GROUNDWATER AQUIFERS OF THE UPPER MOHAWK VALLEY

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INTRODUCTION

Much of the groundwater used by the city of Schenectady and the several smaller communities in the near vicinity comes originally from the Mohawk River via gravel aquifers lying just below or at the present surface. In addition to the city itself, the towns of Niskayuna, Rotterdam Junction and the Scotia-Glenville area also use this major primary source (Figure 1). Of course, other smaller sources exist, including the bedrock sandstones and shales (the Middle Ordovician Schenectady Formation) and surficial but small perched sand and gravel deposits adequate for household supplies with volumes that range from 1.5 to perhaps as much as 10 gallons per minute for a reasonable period of time. The Mohawk River, however, provides millions of gallons of clean fresh water each day from gravel aquifers through which the less than desirable river water flows and is, as a result, cleaned to a remarkable degree.

The basic study of the area was done by Simpson (1949) and by Winslow *et al.* (1965) as well as several other authors. The present study, primarily in the Rotterdam Junction Aquifer (Figure 1), builds upon their work and corrects some basic misconceptions regarding gravel aquifers of this type. It was supported by the Schenectady Chemical Company, now Schenectady International, and was used in litigation designed to protect their own and the town of Rotterdam Junction's water supply. The matter became important because the gravels were being mined and the aquifer was in danger of total removal (Figure 2). The vice-president of the company at that time (Clinton P. Braidwood) provided a drill rig and crew for my exclusive use and hired me as a consultant to study the aquifer fully. Dr. Robert Yunick, the present vice-president, continued the effort and now that litigation has ended successfully, has given me permission to publish the study. The town of Rotterdam Junction now owns the property in question in that area and James Constantino, the present town supervisor, has given permission for our entry to that particular site and has permitted our visit.

GENERAL GEOLOGY

The gravel aquifers in the Schenectady, New York, area are located west of the city along the Mohawk River. They result from a series of glacial advances and withdrawals coupled with fairly complex erosion cycles intermixed with these glacial alternations. All of this lies on the eroded and well dissected preglacial surface of the Middle Ordovician Schenectady Formation consisting of thick-bedded, grey and brown sandstones overlain by a sequence of sandstones and dark grey to black shales followed by an upper series of grey to black shale beds. Each of these lithologies resembles the different members of the Normanskill Formation (Mount Merino and Austin Glen) but there are differences both in the character of the grains and in the included fragments common in the Austin Glen (see Kidd et al., this volume). The Schenectady Formation differs from the other units in sufficient characteristics that it can easily be distinguished from them.

A lobe of the advancing ice turned from its southward course and flowed eastward down the Mohawk Valley. The advancing ice moved over the unconformity on the top of the then eroded Schenectady Formation, eroding it even more, and deepened the walls of that ancient Mohawk Valley. When the ice melted back and withdrew from the area, its fast moving outwash cut another new path in places, often producing deep but small gorges or waterfalls.

Excellent stream gravels were deposited along the course of that river bed but in the deeper areas farther east, glacial muds and grey silt and clay with shale fragments were deposited. These deeper locations may have been parts of an old river bed or merely places where erosion took place at an ice margin, producing deeper pools. As the stream velocity slowed, these finer materials were deposited. Therefore, an old stream valley

In Garver, J.I., and Smith, J.A. (editors), Field Trips for the 67th annual meeting of the New York State Geological Association, Union College, Schenectady NY, 1995, p. 413-425.

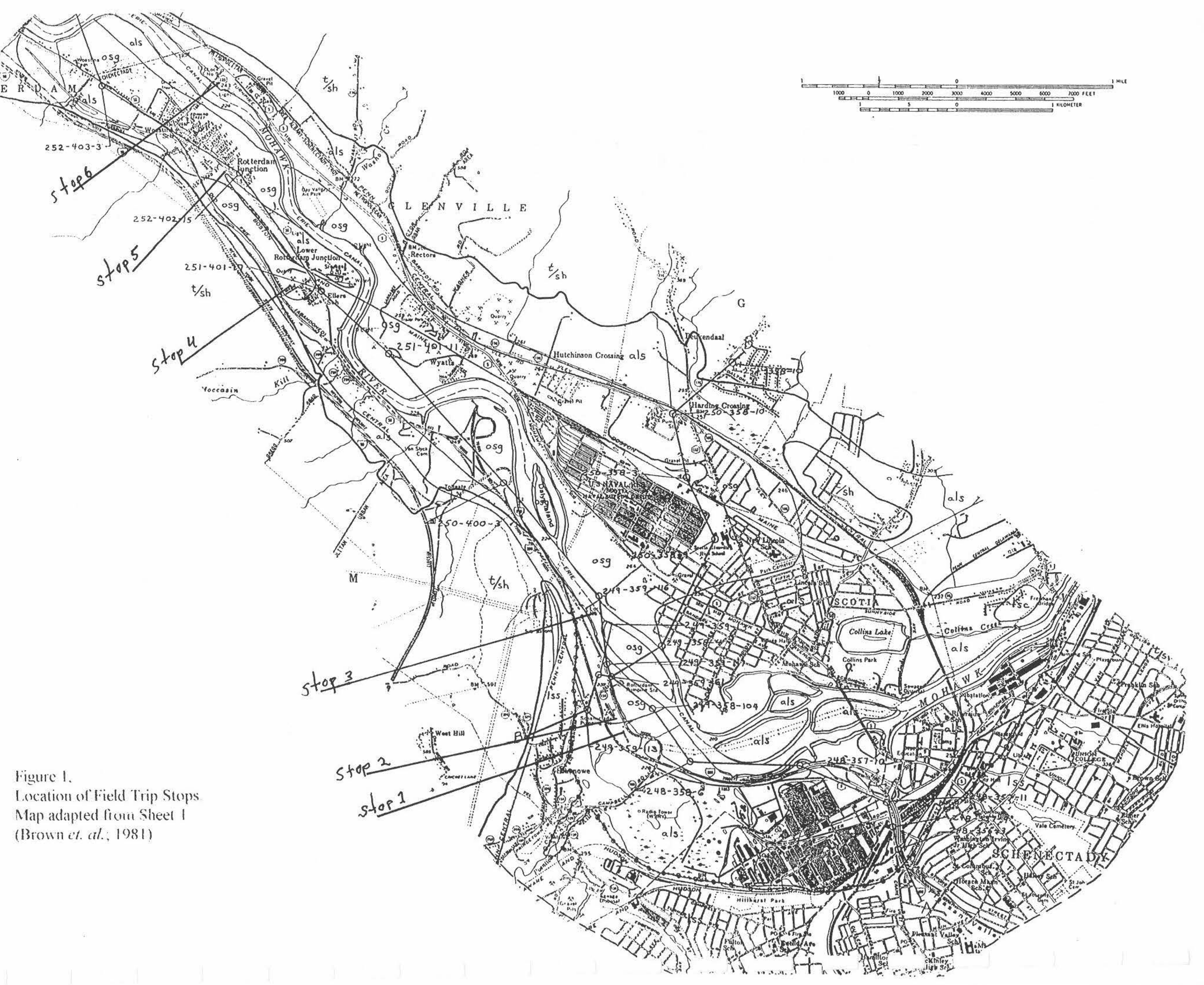

Figure 1.
Location of Field Trip Stops
Map adapted from Sheet 1
(Brown *et. al.*, 1981)

south of, but parallel to, the present stream contains beds of economically useful and well-sorted gravels cut by thick deposits of the clay, silt and fragments. The thickness of the gravels in places is up to about 40 ft. and the thick clay and fine deposits are hundreds of feet thick (see the well logs in Table 1).

The last major event was a brief advance of the ice over the region and the subsequent deposition of a ground moraine of till (gravel, clay, etc.) up to 10 feet thick.

THE GROUNDWATER PICTURE

In no way does this report attempt to discuss the entire story of the groundwater of Schenectady County. That very large study was well done by Simpson (1949) and Winslow *et al.* (1965). However, neither of those studies had sufficient well data to describe the major aquifer and the prime source of water from the aquifer south of Rt. 5S in Lower Rotterdam Junction. This unit is closely related to the Schenectady water well supply which also supplies Rotterdam itself. It is the problem of the lower Rotterdam Junction aquifer that is of primary concern in this report. A discussion of the Schenectady-Rotterdam-Rotterdam Junction aquifer ties the general picture together. Our field trip will visit locations for these parts of the aquifer.

Each of the individual gravel "patches" represents a portion of an extensive series of gravels deposited in an earlier Mohawk River. Each was cut off from the other "patches" by meandering of the river and each became and is now a separate aquifer.

THE SCHENECTADY AQUIFER

These gravel deposits are located in an area known as the Great Flats and are found along the south bank of the Mohawk River over an area a few hundred feet wide and less than one-quarter of a mile in length. The L&M Motel lies on top of the easternmost extent of that aquifer. West of the Schenectady Rotterdam #5 Well Field is Lock #8, but it is Lock #7 which actually controls the level of the water in the River (called the Barge Canal) at that point. As will be shown, the locks on the Mohawk River actually control the flow of water into these gravels.

The quality of the Mohawk River water is dramatically changed after it enters the gravels, which have small amounts of sand and clay in the interstices. As a result, water pumped at the Schenectady and Rotterdam #5 Well Field is cleaned and requires only a small amount of chlorination and relatively minor treatment to make it palatable and highly potable. Of course, it is an area in delicate balance. On an early occasion during the construction of the motel, some contamination did in fact occur but it was rapidly ended and there appears to have been no problem since that time. Any construction or even contamination from the recently built mall on Campbell Rd. (Rotterdam Square Mall), or the recently closed gasoline station (Mobil) could also endanger these water supplies. Futhermore, the water level in the Mohawk River depends upon the lock levels for each of the aquifer portions of these gravels.

THE ROTTERDAM JUNCTION AQUIFER

By far the largest and most vulnerable of the gravel aquifers is the one that provides the water supply for the town of Rotterdam Junction and its main industry, Schenectady International. The length of this gravel aquifer is over 11,000 ft. and it varies from a few hundred to over a thousand feet in width. The gravel is typically a clean pea gravel, but also has a reasonable quantity of sand and minor clay. Thicknesses are quite variable but primarily the best gravels are as few as ten to fifteen to over forty feet thick in much of the length.

The most interesting part of the problem lies in the fact that this aquifer is also a valuable economic resource. Its first appearance was in the Kellam-Schaffer Pit which we will visit on Stop 4. Here gravel was mined for many years. Two wells in this area tap the aquifer and for years provided water for the function of the Rotterdam Junction Chemical Plant which had (and still has) need for a plentiful supply (at least 2000 gallons per minute) of clean water for its operation. Later, others purchased the pit and expanded the quarrying, leaving a large and deep pit (Figure 2). The question of the value of the gravel versus the value of the water produced

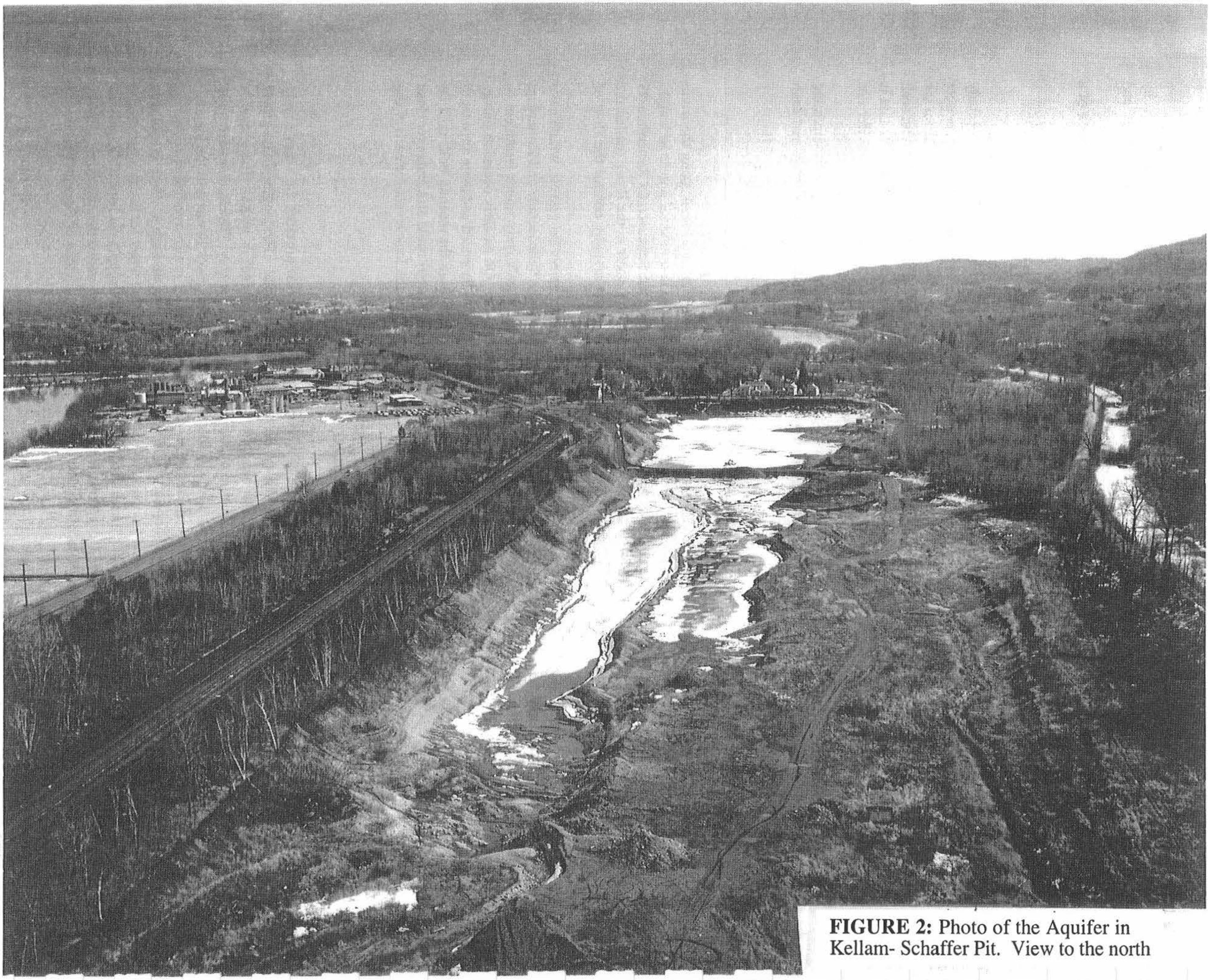

FIGURE 2: Photo of the Aquifer in Kellam- Schaffer Pit. View to the north

nearly thirty years of litigation, mining, periods in which mining was stopped legally, and continual study to learn everything we could about the aquifer in order to do all we could to prove its vulnerability and the probable loss of clean water with the loss of the aquifer to mining. Finally, thanks to Schenectady International, the aquifer area in the now much enlarged pit belongs to the town of Rotterdam Junction which plans to preserve it as parkland.

THE HYDROLOGIC REGIME

Very little recharge of the aquifer results from the surface except where the till cover and/or the gravel have been removed by mining. Originally, before mining, virtually no meteoric water passed through the highly clay-rich till at the surface overlying the aquifer. Now the surface of the aquifer is exposed and is constantly subject to potential contamination.

Recharge of this aquifer has been demonstrated to be from the Mohawk River west of Lock #9. For many years those who had earlier studied the aquifer believed recharge also came from the river east of Lower Rotterdam Junction and above Lock #8. Their argument presented some problems during litigation designed to protect the aquifer. As a result, however, wells were drilled in every possible location and direction east and north (as well as south and west, where possible) and well records fail to show the aquifer in any other position but that shown on Figures 1 & 3. A series of brief logs has been included at Table 1 which is keyed by H number (Hewitt number) to locations on the map (Figure 3) which demonstrates the recharge picture.

It is now very obvious that recharge occurs west of Lock #9 at the southward bend of the river. The water elevation of the river controls the water elevation in the aquifer. Records have been kept for over thirty years that demonstrate this correlation very closely. Within seven to ten days of the time Lock #9 is closed, the water at the old pit begins to rise. When the river level is lowered with the Lock #9 gates opened, the water level in the wells drops subsequently and in the same time interval. Were it not for the voluminous material and the need to consider space available in this guidebook, this material could easily have been included in this present report. Numerous wells have been drilled east of the old pit (Kellam and Schaffer) and east of Mabee Lane. No gravel is found at the horizon of the aquifer although a few minor gravels appear at shallow depths but show no hydraulic connection with the major aquifer. Some of these wells are also shown on the enclosed logs and are located in Figure 3 by H number (Hewitt number).

In addition to all of this, the river bank on the southward bend east of the pit area shows no sign of gravel and wells drilled all along that area show primarily upper-level gravels and deep silt and clay deposits some several hundred feet deep.

Brown *et al.* (1981) described the area in maps and cross-sections to show the geohydrology of the aquifer. In the area of the Rotterdam Junction aquifer, they used my data to produce their concept of this aquifer. Actually, our ideas appear to be quite similar but there are differences based on my complete well data. I have used their base map as my Figure 3 but have added a line marked with x's to show where we differ in concept. Therefore, my Figure 3 is adapted from their Sheet #1.

The aquifer is capable of very high hydraulic conductivity. Enormous volumes of water are passed through daily even at the lowest levels of the Mohawk River source. Schenectady International uses well over two million gallons per day and when one considers the entire area, including the Rotterdam Junction town wells and other users, it is probable that the aquifer could provide better than three million gallons per day with no appreciable loss of storage capacity. A rough estimate done by Prof. Carl George (Union College Biology Department) and Sandy Cardella, engineer, indicates yields and storage capacities even higher.

CONCLUSION

That the aquifer at Lower Rotterdam Junction has suffered from mining is quite clear from the aerial view in Figure 2. Even more obvious is that since the gravel has been mined so seriously, calcium carbonate deposits and surface clay settling prevent water from rising as high as it formerly did in the old pit. Fortunately,

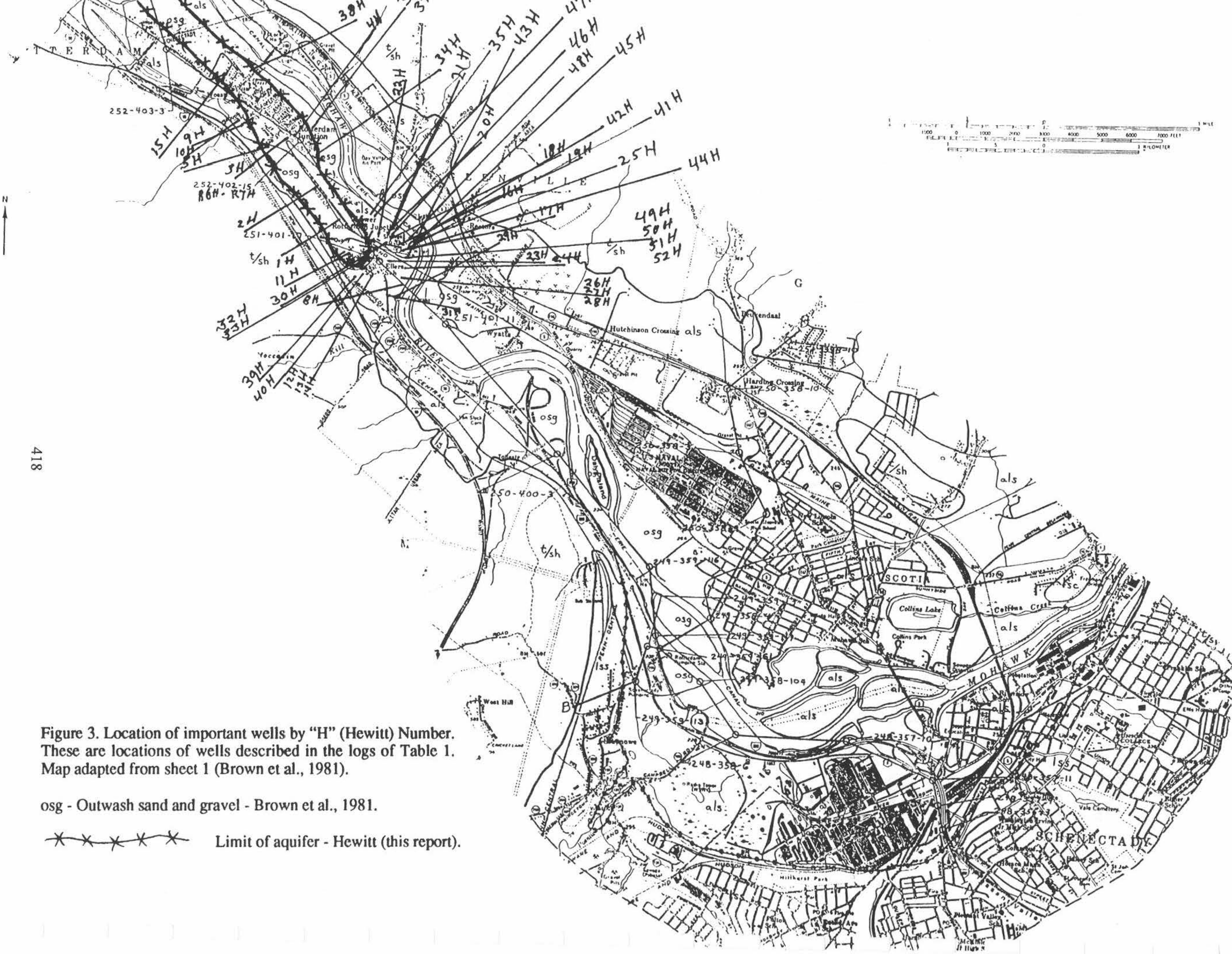

Figure 3. Location of important wells by "H" (Hewitt) Number. These are locations of wells described in the logs of Table 1. Map adapted from sheet 1 (Brown et al., 1981).

osg - Outwash sand and gravel - Brown et al., 1981.

Limit of aquifer - Hewitt (this report).

there remains much below surface storage and by intercepting the water in a more westerly area, the volumes are still great and transmissivity is still very high.

The aquifer further east, used by Schenectady and the town of Rotterdam, has not suffered in the same way and should provide its usual plentiful supply of clean water unless additional problems arise.

ACKNOWLEDGEMENTS

My gratitude to Schenectady International and all those associated with it, particularly Sandy Cardella, who assisted in every possible way to make this study successful and complete. There is no way to thank Sandy enough for his interest and his help. Even opponents who argued against certain conclusions are to be thanked. They literally and legally forced the study to go toward certainty and not merely scientific probability. They were actually of great help by making us do more than would normally be required.

TABLE 1: LIST OF WELLS AT ROTTERDAM JUNCTION BY "H" NUMBER (HEWITT NUMBER)

1H	Test Well	1-65			Dry hole
	Layne-New York Co.	Permeable bed	0	- 34"	Sand, gravel, boulders
			(19')	- 53"	Sandy grey clay, gravel
			(8')	- 61'	Grey clay
			(35')	- 96'	Sandy grey clay
			(2')	- 98'	Sand, gravel, clay
					98' Bedrock
2H	Layne-New York Co.	2-65			Water 35' 2"
			(16')	- 51"	Sand, gravel
			(37')	- 88'	Sand, grey clay
				- 88'	Bedrock
3H	Layne-New York Co.	3-65			Water 34'
			0	- 15'	Sand, gravel, clay
			(28')	- 43'	Sand, gravel
			(24')	- 67'	Sand, gravel, some clay
			(64')	- 131'	Sandy, grey clay
				- 131'	Bedrock, sand, gravel on top (thin)
4H	Layne-New York Co.	4-65			Water 35'
			0	- 8'	Sand, gravel
			(6')	- 14'	Hardpan clay, sand, gravel
			(56')	- 72'	Sand, gravel
			(2')	- 74'	Sandy clay, gravel
			(57')	- 131'	Sandy grey clay
5H	Layne-New York Co.	5-65			
			(6")	- 6"	Top soil
	Record enclosed		(13')	- 13'	Sandy clay
			(8')	- 21'	Sand, gravel & clay
			(24')	- 45'	Sand & gravel
			(21')	- 66'	Sand, gravel & boulders
			(16')	- 82'	Sand, clay with gravel
			(2')	- 84'	Soft rock
				- 84'	Hard rock
R6H		Stewart's	RJ 1957-1		Water 32.63'
			(25')1	- 25'	Silty sand, gravel
	Get record from Stewart		(11')	- 36'	Clayey sand, gravel

by permission		(13.5)	- 49.5'	Silty sand, gravel
		(36.5')	- 86'	Sand, gravel (water bearing)
		(2')	- 88'	Hardpan

R7H	Stewart's	RJ1947-1		Water 27.5'
		1'	- 5'	Silty gravel
Get record from Stewart		(15')	- 20'	Clayey sand
by permission		(20')	- 40'	Gravel with clay
		(5')	- 45'	Gravel, little clay
		(3')	- 48'	Clean gravel
		(15')	- 63'	Gravel (water bearing?)
		(2')	- 65'	Clayey gravel

8H B&M R.R. (G.W. - 30)

20 feet deep in gravel-dug 300 gpm

9H R.J. Water district #3 test 1 - south of Erie Canal at end of Iroquois St.

Clay (see G.W. - 30) or Stewart or R.J. Dist. #3.

10H R.J. Test well for Water district #3 in clay, small yield - N side of Erie Canal.

100+ ft. of clay

11H	Schenectady International - 2 wells in quarry		Water 33'6"
	0	- 6'	Sand and gravel
	(2)6	- 8	Blue clay
	(9)8	- 17	Gravel, sand & clay
	(16)17	- 33	Gravel, sand & clay
	(7)33	- 40	Medium & large gravel
	(6.5)40	- 46.5	Large & medium gravel, boulders
		46.5	Bedrock

12H)		98)	All shallow wells -note topography
13H)	Gravel	101)	of Simpson's Report.
14H		102)	G.W. - 30

15H	Layne-New York Co.	6-65		(Water)
		(6")	- 6"	Top soil
		(2.6")	- 3'	Sandy brown clay
		(44)	- 47'	Sand and gravel
		(4)	- 51'	Dirty sand and gravel
		(11'9")	- 62'9'	Grey sandy clay

16H	Layne-New York	1-51		(No Water)
			- 2'	Top soil
		(7)	- 9'	Sandy clay
		(7)	- 16'	Sandy clay & boulders
		(33)	- 49'	Tough grey clay
		(56)	- 105'	Sticky grey clay

17H	Layne-New York	2-51		(No water)
			- 2'	Top soil
		(18)	- 20'	Sandy clay
		(2)	- 22'	Sandy clay, little gravel & boulders
		(87)	- 109'	Tough grey clay

18H	Layne-New York	3-51		(No water)
		(7)	- 7'	Fill and boulders

		(12)	- 19'	Sandy clay
		(14)	- 33'	Tough grey clay
		(3)	- 36'	Clay packed, little sand, gravel, boulders
		(64)	- 100'	Sticky grey clay
19H	Layne-New York Co.	4-51		(No water)
		(18)	- 18'	Sandy clay, little gravel & boulders
		(5)	- 23'	Muddy sand, gravel, boulders-takes water
		(59)	- 82'	Sticky grey clay
		(60)	- 142'	Tough grey clay, little gravel
20H	Layne-New York Co.	6-51		(Some water)
		(13)	- 13'	Sandy clay, little gravel & boulders
N.G. pulled casing and		(18)	- 31'	Dirty sand, gravel & boulders
filled hole.		(1)	- 32'	Muddy sand, gravel & boulders - takes water
See comments 21H		(2)	- 34'	Coarse sand, gravel & boulders (water)
		(46)	- 80'	Grey clay
		(10)	- 90'	Sticky grey clay
21H	Layne-New York Co.	5-51		(Some water)
Record enclosed.		(9)	- 9'	Sandy clay, little gravel, boulders
Ten ft. higher (all measurements)		(15)	- 24'	Muddy sand, gravel & boulders (takes water)
than at S.C. wells. Not aquifer - relates to		(11)	- 35'	Coarse sand, gravel & boulders (water)
upper stratum 1# (dry) temporary water.		(3)	- 38'	Grey clay
22H	Layne - New York	7-51		(No water)
		(6)	- 6'	Sandy clay, little gravel & boulders
		(20)	- 26'	Muddy sand, gravel & boulders (takes water)
		(29)	- 55'	Sticky grey clay
		(64)	- 119'	Grey clay, little sand
		(19)	- 138'	Grey clay, little gravel
		(5)	- 143'	Clay, little shale & little gravel
		(2)	- 145'	Broken rock
23H	Layne-New York Co.	8-51		(Some water)
		(8)	- 8'	Sandy clay & boulders
N.G. pulled out		(19)	- 27'	Muddy sand, gravel & boulders (takes water)
		(3)	- 30'	Coarse sand, gravel, boulders (water)
		(13)	- 43'	Sticky grey clay
24H	Layne-New York Co.	11-55		(No water)
		(29')	- 29'	Fine brown sand & gravel
		(61')	- 90'	Grey clay with sharp, black gravel
25H	Layne-New York Co.	12-55		(No water)
		(6)	- 6'	Top soil
		(15)	- 21'	Sand and gravel
		(36)	- 57'	Grey clay
26H	Bradt home 285 ft. to bedrock			240'
See Mr. Bradt for record	All grey clay	285		
27H	Bradt home85 ft. in grey clay			
See Mr. Bradt for record.				
28H	Bradt home17 ft. well static level 10 ft.			
See Mr. Bradt for record.	(7 ft. of water) in gravel, Coarse with big boulders - not the aquifer.			

29H	Layne-New York Co.11a-51			(2'6" from surface) (Some water.)
		(5)	- 5'	Top soil and clay
		(9)	- 14"	River mud
Not aquifer		(6)	- 20'	Dirty sand, gravel, boulders - water
Water at 2'6" - would not pump!		(2)	- 22'	Muddy little tight sand, gravel & boulders
		(3)	- 25'	Clay
30H	Layne-New York Co. 10-51			(Water)(38'-46')
This well now dry. Had rapid drawdown.		(9)	- 9'	Sandy clay, gravel & boulders
Note: material not aquifer.		(18)	- 27'	Muddy sand, gravel & boulders (takes water)
		(11)	- 38'	Dirty sand, gravel & boulders (takes water)
		(8)	- 46'	Coarse sand, gravel & boulders (water)
		(4)	- 50'	Clay
31H	Layne-New York Co. 9-51			
		(5)	- 5'	Topsoil and clay
Static 9'. Pumping level 16'		(11)	- 16'	River mud
Draw down 7' with G.P.M.		(6)	- 22'	Muddy sand, gravel & boulders (water)
N.G.		(3)	- 25'	Tough clay
32H	Layne-New York Co. 14-55			(Water)
		(47)	- 47	Sand and gravel
		(30)	- 7'	Clay
33H	Layne-New York 13-55			(No water)
		(29)	- 29'	Yellow sand & gravel
		(31)	- 60'	Grey silt & grey clay
34H	West End Orchard St.Hauserwas well north side of house.			
See owner for record.	260 ft. deep. All clay.			
35H	Layne-New York CoSimpson G.W. - 30			(Some water)
		(24)0	- 24	Sandy brown clay
		(2)	- 26	Muddy sand with wood
Not enough to pump!		(5)	- 31	Sand, gravel & clay
		(13)	- 44	Grey sand clay
		(13'6")	- 57.6"	Grey clay with gravel
			- 57.6'	bedrock
36H	Mr. Zielinski30' in gravel (water)			
See Mr. Zielinski for record.	Shallow gravel (30')			
37H	Schultz	0	- 31'	gravel (carbonated water!)
See Mr. Zielinski for record.		-	150	clay, gravel below
38H	Applebee Well 90' in clay			
	west side of Bridge St. at 5S			
	Hearsay record - cannot confirm, but fits other data.			
39H	Layne-New York Co. 8-65			Water (out at 15gpm)
		0	- 36	Sand, gravel & clay
		36	- 42	Grey clay
			- 42'	Bedrock
40H	Layne-New York Co. 9-65			
		(21)	- 21'	Sandy clay with sand and gravel

		(5)	- 26'	Brown sandy clay
		(17)	- 43'	Soft grey clay with sand and gravel
		(2)	- 45'	Sand, gravel with clay
		(1)	- 46'	Soft rock
			- 46'	Hard rock
41H	Layne-New York Co.	10-64		Water (out at 7 gpm)
		(16)	- 16'	Sandy silty clay
		(16)	- 31'	Sand, gravel, boulders with clay
		(7)	- 39'	Silty clay with sand
		(30	- 42'	Black shale
42H	Layne-New York Co.	11-65		Some water
		(19)0	- 19'	Yellow sandy clay with sand
		(8)	- 27'	Yellow sand, gravel & clay streaks
		(4)	- 31'	Grey clay with sand & gravel
		(18)	- 49'	Grey sticky clay
43H	Layne-New York Co.	12-65		(No water)
		(14')	- 14'	Brown sandy clay, sand, gravel, boulders
		(7')	- 21'	Grey clay with sand & gravel
		(24')	- 45'	Sticky grey clay
44H	Stewart	1-80		
		0	- 29	Brown sand, gravel (yellow!), some silt, trace clay, few gravel pieces
		29	- 50	Grey clay with silt and fine sand
		50	- 55	Silt with fine sand and clay
		55	- 60	Grey clay with silt and fine sand
		60	- 80	Grey clay
		80	- 85	Grey clay with silt and fine sand
		85	- 110	Grey clay
		110	- 120	Grey clay with silt and fine sand
		120	- 133	Grey clay
		133	- 137	Till - compact - dense fine sand, silt, clay - rock fragments
		137	- 165	Med. -fine sand - silt - trace clay, few pieces gravel
		165	- 180	Grey clay with fine sand - silt - few small gravel pieces
		180		Gas - clay and shale fragments - bedrock
45H	Stewart	2-80		
		0	- 10	Sand - coarse, yellow, medium-fine with silt, some pieces fine gravel, stone
		10	- 17	Sand - coarse, medium-fine with silt odor - chemical unrelated to aquifer on this alone and too high.
		17	- 20	Grey clay
46H	Stewart	3-80		
		0	- 10	Brown sand - gravel - some silt (yellow?)
		10	- 15	Brown sand -silt - some fine gravel (yellow?)
		15	- 20	Brown fine sand - silt (yellow?)
		20	- 25	Brown fine sand with silt - some fine gravel (yellow?), clay 24-25 ft.
		25	- 40	Grey clay, silt - some fine sand
		40	- 50	Grey clay

		50	- 60	Grey silt, clay fine sand
		60	- 70	Grey clay
		70	- 85	Sandy grey clay
		85	- 100	Grey clay
47H	Stewart	4-80		
		0	- 10	Brown sand - silt- some fine gravel (yellow?)
		10	-15	Brn. sand - cs., med., fine silt, pieces of cobbl.
		15	- 20	Brown fine - medium sand, some coarse and few pieces of large cobble, silt
		20	- 25	Brown fn. sand, some cs. & med. sand with silt
		25	- 30	Brown cs. sand - with med. & fine gravel -silt
		30	- 35	Brown sand - coarse, medium, fine with silt
		35	- 37	Brown clay - sand, silt, trace grey clay
		37	- 65	Grey till(?) clay, sand, silt, stone
		65	- 75	Grey clay
		75	- 80	Grey till (?) clay, sand, silt, stone
		80	- 83	Grey clay
		83	- 90	Lumps of grey clay with sand silt stone (till ?)
		90	- 95	Grey clay
		95	-105	Fine-med. sand, silt, clay; some stone
48H	Stewart			
		0	- 29	Brown (yellow?) sandy loan, sand - silt -fine gravel, cobbles
		29	- 32	Brown fine sand (yellow?)
		32	- 40	Grey clay, silt, sand with some stones
		40	- 55	Silt - sand - grey clay
		55	- 70	Silt - sand - clay - some stone (till)
		70	-100	Grey clay
49H	Layne-New York Co.	1-66		No water
		0	- 8	Fill
		8	- 12	Clay and gravel
		12	- 64	Sand and gravel
		64	- 132	Clay with streaks of gravel
		133		Rock
50H	Layne-New York Co.	2-66		Not pumpable water
		0	- 14	Fill
		14	- 22	Brown clay and gravel
		22	- 48	Sand and gravel
		48	- 51	Brown clay
		52		Rock
51H	Layne-New York Co.	3-66		Not pumpable water
		0	- 12	Fill
		12	- 21	Brown sandy clay
		21	- 46	Sand and gravel
		46	- 49	Clay
		49	- 52	Soft rock at 52
52H	Layne-New York Co.	4-66		Dry hole
		0	- 9	Fill
		9	- 11	Brown clay and gravel
		22	- 15	Sand and gravel
		15	- 17	Rock

REFERENCES

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ROAD LOG

Part of this Road Log is being prepared at a time when construction has altered or impeded travel. The mileage accuracy cannot be precise since road intersection changes may be made by the time the Field Trip is made. Enough data are given to make a successful trip, however. The trip leaves from the west side of the Ramada Inn parking lot near the Automatic Car Wash, Nott St., Schenectady, NY..

Cumulative Miles	
	Left on Nott St.
.1	Traffic light - Left (S) on Erie Blvd.. Move to right side of Erie Blvd. for right turn.
.6	Right turn on State St. at traffic light. Move to left lane for left turn.
1.8	Left turn at light. Follow signs for Interstate 890 to 90 or Rt. 5S toward Thruway. Bear to right at Schenectady County Community College. (General Electric Co. plant on left.) Go West on Interstate 890.
2.8	Mohawk River on right. Take exit for Rice Rd. L&M motel ahead on right.
3.1	**STOP 1** at L&M Motel. Discuss aquifer location.
3.3	Schenectady Water Pumping Station on left. **STOP 2.** Continue discussion of aquifer location. This is source of Schenectady City Water. Note Rotterdam Town Wells #5 District is in same well field. Discuss the aquifer itself and probable environmental concerns.
3.5	Go west 0.2 miles on Rice Road to Lock #8. **STOP 3** Park. Discuss source of water here.
4.0	Return on Rice Rd. to Rt. 890 (90). Turn right (west) toward NYS thruway entrance. Stay on Interstate 890 (90) to Rt. 5S. Do Not take entrance ramp to the Thruway (Interstate 90) - continue straight (left lane) to Rt. 5S.
7.8	Entering Lower Rotterdam Junction. Note bedrock on this road is Schenectady formation.
8.2	Mabee Lane. Turn left. Enter gate at fence on right at south corner. Park. **STOP 4** at old Kellam-Schaffer pit. Discuss Rotterdam Junction Aquifer. Note groundwater elevation differences. Note surface till. Note gravel and clay and calcium carbonate blocking pores. Discuss pumping situation and excavation problems. Return to cars.
8.4	Turn left onto Rt. 5S. Note Schenectady International Plant at NE location.
9.3	#3 Pump House on left side of Rt. 5S opposite Post Office. **STOP 5.** Discuss pumpage of well and the well development. Continue aquifer discussion. Return to cars. Continue west on Rt. 5S.
9.8	Turn right (N) on Bridge St. (Rt. 103)
10.1	Turn right into Canal Park. **STOP 6.** Discuss Lock #9 and Lock System in general. Field trip ends.

To return to Rt. 5S, leave park; turn left on Rt. 5S to Interstate 890 or 90 to Thruway east or west.