KARST AND STREAM CONSIDERATIONS IN THE ENVIRONMENTAL GEOLOGY OF THE MIDDLE RONDOUT AND ESOPUS VALLEYS, ULSTER COUNTY, NEW YORK

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INTRODUCTION

The geology of the middle Rondout and Esopus Valleys is as rich and varied as is the story of the struggle of the early colonial Dutch, French and English settlers of this region. The area has remained essentially rural in character until recently, but with the relative nearness of the nation's largest metropolis in the time of rapid transportation and hightech employment the region's land is quickly becoming developed.

Soils in these valleys are on bedrock of carbonates topped by thick deposits of till, modern alluvium and post-glacial lake bottom deposits. These valleys are well known for abundant harvests of sweet corn and apple production. Any acid precipitation is apparently neutralized by the carbonate character of the bedrock and the alkalinity of the streams that flow across them since no noticeable effects that occurred in these valleys. But the increase of population is coupled with a greater need for groundwater construction resources such as sand and gravel, and additional land fill sites for waste disposal. Land development has occurred here, as it has in many other areas, with little forethought and planning for environmental consequences. This field trip is a look at some factors that should be considered here and in other areas with a similar projected development of the land.

Figure 1 is a location map for this field trip. The trip can be taken with 11 stops or as either of its parts. The first part, trip G-I (stops 1-6) is a study of the environmental geology and hazards associated with Karst features of the Stone Ridge area; and the second part, trip G-II (stops 7-11) is a study of the environmental geology of the Esopus Creek Valley and some factors that may be at least partially responsible for apparently increased stream flooding and the resulting publicly-voiced concern of local residents.

The middle Rondout and Esopus Valleys are enclosed by clastic rocks of the Shawangunk Mountains to the southeast and the Catskill Mountains to the West. A more complete discussion of the bedrock geology of this "classic" area has been recently described by Lindemann and Waines (1987), and a postulated stratigraphic column of most of the formations of the valley is given in Figure 2. The Onondaga Formation is located stratigraphically 225-420 feet higher in the column than the Glenerie Formation. The basal Onondaga Formation beds are coarse-grained limestones containing abundant corals and large crinoid columnals, while the upper beds are fine-grained limestones containing dark-gray to black chert and bryozoa and brachiopod fauna.

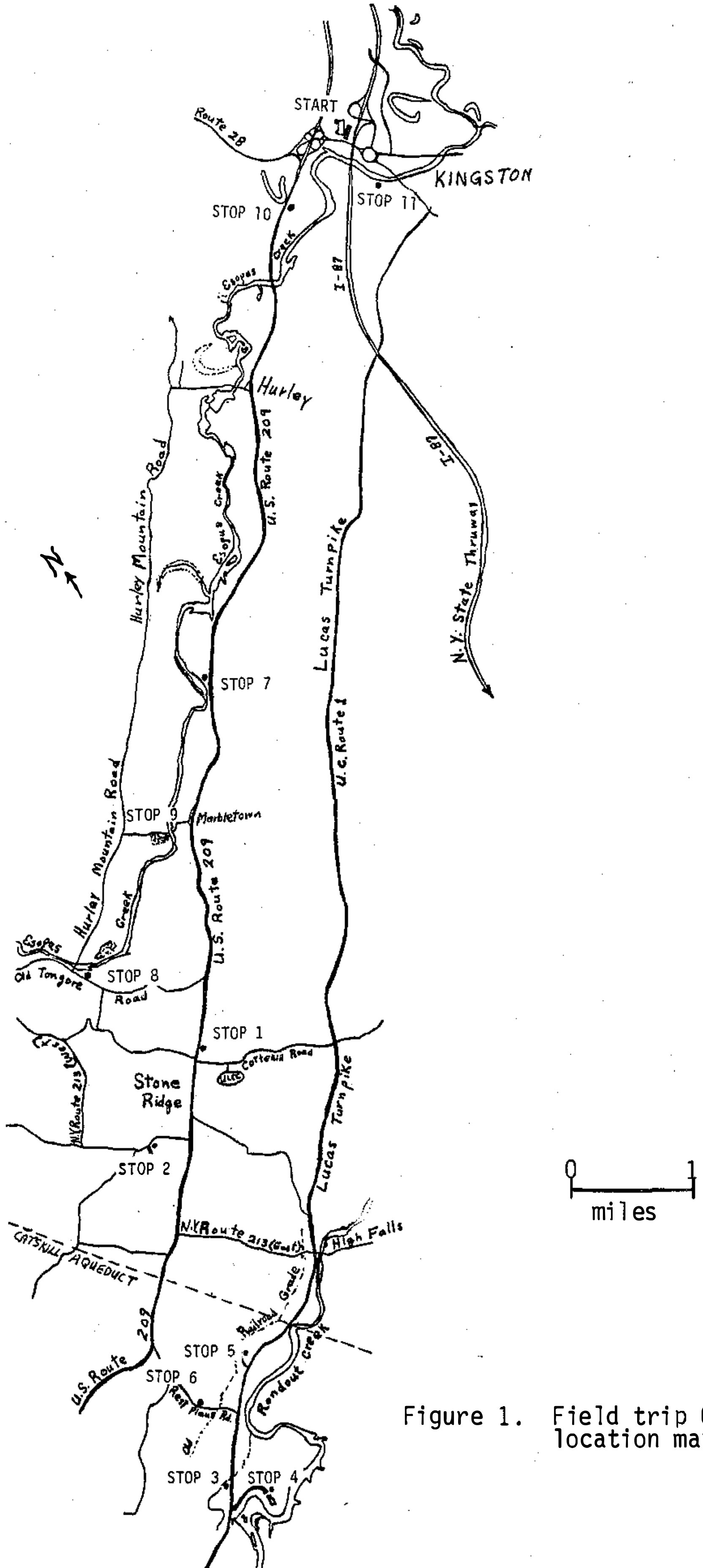


Figure 1. Field trip G field stops location map.

Karst features of the Stone Ridge, N.Y. area involve principally the Onondaga, Becraft and Rondout Formations, all quite pure limestones subject to dissolution. These units have been mined in open pits and shafts for the manufacture of natural and portland cement and for use as construction aggregate. A small solution cavity swallowing an intermittent stream is located in the Onondaga Limestone near the intersection of Route 9W and Route 199 near Kingston, N.Y. and outside of this field trip area.

Pre-Wisconsinan near-surface weathering may have led to the development of solution features along joint planes in the carbonates of these valleys.

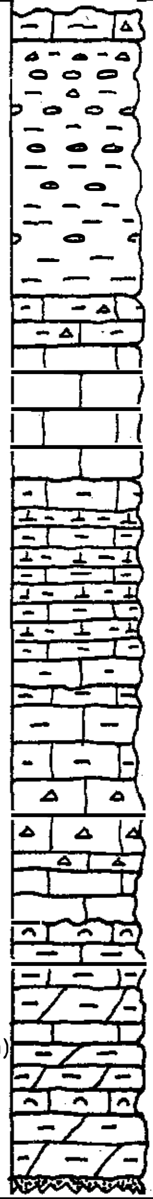
Concurrent with the forced closings of present landfills throughout the region, community leaders are faced with the difficult tasks of locating economically feasible waste disposal sites while also protecting their citizens, present and future. In order to locate and determine sites that are suitable for safe waste disposal, knowledge of site geology must be included. Early input by geologists and hydrogeologists may quickly rule out some areas before costly engineering and construction is performed. Conversely early study by geologists and hydrogeologists may affirm the inherent suitability of a site and allow progress in the difficult task of landfill selection. Important in the study of landfill site selection, in the proper management of sand, gravel and water resources and in stream flood control is an appreciation of the surficial deposits. The surficial deposits of the study area include lodgement till, modern alluvium and kames, (figure 3).

Figure 4 is the location map for a proposed landfill site near Rest Plaus Road in the Town of Marbletown. The geology and hydrology of the site and nearby areas proved to be more complex than could be estimated from published geologic maps and a brief study would indicate. Field trip part G-I examines the evidence that geological and hydrological data should be gathered and analyzed early in landfill site selection.

Field trip part G-II is a study of stream conditions that have become, at least in the eyes of the public, an increasing threat from flooding. The Esopus Creek has, however changed its course several times in the pre-history and perhaps early history of the area. With this fact in mind, present land-use practices may be evaluated less harshly than may immediately be apparent. Nevertheless, certain land-use practices, such as mining or other stream disturbances may upset a balance and increase existing environmental problems. We will examine the possible or probable effects of mining, agriculture, and residential and commercial development in the Esopus Creek floodplain.

ACKNOWLEDGEMENTS

My thanks go to many who have contributed their time and efforts to assist my study of these field trip areas, including



	CUMULATIVE THICKNESS	FORMATION	THICKNESS ± m (ft)	LITHOLOGY - REMARKS
LOWER DEVONIAN		GLENERIE	3 (10)	argil. ls., occl. chert
	30 (100)	PORT EWEN	30 (100)	argil. mudst. w/bands of ls. nodules and chert toward top
		ALSEN	6 (20)	argil. ls., sly. cherty
		BECRAFT	15 (50)	'crinoidal' ls., relatively soluble, possible aquifer
	61 (200)	NEW SCOTLAND	24 (80)	alternate calc. mudsts. and argil. ls., very fossilif.
	91 (300)	KALKBERG	21 (70)	argil. ls. at top grading to cherty ls. at base
		RAVENA	6 (20)	'crinoidal' ls. relatively soluble, possible aquifer
	122 (400)	THACHER	15 (50)	organic ls., argil. ls., argil. dol., occl. thin sh.
UPPER SILURIAN		WHITEPORT (RONDOUT)	5 (15)	argil. dol.
		GLASCO (RONDOUT)	3 (10)	organic ls., relatively soluble possible aquifer
		ROSENDALE (RONDOUT)	8 (25)	argil. dol.

Figure 2. Postulated Stratigraphic Column - Rest Plaus Property, Stops 5 and 6. Data Largely after Waines and Hoar (1967), diagram after Matson and Waines (1985)

several landowners who have allowed geologists and students to cross and examine their property, my college administrators who have supported an active UCCC geology field trip program and numerous students who have had to suffer with wet shoes, cold winds, and instructor lectures while on these field trips. The continuing support of my family in sharing my time has been most important. I especially am pleased to thank Dr. Russell Waines for the privilege of working with him (and thereby hopefully absorbing some portion of his depth of geologic understanding) and typists, Susan Salzmann, and Helen Chase, Assistant to the Dean of Instruction. Errors are assuredly mine. It is also important to me that increasing numbers of people learn and appreciate the important role of geology in protecting our environment. I hope this small study may encourage additional serious study and proper planning, and will be a help to secondary school science and introductory college science course teachers.

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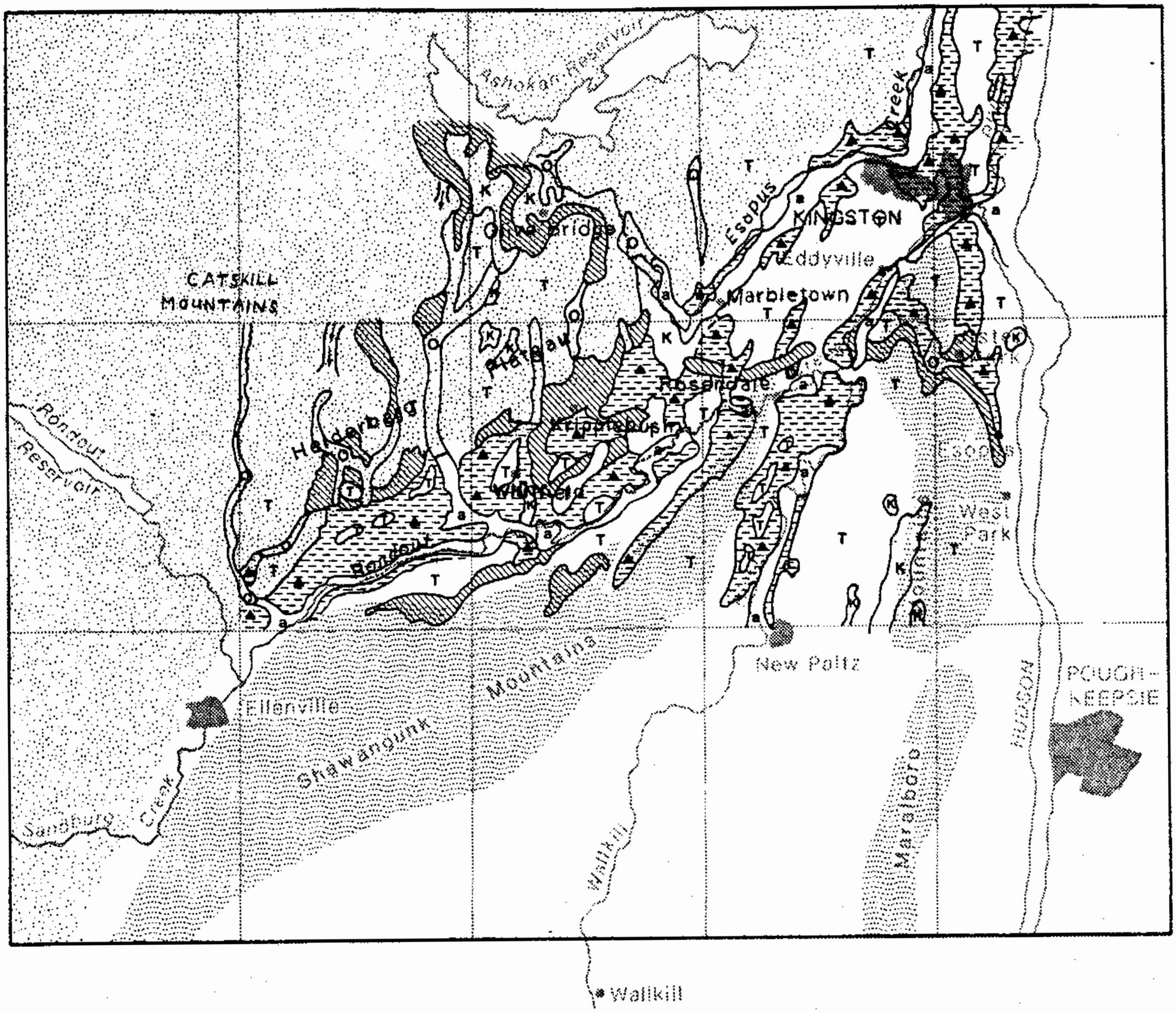
FIGURE 3. SURFICIAL GEOLOGY



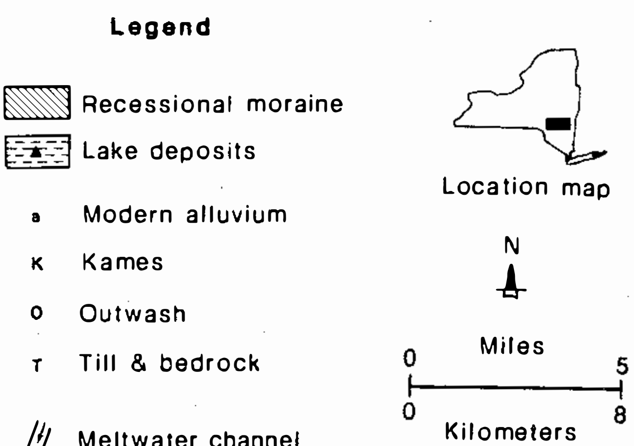


Figure 3. Surficial Geology of Middle Esopus and Rondout Valleys, Ulster County, N.Y. Modified from Dineen and Duskin (1987)

Road Log - Trip G

Cumulative Mileage

Trip G-I

Cumulative Mileage	
0.0	Road log begins at the parking lot of the Ramada Inn, Route 28 west of Kingston, N.Y. - Kingston West quad.
0.1	At traffic light, turn right onto Route 28.
0.4	Take Route 209 Exit South, Ellenville.
1.2	Oxbow on right (west), and Stop 10.
1.9	Bridge over Esopus Creek.
2.9	Hamlet of Hurley and overpass.
3.4	Roadcut with Onondaga Limestone exposed alongside highway for next 1.5 miles.
5.7	Meander of Esopus Creek on right (west).
8.5	Onondaga Limestone (old quarry?) on right (west); entering hamlet of Stone Ridge.
9.1	Park along east side highway next to fruit and vegetable stand on the corner of Cottekill Road and Route 209.

STOP 1. Enlarging Sinkhole

This sinkhole was first noted in the mid-1970's. At that time, it was approximately 5 feet in diameter and provided a convenient drain for the then-producing grapevines nearby. In ten years, it has enlarged to its present diameter of about 20 feet, with two well-developed channels leading to it. A drain next to the highway leads to a storage basin that overflows with each heavy rain. CAUTION PLEASE: the storage basin cover is a lightweight steel plate and is usually lifted off the basin entrance by the force of the overflowing water; the opening is a danger to anyone walking through the brush along this road.

Another small sink has developed next to the foundation of the rear of the two-century-old house immediately north of this stop. Please respect private property and do not enter without permission. An additional sink is located east of the rear lawn, and some subsidence is in evidence on the front and side lawns.

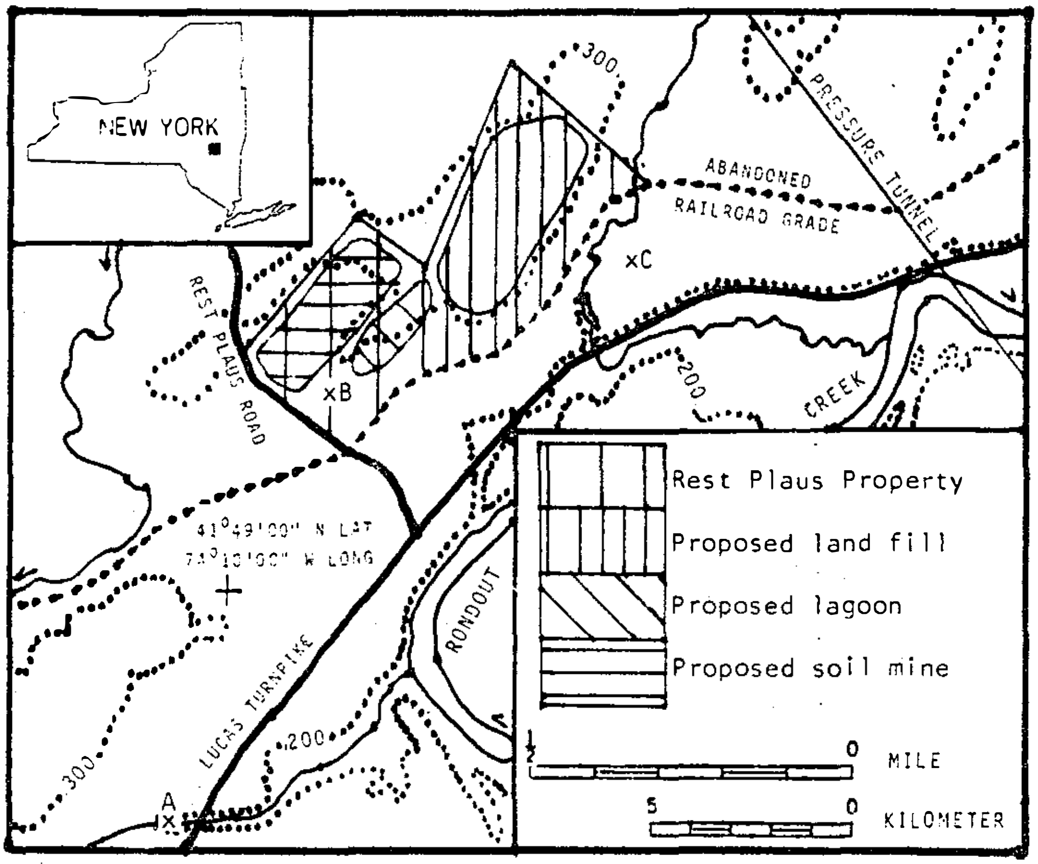


Figure 4. Location Map, adapted from Matson and Waines (1985). A on map is stop 3, C on map is stop 5, B on map is stop 6, location of sinkhole in the Becraft Limestone.

The former owner of the property on the west side of the highway wished to construct a small pond on the property. He excavated soil and lined it with clay as he was instructed by personnel with the State Department of Environmental Conservation, and watched it fill with rain water. He was quite perturbed to see the water go "down the drain." In the center of the dry basin was a hole about one foot in diameter which he sealed with cement. The man-made basin stays dry and the present landowners are evidently trying to fill it with debris.

The cause of the sinkhole development here is evidently the collapse of a cave or cave system within the Onondaga Limestone during a lowering of the local water table. When the water level dropped, the cave roof was unsupported and collapsed. The condition is accelerated by the entrance of surface water that can cause more solution of the carbonate bedrock.

In the mid-1970's, a company located about one mile to the north of this site was using water drawn from several drilled wells. The company reportedly had a need for a dependable and plentiful supply of water and were concerned that the water level in its wells had dropped more than 40 feet in three or four years. The company wanted to know where it should drill for more water. At least one neighbor was concerned that the company's drilling for more water was causing his household well to be contaminated with silt and clays. The company was advised to obtain its water from the west side of the highway from tills and alluvial sediments in the Esopus Valley. This "solution" has evidently ended for the present the company's water supply problems.

The cause for the lowering of the local water table is difficult to determine. The construction of the wider highway may have restricted important recharge locally (Egemier, personal communication). Ulster County Community College with large, impermeable parking lots and increased commercial development locally may all be withdrawing much water and preventing recharge that could result in a lowering of the water table. There has been a significant increase in the number of homes built nearby, and all have drilled wells with cones of depression that may cause a lowered water table. The temperature-precipitation conditions may have changed to decrease the ground water recharge. A stream, local excavation, or road-cut nearby may have intersected a cave or fracture system that is now flowing as a spring. Of course, the lowering may be a natural event producing a sinkhole that should be considered normal in a carbonate bedrock located in a humid region. Well-developed sinkholes that are located at Stop 2 have evidently formed naturally during the past.

Continue driving south on Route 209.

9.8 Intersection of Route 209 and Route 213 West; turn right onto Route 213 West.

10.0 Sinkhole pond(?) on left.

10.25 Turn left at Hendricks Lane and park along the side road (old Route 213).

STOP 2. Hendricks Lane Sinkholes

Positions of at least four sinkholes can be seen in the field to the south. They can be recognized by stands of large trees. Farmers were not able to work the land at sinkholes and trees were allowed to grow there. A sinkhole in the field to the north was covered during the early 1980's. It will be interesting to see how long it will remain covered and tillable.

Return to cars and drive east on Route 213 back to Route 209.

10.7 Intersection with Route 209, turn right (south).

11.0 Town of Marbletown, Town Hall on left.

11.5 Intersection with Route 213 East, turn left (east).

12.7 Limestones in roadcut, former railroad overpass at hamlet of High Falls.

12.8 Light at High Falls intersection with Lucas Turnpike (Ulster County Route 1); turn right (south).

13.1 Rondout Creek meander on left.

13.5 Rondout Creek meander on left.

14.7 Limestone on right, New Scotland and Kalkberg Formations.

15.0 Bridge over dry Kripplebush Creek and parking area on right side of road. Park car and walk to dry creekbed, Stop 3.

STOP 3. Pompey's Cave

A suggested explanation of the initiation of this cave and subsurface drainage follows. Kripplebush Creek has cut through a recessional moraine at the hamlet of Kripplebush and its course meanders considerably as it flows southeasterly across the post-glacial lake bottom deposits and empties into the Rondout Creek nearby. The Rondout Creek flows over a shrinking waterfall $\sim$ 2 miles north at High Falls since the caprock is dipping west. As the waterfall height lowers and as the Rondout Creek above the waterfall continued to erode through the carbonates, the base level of the Kripplebush Creek was lowered and the local water table dropped. Subsequently, the lower reach of the Kripplebush Creek was rejuvenated and has cut into the Rondout carbonates. The water evacuated from the cave beneath the Mg-Carbonate member of the Rondout Formation following the lowering water table, and eventually the surface stream began seeping downward through and, thereby, enlarging joints in the Rondout carbonates. This probably occurred first in joints near the Rondout Creek, then later in joints farther upstream. Now, the stream enters several "swallow holes" upstream and has become an underground stream flowing presumably into the Roundout Creek. Indications are that this process will continue and, in fact, the upstream, meandering portion of the stream seems to be rejuvenated more each year; it is expected that the increased downcutting will result in additional sinks developing in the stream bed as long as the surface water can enter a cave below it.

Note the character of the dry stream bed near the Lucas Turnpike bridge. Joints are apparent, and well-developed mudcracks can be observed. An entrance to the cave is located a few hundred feet "upstream" in the dry stream bed, and a homemade ladder is constructed to assist people who wish to enter the cave. CAUTION: The property owner has not chosen to "post" or restrict valid study of this local phenomenon. If you decide to enter, please realize it is your decision and you have decided to assume any associated risk. Before studying or entering the cave, you may wish to walk upstream farther to see a partial collapse of the stream bed into the cave below, and to observe the stream entrance holes farther upstream. CAUTION: The fields nearby are used for pasture for cattle. Be careful that a bull in not loose nearby or you may need to make a hasty retreat downstream! If you decide to enter the cave, check each ladder rung very carefully to determine if it will hold your weight. Always leave at least one person on the surface to obtain help if the ladder breaks.

Return to the cars and drive south to the driveway for the United Methodist Church Camp.

15.1 Turn left into Camp Epworth and drive to the lodge parking lot and park.

STOP 4. Rondout Creek Meander

This vantage point provides an excellent view of the Rondout Creek at a magnificant sweeping mobile meander. During flood stage, the stream severely undercuts its bank and some slumps and subsidence have occurred. Return to cars and drive out to highway.

15.7 Lucas Turnpike, turn right (north).

17.0 Turn left and drive up a slight incline and park in the lot of Rondout Manufacturing Company (RMC).

STOP 5. Artesian Spring and Pool

A fence protects an unwary visitor from the artesian spring (locally called a sinkhole) located near the western boundary of the RMC parking lot. This is reported to be the third protective fence placed around this feature, following the enlargement of the pool and loss of the fences. This lot was a sand and gravel quarry that was mined until the operators noted the appearance of groundwater surfacing. After mining ceased, the property was developed in the 1970's as the current operation. Water broke through the sand forming an apparent sinkhole. Evidently, sand is flushed out and onto the land surface with occasional increased water flow, causing a pit to form filled with water. The pool within this pit was plumbed to be about 40 feet deep in the early 1980's. I have observed water, and possibly gas bubbles, ejected one or two feet into the air, with the appearance of "rising" and/or "jumping" fish! The aquifer feeding this spring is unknown and somewhat of an enigma, since the elevation of discharge is about 30 feet higher than the nearby unnamed stream. The surrounding surface is generally at a lower elevation and increased discharge does not seem to be immediately correlated with rainstorms. No geochemical tests of the water or continuous studies or monitoring of discharge are known. Could this spring be the outflow of a leak in the nearby Rondout Pressure Tunnel section of the New York City Aqueduct? Clearly, additional study is warranted and could prove interesting. In any event, it does indicate that the hydrology of this area is not well-known.

Drive back to highway.

17.2 Turn right (south) onto Lucas Turnpike.

17.8 Turn right onto small road named Rest Plaus Road.

18.0 Narrow former underpass of former railroad. The rocks used in constructing this underpass/railroad bridge foundation were taken from the old Delaware and Hudson Canal works. Continue up slight grade and park along road with flashers on.

18.1 STOP 6. Rest Plaus Road Proposed Landfill Site

This site was considered as a landfill for the Town of Marbletown in the early 1980's. The landfill would be located within the shielding forest to the northeast with a leachate lagoon located on the southwest. The soils of the land on the western portion of the property would serve as the mine for the daily landfill cover, as well as to provide for some future expansion of the landfill if needed.

Near the southern boundary of the property, a small stand of trees can be seen from the road in the field. Close examination shows that the trees are growing within and around a shallow, filled sinkhole. Blocks of the relatively soluble Becraft Limestone are exposed, and dissolution has occurred between the separated limestone blocks which are at slightly different attitudes. Some surface runoff is passing into this depression. At various depths, Becraft Limestone and other limestones less susceptible to solution and sinkhole development underlie the proposed lagoon and landfill areas, as well as the proposed landfill mine.

Some less obvious solution effects can be observed along joint planes and limestone nodule layers in the Port Ewen mudstones. These appear to occur within 2 m. (∽6 ft.) of the bedrock surface and can be seen after a short walk along the abandoned railroad grade along the east border of the site.

In addition to solution effects calling into question the use of the site as a landfill, there is some evidence that a southeast-northwest thrust in the Port Ewen Formation occurs in the eastern limb of a northeast-trending plunging syncline, projected along the hillside and crossing the abandoned railroad grade. Also, a much smaller, narrower, more tightly folded, northeast-trending and plunging anticline may project into the southern half of the property and may pass through the location of the previously described sinkhole in the Becraft Limestone.

Clearly, additional geology and hydrology investigations are called for before this property should be used as a landfill. The recent search for a town landfill has been abandoned, and there are at present no known plans to determine the suitability of this site.

Return to cars and continue driving west.

18.6 Intersection with Old Kings Highway - continue straight (west).

18.8 East overview of Stop 6, former proposed landfill site.

18.9 Intersection with Route 209.

END OF FIELD TRIP G-I. To return to Ramada Inn, turn right and drive about 13 miles north.

Start of Trip G-II.

18.9 Turn right (north) onto Route 209.

19.9 Intersection with Route 213 East, drive straight on Route 209 North.

20.3 Hamlet of Stone Ridge, N.Y.

24.9 Meander of Esopus Creek along west side of highway.

25.1 Turn left onto short drive to Esopus Creek.

STOP 7. Esopus Creek - "Bathtub"

This area is called locally the Bathtub. Reportedly, sand and gravel mining was conducted here, along the outside of a stream meander. During a flood in the 1960's, the stream cut through the narrow berm separating the quarry from the stream, and the quarry became a portion of the stream. Mining operations have been relocated to several other areas of the Esopus Floodplain; we will visit some of the newer operations.

Environmental problems associated with a breach of quarry operations that could affect the Esopus Creek include the following. (1) The stream slows when entering the wider, deeper area, and exposure to additional light coupled with less shade from protective shoreline trees will warm the waters. The warming waters will be expected to hold less dissolved oxygen and the stream ecology will, thus, change. This renowned fishing stream will probably produce fewer trout in the future. (2) More rapid stream bank erosion may be expected during flood stage causing an increase in stream sediment load. This also is expected to change the stream ecology. (3) Increased erosion here should produce increased stream channel deposition downstream, and more over-bank flooding more often. Communities downstream include the hamlet of Hurley, the City of Kingston, the hamlet of Lake Katrine, the Town of Ulster, and the Village of Saugerties; increasing concern is being expressed in local newspapers by citizens and local government officials (Kwiatoski byline, Kingston Daily Freeman, 10/2/87 and 10/5/87). The usual call is for the Army Corps of Engineers to dredge, channelize, or to otherwise provide increased flood control of the middle Esopus Creek.

25.1 Return to cars and turn right (south) onto Route 209.

27.8 Turn right onto Tongore Road (Old Tongore Road on Mohonk Lake, N.Y. Quad.) and drive west. CAUTION: Make sure you slow down well before this turn and signal a right turn to avoid a rear-end collision, a common occurrence here.

29.0 STOP 8. Town of Marbletown Park, Esopus Creek

A kame can be seen to the south that has been mined since the late 1970's. A kame is valuable for sand and gravel mining, since it is sorted by glacial-fluvial processes and operations can thereby save considerably.

The Esopus Creek enters the valley about one-half mile upstream (west) of this stop and begins a broad meander to flow northeasterly. Mining of sand and gravel deposits was done on the floodplain on the opposite side of the stream, evidently in accordance with (then) existing state and local regulations that required a minimum 10-foot berm to be left untouched. Floods of the late 1970's repeatedly breached the berm; and repeated efforts to reinforce the berm with at first gravels and then a steel wall continually failed. Rapid bank erosion has begun on the south side of the Esopus. In 1977, a row of trees about 20 feet wide existed from the man-made sand beach to the east along the creek. These have been washed away. The channel downstream is evidently filling with gravels, and it appears the stream may be changing its course here because of, or in spite of, the mining disturbance.

Return to cars and continue driving west on Tongore Road.

29.4 Turn right (north) onto Hurley Mountain Road, unnamed on Ashokan and Kingston West Quads.

29.45 Cross bridge over Esopus Creek.

29.8 On the left side, is this a meander scar of an earlier Esopus Creek channel?

30.4 Is this an oxbow of an early Esopus Creek? This was a nearly filled pond until the 1980's, when it was dredged to provide a more attractive pond. It is possible that the stone house was contructed alongside a well-flowing stream two or three centuries ago. Several small streams flowing into the valley seem to flow into meander scars of a once larger stream. Of course, they may have constructed these meanders themselves if they previously had a greater discharge. However, several other undoubtedly Esopus Creek oxbows and meander scars are apparent from a study of the Kingston West Quad.

30.7 Crossroads of Lomontville, turn right (south) onto Fording Place Road.

31.1 Sand and gravel mining on right side; operation has been intermittent during the 1980's.

31.2 STOP 9. Fording Place on Esopus Creek.

Sand and gravel mining can be studied here. Note that an operation in modern alluvium, ground moraine, and lake deposits must include mechanical separation or grading. This increases mining costs to the operators. Occasional glacially carried boulders and cobbles can be found here, recognized by facets and striae. Note also that the operations of the mine are near the stream and the berm is occasionally breached by floods. When water is low, many local residents ford the stream here with their vehicles. The hamlet of Marbletown is located on the other side.

Cautiously turn around (since local residents are not used to finding cars blocking their accustomed stream crossing), and drive back on Fording Place Road.

32.4 Turn right (north) onto Hurley Mountain Road.

33.1 Fallen rock zone; cliff prone to landslides. This valley wall was probably cut by the glacier(s), but the cliff base may have also been undercut by an early meandering Esopus Creek.

33.7 Landslide prone area. Rockslides and slumps occur here about every 7 to 15 years, often covering the roadway. The highway department has each time quickly removed the supporting talus at the base of the cliff, probably encouraging additional future landslides. Note the "blocks" of rock (Hamilton Formation, shales and siltstones) that are ready to break loose along joints.

35.7 Turn right onto Wyncoop Place (no sign and not named on Kingston West Quad.), now occupied by Englishman's Creek, a local name.

35.8 Crossing over a meander scar of early Esopus Creek? At the end of Evergreen Lane, a broad, open oxbow lake, a meander of an early Esopus Creek can be seen (on private property). This oxbow lake is apparent on the Kingston West Quad.

36.2 Lawns of the houses on the left were severely damaged by Esopus Creek floodwaters during the heavy rains of mid-April, 1987. If the rains had occurred with a melting snow, the damage might have been more serious. Large "potholes" or "swirlholes" over 10 feet in diameter, several feet deep, developed in at least one lawn. The damage has since been repaired by residents.

36.3 Bridge over Esopus Creek.

36.4 Stop sign at hamlet of Hurley, N.Y.

36.5 Intersection with Route 209, turn left (north).

37.5 Bridge over Esopus Creek, rip-rap placed along stream bank.

38.2 STOP 10. Oxbow Lake

A large gravel-covered area on the right side of the road provides ample parking space. If you cross the road, use extreme caution since cars are leaving a controlled-access four-lane highway here and are often travelling at a high speed.

Some area residents believe that the stream's channel was changed by man during the construction of this newer section of Route 209, and that the pond along the west side of the highway was where the pre-highway Esopus Creek was flowing. The 1942 Kingston West Quad, however, shows that this existed before the highway was constructed in the early 1960's. It is certain evidence that the Esopus Creek has changed its course in the past, and probably will continue to do so in the future barring complete channelization.

This oxbow is undergoing rapid eutrophication now, since the nearby agricultural fields are heavily fertilized; normal runoff is feeding the vegetation within this oxbow.

Return to cars and drive north.

38.6 Turn right onto Route 28 Exit to Kingston, N.Y.

39.2 Traffic circle; turn onto first exit, Washington Avenue, Kingston.

39.7 Bridge over Esopus Creek.

39.8 Turn left (northeast) at traffic light onto Schwenk Drive.

40.0 Turn left (west) into Kingston Plaza and take first left into drive along the side of the Sear's Department Store. Drive to the right in back of the Plaza and park.

40.3 STOP 11. Plaza Flood Control Project

Flooding during January thaws and spring melts of 1976-1978 caused citizens, commercial interests, and politicians to request the Army Corps of Engineers to provide flood control. The Corps of Engineers at first suggested that flood control might not be wise since it might cause increased flood problems downstream (north), but a compromise was agreed upon to construct flood control on the Plaza side only. High waters are now not a hazard to the stores, but some people have wondered if flooding of the oposite side might become more common now that nearly all the flood waters must flood onto the opposite side.

40.5 Continue driving along the flood control dike. Note that high flow water can be diverted to a confined wetland to allow some groundwater recharge.

41.1 Exit the Kingston Plaza and turn right onto Schwenk Drive.

41.4 Turn right (north) at traffic light onto Washington Avenue.

41.6 Bridge over Esopus Creek.

41.9 Traffic circle.

42.0 Take first right after N.Y. State Thruway (Route I-87) entrance, turn right into the parking lot of the Ramada Inn.

42.3 END OF FIELD TRIP G-II.