moist
1-2 ft.	-clay loam, moist
2-8 ft.	-sand, brown, medium, loose, dry
8-13 ft.	-same
13-18 ft.	-same
18-23 ft.	-same, except encountered cobble
23-27 ft.	-sand, coarse, fine gravel
27-32 ft.	-same
32-34 ft.	-sand, coarse, medium gravel
34-37 ft.	-same
37-42 ft.	-same, but no gravel
42-52 ft.	-sand, coarse, little fine gravel
52-55 ft.	-same

APPENDIX C

- Well Construction Reports and Certified Well Logs From High Capacity Wells

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

DEC 26 1975

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

1. COUNTY: St Croix | CHECK ONE: ☒ Town ☐ Village ☐ City | NAME: Hudson

2. LOCATION – ¼ Section: NE | Section: 14 | Township: T29N | Range: R19W

OR – Grid or street no. | Street name

AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: Dedrick Frank
ADDRESS: RR
POST OFFICE: Burkhart Wisc

4. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
20	40	–	40					

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		100	–	110					

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream. pond, lake, etc.): NONE

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	50			
6	50	125			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New Bell & C ABS M-D SS	Surface	124
6	Johnson Screen	121	125

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	50

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand	Surface	125

10. TYPE OF DRILLING MACHINE USED
☐ Cable Tool ☐ Direct Rotary ☐ Reverse Rotary
☐ Rotary – air w/drilling mud ☒ Rotary – hammer with drilling mud & air ☐ Jetting with ☐ Air ☐ Water

Well construction completed on Dec 1 19 75

Well is terminated 18 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA
Yield test: 5 Hrs. at 15 GPM

Depth from surface to normal water level 70 ft.

Depth to water level when pumping 90 ft.

Water sample sent to Madison laboratory on: Dec 22 19 75

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seal type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGN: S. Jacobs
Registered Well Driller

COMPLETE MAILING ADDRESS: Marked Well Drilling, Inc.
Box 247-B
Somerset, Wisconsin 54025

Please do not write in space below

COLIFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

REV. 3–71

State of Wisconsin
Department of Natural Resources
Private Water Supply
Box 7921
Madison, Wisconsin 53707

White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT

Form 3300-15 Rev. 2-79

COUNTY: St.Croix

CHECK (✓) ONE: ☒ Town ☐ Village ☐ City

Name: Hudson

LOCATION: ¼ Section or Gov't. Lot: N.W. ¼ | Section: 14 | Township: 29 N | Range: 19 W

OR – Grid or Street No. | Street or Road Name

AND – If available subdivision name, lot & block No.

3. NAME ☒ OWNER ☐ AGENT AT TIME OF DRILLING CHECK (✓) ONE: John Hintz

ADDRESS: R. I La Barge

POST OFFICE: Hudson Wis. ZIP CODE: 54016

Distance in feet from well to nearest: (Record answer in appropriate block)	Building	Sanitary Bldg. Drain		Sanitary Bldg. Sewer		Floor Drain Connected To:		Storm Bldg. Drain		Storm Bldg. Sewer	
		C.I.	Other	C.I.	Other	C.I. Sewer	Other Sewer	C.I.	Other	C.I.	Other
	I5			30		30					

Street Sewer		Other Sewers		Foundation Drain Connected to:		Sewage Sump		Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit	Manure Hopper or Retention or Pnuematic Tank
San.	Storm	C.I.	Other	Sewer	Sewage Sump	C.I.	Other		60		Seepage Pit	
				Clearwater Dr.	Clearwater Sump						Seepage Bed 75	
											Seepage Trench	

Privy	Pet Waste Pit	Pit: Nonconforming Existing		Subsurface Pumproom Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit	Earthen Manure Basin
		Well										
		Pump										
		Tank										

Temporary Manure Rack or Platform	Watertight Liquid Manure Tank or Basin	Manure Pressure Pipe	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Manure Storage Basin: Concrete Floor Only / Concrete Floor and Partial Concrete Walls	Other (Describe)

Well is intended to supply water for: Rual Home

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
I0	Surface	I8	6	I8	I08

CASING, LINER, CURBING AND SCREEN

Dia. (in.)	Material, Weight, Specification Mfg. & Method of Assembly	From (ft.)	To (ft.)
6	New Steel Pipe	Surface	I08
	I9.45 T&C ASTM		
	A-I20 Val ly		
	Steel Maass		
	Adapter	Open	Bottom

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Clay Slur	Surface	I8
Drove	I8	I08

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand	Surface	I08

10. TYPE OF DRILLING MACHINE USED

☐ Cable Tool ☐ Rotary-air w/drilling mud ☐ Rotary-w/drilling mud ☐ Rotary-hammer w/drilling mud & air ☒ Rotary-hammer & air ☐ Reverse Rotary ☐ Jetting with Air ☐ Jetting with Water

Well construction completed on I0 20 19 82

Well is terminated I0 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

11. MISCELLANEOUS DATA

Yield Test: 2 Hrs. at I0 GPM

Depth from surface to normal water level 75 Ft.

Depth of water level when pumping 83 Ft. Stabilized ☒ Yes ☐ No

Water sample sent to State laboratory on 2 I 1983

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of finishing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

Signature: Layer Bros. John Wagner Registered Well Driller

Business Name and Complete Mailing Address: R I Bros. Barcelo Wis.

L CONSTRUCTOR'S REPORT
M 3300–15

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES
Box 450
Madison, Wisconsin 53701

UNTY	CHECK ONE	NAME
Polk	☒ Town ☐ Village ☐ City	Hudson

ION –	¼ Section	Section	Township	Range	3. OWNER AT TIME OF DRILLING
	NE	14	T29N	R-19W	EMATZURK

Grid or street no.	Street name	ADDRESS
		Hudson

– If available subdivision name, lot & block no.	POST OFFICE
	Hudson

istance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
	15	35	–	35					

R WATER DRAIN C. I.	R WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		70	–	80					

R POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)
None

ell is intended to supply water for: Home

RILLHOLE

(in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	40			
6	40	147			

ASING, LINER, CURBING, AND SCREEN

(in.)	Kind and Weight	From (ft.)	To (ft.)
6	New Blk PC 19.46 Steel	Surface	73
6	Open Hole	73	147

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand	Surface	73
Lime	73	147

ROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	40

10. TYPE OF DRILLING MACHINE USED

☐ Cable Tool ☐ Direct Rotary ☐ Reverse Rotary
☐ Rotary – air w/drilling mud ☒ Rotary – hammer with drilling mud & air ☐ Jetting with ☐ Air ☐ Water

Well construction completed on July 13 1972

MISCELLANEOUS DATA

d test: 3 Hrs. at 15 GPM

Well is terminated 12 inches ☒ above ☐ below final grade

th from surface to normal water level 89 ft.

Well disinfected upon completion ☒ Yes ☐ No

th to water level when pumping 110 ft.

Well sealed watertight upon completion ☒ Yes ☐ No

er sample sent to MADISON laboratory on: July 24 1972

r opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, e of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should iven on reverse side.

RE
S. Soling
Registered Well Driller

COMPLETE MAIL ADDRESS

Please do not write in space below

IFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

3–71

DEC 6 1971

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCE
Box 450
Madison, Wisconsin 53701

1. COUNTY: St. Croix
CHECK ONE: ☒ Town ☐ Village ☐ City
NAME: Hudson

LOCATION – ¼ Section: NE | Section: 14 | Township: 29N | Range: 19W.

OR – Grid or street no. | Street name

AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: Edwin Sutliff
ADDRESS: Hudson
POST OFFICE: Wisconsin

4. Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DR C. I.	WASTE WATER DR TIL
20	28	–	28	–	–	–	–	–

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
–	–	85	–	105	–	–	–	–	–

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.): None

5. Well is intended to supply water for: Home

6. DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	45			
6	45	110			

7. CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New Black Steel Tbg 19#45	Surface	45
6	Open Hole	45	110

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	45
Lime Rock.	45	110

8. GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	45

10. TYPE OF DRILLING MACHINE USED
☒ Cable Tool ☐ Direct Rotary ☐ Reverse Rotary
☐ Rotary – air w/drilling mud ☐ Rotary – hammer with drilling mud & air ☐ Jetting with ☐ Air ☐ Wa

Well construction completed on: Nov. 29 19 71

11. MISCELLANEOUS DATA
Yield test: 3 Hrs. at 20 GPM
Depth from surface to normal water level: 65 ft.
Depth to water level when pumping: 82 ft.

Well is terminated 12 inches ☒ above ☐ below final gra
Well disinfected upon completion ☒ Yes ☐
Well sealed watertight upon completion ☒ Yes ☐

Water sample sent to Madison laboratory on: Dec 6 19 7

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, su type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., shou be given on reverse side. Pump installed by Martell Well Drilling Co.

SIGNATURE: Stephen J Martell Registered Well Driller

COMPLETE MAIL ADDRESS: RT #1 Box 247A Somerset, Wis 54025

Please do not write in space below

COLIFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

REV. 3–71

WELL CONSTRUCTOR'S REPORT
FORM 3300–15

FEB 5 1974

NOTE
WHITE COPY – DIVISION'S COPY
GREEN COPY – DRILLER'S COPY
YELLOW COPY – OWNER'S COPY

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCE
Box 450
Madison, Wisconsin 53701

COUNTY: St.Croix

CHECK ONE: [X] Town [ ] Village [ ] City

NAME: Hudson

LOCATION – ¼ Section: S.E.¼ | Section: 14 | Township: 29-N | Range: 19-W

OR – Grid or street no. | Street name

AND – If available subdivision name, lot & block no.

3. OWNER AT TIME OF DRILLING: Donavan Campbell

ADDRESS: R.R.1

POST OFFICE: Hudson, Wis. 54016

Distance in feet from well to nearest: (Record answer in appropriate block)

BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRAIN C. I.	WASTE WATER DRAIN TILE
8	30		30		XX	XX	30	

CLEAR WATER DRAIN C. I.	CLEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
		60	XX	75	XX	XX	XX	XX	XX

OTHER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

Well is intended to supply water for: Family Home

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
6	Surface	123			

CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	Steel pipe new	Surface	66
	Weight 19.45		
	T.& C.		

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Drove	Surface	66

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand & Gravel	Surface	66
Lime stone	66	123

10. TYPE OF DRILLING MACHINE USED

[ ] Cable Tool [ ] Direct Rotary [ ] Reverse Rotary
[ ] Rotary – air w/drilling mud [X] Rotary – hammer with XX drilling mud XX & air [ ] Jetting with [ ] Air [ ] Water

MISCELLANEOUS DATA

Yield test: 2 Hrs. at 10 GPM

Depth from surface to normal water level: 83 ft.

Depth to water level when pumping: 93 ft.

Well construction completed on: Jan. 9 1974

Well is terminated 12 inches [X] above [ ] below final grade

Well disinfected upon completion [X] Yes [ ]

Well sealed watertight upon completion [X] Yes [ ]

Water sample sent to: State laboratory on: Jan. 22 1974

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seal type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, sub-surface pumprooms, access pits, etc., should be given on reverse side.

SIGNATURE: Lyle S. Harper Registered Well Driller

COMPLETE MAIL ADDRESS: R.R.1 Bay City, Wis. 54723

Please do not write in space below

COLIFORM TEST RESULT	GAS – 24 HRS.	GAS – 48 HRS.	CONFIRMED	REMARKS

REV. 3–71

ELL CONSTRUCTOR'S REPORT

DEPARTMENT OF RESOURCE DEVELOPMENT

We

COUNTY: St Croix

CHECK ONE: ☒ Town ☐ Village ☐ City

NAME: Hudson

LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.): NE ¼ Sec 14 T 1 N R 19 W

OWNER AT TIME OF DRILLING: Richard Zapp - Miraflecs

OWNER'S COMPLETE MAIL ADDRESS: 342 No 4th - Hwy Richmond Wis

Distance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRA. C. I.	WASTE WATER DRA. TILE
	12						—	—	

YEAR WATER DRAIN C. I.	YEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE
								60'	

HER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.): None

Well is intended to supply water for: Farm home and reconstruction

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10	Surface	40			
6	40	115			

CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
6	New Black Steel T+C 17#	Surface	57
6	Open Hole	57	115

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Cement	Surface	40

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand	Surface	57
Lime Rock	57	115

Well construction completed on: Aug 21 19

Well is terminated 12 inches ☒ above ☐ below final grad

Well disinfected upon completion ☒ Yes ☐ N

Well sealed watertight upon completion ☒ Yes ☐ N

1. MISCELLANEOUS DATA

Yield test: 6 Hrs. at 10 GPM

Depth from surface to normal water level 45 ft.

Depth to water level when pumping 113 ft.

Water sample sent to Madison laboratory on: Aug 21 19

Your opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to near wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, su surface pumprooms, access pits, etc., should be given on reverse side.

Pump installed by State Water Well Drilling Co.

SIGNATURE: Stephen J Martell Registered Well Driller

COMPLETE MAIL ADDRESS: Rt #1 Somerset Wis 54025

Please do not write in space below

COLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS

State of Wisconsin
Department of Natural Resources
Box 7921
Madison, Wisconsin 53707

NOTE:
White Copy – Division's Copy
Green Copy – Driller's Copy
Yellow Copy – Owner's Copy

WELL CONSTRUCTOR'S REPORT
Form 3300-15 Rev. 12-76

JAN 24 19[illegible]

COUNTY: St Croix

CHECK (✓) ONE: ☒ Town ☐ Village ☐ City Name: Hudson 3 out part

LOCATION: ¼ Section: NE | Section: 24 | Township: T29N | Range: R19W

OR – Grid or Street No. | Street Name

AND – If available subdivision name, lot & block No.

3. NAME ☐ OWNER ☒ AGENT AT TIME OF DRILLING CHECK (✓) ONE: Sam Miller

ADDRESS: Trout Brook Road

POST OFFICE: Hudson Rt 5 w. Id

Distance in feet from well to nearest: (Record answer in appropriate block)	Building	Sanitary Bldg. Drain C.I.	Sanitary Bldg. Drain Other	Sanitary Bldg. Sewer C.I.	Sanitary Bldg. Sewer Other	Floor Drain Connected To: C.I. Sewer	Floor Drain Connected To: Other Sewer	Storm Bldg. Drain C.I.	Storm Bldg. Drain Other	Storm Bldg. Sewer C.I.	Storm Bldg. Sewer Other
	15	40		40							

Street Sewer	Other Sewers: Storm	C.I.	Other	Foundation Drain Connected to: Sewer	Sewage Sump	Clearwater Dr.	Clearwater Sump	Sewage Sump: C.I.	Other	Clearwater Sump	Septic Tank	Holding Tank	Sewage Absorption Unit: Seepage Pit	Seepage Bed	Seepage Trench
											60	70			

Ivy	Pet Waste Pit	Pit: Nonconforming Existing: Well	Pump	Tank	Subsurface Pumproom Nonconforming Existing	Barn Gutter	Animal Barn Pen	Animal Yard	Silo With Pit	Glass Lined Storage Facility	Silo w/o Pit	Earthen Silage Storage Trench Or Pit
												OK

mporary ure ck	Watertight Liquid Manure Tank	Solid Manure Storage Structure	Subsurface Gasoline or Oil Tank	Waste Pond or Land Disposal Unit (Specify Type)	Other (Give Description)
				500' from Junker Lane Field	See 2/2/1/80 Letter

Well is intended to supply water for: Home

DRILLHOLE

a. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
0	Surface	82			
6	82	187			

CASING, LINER, CURBING AND SCREEN

a. (in.)	Material, Weight, Specification & Method of Assembly	From (ft.)	To (ft.)
	19.45 # ASTM A53 New pump pipe T+C	Surface	82
6	Open Hole	82	187

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Neat Cement	Surface	82

9. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand	Surface	70
Lime	70	170
Sand Rock	170	187

over

10. TYPE OF DRILLING MACHINE USED

☐ Cable Tool
☐ Rotary-air w/drilling mud
☐ Rotary-w/drilling mud
☐ Rotary-hammer w/drilling mud & air
☒ Rotary-hammer & air
☐ Reverse Rotary
☐ Jetting with: ☐ Air ☐ Water

Well construction completed on Oct 16 19 71

Well is terminated 12 inches ☒ above ☐ below final grade

Well disinfected upon completion ☒ Yes ☐ No

Well sealed watertight upon completion ☒ Yes ☐ No

MISCELLANEOUS DATA

Yield Test: 3 Hrs. at 15 GPM

Depth from surface to normal water level 135 Ft.

Depth of water level when pumping 150 Ft. Stabilized ☒ Yes ☐ No

er sample sent to _____ laboratory on _____ 19 ____

ur opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to nearby wells, screens, seals, method of shing the well, amount of cement used in grouting, blasting, etc., should be given on reverse side.

ature: George Solberg
Registered Well Driller

Complete Mail Address: Martell Well Drilling Inc
Box 340 Somerset Wi 54025

/ELL CONSTRUCTOR'S REPORT

DEPARTMENT OF RESOURCE DEVELOPMENT

We

COUNTY: St. Croix

CHECK ONE: ☐ Town ☒ Village ☐ City

NAME: Roberts

LOCATION (Number and Street or ¼ section, section, township and range. Also give subdivision name, lot and block numbers when available.)

NE 1/4 of SE 1/4, Sec. 13, Twp. 29 North, Range 19 West

OWNER AT TIME OF DRILLING

Girl Scout Council of St. Croix Valley

ER'S COMPLETE MAIL ADDRESS

49 West 9th Street, St. Paul, Minnesota

Distance in feet from well to nearest: (Record answer in appropriate block)	BUILDING	SANITARY SEWER C. I.	SANITARY SEWER TILE	FLOOR DRAIN C. I.	FLOOR DRAIN TILE	FOUNDATION DRAIN SEWER CONNECTED	FOUNDATION DRAIN INDEPENDENT	WASTE WATER DRA C. I.	WASTE WATER DRA TILE
	1500	-	-	-	-				

LEAR WATER DRAIN C. I.	LEAR WATER DRAIN TILE	SEPTIC TANK	PRIVY	SEEPAGE PIT	ABSORPTION FIELD	BARN	SILO	ABANDONED WELL	SINK HOLE

THER POLLUTION SOURCES (Give description such as dump, quarry, drainage well, stream, pond, lake, etc.)

Closest source of any type is dry well, approx. distance - 600'.

Well is intended to supply water for:
Drinking

DRILLHOLE

Dia. (in.)	From (ft.)	To (ft.)	Dia. (in.)	From (ft.)	To (ft.)
10"	Surface	204'			

CASING, LINER, CURBING, AND SCREEN

Dia. (in.)	Kind and Weight	From (ft.)	To (ft.)
10"	Black Steel - New .365 wall	Surface	108'
6"	Black Steel - New .280 wall	"	150'

GROUT OR OTHER SEALING MATERIAL

Kind	From (ft.)	To (ft.)
Neat Cement	Surface	150'

10. FORMATIONS

Kind	From (ft.)	To (ft.)
Sand and Gravel	Surface	77
Sandy Hardpan	77	96
Sandrock	96	118
Limerock	118	132
Sandrock	132	204

1. MISCELLANEOUS DATA

ield test: Two (2) Hrs. at 60 GPM

epth from surface to normal water level 133 ft.

epth to water level when pumping 146 ft.

Well construction completed on May 12, 19 6

Well is terminated 24 inches ☒ above ☐ below final grad

Well disinfected upon completion ☒ Yes ☐ N

Well sealed watertight upon completion ☒ Yes ☐ N

Water sample sent to Wisconsin State Laboratory of Hygiene, Madison laboratory on: August 5, 19 6

our opinion concerning other pollution hazards, information concerning difficulties encountered, and data relating to near wells, screens, seals, type of casing joints, method of finishing the well, amount of cement used in grouting, blasting, su urface pumprooms, access pits, etc., should be given on reverse side.

IGNATURE
KEYS WELL DRILLING CO.
B: W Vere Secy. Registered Well Driller

COMPLETE MAIL ADDRESS
413 N. Lexington Avenue
St. Paul, Minnesota 55104

Please do not write in space below

OLIFORM TEST RESULT	GAS — 24 HRS.	GAS — 48 HRS.	CONFIRMED	REMARKS
See letter of 8-18-69 in file.				cc: M. E. Ostrom 8-18-69 Low-Capacity well

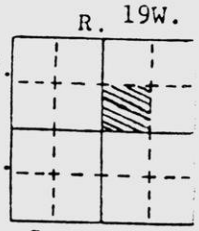
UNIVERSITY OF WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY
1815 University Avenue, Madison, Wisconsin 53706

Log No. F31-SC

Well name Arno B. Birr Well
Troy Township
Owner.... Arno B. Birr
Address.. Route 5
River Falls, WI 54022
Driller.. Aamot Well Co., Inc.
Engineer.

County: St. Croix

Completed... 6/15/75
Field check.
Altitude.... 955' ETM
Use..... Irrigation
Static w.l.. 44'
Spec. cap... 21 GPM/ft



5½ mi. due south of site

Quad. Northline 7½'

Drill Hole						Casing & Liner Pipe or Curbing						
Dia.	from	to	Dia.	from	to	Dia.	Wgt.& Kind	from	to	Dia.	Wgt.& Kind	from
12"	0	365'				12"	Steel-48 lb. ASTM53 Driven to refusal	0	42'			

Drilling method: cable tool
Samples from 0 to 365' Rec'd: 9/22/75

Studied by: Mark Ver Hoeve

Grout	from
None	

Issued: 10/6/8

Formations: Surface, Drift, St. Peter Sandstone (Tonti Member), Prairie du Chien Group, Jordan Formation (Coon Valley Member, Van Oser Member).

Remarks: Well tested for 8 hours at 750 GPM with 36 feet of drawdown.
DNR Permanent Well # 29215 and St. Croix Co. Irrigation # 12.

P.d.c. 245' thick

LOG OF WELL:

	Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics
Sfc	0-5		Soil	Black	—	—	Much silt. Little sand, organic matter.
	5-10		Sand	Dk yl bn	M	Vfn/VC	Much silt. Little siliceous clay. Trace granules.
DRIFT 35'	10-15		"	"	"	"	Same but little gravel.
	15-20		"	"	"	"	Much silt. Little siliceous clay. Trace gravel.
	20-25		"	Strg brown	"	"	Same.
	25-30		"	"	"	"	"
	30-35		"	"	"	"	"
	35-40		"	Dk yl bn	"	"	Much silt, siliceous clay. Little gravel.
TONTI 40'	40-45		Sandstone	Pale brown	"	"	Subrounded. Little silt, caved material.
	45-50		"	Pl yellow	"	"	Subrounded. Little silt.
	50-55		"	"	"	"	Subrounded. Much silt.
	55-60		"	Yellow	"	"	Same.
	60-65		"	Pl yellow	"	"	"
	65-70		"	Yellow	"	"	"
	70-75		"	Pale brown	"	"	Same but trace blue shale.
	75-80		"	Lt yl bn	M&VC	"	Srnd & rnd. Much silt. Trace pyrite, very pale brown dolom
PRAIRIE DU CHIEN	80-85		Dolomite	Pale brown	M	Fn/M	Much brown mottling. Ltl floating sand. Trace green shale.
	85-90		"	"	"	"	Same.
	90-95		"	Lt gn gy & V pl brown	"	"	Few oolites. Little floating sand, gray green shale.
	95-100		"		"	"	Same but no gray green shale.
	100-105		"	"	"	"	Partially disaggregated. Much sand. Trace blue shale.
	105-110		"	"	"	"	Same.
	110-115		"	"	"	"	"
	115-120		"	"	"	"	"
	120-125		"	"	"	"	Few oolites. Little sand.
	125-130		"	"	"	"	Much floating sand.
	130-135		"	"	"	"	Same plus little gray mottling.
	135-140		"	"	"	"	Partially disaggregated. Much sand.
	140-145		"	Light gray	"	"	Little very pale brown sandy dolomite.
	145-150		"	V pl brown	"	"	Partially disaggregated. Much sand. Ltl light gray dolomite
	150-155		"	"	"	"	Little light gray dolomite. Trace floating sand.
	155-160		"	"	"	"	Same plus trace brown shaly partings.

Well name: Arno B. Birr Well

Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics
160-165		Dolomite	Gray	M	Fn/M	Sugary. Little very pale brown mottling, floating sand,
165-170		"	V pl brown	"	"	Little floating sand.
170-175		"	"	"	"	Much floating sand.
175-180		"	"	"	"	Same.
180-185		"	V pl bn&gy	"	"	"
185-190		"	"	"	"	Partially disaggregated. Trace sand.
190-195		"	Yellow	"	"	Little sand.
195-200		"	V pl brown	"	"	Much floating sand. Little gray mottling.
200-205		"	"	"	"	Trace sand.
205-210		"	"	"	"	Same.
210-215		"	Light gray	Fn	"	Much very pale brown sandy dolomite, Little white chert.
215-220		"	V pl brown	M	"	Little floating sand, oolitic chert.
220-225		"	"	"	"	Much white oolic cht. Ltl fltg sand. Few ools. Tr pnk dol, py
225-230		"	"	"	"	Same but little white oolitic chert. gy s
230-235		"	"	Fn	"	Sugary. Trace pyrite.
235-240		"	"	M	"	Much floating sand. Little white oolitic chert.
240-245	G G	"	"	"	"	Same plus little silt sized glauconite.
245-250		"	"	"	"	Little floating sand, gray dolomite.
250-255		"	"	"	"	—
255-260		"	"	"	"	Much iron stained drusy quartz. Trace white chert.
260-265		"	Yellow	"	"	Sugary.
265-270		"	V pl brown	"	"	Sugary. Much white chert.
270-275		"	"	"	"	Sugary.
275-280		"	"	"	"	"
280-285		"	"	"	"	Little white chert.
285-290		"	"	"	"	Trace white chert.
290-295		"	"	"	"	—
295-300		"	"	"	"	Sugary.
300-305		"	Lt bn gray	"	"	"
305-310		"	Yellow	"	"	Trace white chert.
310-315		"	Lt bn gray	"	"	Partially disaggregated. Trace white chert.
315-320		"	"	"	"	Sugary.
320-325		"	"	"	"	Same.
325-330	G	"	Yellow	"	"	Sugary. Little floating sand. Trace vfn glauconite.
330-335		"	"	"	"	Much floating sand. Trace green shale.
335-340		Sandstone	"	C	Vfn/VC	Subrounded. Ltl V pl bn dolomite. Tr dolomite cement, (silt.)
340-345		"	"	M&VC	"	Subangular & Subrounded. Much silt. Trace dolomite cement.
345-350		"	"	Fn&C	"	Subangular & rounded. Much silt. Trace dolomite cement.
350-355		"	"	"	"	Same.
355-360		"	"	C	"	Subrounded, Little silt.
360-365		"	"	"	"	Same.

END OF LOG

PRAIRIE DU CHIEN

245' C.V. 10'

ANOSER 30'

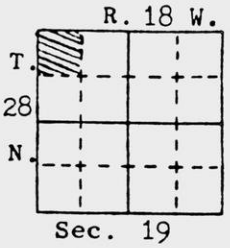
UNIVERSITY OF WISCONSIN GEOLOGICAL & NATURAL HISTORY SURVEY
1815 University Avenue, Madison, Wisconsin 53706

Log No.H245-SC-1

Well name James H. Lubich Well
Kinnickinnic Township
Owner.... James H. Lubich
Address.. Route 2, Box 165
River Falls, WI 54022
Driller.. Olson Bros. Well Drilling Co.
Engineer.

County: St. Croix

Completed... 4/8/76
Field check.
Altitude.... 950' ETM
Use..... Irrigation
Static w.l.. 27'
Spec. cap... 50 GPM/ft



6¼ mi. due south of site

Quad. Roberts 7½'

Drill Hole						Casing & Liner Pipe or Curbing							
Dia.	from	to	Dia.	from	to	Dia.	Wgt.& Kind	from	to	Dia.	Wgt.& Kind	from	to
15"	0	222'				16"	O.D. new steel .375 wall 62.58 lb. P.E.	+2.5'	65'				
12"	222'	325'											

Grout	from	to

Drilling method: Rotary
Samples from 0 to 325' Rec'd: 4/24/77

Studied by: Mary J. Hartman

Issued: 5/3/84

Formations: Drift, Prairie du Chien Group, Jordan Formation (Coon Valley & Van Oser Members), St. Lawrence Formation (Black Earth Member).

Remarks: Well tested for 3 hours at 500 GPM with 10 feet of drawdown.
DNR Permanent Well #29217 and St. Croix Co. Irrigation #14.

LOG OF WELL:

	Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics
	0-5		Sand	Dk yl bn	M	Vfn/VC	Trace silt, clay, fine magnetite, zircon grains.
	5-10		"	"	"	"	Same but little silt.
D	10-15		"	Yl brown	"	"	Tr silt,clay,Fn magnetite,zircon grains,caved organic material
R	15-20	G	"	"	"	"	Trace silt, clay, Fn magnetite, zircon grains, Fn/M glauconite
I	20-25		"	"	"	"	Same plus trace granules.
F	25-30	G	"	"	"	"	Same but no granules.
T	30-35		"	"	"	"	Same.
	35-40	G	"	"	"	"	"
	40-45		"	"	"	"	Trace granules, silt, clay, fine magnetite.
	45-50		"	"	"	"	Same plus trace zircon grains.
	50-55		"	Bn yellow	"	"	Mch dolomite(some ool). Tr silt,clay,Fn magnetite,zircon grains
DO	55-60		"	"	"	"	Same.
	60-65		Dolomite	"	"	Fn/M	Much quartz sand(some fltg). Trace ooids,silt,shale,bk spklg.
P	65-70		"	Pl yellow	"	"	Same.
R	70-75		"	"	"	"	"
A	75-80		"	"	"	"	"
I	80-85		Sandstone	Light gray	M/C	Vfn/VC	Rnd, Mch lt gry/wh dol(some ool). Tr sec qtz grwths,wh sh,mfc
R	85-90		"	"	M	"	Same, incl,cvd soil.
I	90-95		"	V pl brown	"	Vfn/C	Srnd, Tr v G dol cem,v pl bn dol,zircon grns,wh shale,mfc incl
E	95-100	G	"	"	"	"	Same plus trace fine glauconite, v pl bn dol.
	100-105		"	"	"	"	Srnd, Tr v G dol cem,wh & gn gry sh,zircon grns,mfc incl. Ltl
DU	105-110		Dolomite	"	"	Fn/M	Sug, Mch qtz snd(some fltg). Tr vugs,gry stng,pl gn & wh shale
	110-115		"	"	"	"	Same plus trace ooids.
C	115-120		"	"	"	"	Same plus trace green staining.
H	120-125		"	"	"	"	Same.
I	125-130		"	"	"	"	"
E	130-135		"	"	"	"	Sugary, Mch qtz sand(some fltg). Tr vugs,pl bn stng,bn spklg.
N	135-140		"	"	"	"	Slgtly sugary, Much quartz sand(some fltg). Trace pl gn shale.
	140-145		Sandstone	"	"	Vfn/VC	Subrounded, Much dolomite as above. Trace mafic inclusions.
Gp.	145-150		Dolomite	"	"	Fn/M	Slgtly limy,sug, Mch qtz snd(some fltg). Tr gn stng,bn spklg.
	150-155		"	"	"	"	Same plus trace yellow staining.
	155-160		"	"	"	"	Same.

ell name: James H. Lubich Well

Depths	Graphic Section	Rock Type	Color	Grain Size Mode	Grain Size Range	Miscellaneous Characteristics
160–165		Dolomite	Pl yellow	M	Fn/M	Slgtly limy,sug. Mch qtz snd(some fltg). Tr vugs,bk spklg,wh
165–170		"	"	"	"	Same but sugary. shale.
170–175		"	"	"	"	Same.
175–180		"	"	"	"	Same plus trace white oolitic chert. spklg,wh ool cht.
180–185		"	V pl brown	"	"	Slgtly limy,sug. Mch qtz snd(some fltg). Tr gn & pnk stng,bn
185–190		"	"	"	"	Slgtly limy,sug,vug. Ltl fltg qtz snd(loc conc). Tr gn & pnk
190–195		"	"	"	"	Same plus trace green gray shale. stng,bk spklg,wh ool cht.
195–200		"	"	"	"	Slgtly limy,sug. Ltl fltg qtz snd(loc conc). Tr lt gry & gn
200–205		"	Lt yl bn	"	"	Slgtly limy, Sug. stng,gn gry sh,wh ool cht,vugs,bk spklg.
205–210		"	"	"	"	Same. Ltl qtz snd(some fltg). Tr gn & pnk & gry stng,gn gry
210–215		"	"	"	"	" sh,bk spklg.
215–220		"	"	"	"	Same plus trace yellow staining.
220–225		"	Pl yellow	"	Fn/C	Limy. Sug. Slgtly vug. Ltl bk spklg. Tr qtz snd,wh cht,calc xl
225–230		"	"	"	Fn/M	Same. shale.
230–235		"	"	"	"	Limy. Sug. Slgtly vug. Few calc xls. Tr bk spklg,qtz snd,pl gr
235–240		"	"	"	Fn/C	Same. glauc,pnk stng,pyr,wh sh.
240–245	G	"	"	"	Fn/M	Slgtly limy,vug. V sug. Ltl bk spklg. Tr calc xls,qtz snd,Fn
245–250	G	"	"	"	"	Slgtly limy,vug. Sug. Ltl bk spklg. Tr gn gry & wh sh,pnk stng
250–255	G	"	"	"	"	Same. Fn glauc,xln qtz,qtz snd,calc xls,
255–260	G	"	"	"	"	Same but no green gray shale.
260–265	G	"	V pl brown	"	"	Sug. Slgtly vug. Tr Vfn glauc(more than abv),xln qtz,qtz snd,
265–270	G	"	"	"	"	Same plus ltl gry dol cem ss w/pyr. calc xls,bk spklg,gry
270–275	G	"	"	"	"	Same. stng from pyr.
275–280	G	"	"	"	"	Same but much sandstone. dol,zircon grns,mfc incl.
280–285	G	Sandstone	Gray	C	Vfn/VC	Rnd. Ltl v G dol cem. Tr Vfn/Fn glauc(loc conc),pyr,fros,wh
285–290	G	"	"	M	"	Rnd. Ltl v G dol cem,Fn glauc. Tr pyr,gn gry sh,fros,mfc incl.
290–295	G	"	Light gray	"	"	Srnd. Tr v G dol cem,Fn glauc,pyr,lt gry dol,bl gn sh,mfc incl
295–300	G	"	Olive gray	M/C	"	Same but little very good dolomite cement. fros.
300–305	G	"	Lt ol gray	C	"	Same.
305–310	G	"	"	"	"	"
310–315	G	"	"	"	"	Rnd. Tr v G dol cem,Fn glauc,pyr,pl gn sh,lt gry dol,mfc incl.
315–320	G	"	"	"	"	Same but ltl v G dolomite cement. zircon grns. Ltl fros.
320–325		Dolomite	V pl brown	M	Fn/M	Slightly limy, sugary. Trace calcite crystals, white chert, vugs, floating quartz sand, sandstone, pink & green staining ooids, pale green shale.

END OF LOG

Pdwc. [redacted] at least 192' thick

RECEIVED SEP 13 1954 WISCONSIN DEPARTMENT OF HEALTH SANITATION

VILLAGE WELL, ROBERTS, WIS.

Division St., north of Ash St. Sec. 22, T. 29 N., R. 18 W.
H. T. Hagestad, Engineer Keys Well Drilling Co., Contractors
Samples examined by F. T. Thwaites, Wisconsin Geological Survey,
Nos. 167540-167600

		0-5	5	Silt, brown-gray, weathered	
		5-10	5	Sand, very fine, much silt, yellow-orange	
		10-20	10	Sand, very fine, much silt, orange-pink	
DRIFT	30	20-30	10	Sand, very fine, much silt, gray-orange	16" pipe
ST PETER		30-40	10	Sandstone, fine to medium, light yellow-gray	10" pipe cemented
		40-70	30	Sandstone, very fine to fine, light gray	50
		70-80	10	Sandstone, very fine to fine, silty, lt.gy, light yellow-gray	
		80-90	10	Sandstone, very fine to medium, light ylpgray	
		90-100	10	Sandstone, very fine to medium, light gray	15" hole
	80	100-110	10	Sandstone, very fine to medium, silty, yl-gy, dolomitic	
LOWER MAGNESIAN		110-130	20	Dolomite, light gray, sandy, silty Prairie du Chien	114 water
		130-135	5	Dolomite, light gray, light yellow-gray	
		135-140	5	Sandstone, fine to medium, light gray, dol.	
		140-145	5	Dolomite, light gray, floating sand grains	
		145-160	15	Dolomite, light gray, some fine sand	
		160-165	5	Dolomite, sandy, lt.gray, lt. yellow-gray	
		165-172	7	Dolomite, light gray, some fine sand	N.R.
		172-177	5	Sandstone, fine to medium, light gray, dol.	
		177-200	23	Dolomite, medium gray, light yellow-gray, floating sand grains	188
		200-210	10	Dolomite, light yellow-gray, light gray, sand	
		210-230	20	Dolomite, light gray, some yellow-gray	
		230-245	15	Dolomite, light yellow-gray, some sand grains	15" hole
		245-255	10	Dolomite, light gray, some yellow-gray	
		255-265	10	Dolomite, like above with sand grains	
		265-302'	37	Dolomite, light gray and light yellow-gray	
	192	thick =		Prairie du Chien	

Formations: Drift; St. Peter (Cretaceous or New Richmond??); Lower Magnesian (Prairie du Chien)
Tested 7 hours at 837 g.p.m. specific capacity = 167.4 g.p.m./ft. (837 gpm ÷ 5 ft)
Additional copies may be secured from Wisconsin Geological Survey, Science Hall, Madison 6, Wis

1) Not below Prairie du Chien

1954

ISCONSIN GEOLOGICAL SURVEY, Science Hall, 500 block N. Park St., Madison, Wis. Log No. SC-112

New Richmond, Municipal Well, #4 New Richmond, Wisconsin
NE, SW, NE Sec. 3, T 30N, R 18W
Geo. H. Keys, Keys Well Drilling Co , Driller, March 1962 Alt. 985' ETM
Sample Nos. 231038-231108 - Examined by M. E. Ostrom

	5	St, dusky bn; tr fn&Vfn gvl, ltl VC snd, mch C&M	+30"
5- 20	15	Snd, yl bn, C&M, Srnd, P srtg, ltl fn&Vfn; mch st, ltl VC, tr Vfn gvl	24", 3/8" steel pipe 24" hole
20- 25	5	St, yl bn; mch C&M, ltl fn&Vfn, ltl VC snd; ltl gvl	
25- 35	10	St, lt yl bn, slgt dolic cem; V mch C, M, & fn snd	
35 (950') 35- 40	5	Dol, lt yl bn, M; V sndy (C&M)	37' water reve
40- 45	5	Dol, lt yl bn, M; V sndy; tr glauc	38'6"
45- 50	5	Dol, lt yl bn, M; V sndy	
50- 55	5	Dol, lt yl bn, M; V sndy; ltl cht	
55- 60	5	Dol, Vlt yl bn, M; V sndy	
60- 70	10	Dol, yl bn, M; V sndy	
70- 75	5	Dol, yl bn, M; sndy	
75- 80	5	Dol, lt yl bn, M; V sndy	
80- 95	15	Dol, lt yl bn, M; V sndy; tr glauc	16" pipe
95-100	5	Dol, lt yl bn, M; sndy	
100-105	5	Dol, lt yl bn, M; V sndy	
105-110	5	Dol, lt yl bn, M; sndy; tr glauc	
110-155	45.	Dol, M & pl yl bn, M; sndy	
155-160	5	Dol, M & pl yl bn, M; sndy; tr glauc	
160-165	5	Dol, pl yl bn, M; sndy; tr glauc	
165-170	5	Dol, pl yl bn, M; slgt sndy; tr glauc	
170-175	5	Dol, pl yl bn, M; slgt sndy; tr glauc; tr cht	
175-180	5	Dol, pl yl bn, M; slgt sndy; tr glauc; ltl cht	
180-200	20	Dol, lt yl bn, M; V slgt sndy	
200-215	15	Dol, pl yl bn, M; V slgt sndy	
215-225	10	Dol, pl yl bn, M; sty & slgt sndy	
225-230	5	Dol, lt yl bn, M; sty & sndy	
230-235	5	Dol, yl gry, M; sty & sndy	
(735') 235-240	5	Dol, pl yl bn, M; sty & slgt sndy	
240-250	10	Dol, lt yl bn, M; sty & slgt sndy	
250-255	5	Ss, lt yl bn, C, P cem dol, ltl M, fn, Vfn; ltl dol	263'
255-260	5	Ss, dk yl or, C, P cem dol, ltl M, fn, &Vfn; mch st	
260-265	5	Ss, dk yl or, C, P cem dol, ltl M, fn, &Vfn; ltl st	
265-270	5	Ss, yl gry, C, rnd, P cem dol, ltl M, fn, &Vfn; ltl st	
270-280	10	Ss, yl gry, C&M, rnd, F srtg, P cem dol, ltl fn, Vfn; ltl st	
280-285	5	Ss, yl gry, C&M, rnd, P cem dol, ltl fn, Vfn; ltl st	
285-290	5	Ss, yl gry, M, rnd, P cem dol, ltl C, fn, &Vfn	
290-295	5	Ss, yl gry, fn, rnd, P cem dol, ltl C, M, &Vfn	
295-300	5	Ss, lt gry, fn&Vfn, F cem dol, ltl C&M; ltl pyr	
300-305	5	Ss, M lt gry, fn&Vfn, G cem dol, ltl C&M; ltl pyr	
305-310	5	Ss, M gry, fn&Vfn, rnd, F srtg, G cem dol, mch C&M	
310-315	5	Ss, M lt gry, fn&Vfn, G cem dol, ltl C&M; ltl pyr	
315-320	5	Ss, M lt gry, fn&Vfn, rnd, F srtg, F cem dol, ltl C&M	
320-330	10	Ss, yl gry, Vfn, rnd, G srtg, P cem dol, tr C&M, ltl fn; mch st; mch dol	
330-349	19	Sts, yl gry, dolic cem; mch Vfn snd	352'
349-352	3	Sts, gn gry, dolic cem; ltl dol	

ormations: Surface, Prairie du Chien, Trempealeau
ell tested for 2.5 hrs. at 600 gpm with 35'10" of drawdown. Specific capacity = 16.66 gpm per ft. of drawdown.

WISCONSIN GEOLOGICAL SURVEY, Science Hall, 500 block N.Park St., Madison, Wis. Log No. SC-10

#4 → west of fault

Hudson, Municipal Well, Hudson, Wisconsin

SE1/4, NW1/4, NE1/4 Sec. 25 T.29N. R20W. Between 7th & 8th, Walnut & Commercial Sts.

George H. Keys, Driller, June, 1961

Sample Nos. 225418-225522 - Examined by M. E. Ostrom

Pit 880' ETM

	0- 25	25		Snd,yl bn,C,Sang,P srtg,mch VC,M,fn, & Vfn; mxd		+3'	20"hole 20"pipe 3/8"blk heat cemen grout
DRIFT	25- 30	5		Snd,yl bn,C,Sang,mch VC,M,fn &Vfn;tr Vfn gvl			
	30- 40	10		Snd,yl bn,C,Sang,mch VC,M,fn & Vfn;tr Vfn gvl			
	40- 70	30		Snd,yl bn,C,Sang,P srtg,mch VC-M,tr fn;ltl Vfn gvl			56'
	70- 75	5		Snd,yl bn,C,Sang,P srtg,mch VC-M,tr fn;ltl gvl			16"hole
	75- 80	5		Gvl,Vfn,Sang,P srtg,mch fn,mxd;mch snd,VC & C			16"pipe,
85	80- 85	5		Gvl,fn,Sang,P srtg,mch Vfn,ltl M,mxd;tr VC snd			3/8"blk s
	85- 90	5		Ss,Vlt ol gry,Vfn,Sang,F cem dol,mch fn;sty			
FRAN	90- 95	5		Ss,lt ol,Vfn,F cem dol,mch fn;sty;mch glauc			
	95-100	5		Ss,lt ol,Vfn,G cem dol,mch fn;sty;mch glauc			
	100-120	20		Ss,lt ol,Vfn,Sang,P srtg,P cem dol,mch fn;sty; mch glauc;ltl mica			
35							
	120-125	5		Ss,lt ol,fn,P cem dol,mch Vfn,ltl M,C,&VC;sty			
	125-130	5		Ss,lt ol gry,fn,P cem dol,mch Vfn,ltl M,C,&VC			
IRON	130-135	5		Ss,yl gry,M,P cem dol,mch Vfn,fn,C,&VC,sty			
	135-140	5		Ss,lt ol gry,M,P cem dol,mch Vfn,fn,C,&VC;sty			134'
	140-145	5		Ss,yl gry,C,P cem dol,mch VC,M,& fn,tr Vfn;ltl st			
TON	145-150	5		Ss,yl gry,C,P cem dol,mch VC,M,& fn,tr Vfn			
	150-155	5		Ss,yl gry,C,P cem dol,mch VC,M,& fn,tr Vfn;sty			
	155-160	5		Ss,yl gry,C,P cem dol,mch VC,M,& fn,tr Vfn;sty			
	160-165	5		Ss,yl gry,C,P cem dol,mch VC&M,ltl fn&Vfn			
	165-170	5		Ss,Vlt yl bn,fn,P cem dol,mch M&Vfn,ltl C,tr VC			
	170-175	5		Ss,lt yl bn,fn,F cem dol,mch M&Vfn,ltl C,tr VC			
60	175-180	5		Ss,lt yl bn,fn,P cem dol,mch M&Vfn,ltl C,tr VC			174'
	180-185	5		Ss,yl gry,fn,P cem dol,mch Vfn,tr M,mch st			
	185-190	5		Ss,yl gry,fn,P cem dol,mch Vfn;mch st;ltl cl			
EAU	190-195	5		Ss,lt ol gry,fn,P cem dol,mch Vfn;mch st;ltl cl			
	195-205	10		Ss,lt ol gry,fn,Sang,P srtg,P cem dol,mch Vfn; mch st;ltl cl,dol, & sh;many foss			
CLA	205-215	10		Ss,lt ol gry,fn,Sang,P srtg dol,mch Vfn;mch st;ltl cl,dol & sh			
	215-220	5		Ss,ol gry,Vfn,P cem dol,mch fn;mch st&cl			
	220-225	5		Dol,yl gry,fn,sndy,many foss;mch st,sh & snd			
IRE	225-230	5		Ss,ol gry,fn,F cem dol,mch Vfn,ltl M,tr C			
	230-235	5		Ss,ol gry,Vfn,F cem dol,mch fn,ltl M,tr C;mch st			
	235-240	5		Ss,ol gry,Vfn,F cem dol,mch fn,ltl M,tr C			
	240-245	5		Ss,ol gry,Vfn,F cem dol,mch fn;mch st&sh			
	245-260	15		Ss,ol gry,Vfn,ang,P srtg,VP cem dol,mch fn; mch st & sh;mch mica;tr glauc			
95							
	260-275	15		Ss,ol gry,Vfn,Srnd,P srtg,VP cem dol,mch fn, ltl M & C;mch st & cl;mch mica;tr foss & pyr			
MT	275-280	5		Ss,ol gry,Vfn,VP cem dol,mch fn,ltl M&C;mch st&cl			
	280-295	15		Ss,ol gry,Vfn,Srnd,P srtg,VP cem dol,mch fn, ltl M & C,tr VC;tr Vfn gvl;mch st&cl;tr pyr & foss			
SIM	295-300	5		Ss,ol gry,C,VP cem dol,mch VC,M,fn,& Vfn;mch st			
	300-310	10		Ss,ol gry,Vfn,Srnd,P srtg,VP cem dol,mch VC, M,fn,& Vfn;"sooty";mch Vfn gvl;mch st;ltl sh			
ON	310-320	10		Ss,ol gry,C,Srnd,P srtg,VP cem dol,mch VC,M,fn, & Vfn;"sooty";mch Vfn gvl;ltl st			
	320-325	5		Ss,ol gry,C,VP cem dol,mch VC,M,& fn;"sooty"			
	325-330	5		Ss,ol gry,C,VP cem dol,mch VC,M,& fn;"sooty"			
	330-335	5		Ss,ol gry,VC,VP cem dol,mch C,M,& fn;"sooty"			
	335-345	10		Ss,ol gry,VC,VP cem dol,mch C,M,& fn;"sooty" mch Vfn gvl;ltl st & sh			
	345-350	5		Ss,lt ol gry,C,VP cem dol,mch VC,M,&fn;"sooty"			
	350-365	15		Ss,ol gry,C,Srnd,P srtg,VP cemdol,mch VC,M,& fn;"sooty";tr Vfn gvl;mch st			
	365-370	5		Ss,ol gry,C,VP cem dol,mch M-fn,tr VC-Vfn;tr st			

Hudson, Municipal Well, Hudson, Wisconsin

	370-380	10		Ss,ol gry,C,Srnd,P srtg,VP cem dol,mchM-fn, ltl VC,tr Vfn;tr st		
	380-385	5		Ss,ol gry,C,VP cem dol,mch M-fn,ltl VC,tr Vfn		
	385-395	10		Ss,ol gry,C,Srnd,P srtg,VP cem dol,mch M-fn, ltl VC,tr Vfn;"sooty";ltl Vfn gvl;tr glaucic sh		
	395-400	5		Ss,ol gry,C,VP cem dol,mch M-fn,ltl VC,tr Vfn		
	400-405	5		Ss,ol gry,C,VP cem dol,mch M-fn,ltl VC,tr Vfn		
	405-410	5		Ss,ol gry,C,VP cem dol,mch M-fn,ltl VC,tr Vfn		
	410-420	10		Ss,ol gry,C,Srnd,P srtg,VP cem dol,mch M-fn, ltl VC,tr Vfn;tr Vfn gvl;tr glaucic sh		
	420-425	5		Ss,ol gry,C,VP cem dol,mch M,fn,& Vfn,ltl VC		
	425-435	10		Ss,ol gry,C,Srnd,P srtg,VP cem dol,mch M-VC, ltl fn-Vfn;tr Vfn gvl		
	435-440	5		Cong,lt ol gry,fn,VP cem dol,mch Vfn gvl;mch snd		
	440-445	5		Ss,vlt ol gry,M,VP cem dol,mch fn,ltl C,Vfn&VC		
	445-450	5		Ss,lt ol gry,C,VP cem dol,mch VC&M,ltl fn&Vfn		
	450-455	5		Cong,lt ol gry,fn,VP cem dol,mch Vfn gvl;mch snd		
	455-460	5		Ss,lt ol gry,C,VP cem dol,mch VC&M,ltl fn&Vfn		
	460-465	5		Cong,lt ol gry,fn,VP cem dol,mch Vfn;mch snd		
	465-470	5		Cong,lt ol gry,fn,VP cem dol,mch Vfn;mch snd&st		
	470-480	10		Cong,lt ol gry,fn,VP cem dol,mch Vfn;mch snd & st;tr pnk feldspar & gn glaucic sh,ltl pyr & dol		
	480-485	5		Snd,lt ol gry,C,VP cem dol,mch M-VC,ltl fn-Vfn		
	485-495	10		Cong,lt ol gry,Vfn,Srnd,P srtg,F cem dol,ltl fn gvl;mch snd;ltl st;tr pyr		
	495-500	5		Cong,lt ol gry,Vfn,Sang,mch Vfn;ltl snd;tr pyr		
	500-505	5		Cong,lt ol gry,Vfn,Sang,tr fn;mch snd&st;tr pyr & sh		
	505-510	5		Cong,lt ol gry,fn,Sang,mch Vfn;ltl snd&st;tr pyr		
	510-521	11		Cong,lt ol gry,Vfn,Sang,P srtg,P cem dol,tr fn; mch snd & st;ltl gn glaucic sh;tr sndy dol		
201	521-522	1	xxxxxxxxx	Rhyolite,red gray or possibly Red Clastic Series		522'

Formations: Drift, Franconia, Ironton, Eau Claire, Mt.Simon, Precambrian
Well tested for 15 hours at 600 gpm with 40 feet of drawdown.
Specific capacity = 15 gpm per foot of drawdown

050864- Hydrological Investigation of VOC Contaminated Private Wells Near Hudson, Wisconsin