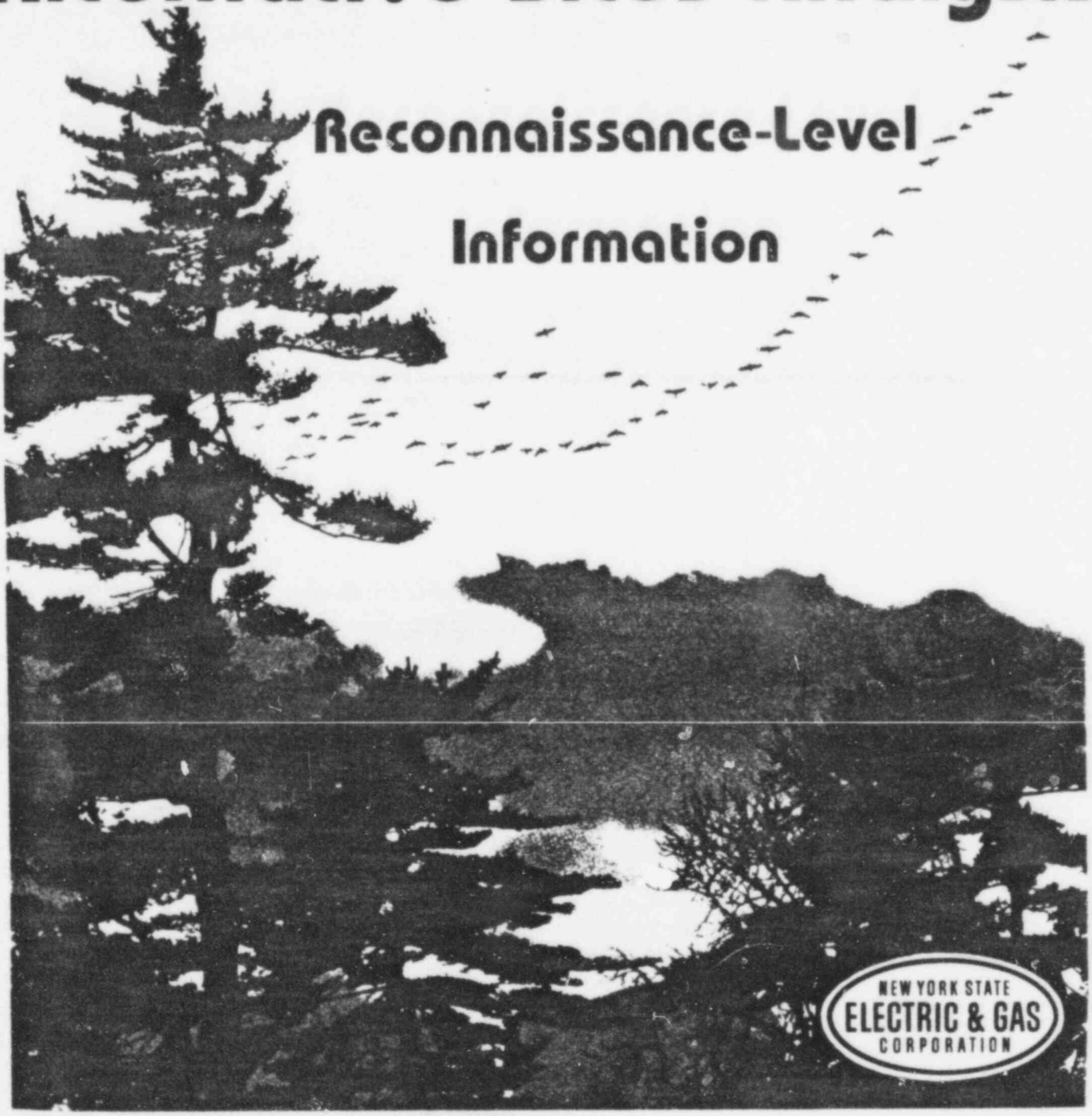
Alternative Sites Analysis

Reconnaissance-Level Information



NEW YORK STATE
ELECTRIC & GAS
CORPORATION

ALTERNATIVE SITES ANALYSIS

RECONNAISSANCE-LEVEL INFORMATION

April 1979

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INTRODUCTION AND METHODOLOGY

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1.0 INTRODUCTION AND METHODOLOGY

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1.0 INTRODUCTION & METHODOLOGY

1.1 PURPOSE

This report has been prepared in response to NRC's ER Docketing Questions, Alternative Sites Analysis, Question 1:

> Identify four (4) sites in addition to Stuyvesant that were considered by NYSE&G, for inclusion in an Alternative Site Analysis. It is suggested that an additional site be identified in each of the following geographic areas:
>
> a. Susquehanna River
>
> b. Mohawk River Valley
>
> c. Northern New York, and
>
> d. Lower Hudson

The report also responds to Alternative Sites Analysis Question 2:

> After identification of the four additional sites, reconnaissance level data should be provided for each site in the following areas:
>
> a. Land Use
>
> b. Water Use
>
> c. Institutional
>
> d. Construction
>
> e. Cost
>
> f. Transmission
>
> g. Engineering and Environmental

Information for the Stuyvesant site is provided in response to NRC's letter of March 18, 1979.

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1.2 ALTERNATIVE SITES IDENTIFICATION

1.2.1 General

The site selection process described in Section 9.2.2 of the ER was reviewed to identify one alternative site in each of the four geographic areas of interest. The objective of this review was to select the most suitable nuclear plant site in each geographic area, considering environmental compatibility, engineering and economic characteristics, and safety considerations.

As described in Section 9.2.2 of the ER, the site selection process involved five stages of analyses. Stages 1, 2, and the first part of Stage 3 were applied to successively screen the entire State of New York, for the purpose of determining the most suitable locations for plant development. The second part of Stage 3, and Stages 4 and 5 were applied to compare potential sites and select the most suitable sites.

In Stage 5, a total of 17 nuclear sites was under investigation. Figure 9.2-19 of the ER presents the general locations of these sites. Figure 9.2-20 of the ER illustrates the results of environmental and engineering/economic evaluations for nuclear sites. These sites were judged the most suitable of all 542 potential sites investigated, and consequently, they were reviewed in detail to identify specific sites for the Alternative Sites Analysis.

1.2.2 Susquehanna River Area

As indicated on Figure 9.2-20 of the ER, there were two sites in the Susquehanna River area under investigation in Stage 5. Site 11-2-35 exhibited more favorable environmental and engineering/economic characteristics than did Site 11-2-8. Field reconnaissance visits conducted during the siting study confirmed the published reconnaissance level information used in the evaluation. Consequently, Site 11-2-35 is identified as the alternative site in the Susquehanna River area. This site is located in the Town of Barton, Tioga County, NY.

1.2.3 Mohawk River Valley Area

Figure 9.2-20 of the ER shows that a total of nine sites in the Mohawk River Valley area was under consideration in Stage 5. Of these, Sites 7-6-6 and 10-2-6 appeared the most suitable for development. Although Site 10-2-6 was assigned a slightly more favorable environmental rating than was Site 7-6-6, the results of field reconnaissance visits conducted during the siting study indicated that the agricultural productivity of Site 10-2-6 was significantly greater than that at Site 7-6-6. Furthermore, water availability at Site 7-6-6 was determined to have been better than at Site 10-2-6*. As a re-

*The availability of Mohawk River water is discussed further in Section 2.2.6.5 of this report.

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sult, Site 7-6-6 is judged the more favorable for nuclear plant development and is identified as the alternative site in the Mohawk River area. This site is located in the Town of Charleston, Montgomery County, NY.

1.2.4 Northern New York Area

Referring to Figures 9.2-19 and 9.2-20 of the ER, only one site in the northern New York area was evaluated in Stage 5. Site 7-2-2 is identified as the alternative site for this area. This site is in the Town of Northumberland, Saratoga County, N.Y.

1.2.5 Lower Hudson River Area

Site 8-4-2 was the only nuclear site in this area evaluated in Stage 5 and is selected as the alternative site. This site is in the Town of Gardiner, Ulster County, N.Y.

1.2.6 Field Verification

After identifying the most suitable alternative site in each of the four geographic areas, a visit was conducted to ensure that the characteristics of these four sites had not materially changed since the time of the siting study, i.e., mid-1975 and early 1976. In February 1979, each of these sites was viewed via helicopter and no significant changes were noted.

1.2.7 Stuyvesant Site

As requested by the NRC, material equivalent to that provided for the new alternative sites has been included for Stuyvesant. This will allow comparison of all the alternates to New Haven on an equal basis.

In conclusion, the following sites are identified for the Alternative Sites Analysis:

1. Susquehanna River Area -- Site 11-2-35, Town of Barton, Tioga County

2. Mohawk River Valley Area -- Site 7-6-6, Town of Charleston, Montgomery County

3. Northern New York Area -- Site 7-2-2, Town of Northumberland, Saratoga County

4. Lower Hudson River Area -- Site 8-4-2, Town of Gardiner, Ulster County

5. Mid Hudson River Area -- Site 7-11-6, Town of Stuyvesant, Columbia County

For ease of reference, the general locations of the sites, including New Haven (Site 4-3-11) are shown on Figure 1.2-1.

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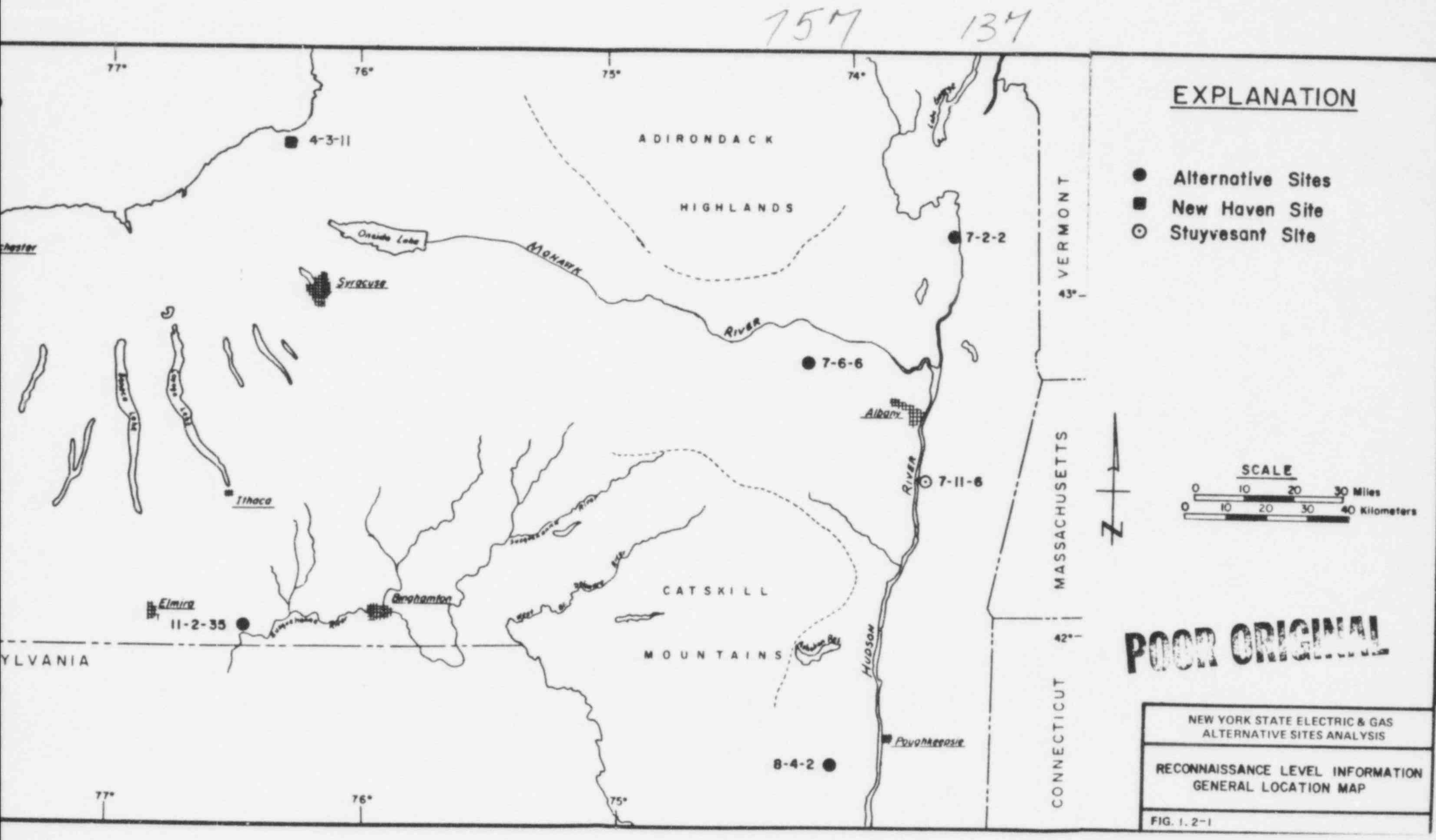

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NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

RECONNAISSANCE LEVEL INFORMATION
GENERAL LOCATION MAP

FIG. 1.2-1

1.3 RECONNAISSANCE-LEVEL INFORMATION*

Section 2.0 of this report presents a summary of characteristics, potential environmental impacts, and costs associated with development of each of the alternative sites. This summary is based on reconnaissance-level information consulted during the site selection study (1975/1976). Specific references are provided for each factor considered. Section 3.0 contains a comprehensive bibliography of all reconnaissance-level information used throughout the siting study.

*As used herein, the term reconnaissance-level information is as defined in the Nuclear Regulatory Commission's Draft Environmental Standard Review Plan, and published for review in November, 1977 (NUREG 0158), "Reconnaissance-level information consists of information that is available from the open literature, published or unpublished reports, existing records, authoritative sources, or that can be obtained by brief field surveys performed by recognized experts. It does not include information that must be obtained by detailed onsite monitoring programs or studies."

1.4 EVALUATION FACTORS CONSIDERED

The format and content of the site summary descriptions, contained in Section 2.0, were developed based on the following:

1. Draft Environmental Standard Review Plan, Section 9.2 -- Alternative Sites, Appendix B, 11/77

2. NRC staff direct testimony in the Seabrook alternate sites remand proceeding, 12/78

3. information available from the site selection study

The following sections describe the evaluation factors considered in the specific site analysis. Also described is certain general and/or regional information applicable to all alternative sites.

1.4.1 Site Description

Each site location is described with the aid of the following maps: general location map, USGS 1:24,000 scale topographic map showing the site boundary, Land Use and Natural Resource (LUNR) Inventory Map, and an aerial photograph. Table 1.4-1 provides category symbols to interpret LUNR maps.

1.4.2 Meteorology

Two general meteorological parameters were evaluated for each nuclear site. These were: (1) ground level dispersive capability, and (2) potential cooling tower impacts on sensitive receptors in the site vicinity.

The evaluation of ground level dispersive capability involved consideration of the regional and local topography and ventilation patterns. Of particular interest for each siting area was the potential for low wind speeds and stable atmospheric conditions which are often associated with cold air drainage in valleys.

The principal data resources used to evaluate the ground level dispersive capability included: USGS 1:24,000 and 1:250,000 scale topographic maps for the site area, and any available meteorological data (wind and atmospheric stability) potentially representative of the site. The available meteorological data for the site area were used for a qualitative evaluation of the site dispersive capability.

The major factors considered in the cooling tower atmospheric evaluation were the site micrometeorological features affecting fogging potential, and the presence of sensitive receptors near the site. Unfavorable meteorological characteristics related to fog (moisture dispersion) potential included locations in valleys and/or near bodies of water. Sensitive receptors included: cities, towns, airports, major highways, other transportation routes, and parks. The use of freshwater, natural draft cooling towers was assumed for this analysis.

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1.4.3 Hydrology

1.4.3.1 Water Supply and Availability

Adequacy of water availability at each site was evaluated using discharge records from the nearest USGS gaging station on the source water body. Regulatory requirements such as consumptive use regulations on the Susquehanna River and navigational requirements on the Mohawk River were also considered. Where necessary, water impoundment sizes were determined using statistical low flow data and assumed plant water requirements. Section 1.4.12 indicates the procedure for developing piping and pumping cost estimates.

1.4.3.2 Flood Protection Requirements

The potential for flooding at each site was determined using USGS 1:24,000 scale topographic maps of the site vicinity and historical flood information (where available).

1.4.3.3 Effects of Construction

The potential impact of dewatering during construction was evaluated from the available information on groundwater level and permeability of the soils at each site. The potential impacts of erosion were evaluated from the available information on soil characteristics, site drainage, and vegetation.

The potential impact of dredging the river bottom for intake and discharge construction was evaluated from the available information on river bottom sediments. The potential impact on onsite streams was evaluated from the location of any onsite streams and the location of the plant.

1.4.3.4 Effects of Operation

The potential effects of station operation were estimated by evaluating the dispersive capabilities of the receiving water body based on flow and size of the body of water.

1.4.4 Water Quality

The evaluation of water quality was made using information available in the literature, and the New York State Department of Environmental Conservation's water quality classifications presented in 6 NYCRR 800, 825, 859, 895, and 930. Data presented in the literature varied in the level of analysis depending on the water source; thus, not all areas were characterized in the same detail.

Potential Impact Assessment

In order to assess the relative aquatic ecology impact at each of the sites, the potential for changing the concentration of dissolved oxygen was qualitatively evaluated.

The potential for adverse impacts was evaluated using information available in the literature, and the New York State Department of Environmental Conservation's water quality classifications presented in 6 NYCRR 800, 825, 859, 895, and 930. The water quality classifications were indicators of the purity of the various water sources and potential for degradation.

Based on the assumed general location of the intake and discharge structures and pipes, and qualitative judgements made as to the aquatic sensitivity of the water source at these points, an evaluation of potential water quality impacts was performed.

1.4.5 Aquatic Ecology

The evaluation of aquatic ecology was made from existing literature to assess potential impact. Characteristics of the water sources under consideration were determined. Data presented in the literature varied in the level of analysis depending on the water source; thus, not all areas were characterized in the same detail.

Potential Impact Assessment

In order to assess the relative aquatic ecology impact at each of the sites, the following factors were qualitatively evaluated:

1. the composition of fish and/or biotic communities in the intake area and areas receiving chemical and thermal discharge

2. the composition of potentially entrainable organisms (i.e., phytoplankton, zooplankton, and fish eggs, and larvae)

3. potential for changing the balanced indigenous community including amounts of nuisance growth and concentration of dissolved oxygen

4. presence or absence of migratory fish species, and potential for blockage of a portion of a cross-sectional area of the water source

The potential for adverse impacts was evaluated using information available in the literature, and the New York State Department of Environmental Conservation's water quality classifications presented in 6 NYCRR 800, 825, 859, 895, and 930. The water quality classifications were indicators of the purity of the various water sources and indirectly represented the quality of aquatic life that could have been supported therein.

Based on the assumed general location of the intake and discharge structures and pipes, and qualitative judgements made as to the aquatic sensitivity of the water source at these points, an evaluation of potential aquatic ecology impacts was performed.

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1.4.6 Terrestrial Resources

1.4.6.1 General

The terrestrial ecology evaluations of each site were based on the uniqueness of site habitats compared to the region, the potential presence of endangered species and associated critical habitat, potential impact on dedicated land areas (federal, state, and local forests, parks, and natural landmarks), and the ecological value and diversity of vegetation onsite and along railroad and pipeline corridors. An assessment of prime farmland was not conducted in 1975, as this information was not available. Transmission line corridors were analyzed separately (Section 1.4.6.3).

1.4.6.2 Land Use, Pipeline, Railroad Assessments

General References

The State of New York has prepared LUNR overlays to USGS 1:24,000 scale topographic maps showing types of land uses and vegetation communities. In addition to LUNR data, the basic references used were USGS maps, aerial photographs (from the LUNR program), State Outdoor Recreation Facilities Inventory, NYSDEC county maps of forest preserves, National Registry of Natural Landmarks, National Wildlife Refuges in the Northeast, and site visits. Contacts with state agencies provided information on sensitive areas, endangered and threatened species, and locations of species of special interest, such as protected uncommon plants and candidate endangered or threatened species.

Analysis

Using the above and additional references, each site was evaluated for its impact on uniqueness of habitat, potential presence of endangered species, and associated critical habitat. Site impact analyses were based on the following premises.

1. The development of a site where an endangered species is present or in the area of a habitat critical to the survival of an endangered species would probably add to the further endangerment of that species.

2. Site development might disrupt temporarily the visiting of a site by a migrating endangered species, but it would not cause further endangerment.

3. Depending on the specific location and habitat requirements, the presence of an endangered plant could be protected during site development.

In addition to the literature survey, the site analysis included helicopter fly-overs and reconnaissance from public access roads. Onsite access was not available.

Dedicated public and private areas onsite and within an approximate 5 mile radius of the site were identified and considered for any potential impacts.

The analysis of vegetation considered the total site area. No site optimization was conducted. Areas of greater ecological value were avoided. Sites disturbed by man due to agricultural, commercial, or other activities were considered more suitable for development as a power plant site than areas with native vegetation. The analysis of ecological value was based on LUNR maps and the site visit. Although specific habitats could not be inspected, the general appearance of the area was considered and compared to the LUNR data.

Pipeline and railroad routes were analyzed using LUNR and USGS maps and site visits. The analysis was based on a single route without optimization. Crossing streams and wetlands was considered; however, final route selection might have avoided sensitive portions of either.

No site-specific layouts were analyzed in an attempt to mitigate impacts, such as habitat destruction. Site optimization could reduce impact on specific sites but was not within the scope of the siting study.

1.4.6.3 Transmission Line Routing

During the site selection study, potential transmission corridors for each site were identified, recognizing electrical considerations, such as termini, required voltages, and numbers of circuits. As much as possible, corridor routing avoided regionally significant features. Wherever possible, preference was given to using existing corridors. Principal cities and villages, airports, national and state historic sites, radio and television towers, federal and state lands, and recreational areas were identified, and plotted on USGS and New York State DOT maps (scale 1:24,000). Physical features, such as large bodies of water, significant topographic features, and extensive wetlands, were also located on these maps. All of the information obtained was reviewed, and two-mile wide corridors were selected for analysis. The assumption here was that the specific transmission corridor would be located within this two-mile wide study corridor; however, optimization analyses within the study corridor were not conducted.

The assessment of potential environmental impacts of the transmission facilities associated with each site was conducted using published information only; there were no field investigations of transmission corridors. Included in the analysis were the impacts on land uses crossed by the proposed transmission corridor, and the cultural and natural features that might be affected by the transmission facilities, such as highways, railroads, water bodies, archaeologic and historic sites, and recreation areas. In addition, assessments of aesthetic impact were performed.

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1.4.7 Socioeconomics

1.4.7.1 Displacement and Disruption of Onsite Resources

The sites were reviewed for the presence of any designated historic sites, scenic natural features, recreation areas, or cultural resources. If any of these were determined to be present onsite, the effect of the proposed project upon such resources was determined.

1.4.7.2 Displacement of Residential and Economic Activities

Residences and income-generating activities satisfy certain basic needs of the local population and were avoided to the extent practicable. Developments of this type were identified from site visits and from the literature, such as the New York Department of Transportation 1:24,000 scale maps.

1.4.7.3 Origin and Size of the Labor Pool

A large semi-permanent inmigration of construction labor over a short period of time would have the potential for stressing a socioeconomic system. If it was determined that there was a potential for significant migration into the region because of the construction labor requirements of the project, the resulting potential for adverse effects was considered in evaluating each site.

The potential for the inmigration of labor is related to the labor pool within a one way commuting distance to the site of approximately 60 linear miles. If a large inmigration is to be avoided, the workers within this commuting area must be large enough to reasonably be expected to fulfill the demand for construction labor at the site. If there appeared to be a shortage of such workers, it was assumed that inmigration will compensate for the shortage. The effects of any significant inmigration upon the demand for housing and local services then became an issue to be considered in evaluating the site.

The primary source of information concerning employment by industry for the counties, cities, and towns in the siting region was the Business Fact Book published for each of the state's economic areas by the New York State Department of Commerce. These areas are shown in Figure 1.4-1.

1.4.7.4 Anticipated Points of Vehicular Congestion

Transportation of construction workers to the site was assumed to be accomplished primarily by private automobile. The roads which provide access to the site vicinity and the site proper were identified using New York State DOT 1:24,000 scale maps. Potential areas of vehicle congestion along these routes were identified considering the direction of traffic movements, the number of roads providing access to the site vicinity/site proper, and any settlements along these routes which could experience traffic congestion.

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1.4.7.5 Potential Impacts on Housing and Services

The potential for impacting housing and services is directly related to the potential for the immigration of a significant number of construction workers. A large immigration of workers will result in a demand for housing and services to support the increased population of the region.

The potential impact on housing was determined by considering the ratio of required housing units to the number of housing units available. For a conservative estimate of the market conditions, only year-round housing units were considered; seasonal units in addition to this were not considered, although these units might have satisfied the demand for housing by some workers.

The potential impact on local community services was considered if it was determined that a significant immigration of labor would occur for any political subdivision or other service area (county, town, village). The impact was estimated based upon the projected proportional increase in population. Specific data on the capacity of various service systems were not considered.

The primary source of housing and population data for the counties, cities, and towns is the Business Fact Book published for each of the state's economic areas (see Figure 1.4-1).

1.4.8 Geology and Seismology

1.4.8.1 Overview

Geological and seismological characteristics of regions, areas, and specific sites were evaluated throughout the site selection process. The following is provided to summarize the scope of investigation and methodology applied.

1.4.8.2 Geology

Figure 1.4-2 illustrates physiographic provinces in New York State. Figure 1.4-3 shows general bedrock geology. Figure 1.4-4 shows a generalized structural map of central-eastern New York State. Regions of known geological uncertainty and possible earthquake hazards were deferred in the siting evaluation.

The geologic and seismic characteristics of the suitable siting areas within New York State were evaluated and rated as shown in Figures 1.4-5 through 1.4-8. The geology ratings were developed using the criteria below.

Specific Criteria	Point Rating
No Major/Serious Adverse Features Known	2g
Some Adverse Features Known	1g

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Specific Crit	Point Rating
Several Major/Serious Adverse Features Known	0g

Major/Serious adverse features were defined as follows:

1. Faults/Zones of Tectonic Structures and Folds. Particularly any such features that may conceivably be approaching reactivation.

2. Limestone Formations, Salt, and/or Gypsum units in the rocks of site area. May be cavernous with natural openings surface and at depth, near-surface slump features, etc.

3. Man-Made Openings. Due to mining/quarrying surface or underground of mineral resources, as well as abandoned construction, disposal areas, etc.

4. General Overburden Conditions. Flood-plain deposits of present or ancient drainages; deep soil and/or weathered bedrocks; soft glacial tills and debris/deep glacial lake beds and/or gravelly backfill in ancient valleys.

In assessing specific sites, a more refined analysis of major/serious adverse features was undertaken. The geologic rating for each site was correlated with the type and depth of overburden materials, type and depth to bedrock, and the source of data on which the evaluation was based. These sources included published state maps, county reports, visual observations, well data, water resources bulletins, and some unpublished materials. The point ratings were used strictly as an aid in summarizing characteristics. The geological information developed was provided as input to the site-specific cost comparisons and the preferred site selection decision making process*. The following point rating system was utilized as a key to summarizing site-specific characteristics:

Specific Criteria	Point Rating
No Major/Serious Adverse Features Known	2g
Some Major/Serious Features Known	1g
Several Major/Serious Adverse Features Known	0g

*Refer to Section 1.4.12 for a discussion of the means by which geological data were used in developing cost estimates.

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Major/Serious adverse features were defined as follows:

1. Faults/Zones of Tectonic Structures and Folds. Particularly any such features that may conceivably be approaching reactivation or have been active in the 'recent' past (10 CFR 100).

2. Limestone Formations, Salt, and/or Gypsum units in the rocks of site area. May be cavernous with natural openings surface and at depth, near-surface slump features, etc. Foundation and/or ground water problems common with other adverse aspects.

3. Man-Made Openings. Due to mining/quarrying surface or underground of mineral resources, as well as abandoned construction, disposal areas, etc.

4. General Overburden Conditions. Flood-plain deposits of present or ancient drainages; deep soil and/or weathered bedrocks; soft glacial tills and debris/deep glacial lake beds and/or gravelly backfill in ancient valleys; special soil characteristics in known areas (liquefaction, sensitive clays, swelling, etc.); and others. Most desirable -- under 20 feet of overburden to satisfactory foundation/bedrock.

5. Ground Water Level/Reservoir Characteristics. High water level affects foundation, possible sliding, etc. An underground reservoir has a potential for contamination, by any surface accident or spills.

6. Slide-Prone Overburden and/or Bedrock. Excavation cuts and foundation are not slide-prone, even when subjected to the design earthquake conditions (shaking).

7. Foundation of Bedrock. Relatively uniform, and lacks such adverse features as zones of deep weathering and weak rock; a deeply scoured or channelled upper surface; and/or abundance of inherent structural features (faults, joints, etc.) and/or zones of weak to poor-quality rock that result in an inadequate bearing capacity.

8. Others. Project construction/operation could conceivably cause or trigger an adverse geologic reaction to occur (one not listed above) according to the onsite geologic conditions.

In addition to a reevaluation of all previous information, sites evaluated in the final stage of the siting study were visited. The sites were inspected by helicopter fly-overs and ground visits.

1.4.8.3 Seismology

As previously discussed for the geological analyses, seismological characteristics were evaluated throughout the site selection process. The seismological investigations were considered with the geological analyses to identify geographic areas of concern.

The seismology ratings shown in Figures 1.4-5 through 1.4-8 correspond to the following conditions:

Seismic Characteristics	Point Rating
Zones of low to moderate ground motion; that is, a relatively inactive tectonic province	2s
Zones of moderate ground motion values because of proximity to a zone described in rating 0 below, or existence in, or proximity to, a moderately active tectonic province	1s
Zones where capable faulting may exist based on exploration or published reports. Also, zones where large ground motions can be expected	0s

The identification of "seismic zones" was based in part on the Hadley-Devine "Seismotectonic Maps of Eastern United States" and localized features and conditions identified from other data sources.

As described for the geological anlyses, the seismological analyses were used to summarize site characteristics and to develop cost estimates.

In addition to the regional criteria, each site was rated on local conditions, described in or estimated from available literature and other data sources, such as deep, intermediate, or shallow overburden depths. Such overburden conditions, together with the estimated ability of the material to transmit seismic energy in the frequency band of interest, were used in assigning numerical rating values. Conditions such as potential liquefaction and other adverse secondary effects from potential ground motions were accounted for in the ratings.

In the final stage of the site selection process, the previous seismological analyses were refined and this information was used in both the cost estimates and site selection.

1.4.9 Accident Analysis

Population distribution surrounding the site and potential impairment of plant operational safety by accidents of external origin were addressed in evaluating potential nuclear power plant sites.

.4.9.1 Population Distribution

Reactor siting criteria in 10 CFR 100 require that population densities be taken into consideration when determining the acceptability of a site. Several zones surrounding the site were considered:

1. exclusion area
2. low population zone (LPZ)
3. population center distance

NRC Regulatory Guide 4.7 provides guidance pertaining to population distribution. The guide indicates that in the siting of nuclear power plants, the exclusion area boundary may generally be assumed to be 0.4 miles from the reactor and the LPZ outer radius may generally be assumed to be 3 miles from the reactor. The population center distance should be at least 4 miles from the reactor. These guidelines were used in evaluating all sites.

Additional evaluations of population distribution were undertaken using the methodology described in WASH-1235, "The Site Population Factor, A Technique for Consideration of Population in Site Comparison". The site population factor (SPF) weights the population in concentric rings around the reactor center according to the expected dose a person would receive from a ground level release of radioactive fission products from the reactor containment. Uniform population densities of 500 and 1000 persons per square mile, out to 30 miles, correspond to SPF (30)s of 0.5 and 1.0, respectively. The surrounding population characteristics were considered for the years 1985 and 2025*.

1.4.9.2 Nearby Industrial, Transportation, and Military Facilities

For each site, potential hazards associated with nearby industrial, transportation, and military facilities were considered. In general, potentially hazardous facilities and activities within approximately 5 miles of each site were identified. Air traffic related activities were considered within approximately 10 miles of the reactor center.

The purpose of this evaluation was to identify potential hazards in the vicinity of each site based on reconnaissance-level information. It was recognized that if a significant hazard was identified in the vicinity of a given site, a detailed study (during preparation of the Preliminary Safety Analysis Report - PSAR) would be required. It was also recognized that the results of the detailed PSAR-level analysis could indicate that additional plant protective features might be required at a given site to mitigate consequences of postulated accidents.

*The years 1985 and 2025 were used for convenience relative to published population projections, rather than actual startup and shutdown dates.

1.4.10 Aesthetics

Each site was evaluated for potential visual impact as viewed from visually sensitive and intensive land use areas within 6 miles of the site center. The types of land uses which comprised the categories of visually sensitive and intensive land uses are defined in 16 NYCRR 77.

Two parameters were evaluated at each visually sensitive and intensive land use viewing area. These were the distance from the site center to the viewing area and the visibility of the plant from the viewing area. A 575-foot natural draft cooling tower was assumed to be located at site center and was the dominant visual structure. The distance parameter was grouped into three major categories:

1. background -- greater than 5 miles

2. middleground -- between 1 and 5 miles

3. foreground -- less than 1 mile

The visibility parameter considered the topographical influence and vegetative cover on the visual impact of the plant.

Using the standard resources for all sites (National Register of Historic Places, National Registry of Natural Landmarks, A Guide to Historical Markers of New York State, New York State Outdoor Recreation Facilities Inventory, New York State Historical Places, aerial photographs, LUNR maps, USGS 1:24,000 scale topographic maps and site visits), visually sensitive and intensive land uses were plotted on a map. Line of site profiles between the site and each viewing area were developed and the visual impact on each viewing area determined. Sites were then compared based on each site's aggregate visual impact.

1.4.11 Land Use Planning

The land use planning evaluation considered the relative compatibility of electric power generation, with the projected land use plan for the site as adopted by the responsible planning agency. A comparison among each site's projected land use designation was conducted and each site was then ranked according to its degree of compatibility/conflict. This assessment was based on the following guidelines:

1. Electric power facility would be classified in the general land use category -- industrial.

2. The least compatible, highest conflict situation would occur when the projected plan designated the site area for preservation of its natural resources.

3. The most compatible, nonconflicting situation would occur when the projected plan designated the site area for potential heavy industrial development.

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4. Between these two extremes, there is a sliding scale of relative compatible/conflicting land use designations. Preempting high intensity superior farmland was considered a greater conflict than preempting marginally productive farmland. Preempting land which was designated to remain undeveloped open space was considered to be less compatible and of greater conflict than a preemption of disturbed land where potential development was encouraged.

Comprehensive planning documents were obtained and reviewed for the projected land use plans for the site area. For all sites, an attempt was made to obtain the local (county level) comprehensive plan for the land use planning assessment. The rationale for adopting the local planning report was based on the premise that the smaller the jurisdiction of the governing agency, the more responsive the agency can be to the specific and unique problems and needs of the local community. Consequently, the local land use plan should best represent solutions to the community's problems and its needs.

1.4.12 Costs

1.4.12.1 Basis and Assumptions

The total evaluated cost of a power plant at a given site is the sum of the total capital cost and total capitalized operating cost components. The total capital cost consists of the plant construction cost (base plant), site-related costs, and transmission construction. The total operating cost component is the cost of fuel, operation and maintenance, transmission losses, and pumping, capital ·ed over the 30-year life of the plant. This plant life was assumed for all economic analyses in the siting study. All costs are expressed in 1987 dollars.

To compare the total evaluated cost of the nuclear plant at different sites, a "global estimate" of the base plant was first developed. The base plant assumed the plant to be equipped with natural draft cooling towers; to be located in the county with the lowest labor rates in the state; and 1/2 mile away from a water source, a railroad line, and an access road. It also assumed good geological and foundation conditions with a minimum amount of overburden excavation (50 ft), as well as a Safe Shutdown Earthquake (SSE) of 0.25g.

Site-related costs were computed for deviations from the base plant using incremental costs associated with each economic consideration. The costs of transmission construction and transmission losses were computed on a site-by-site basis. Fuel cost and operation and maintenance costs were the same for each site considered. Site-specific differential costs were developed for comparison by subtracting the total evaluated cost of the lowest cost site from that of each site evaluated.

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The parameters used in the economic evaluations are listed in Table 1.4-2.

The annual escalation rate used in the site selection study was based on the then current trends of the economic recovery of the country and the measures taken by the federal government to curb inflation.

In Table 1.4-2, the annual rate of interest during construction, plant life, annual fixed charge rate, and annual discount rate parameters were NYSE&G corporate figures in effect as of 1975. The average capacity factor and net plant heat rate parameters were average figures, representative of the current trends of nuclear operations. Plant construction costs and operation and maintenance costs were "global estimates," and appropriate for comparing one site versus another when only differential costs are of significance. The cost of one kWe of operating auxiliaries was determined by taking into consideration the plant construction, the fuel cost, and the plant operation and maintenance costs.

1.4.12.2 Tabulation of Site-Related Construction Costs

Described below are the unit costs and the units for each of the engineering/economic considerations that make up the site-related costs.

1.4.12.2.1 Land and Land Rights

The base plant cost included $2,000,000 for land and rights-of-way. For each site the real estate records were reviewed and the cost for purchase of required lands was estimated.

A 250-ft wide right-of-way was established based on 765kV transmission requirements. This size was also deemed adequate for railroad and pipeline routes. Wherever possible, the pipeline and railroad were assumed to use the same right-of-way. The cost of the right-of-way was established on the following unit rates:

	Unit Rate
Right-of-Way	$1620.00/acre
Clearing	$ 930.00/acre

1.4.12.2.2 Excavation and Foundations

The base plant cost included the cost of excavating to competent bedrock or suitable glacial till within 50 ft of the surface (i.e., the bottom of the reactor containment).

For each site, the type of overburden, the depth to the competent bedrock and/or suitable glacial till, and other geological site characteristics were

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evaluated. The incremental cost of excavation was determined using the following unit costs:

Excavation	Incremental Cost
Overburden Removal (to bottom of foundations)	Base Cost
Glaci Till Removal	$ 4.90/cu yd
Rock Removal	$19.40/cu yd

1.4.12.2.3 Cooling System

For each site, it was assumed that the cooling system would use natural draft cooling towers.

1.4.12.2.3.1 Impoundments

The plant water requirements used throughout the site selection study were as follows:

	Nuclear Plants
Consumptive Use (Evaporation plus drift)	52 cfs
Blowdown rate	25 cfs
Pumping capacity from river to impoundment	88 cfs

For nuclear plants with intakes located on rivers where the minimum daily flow was greater than or equal to 260 cfs, no impoundment was assumed to be required.

The following flow conditions were used for impoundment sizing calculations, where Q is the daily river flow upstream from the intake.

Daily Stream flow Q, cfs	Pumping to Impoundment cfs	Impoundment Outflow including Consumptive Use cfs	Impoundment Drawdown* cfs-days
$Q \leq 183$	0	260-Q	260-Q
$183 \leq Q \leq 271$	Q-183	77	260-Q
$Q \geq 271$	88	77	(-11)

*Impoundment Size (acre-feet) = 1.98 Σ cfs-days for critical dry period of record.

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Embankment height allows for a freeboard of 5 feet, which is based on engineering judgement. Embankment volumes were estimated in cubic yards of earth/ft of impoundment perimeter versus embankment height. This assumed a 1:3 upstream slope, a 1:2½ downstream slope, and a crest width (W) as follows:

$$W = \frac{\text{Maximum Height of Embankment}}{5} + 10 > 12 \text{ ft} \qquad (1.4\text{-}1)$$

Impoundment volumes were computed, and embankment heights and lengths determined from USGS contour maps. Volume of excavation and earth fill was also determined, as required.

Costs of the impoundments were estimated using the following unit costs:

Land	\$ 16.20/acre
Clearing	\$ 930.00/acre
Excavation	
a. Earth	\$ 2.40/cu yd
b. Glacial Till	\$ 4.90/cu yd
c. Rock	\$ 19.40/cu yd
Earth fill	\$ 17.00/cu yd

1.4.12.2.3.2 Piping Installation, Pumping Equipment, and Pumping Costs

For sites where high elevations between the source and the plant indicated that a gravity discharge would be too costly, pumping of the blowdown and/or rerouting of the pipeline were considered.

Actual pipe lengths were then multiplied by the unit costs given below. Unit costs include the trench excavation, the furnishing and installation of the intake and discharge piping, and the earth backfill. Where an impoundment was required, similar costs were developed for the pipeline from the impoundment to the cooling tower basin.

Two steel pipes in one trench	
3'-6 dia w/2'-6" dia	\$6,800,000/mile
w/3'-0" dia	\$7,300,000/mile
4'-0 dia w/2'-6" dia	\$7,300,000/mile
w/3'-0" dia	\$7,800,000/mile

The pumps, located near the cooling water source in a suitable concrete pumphouse, were sized at 88 cfs. This capacity was based on the peak month evaporation rate of 57 cfs and associated 29 cfs blowdown, as well as a 2.5 percent flow margin.

The pumping capacity, expressed in kW, took into consideration the straight line distance as well as the difference in elevation (lift) between the water source and the power plant, and was represented by the following relationship:

$$kW = 9.24(H + 19.82L) \qquad (1.4\text{-}2)$$

where: H is the difference in elevation (lift) in feet between the water source and the site

L is the distance in miles between the water source and the site

The cost of the pump and pumphouse was assumed to be $330/kW, based on industry-wide experience.

For plants with no impoundments, the makeup piping was connected directly to the cooling tower basin. Conversely, for plants with impoundments, the piping was directed to the impoundment and a separate pipe with the appropriate size gate connected the impoundment to the cooling tower basin. For either scheme, the blowdown (or return) piping ran between the cooling tower basin and the cooling water source.

The makeup piping was sized for a velocity of 6 to 7 fps; thus, a 48-inch pipe was assumed. The size of the blowdown pipe varied between 30 inches and 48 inches depending upon the difference in elevation between the cooling tower basin and the water source and the necessity for maintaining the downstream flow of 208 cfs.

Pumping energy costs over the life of the plant were based on an intake average flow of 68 cfs, consisting of an evaporation rate of 45 cfs and a blowdown of 23 cfs. The pumping energy cost took into consideration the distance as well as the difference in elevation (lift) between the water source and the power plant and was represented by the following relationship:

$$\text{Pumping Energy Cost} = 7.14(H + 10.51L)\ C \qquad (1.4\text{-}3)$$

where: H is the difference in elevation (lift) in feet between the water source and the site

L is the distance in miles between the water source and the site

C is the capitalized cost of pumping power over the life of the plant ($/kW)

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All the above relationships assumed a pump efficiency of 85 percent and a motor efficiency of 95 percent. Friction losses were based on Manning's equation with n = 0.013.

1.4.12.2.4 Intake and Discharge Structures

The size and location of the intake and discharge structures incorporated the following parameters, which were based on engineering data at hand, and that gathered from other power plants located on similar lakes and rivers:

1. Lake Site Intake Structures

   a. Distance from shore = 500 ft maximum (based on lake depth)

   b. Approach velocity at face = 0.5 fps

   c. Intake pipe velocity = 7 fps maximum

   d. Intake opening = 3 ft minimum off lake bed

   e. Structural clearance = 15 ft minimum below low water datum

2. Lake Site Discharge Structures

   a. Discharge from shore = 500 ft minimum

   b. Distance from intake = 300 ft minimum

   c. Discharge pipe velocity = 7 fps maximum

3. River Site Intake Structures

   a. Basin = 10 ft deep minimum

   b. Intake opening = 3 ft minimum off river bed

   c. Basin probably semicircular, 150 ft ± diameter, with intake on site of river at center of semicircle.

4. River Site Discharge Structures

   a. Distance from intake = 100 ft deep minimum downstream

Costs were developed using the following unit costs:

1. Silt Excavation in water body $ 50/cu yd

2. Rock Excavation in water body $ 100/cu yd

3. Reinforced Concrete Pipe - Single

2'-6" dia	$1,640,000/mile
3'-0" dia	$1,847,000/mile
3'-6" dia	$2,066,000/mile
4'-0" dia	$2,309,000/mile

4. Concrete, incl. reinforcing & embedments — $ 365.00/cu yd

5. Cofferdam — $ 1460.00/ton

These costs were added to, or subtracted from, the base plant intake and discharge system of $20,500,000.

1.4.12.2.5 Transmission and Substations

Transmission costs including offsite power and right-of-way costs were developed. The transmission costs also included the cost of substations for remote terminals, but not the plant switchyard. The cost of the latter was in the base plant cost.

The transmission unit costs and substation costs are summarized in Table 1.4-3.

1.4.12.2.6 Transportation

Railroad spurs required to connect the sites to existing railroads were determined by reviewing the New York State DOT maps, and the distances were multiplied by $808,500/mile to obtain the construction cost. In those instances where the routing exceeded the 2 percent slope restriction, the railroad routes were adjusted to conform to this limitation.

Roadways required to connect the sites to existing highways, and not exceeding the 6 percent slope restrictions, were determined by reviewing the New York State DOT maps. The distances were multiplied by $294,000/mile to obtain the construction cost.

1.4.12.2.7 Seismology

As stated previously, the base plant cost incorporated a horizontal ground acceleration of 0.25g for those structures, systems, and components that required seismic design consideration. The sites considered were determined to be within the above stated limit; accordingly, the seismic design incremental cost was zero.

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1.4.12.2.8 Labor Cost

Labor rates by trade were obtained by telephone calls and meetings with union officials of various locals in New York State, and the overall labor rates were determined. A matrix was set up by Candidate Areas, and counties therein. Candidate Region 11 - Broome County (Binghamton Area) was used as the base cost since it has the lowest overall rate. A productivity rate, based on engineering experience, of 12 manhours/kW was used.

The differential cost of labor for each Candidate Area is shown in Table 1.4-4 and is calculated using the formula:

$$\Delta \text{ Labor Cost} = (\Delta \text{ Labor Rate})(\text{Productivity})(KW_e \text{ net Plant Capacity}) \quad (1.4\text{-}4)$$

1.4.12.2.9 Ultimate Heat Sink

At each site, it was assumed that a Seismic Category I mechanical wet tower would be employed as the ultimate heat sink.

1.4.12.2.10 Transmission Losses

Load flows were run using a computer program at 63 percent of the forecast 1987 peak summer load level. This was the average New York Power Pool load level determined from the 1965 to 1974 load energy and demand data.

The level flow calculations were run with and without the new generation inserted into the system, for the sites under construction. The difference in losses was attributed to the new generation at a particular site. The cost of losses was based on losses of the member companies of the New York Power Pool, rather than those of the entire system.

Replacement costs were based on nuclear fuel. If new generating capacities were added to supply future load increases, losses would have been incurred by the delivery of energy from the new source to the new load. From a supply point of view, these losses would have been indistinguishable from the load and, therefore, were treated as part of that load. Since the added losses would not have existed without the added load and generating capacity, a portion of the added generating capacity would have been necessary to supply those added losses; thus, in evaluating the cost of those losses, the calculations assumed that the capacity and energy charges associated with the future generating capability would have been used to supply those losses. A replacement cost of $36.30 MWh was used for the calculations. To allow for scheduled maintenance and forced outages a capacity factor of 75% was assumed.

To determine the total annual cost of losses the following equation was used:

$$\text{Annual cost of } \Delta \text{ NY MW losses} = (\Delta \text{ NY load flow MW losses @ 63\% peak load level}) \times (\text{replacement cost}) \times (\text{capacity factor}) \times (8760 \text{ hr/yr}) \quad (1.4\text{-}5)$$

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TABLE 1.4-1

CATEGORY SYMBOLS
NEW YORK STATE LAND USE AND NATURAL RESOURCES INVENTORY
AREA LAND USE DATA

Active

Ao Orchard
Av Vineyard
Ah Horticulture
At High intensity
Ac Cropland/cropland pasture
Ap Permanent pasture

Inactive

Ai Inactive agricultural
Ui Urban intensive
Uc Ui under construction

Specialty Farm

Ay Minks, game, aquatic ag, horse farms

Forestland

Fc Brush cover up to fully stocked poles less than 30 feet
Fn Forest over 30 feet
Fp Plantations, any size

Water

Wn Natural, any size
Wc Artificial, one acre
Ws Streams, rivers - 100 feet

Wetlands

Wb Bogs, shrub wetlands
Ww Wooded wetlands
Wm Marine wetlands, navigable (St. Lawrence)
Wh Hudson River

Residential

Rh High density, 50 feet frontage
Rm Medium density, 50-100 feet frontage
Rl Low density, over 100 feet frontage
Rs Strip with max of 1/3 intermixture of Cs commercial
Rr Rural hamlet
Re Estates, 5 acres
Rc Farm labor camp

Shoreline

Rk Shoreline developed

Commercial

Cu Urban (Downtown)
Cc Shopping center
Cs Commercial strip with max of 1/3 intermixture of Rs or density housing
Cr Resorts

Industrial

Il Light manufacturing
Ih Heavy manufacturing

Outdoor Recreation

OR ALL categories

Extractive

Eg Gravel, sand
Es Stone quarries
Em Minerals, cement, clay
Eu Oil, gas, salt

TABLE 1.4-1 (Cont'd)

Non-Productive

Ns Sands
Nr Exposed rocks

Public

P All categories

Communications

Tt Area of service facilities

Transportation

Th Highway (limited access)
Tb Barge canal (channel, lock)
Tp Port or dock
Tl Locks or dams
Ts Shipyards
Ta Airport, any type
Tr Railroad

Land Area Not in New York State

No

NYSE&G ASA

TABLE 1.4-2

ECONOMIC PARAMETERS

The parameters used to prepare the costs shown in the engineering/ economic evaluations are as follows:

1.	Two 1200 MWe Net Nuclear Units	
2.	Commercial Operation Date	1986-1988
3.	Annual Rate of Escalation	8% to 1980, 6% from 1981 to 1988; except for transmission and substation capital costs, and fuel costs which are calculated at a straight 8% per year
4.	Annual Rate of Interest during Construction	9%
5.	Plant Life.	30 years
6.	Annual Fixed Charge Rate.	15.9%
7.	Annual Discount Rate.	10.65%
8.	Average Capacity Factor	75%
9.	Net Plant Heat Rate	10,250/Btu/kWh
10.	Plant Construction Cost	$2,880,000,000
11.	Operation and Maintenance Cost.	1.125 mills/kWh
12.	Capitalized Cost of Power over Plant Life.	$1643/kW

TABLE 1.4-3

TRANSMISSION LINE UNIT COSTS AND SUBSTATION COSTS*

I. 765 kV bdl 4-1351 mcm 5 twr/mile
   a. w/250 ft ROW & cl $1,761,000/mile
   b. w/250 ft cl only $1,623,000/mile
   c. No ROW & no cl $1,542,000/mile

II. 345 kV H-Fr bdl 2-1590 mcm 7 str/mile
   a. w/150 ft ROW & cl $872,000/mile
   b. w/150 ft cl only $789,000/mile
   c. No ROW & no cl $741,000/mile

III. 345 kV twr bdl 2-1590 mcm 6 str/mile
   a. dbl ckt w/150 ft ROW & cl $1,784,000/mile
   b. dbl ckt no ROW & no cl $1,653,000/mile
   c. s c f d c w/150 ft ROW & cl $1,477,000/mile

IV. 230 kV H-Fr 1033 mcm 7 str/mile
   a. w/150 ft ROW & cl $396,000/mile
   b. No ROW & no cl $343,000/mile

V. 115 kV H-Fr 1033 mcm 7 str/mile
   a. w/150 ft ROW & cl $396,000/mile
   b. No ROW & no cl $265,000/mile

VI. Restring 345 kV H-Fr or add 2nd ckt to Existing s c f d c twr
   No ROW & no cl $307,000/mile

VII. Remove existing transmission
   Removal = Salvage

Table 1.4-3 (Cont'd)

VIII. Underground costs
Estimated on a site-specific basis. No generalized cost per mile assumptions were made.

REMOTE SUBSTATION COST ASSUMPTIONS**

765kV	3 bkr	=	$11,989,000
	2 bkr	=	9,324,000
	1 bkr	=	2,896,000
345kV	3 bkr	=	$ 5,009,000
	2 bkr	=	3,851,000
	1 bkr	=	1,535,000
765/345kV	1 - 1 dia 500 MVA	=	$1,000,000
used	4 - 1 dia Units for 1 bank		
	7 - 1 dia Units for 2 banks		
745kV	Shunt Reactor 100 MVAR	=	$1,877,000

* bdl	Bundled
ROW	Right-of-Way
twr	Towers
H-Fr	"H" - frame
str	Structures
dbl ckt	Double circuit
s c f d c	Single circuit future double circuit
ckt	Circuit
cl	Clearing
w/	With
bkr	Breaker

**All costs annualized at 15.9 percent per year substation costs for remote terminals only, not for Switchyard.

TABLE 1.4-4

DIFFERENTIAL LABOR COSTS

Candidate Area*	ΔLabor Cost (in 1987 dollars)
11-2	Base
1-1 7-2, 7-6, 7-11 8-1, 8-4, 8-7	112.0×10^6
4-3	54.0×10^6
10-2, 10-3, 10-4	65.0×10^6

*The first two numbers in any site description refer to the Candidate Area. For example, Site 7-6-6 is located within Candidate Area 7-6. Figure 9.2-12 of the ER shows the locations of the Candidate Areas.

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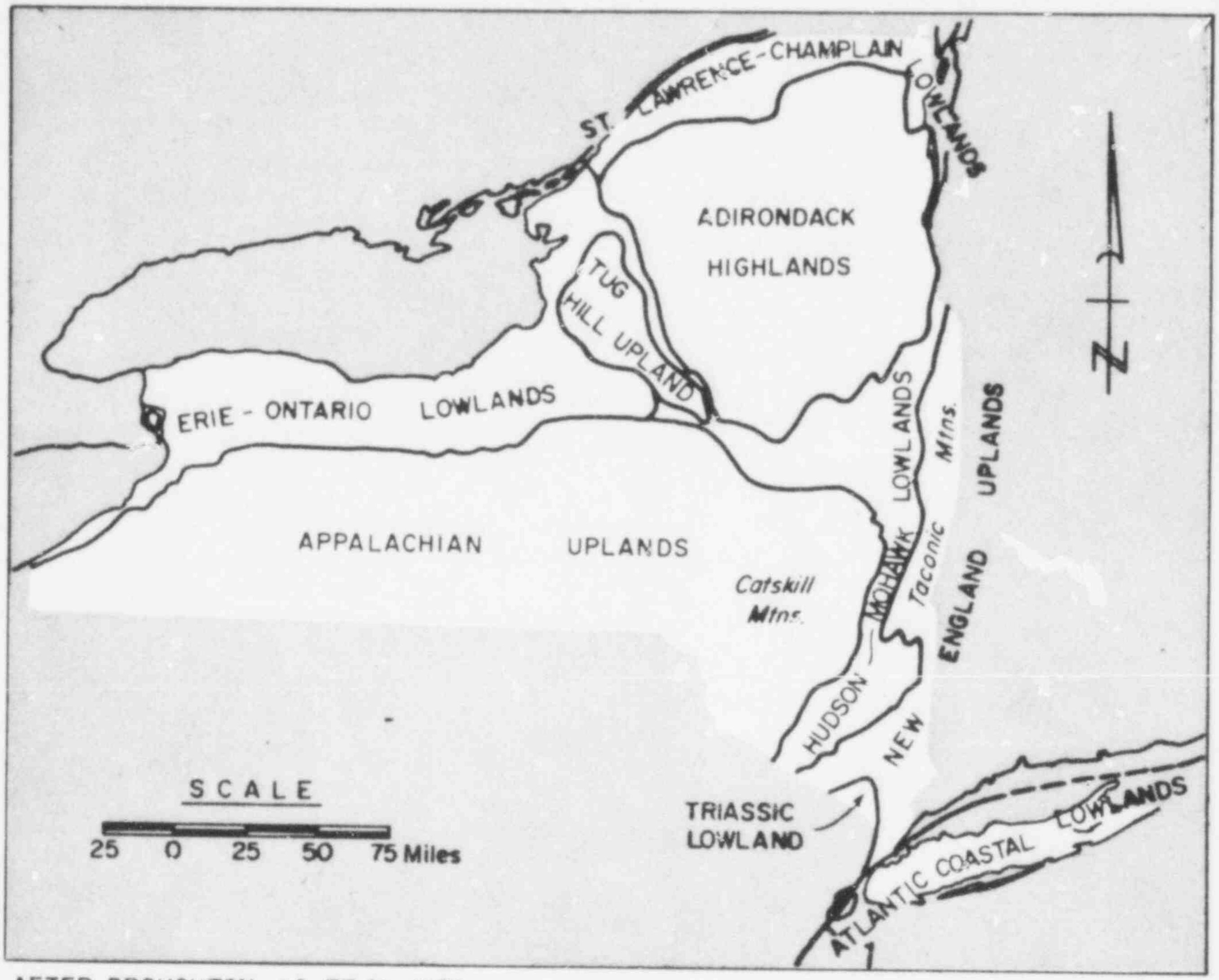
NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

ECONOMIC AREAS
OF NEW YORK STATE

FIG. I.4-1



AFTER BROUGHTON, J.G. ET AL, 1966.

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

RECONNAISSANCE LEVEL INFORMATION
PHYSIOGRAPHIC PROVINCES
OF NEW YORK

FIG. I. 4-2

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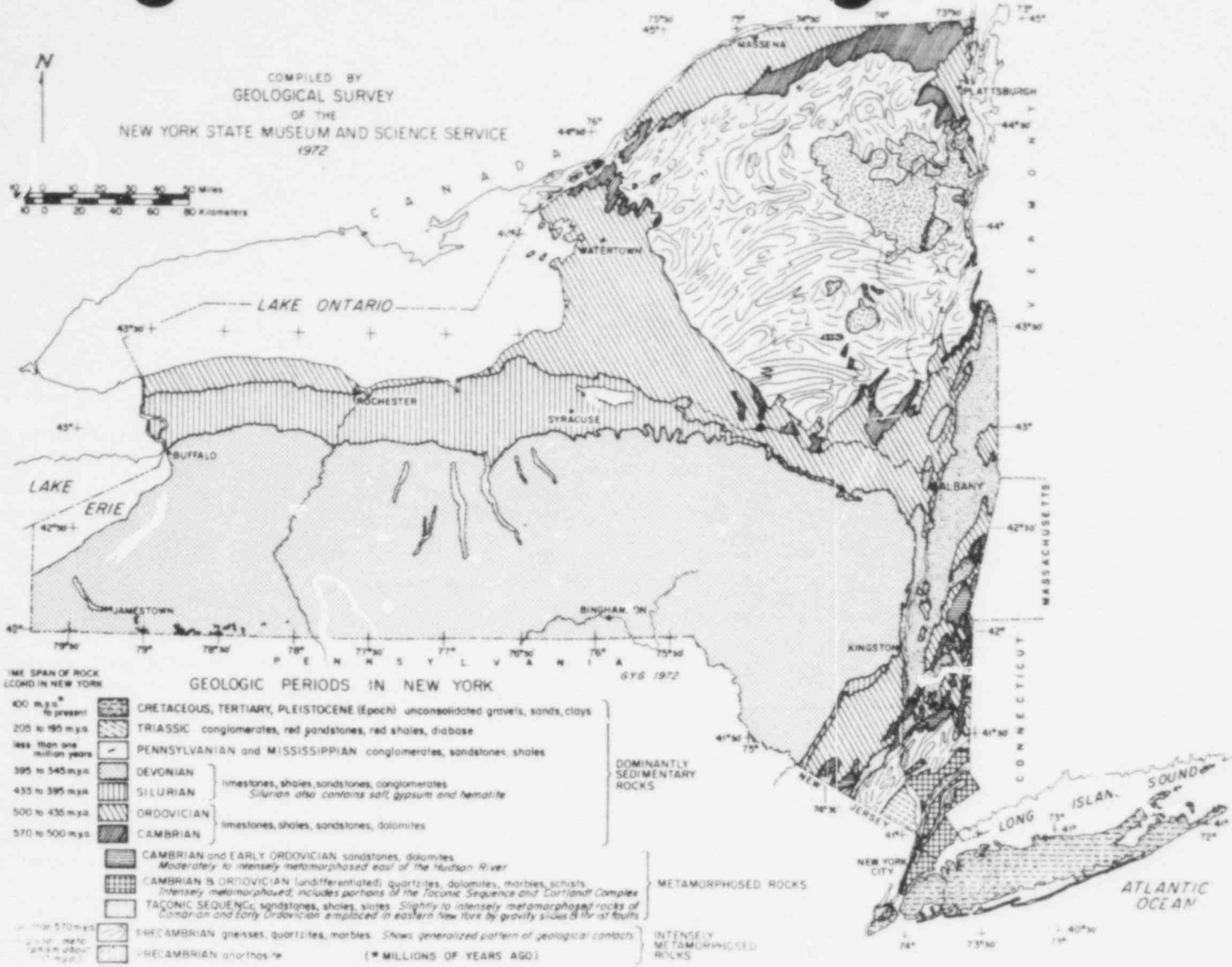
POOR ORIGINAL



NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

GENERALIZED BEDROCK GEOLOGY OF NEW YORK STATE

FIG. I.4-3

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2.0 RECONNAISSANCE-LEVEL INFORMATION

AND

SITE SUMMARIES

SUSQUEHANNA RIVER

POOR ORIGINAL

2.0 RECONNAISSANCE LEVEL INFORMATION AND SITE SUMMARIES

2.1 SITE 11-2-35, SUSQUEHANNA RIVER AREA

2.1.1 Site Description

Site 11-2-35 is located in the Town of Barton, Tioga County, 25 miles west of the City of Binghamton and 2 miles north of the Susquehanna River. The community of Barton, situated along the Susquehanna River, is located 2.5 miles to the south, the community of Ellistown is 4 miles southwest, and Owego 9 miles northeast. Figure 2.1-1 shows the general location of the site. Figure 2.1-2 depicts the site boundary and area topography, and Figure 2.1-3 is an aerial photograph of the site.

The general site land uses are predominantly a mixture of forest land and shrub cover and active and inactive agricultural land. Intermittent streams flow through the valley areas on the site, and a small dam is located near the western boundary. Figure 2.1-4 is a copy of the LUNR map for the site and surrounding area.

Scattered farm and nonfarm residential dwellings are located along the two roads, Oak Hill and Henton, which traverse the site.

2.1.2 Meteorology

The meteorological evaluation of the Susquehanna River site (11-2-35) considered the ground level dispersive capability and the potential for cooling tower impacts on sensitive receptors.

2.1.2.1 Topography

Site 11-2-35 is located near the top of the small creek basin at an elevation in the range of 1200 ft - 1300 ft msl about 2 miles north of the Susquehanna River. The site is well out of the river valley which lies about 400 ft - 500 ft below the site. There is some slightly higher topography in the immediate site vicinity; with hilltops of 1523 ft msl about 1 mile north of the site, 1465 ft about one mile west of the site and 1400 ft about 1 mile east. The topography within 10 miles of the site is characterized by hills and ridges on the order of 1500 ft - 1700 ft msl and river and creek valleys on the order of 800 ft - 1000 ft msl.

2.1.2.2 Meteorological Data

The closest source of meteorological data is the Broome County (Binghamton) Airport, located about 30 miles ENE of the site. The Broome County Airport is located on a small plateau at about 1600 ft msl, and is above most of the surrounding terrain. The meteorological station has an excellent exposure and little topographic influence on the meteorology is expected.

Table 2.1-1 presents an annual wind distribution by atmospheric stability class calculated with the National Climatic Center (NCC) "STAR" Program for 1964 for the Broome County Airport. The overall wind direction distribution showed no evidence of wind channeling. The predominant direction frequencies were reasonably evenly distributed from the south, west, and north. The mean wind speeds also reflected the unobstructed airflow with the frequency of speeds from 0-3 knots about 4%, from 4-6 knots about 26%, and from 7-10 knots about 39%. The frequency of stable atmospheric conditions was 24% with the relative frequency of stable atmospheric conditions with speeds from 0-3 knots about 2%, with speeds from 4-6 knots 14%, and 7-10 knots 8%.

2.1.2.3 Ground Level Dispersive Capability

The site elevation and exposure tend to minimize the potential for topographic obstruction of airflow. There may be a minor potential for cold air drainage due to the slightly higher topography in the immediate site vicinity. The Broome County Airport is judged to be a reasonably representative source of meteorological data for the site due to the similar unobstructed location of both the airport and the site. In general, the ground level dispersive capability of the site is judged to be reasonably favorable.

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2.1.2.4 Cooling Tower Evaluation

Due to the location of the site, 400-500 ft above the Susquehanna Valley, the dispersion potential for moisture from cooling towers is considered to be reasonably good. State Route 17 is a potential sensitive receptor located about 3 miles south of the site; however, its location in the river valley below the site tends to minimize the cooling tower related fogging potential there.

2.1.2.5 References for Section 2.1.2

1. USGS topographic map, 1:24,000 scale, Barton, N.Y. Quadrangle.

2. USGS topographic maps, 1:250,000 scale, Elmira, N.Y., Williamsport, Pa., and Binghamton, N.Y.

3. U.S. Department of Commerce, NOAA, NCC, EDS, Wind Distribution by Pasquill Stability Classes/5, (STAR Program), Binghamton, New York (1964).

4. U.S. Department of Commerce, Weather Bureau, Form WBAN 10-D, Station Description and Instrumentation, Binghamton, N.Y., December 1964.

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2.1.3 Hydrology

2.1.3.1 Water Availability and Supply

The source of cooling water is the Susquehanna River. The intake is located approximately 6 miles upstream of USGS Gaging Station No. 5150 at Waverly, New York. Records (February 1937 to September 1973) at this station indicate a mean flow of 7392 cfs for over the period of record, a minimum daily flow of 237 cfs, a minimum monthly flow of 326 cfs, and a 7-day, once-in-ten-years low flow of 345 cfs.

Due to consumptive use regulations on the Susquehanna River, which limit consumptive withdrawals when the flow is less than the 7-day once-in-ten-years low flow, a water storage reservoir would be needed to ensure adequate water supply. For a nuclear plant, 12,800 acre-ft of active storage would be required. Section 2.1.6.5 provides further information on impoundment requirements.

2.1.3.2 Flood Protection Requirements

The site is located approximately 400-500 ft in elevation above the Susquehanna River. Therefore, there is no problem with flooding at the site and no flood protection requirements are considered necessary.

2.1.3.3 Effects of Construction

No significant problems related to dewatering, erosion, or river bottom dredging during construction were identified. There are two small streams on the edge of the site area which should not be affected by construction.

2.1.3.4 Effects of Operation

There is a potential problem with dispersion of the discharge effluent due to the shallowness of the Susquehanna River in the site vicinity.

2.1.3.5 References for Section 2.1.3

1. Eastern Susquehanna River Basin Regional Water Resources Planning Board, Summary of Tentative Plan, in cooperation with New York State Department of Environmental Conservation, 1975.

2. New York State Department of Environmental Conservation. Susquehanna River Basin Study: Needs and Capabilities for Multi-Purpose Water Resources Development, 1966.

3. New York State Department of Environmental Conservation. Susquehanna River Basin Study: Appendix H - Power, 1970.

4. Susquehanna River Basin Commission, Comprehensive Plan for Management and Development of the Water Resources of the Susquehanna River Basin, 1973.

5. Susquehanna River Basin Commission. Regulations and Procedures for Review of Projects, 1975.

6. Tice, R. H. Magnitude and Frequency of Floods in the United States, Part 1-B. North Atlantic Slope Basins, New York to York River, 1968.

7. U. S. Geological Survey. Compilation of Records of Surface Waters of the United States through September 1950, Part 1, 1954.

8. U. S. Geological Survey. Water Resources Data, Part 1: Surface Water Records in New York State, 1966-1974.

9. USGS topographic map, scale 1:24,000, Barton, N.Y. Quadrangle.

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2.1.4 Water Quality

2.1.4.1 General Description and Analysis

The analysis of the water quality of the Susquehanna River water source for Site 11-2-35 was based on review of the state stream classification, water quality management/planning documents of the Susquehanna River Basin Commission, appropriate USGS maps, and observations made during a water source visit.

The Susquehanna River in the vicinity of Site 11-2-35 has a Stream Classification of B, non-trout waters(1). The Eastern Susquehanna River Basin Board recommended that the Department of Environmental Conservation complete the Basin Water Quality Management plan, pursuant to Section 303(e) of the 1972 Water Quality Act. This should have fully examined the needs for: (a) further regionalization of waste water collection and treatment systems and their management; (b) water conservation for flow releases during drought periods; (c) the applicability of alternative treatment technologies such as physical-chemical treatment and land application; (d) alternative measures for control of non-point sources of water quality degradation; (e) expansion of the water quality monitoring network and improvement of the data processing systems(2). With the completion and operation of municipal wastewater treatment facilities, water quality should continue to improve in this stretch of the Susquehanna River.

The water quality analysis assumed the construction practices utilized and all discharges would have been in conformance with 40 CFR 423(3) to minimize potential impact to water quality due to turbidity, siltation, and runoff. Monitoring and treating in-plant waste streams assumed that the facility's liquid effluent and cooling tower blowdown would have been maintained in compliance with appropriate state and federal guidelines and regulations. Thus, if measures are taken to control possible increases in siltation, turbidity, suspended solids levels, and reduction in dissolved oxygen production from suppressed photosynthesis, existing water quality conditions would not likely be aggravated by the operation of a closed-cycle plant.

2.1.4.2 References for Section 2.1.4

1. New York State Department of Environmental Conservation. 6 NYCRR Subchapter 13, "Classes and Standards of Quality and Purity Assigned to Fresh Water and Tidal Salt Waters," 1966, as amended.

2. Summary of Tentative Plan of the Eastern Susquehanna River Basin Regional Water Resources Planning Board, May 1975.

3. 40 CFR 423, "Steam Electric Power Generating Point Source Category," October 1974, as amended.

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2.1.5 Aquatic Ecology

The analysis of the aquatic ecology and resources of the Susquehanna River water source for Site 11-2-35 was based on a review of background literature, publications of and meetings and conversations with personnel of the New York State Department of Environmental Conservation, and a water source visit.

2.1.5.1 Preexisting Stress

Preexisting stress on the water source biota appear to have been from previously unregulated industrial and sewage discharges.

2.1.5.2 Aquatic Resources

The stretch of the Susquehanna River to be used is immediately west of the Town of Barton. The site location is approximately 2 miles north of the water source.

Studies showed that, in the vicinity of Binghamton, New York, the seasonal distribution of algae was that usually seen in waters of the North Temperate Zone. The taxa and the number of taxa found were those of productive waters but not typical of heavily polluted waters[1].

Benthic studies in the vicinity of Vestal, New York indicated high water quality with 18 taxa of benthic organisms present. Studies in the vicinity of Apalachin, New York showed 14 taxa of benthic organisms present that were organic pollution tolerant or intermediate forms. Conditions indicated upstream organic pollution. Studies in the vicinity of Owego, New York showed an increase in types of benthic organisms. The river appears to be recovering at this station. At Smithboro, high quality water was indicated[2,3].

A warm-water fishery exists in the lower portions of tributaries of the Susquehanna River[4,5]. A very productive habitat characterizes the main stem of the river above Scranton, Pennsylvania extending to the headwaters in New York. This is considered to be one of the finest smallmouth bass and walleye fisheries in the area[6].

Warm-water species reported to occur in the Susquehanna River are as follows[4,5,7]:

- largemouth bass (Micropterus salmoides)
- smallmouth bass (Micropterus dolomieui)
- muskellunge (Exox masquinongy)
- chain pickerel (Esox niger)
- walleye (Stizostedion vitreum)
- yellow perch (Perca flavescens)
- bullheads (Ictaluridae)
- sunfish (Centrarchidae)

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At the time of the study, fishing pressure on walleye (Stizostedion vitreum), compared to other species in the Susquehanna River basin was medium to heavy. Muskellunge (Esox masquinongy) was one of the major sport fish species found in the basin. It is not native to the Susquehanna watershed, but has been successfully introduced into waters providing suitable habitats. The use of this resource is high in terms of recreation days. Smallmouth bass (Micropterus dolomieui) were abundant in lower portions of tributaries and the main stem where water quality was satisfactory and where there was good shoreline gravel for nest-building. Smallmouth bass are probably the most popular and widely distributed warm-water game fish in the basin and because of this receive a relatively heavy use. The panfish e.g., bluegills (Lepomis Macrochirus), perch (Family Percidae), and catfish (Family Ictaluridae) resource was under utilized[6].

Specific information on spawning and nursery areas, resting, feeding, wintering areas or areas of seasonally high concentrations of important species was not available. Review of the habitat preference and reproductive habits of fish reported from the Susquehanna[8,9] indicated that some spawning activity would have been expected to occur in the main stem of the river.

Conowingo Dam prevents upstream movement of anadromous fishes, thus no migratory routes were reported for the stretch of river in the vicinity of Barton[6]. Due to the restricted cross-sectional area of the river, the potential for blocking mobility of aquatic organisms exists; however, as stated previously, there were no migratory routes reported in this stretch of the Susquehanna River.

The Susquehanna River from the Pennsylvania/New York border in Broome County to the City of Binghamton has no serious pollution. Populations of walleye, smallmouth bass, bullheads, sunfish, and yellow perch were found all the way to Rock Bottom Dam in Binghamton. Below Rock Bottom Dam there is a sewage treatment plant that once presented problems with discharges into the Susquehanna River. In recent years, these problems have been greatly reduced[10].

In the Binghamton, Johnson City, Endicott stretch of the river, the water quality in the past, has been poor. However, at the time of the study, the water quality had greatly improved and there were no longer any fish kills. Smallmouth bass reproduced in the river. There was a varied fish population from below Rock Bottom Dam to the Pennsylvania border, Tioga County with walleye and sometimes muskellunge coming up from Pennsylvania[10].

The river was at one time stocked with walleye, but the stocking was discontinued. Tagged walleye from Pennsylvania appeared to be on a spawning run toward Binghamton but they were prevented from going farther by the Rock Bottom Dam. It was presumed that the walleye were on a spawning run although no observations of spawning were made. In general, populations of fish in the Susquehanna River are improving, especially from Binghamton downstream[10].

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2.1.5.3 Potential Impacts of Construction

Environmental impacts of construction are expected to be primarily short term and reversible for organisms inhabiting the Susquehanna River. The primary unavoidable but reversible effects are considered to be associated with dredging and construction of intake and discharge structures.

The aquatic impact associated with the dredging operations may involve short-term turbidity increases as a result of sediment removal. Some benthic organisms may be lost with spoil removal; however, any backfilling would provide suitable habitats for some recolonization. Thus, the impact is considered short-term and reversible.

Effects of dredging activities on organisms other than the displaced macroinvertebrates are considered to be localized and temporary. Dredging operations could be scheduled seasonally to avoid spawning and other biologically active periods. Increased turbidity levels could have a short-term impact on plankton populations. However, because of the limited area involved in dredging, the potential adverse affects are considered inconsequential.

Fish would be largely unaffected because their mobility would enable them to avoid construction activities. Because of the short duration and limited area affected by construction activities, no impact upon or blockage of fish migration in the water source in the site vicinity is anticipated.

2.1.5.4 Potential Impacts of Operation

The potential impacts of plant operation on aquatic biota in this stretch of the Susquehanna River would be mainly dependent upon the specific location and design of the intake and discharge structures. Potential impacts would result from impingement of adult fish, entrainment of ichthyoplankton, phytoplankton, zooplankton, macroinvertebrates and juvenile fish, and thermal and chemical discharges.

The potential operational impacts would be expected to be minimal if the intake and discharge structures were located away from any unique habitats or areas of this stretch of the river conducive to fish congregating, feeding, or spawning.

2.1.5.5 References for Section 2.1.5

1. Wagner, D.B., and Schumacher, G.J. Phytoplankton of the Susquehanna River near Binghamton, New York: Seasonal Variations; Effects of Sewage Effluents. Journal of Phycology, 1970, Vol. (6): No. 2, pp. 110-117.

2. LaBuy, J.L. Biological Survey of the Susquehanna River and Its Tributaries Between Cooperstown, N.Y. and Northumberland, Penna. CB-SRBP Working Document No. 2, FWPCA Middle Atlantic Region, 1967.

3. LaBuy, J.L. Tabulation of Bottom Organisms Observed at Sampling Stations During the Biological Survey Between Cooperstown, N.Y., and Northumberland, Penna. Appendix to Biological Survey of the Susquehanna River and Its Tributaries Between Cooperstown, N.Y. and Northumberland, Penna. CB-SRBP Working Document No. 2, FWPCA, Middle Atlantic Region, 1966.

4. Excerpts from Susquehanna River Basin Natural Resources and the Future. Prepared for U.S. Department of Interior, National Park Service

5. Needs and Capabilities for Multi-Purpose Water Resources Development of the Susquehanna River Basin in New York, Division of Water Resources, Conservation Department, State of New York, 1966.

6. A Report on the Status of Fish and Wildlife Resources and Their Present Use in the Susquehanna Basin, New York, Pennsylvania, Maryland. U.S. Department of the Interior, Fish and Wildlife Service, Division of River Basin Studies, Boston, Massachusetts, 1966.

7. Freshwater Fishing in New York, Prepared by Division of Educational Services, State of New York Department of Environmental Sciences.

8. Eddy, S. and Underhill, J.C. Northern Fishes, 1974.

9. Hubbs, C.L. and Lagler, K.F. Fishes of the Great Lakes Region, 1974.

10. Personal Communication, Mr. Arch Petty, Fisheries Manager, N.Y. Department of Environmental Conservation, Cortland Regional Office, December 16, 1975.

2.1.6 Terrestrial Resources

The following summary and analysis of Site 11-2-35 is based on a review of these sources of data: USGS topographic maps (7.5 minute series), aerial photographs, pertinent literature, contacts with state resource agencies, LUNR maps, and a site visit.

2.1.6.1. Land Use

2.1.6.1.1 Dedicated Areas

1. federal lands -- none on or near the site

2. natural landmarks -- none on or near the site

3. state and local parks -- Municipal Park in Nichols 5 miles southeast. (This area is not part of the site and should not be affected by the development of the site.)

4. privately dedicated areas -- none on or near the site

5. endangered species -- at the time of the study, the U.S. Fish and Wildlife Service (USFWS) had not ruled that any plant taxa were endangered or threatened. The State of New York did not have an endangered plant regulation but did have a regulation prohibiting removal of certain plant species without the consent of the landowner.

   The animals considered endangered by the USFWS at the time of the study, which might have occured in the site vicinity, included the bald eagle, the peregrine falcon, and the Indiana bat. None of these were known to have bred in the vicinity of the site, but may have migrated through the site area. The State of New York also considered the osprey endangered and this bird also migrated through the area but did not nest. The likelihood of an endangered species occurring on any site in the river basin was relatively equal to Site 11-2-35. This area did not represent any unique area which would have attracted an endangered species.

6. critical habitat -- none on or near the site

2.1.6.1.2 Vegetation

The major [illegible] communities as shown on the LUNR map include forest, brushland, cropland, and abandoned agricultural land. The woodlots are located on sloping land which is not suitable for agricultural activities. The LUNR map indicates a small wetland in the northern portion of the site; however, the USGS map does not indicate a wetland, and no wetland was seen during the site visit. During a site visit, some livestock were observed in one of the inactive agricultural areas as shown on the LUNR map.

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2.1.6.1.3 Wildlife Habitat

The plant communities onsite probably support a variety of wildlife. The combination of vegetative cover types, the presence of small streams, a large farm pond and the wet area indicated on the LUNR map provide an indication of many species of mammals, birds, reptiles, and amphibians. The game animals that could be present include deer, rabbits, ruffed grouse, woodcock, and squirrels. Also present could be raccoon, skunk, woodchuck, and fox. No waterfowl are expected to use the site area. Some may migrate along the river but probably do not remain at the site.

2.1.6.1.4 Farmland

At the time of the study, approximately one third of the site was active cropland.

2.1.6.1.5 Wetland, Coastal Zone Management Program, and State Wetland Act

There is a small freshwater wetland in the northern boundary of this site. The area is shown on the LUNR map but is not on the U.S. Geological Survey map. While the wetland probably would have been avoided, it did not represent a significant habitat for aquatic animals. The site is not within the coastal zone.

2.1.6.1.6 Floodplain

No floodplain was identified on site based upon field inspections and review of maps and photographs.

2.1.6.2 Transmission Corridors

For Site 11-2-35, a total of 140 circuit miles of transmission facilities would be required. Two double-circuit steel lattice tower transmission lines would be constructed in a northerly direction from the site to the proposed Straits Corners substation, a distance of approximately 3.7 miles. From this point, new 345kV wood H-frame transmission lines would be constructed, one westerly to Watercure Road substation (16.6 miles), and one easterly to Oakdale substation (25.9 miles), replacing the existing 230kV Oakdale-Watercure Road transmission line. The routes parallel the existing 345kV Oakdale-Watercure Road transmission line; no new right-of-way (ROW) would be required. From the proposed Straits Corners substation to Oakdale substation, the Oakdale-Watercure Road 345kV line would be rebuilt at 345kV to accommodate the proposed bundle conductor.

An additional 345kV transmission line would be required from Oakdale substation to Fraser substation (56.9 miles). The proposed route parallels the existing 345kV Oakdale-Fraser transmission line. Acquisition of additional (ROW) would not be required to accommodate the new facilities.

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Although major population centers are avoided by the proposed corridors, approximately eight linear miles of the two-mile-wide study corridor traversed land classified as residential; 75.2 miles of corridor traverse agricultural areas and forest brushland; 24 miles of the corridors traverse mature forest. The proposed installations would not have significantly affect these land uses.

No historic sites of national or state designation are contained within the study corridors. No areas of unique or high visual quality are traversed, and only eight corridor miles are in areas of medium visual quality.

Approximately 1.4 corridor miles (1,790 acres) traverse wetlands, and 6.2 corridor miles traverse slopes in excess of 25%. The study corridors cross several streams and rivers, including Cayuga Creek, Catatonk Creek, the Tioughnioga River, the Chenango River, and the Susquehanna River, all of which are crossed by the existing transmission lines.

The proposed corridor crosses Interstate Route 88 between the communities of Afton and Bainbridge, and crosses Interstate Route 81 north of Binghamton. Oakley Corners State Forest is also crossed by the study corridor, but final line placement would not affect this area.

Although Oakdale Substation is located on the westerly corporate boundary of Johnson City, and Watercure Road Substation is located less than one mile from the Elmira city limits, it was anticipated that addition of the proposed facilities would not result in significant additional impact at these sites.

Table 2.1-2 presents the transmission corridor data for Site 11-2-35.

2.1.6.3 Pipeline

The pipeline route to the site begins on the bank of the Susquehanna River. Exact location of the intake depends on aquatic ecological and engineering considerations. The route selected for the evaluation is 3 miles long. The line crosses mostly agricultural land and brushland with some forest crossed. The line crosses State Route 17C, a 7300 vehicle per day, two lane road. Two small streams are crossed as well as a railroad main line. Figure 2.1-1 shows the location of the pipeline.

2.1.6.4 Railroad

The railroad route to the site begins at the Erie Lackawanna line south of the site in Barton. The line would require the construction of 7 miles of track. Based on LUNR maps, the vegetation crossed is mostly forest and agricultural with some brushland. A small wetland is crossed as were seven small streams. State Route 17C, a 7300 vehicle per day, two lane road, is crossed once. There is a residential area at the location where the site route joins the main line. Selection of the final railroad route greatly depends on engineering aspects due to the terrain between the main line and the site. There are no unique ecological areas along the potential route. Figure 2.1-1 shows the location of the railroad spur.

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2.1.6.5 Impoundments

As described in Section 9.2.2.6.3.1 of the ER, after the Stage 5 evaluations were completed, consumptive water use limitations were proposed for the Susquehanna River Basin by Susquehanna River Basin Commission (SRBC). These limitations meant that large water storage impoundments would have been required to augment withdrawal of river water during low flow periods.

In a series of public meetings, the SRBC discussed the implementation of new regulations to limit the comsumptive use of water during periods of low flow. A number of proposals were discussed, with most centering on a requirement to compensate for consumptive uses when the stream flow approached a specific value. Thresholds of 1.0 and 1.5 times the 7-day, once-in-ten-years, low flow were proposed. Some representatives from the New York State Department of Environmental Conservation strongly favored immediate implementation of the limit of 1.5 times the 7-day, once-in-ten- years, low flow, at least for portions of the river flowing through New York. Other members of the commission supported an initial limit of 1.0 times the 7-day, once-in-ten-years, low flow, but considered that the 1.5 limit might be appropriate for implementation at a later date.

Recognizing that consumptive use regulations would soon be forthcoming, and certainly in force by the time of scheduled plant operation, studies were undertaken to determine the implications of developing appropriate impoundments on the Susquehanna to meet regulations in the range of 1.0 to 1.5 times the 7-day, once-in-ten-years, low flow. In these studies, the required amount of low flow augmentation was calculated, and the Army Corps of Engineers was contacted to determine whether existing, or planned reservoirs upstream of the Susquehanna Site 11-2-35 could have supplied the necessary compensation during low flow conditions. The Corps responded that the reservoirs under their jurisdiction were committed to uses that conflict with power plant requirements for low flow augmentation. Specifically, releasing water during the dry late summer season would impair the recreational use of the various reservoirs. Also, storage of additional water during high flow, for later compensative use, would reduce the flood protection capability below what was already considered a marginal condition. To maintain power plant operation during periods of low flow, new reservoirs, which are dedicated primarily to providing compensatory flow, would therefore be required.

In the Stage 5 evaluations, to provide adequate supplemental makeup, only minor impoundments on the Susquehanna were considered necessary*. Suitable locations for large impoundments, thus, were not identified. To give an indication of the range of costs, and environmental impacts associated with developing large impoundments, several alternatives were investigated in the vicinity of Site 11-2-35. Impoundments were sized to provide adequate compensatory flow so that they could have met the proposed 1.5 times the 7-day,

*The cost estimate for development of Site 11-2-35 provided in Section 2.1.12 is based on the use of only a small impoundment. That estimate was made prior to the impoundment studies described in this section.

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once-in-ten-years, low flow requirement. This limit was assumed because it could likely have been the initial limit applied in New York State, and could possibly be implemented over the entire basin by the late 1980s.

Three potential impoundment locations, with storage capacities in excess of 25,000 acre-ft. were identified. This was the estimated volume required to meet the 1.5 times the 7-day, once-in-ten-years, low flow condition. The design assumptions for this estimate are provided in Table 2.1-3. The three impoundment locations, Ellis Creek, Ross Hill, and Pipe Creek are shown on Figures 2.1-5 and 2.1-6. Storage and size information for these impoundments is provided in Table 2.1-4. Table 2.1-5 presents other information relative to potential environmental impacts.

The total costs for these reservoirs, including operation, was estimated to range from $36-$86 million, depending on the pumping scheme analyzed. In addition, these impoundments covered 390-880 acres of land, and would have displaced forests, cropland, and residential areas. In some cases, they would have adversely impacted NYS designated trout streams.

As indicated in 18 CFR 803 (Federal Register, September 30, 1976), the SRBC passed an initial standard which required projects to compensate for their consumptive use when river flows are equal to, or below, 1.0 times the 7-day, once-in-ten-years, low flow.

The cost and size of the impoundment required to meet the 1.0 times the 7-day, once-in-ten-years, low flow limit would have been less than the values mentioned above for the 1.5 case. To meet either limit, significant additional costs and environmental impacts would have been incurred above those previously evaluated in Stage 5 for the Susquehanna River sites (11-2-35 and 11-2-8). The relatively large impoundment made necessary by the new regulations added costs to the sites in the Susquehanna River area which was already the most expensive area considered at the Stage 5 level of the study.

2.1.6.6 Construction Impacts

During site preparation and facility construction, the terrestrial community would be affected by clearing and grubbing, excavation, dewatering, placement of roads, railroads and pipelines, and operation of construction equipment.

The impacts expected from these activities include the alteration of existing vegetation, causing changes in wildlife populations onsite and within terrestrial communities surrounding the site, and introduction of barriers to wildlife movement.

Site 11-2-35 is located in an area of rough terrain, requiring extensive excavation and landfilling to create a level construction area. Extensive excavation in the area possibly could cause erosion in bordering areas. This activity probably would result in the loss of all wildlife within the construction area. If the wildlife were not lost, but were

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able to disperse into surrounding communities, the carrying capacities of these surrounding areas might be exceeded, causing adverse impacts in these areas.

None of the cover types affected by construction on Site 11-2-35 is unique to the site region; consequently, disrupting the site would not have a significant impact to the region.

Construction of a railroad spur and pipeline from the existing tracks along the Susquehanna River to the site would require disturbance of a large land area because of the rugged topography present in this area.

2.1.6.7 Operation Impacts

Impacts on terrestrial ecology from operation of a nuclear power plant at the site would be limited to the possible effects of cooling tower drift deposition and noise. No expected levels of materials known to cause damage to flora and fauna would be deposited as a result of operation of the nuclear facility.

2.1.6.8 References for Section 2.1.6

1. Hunt, Oliver P., "Duration Curves and Low-Flow Frequency Curves of Streamflow in the Susquehanna River Basin, New York", State of New York Conservation Department, Water Resources Commission Bulletin 60, 1967.

2. Susquehanna River Basin Electric Utilities, "Master Siting Study, Susquehanna River Basin, Major Electric Generating Projects, 1975-1989", 1975.

3. Susquehanna River Basin Commission, "Comprehensive Plan for Management and Development of the Water Resources of the Susquehanna River Basin", 1973.

4. U.S. Army Corps of Engineers, North Atlantic Division, "Water Resources Development by the U.S. Army Corps of Engineers in New York", 1976.

5. New York State Conservation Department, Division of Water Resources, "Needs and Capabilities for Multipurpose Water Resources Development of the Susquehanna River Basin in New York", 1966.

6. Susquehanna River Basin Commission, "Review: Susquehanna River Basin Study", 1970.

7. Susquehanna River Basin Commission, "Susquehanna River Basin Study", Appendix H, Power, June 1970.

8. U.S. Geological Survey, "Water Resource Data for New York", 1974.

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9. North Atlantic Regional Water Resources Study Coordinating Committee, "North Atlantic Regional Water Resources Study"; Appendix E, "Flood Damage Reduction and Water Management for Major Rivers and Coastal Areas", 1972.

10. Britton N.L. and A. Brown, An Illustrated Flora of the Northern United States and Canada, 1913.

11. Burt, W.H., Mammals of the Great Lakes Regions, 1957.

12. Burt, W.H. and R.P. Grossenheider, A Field Guide to the Mammals, 1964.

13. Conant, R., A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 1975.

14. Fernald, M.L., Gray's Manual of Botany, 1950.

15. Hall, E.R. and K.R. Kelson, The Mammals of North America, 1959.

16. New York State Department of Environmental Conservation, "Protected Native Plants.", 6 NYCRR 193.3, 1974.

17. New York State Office of Planning Services, Land Use and Natural Resources Inventory Map Overlays (1:24,000), 1968-1974.

18. Palmer, E.L., Fieldbook of Mammals, 1957.

19. Peterson, R.T., A Field Guide to the Birds, 1947.

20. Peterson, R.T. and M. McKenney, A Field Guide to Wildflowers of Northeastern and North Central North America, 1968.

21. Rickett, H.W., Wildflowers of the United States, Vol. 1: The Northeastern States, 1966.

22. Robbins, C.S., B. Brunn, and H.S. Zim, Birds of North America, 1966.

23. U.S. Fish and Wildlife Service, "Endangered and Threatened Species Notice on Critical Habitats." In: Federal Register, 1975.

24. U.S. Fish and Wildlife Service, "Review of Endangered Species Status." Federal Register, 1975.

25. U.S. Fish and Wildlife Service, "Review of Status of Vascular Plants and Determination of 'Critical Habitat'." In: Federal Register, 1975.

26. U.S. Fish and Wildlife Service, Threatened Wildlife of the United States, 1973.

27. U.S. Fish and Wildlife Service, Office of Endangered Species and International Activities, United States List of Endangered Fauna, 1974.

28. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Maps.

29. New York State Department of Environmental Conservation, Division of Educational Services, Environmental Deterioration and Declining Species, 1970.

2.1.7 Socioeconomics

2.1.7.1 Displacement and Disruption of Onsite Resources

There are no designated historic, scenic, cultural, or natural resources on the site. Construction of a power plant would not adversely affect access to any other resources in the site vicinity.

2.1.7.2 Displacement of Residential and Economic Activities

Development of a power plant on this site would require that seventeen dwellings be acquired and the households be relocated offsite.

Approximately 31% of the site is agriculturally productive land. No other economic activity is conducted onsite.

2.1.7.3 Origin and Size of the Labor Pool

The labor pool for the site consists of approximately a nine-county area, and in mid-state New York, encompasses all or part of three state economic areas: Binghamton, Elmira, and Syracuse. A triangle formed by the Cities of Elmira, Ithaca, and Binghamton contains the site, and this area is expected to provide the major portion of the site's construction labor requirements.

The construction labor force in this area was estimated to be in excess of 18,000 workers (1970). Significant inmigration of labor was not expected to be necessary in order to supply the construction trades labor requirements.

2.1.7.4 Anticipated Points of Vehicular Congestion

The major roads providing transportation access to the site vicinity are Interstate 81 and State Route 17. State Route 17C would funnel most of the construction traffic to the local site access roads, and it would experience some vehicle congestion near the community of Barton where the eastbound and the westbound traffic using this road for access to the site would merge into local roads serving the site.

2.1.7.5 Potential Impacts on Housing and Services

The housing vacancy rate in the site's commuting area was estimated to be 5.9% (1970), more than 15,000 vacant year-round units. This was considered indicative of adequate housing stock to absorb the construction workers likely to migrate into the area. Adverse effects on the local housing market were not anticipated.

Because of the projected low potential for inmigration of construction workers, there was no significant potential for impacting local services.

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2.1.7.6 Analysis

Good access to labor and housing markets, and good highway access combine to produce an acceptable location for development of a power plant. Inmigration of construction workers, the primary vehicle for socioeconomic impacts, was not expected to exceed acceptable levels. Several possible site access roads from Route 17C could have been managed to mitigate traffic congestion near Barton. The major adverse socioeconomic effects at this site result from the necessity to relocate a relatively large number of households inhabiting the site.

2.1.7.7 References for Section 2.1.7

1. New York State Department of Commerce, Binghamton Area Business Fact Book, Part 2, 1974.

2. New York State Department of Commerce, Elmira Area Business Fact Book, Part 2, 1974.

3. New York State Department of Commerce, Syracuse Area Business Fact Book, Part 2, 1974.

4. New York State Department of Transportation, Transportation/Planning Map, New York State-South, 1974.

5. U.S. Geological Survey, 7.5 Minute Series (Topographic) Map, Barton Quadrangle, 1969.

6. New York State Department of Transportation, Barton Quadrangle Map, Scale 1:24,000, 1973.

2.1.8 Geology and Seismology

2.1.8.1 Introduction

The area of Site 11-2-35 is a rolling plateau, cut by frequent stream valleys with steep slopes. The site contains woodlots, both active and abandoned fields and a small wet to swampy area on the northern edge.

The site is drained by Ellis Brook and Butson Creek and their tributaries, which flow southward into the Susquehanna River.

2.1.8.2 Regional Geologic Setting

2.1.8.2.1 Rocks

The site is in the eastern portion of the Appalachian Uplands physiographic province (Figure 1.4-2). The major rocks in the region (Figure 1.4-3) include a sequence of Devonian shales, siltstones, and sandstones several thousand feet thick which are some 350 million years old[1].

2.1.8.2.2 Structural Features

The principal structural feature of the region is a slightly flexured, southwest dipping homocline of one to two degrees. The general regional dip of beds is interrupted by eastward trending low domes and/or broad folds spaced five to ten miles apart with dips of only a few degrees[2]. No faults have been mapped or reported in the area[1].

2.1.8.2.3 Glacial Features

The region is covered by a variable thickness of glacial till laid down by the Pleistocene ice sheets that advanced across the area. The last major ice sheet, Wisconsin, covered the Binghamton area to depths of some 3,000 ft[2]. The relatively thin till cover is interrupted only where erosion has exposed fresh or weathered bedrock, or where stripped and recent alluvium backfills the major stream valleys[3].

2.1.8.2.4 Groundwater

The entire region is underlain by a thick section of low permeability shales and siltstones which will protect any deep regional rock aquifer from possible surface contamination by plant spills.

2.1.8.3 Areal/Site Geology

The topography of the site is a rolling, plateau-like area that drops off steeply toward Ellis Brook and its tributary on the east, and likewise to Butson Creek on the west. The hills are rounded and the north-south oriented streams impart a similar trend to the hill crests. Total relief on the site is over 400 ft.

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2.1.8.3.1 Bedrock Units

The site is wholly underlain by the Gardeau Formation (Figure 2.1-7) consisting of shales and siltstones. Below elevation 1,000 ft south of the site, the underlying Rhinestreet Formation crops out along the slopes of the stream valleys(1) as shown on Figure 2.1-7.

2.1.8.3.1.1 Gardeau Formation

This unit, part of the upper Devonian West Falls Group, consists of gray to greenish-gray, thin-bedded, argillaceous shale and interbedded gray siltstone and dark gray to black shale. The Corning Member, at the top of the formation, is a sequence of dark gray to black shale and thin-bedded, gray siltstone approximately 40 ft thick. The entire formation is 400 to 620 ft thick(4).

The shales weather and disintegrate on exposure and in outcrop, breaking down to small, slabby pieces with intermixed silt, clay, and sandy material. The shallow weathered rock zone grades into fresh shale and/or siltstone within a few feet.

2.1.8.3.1.2 Rhinestreet Formation

This unit, part of the West Falls Group, consists of from 600 to 800 ft of thin interbeds of black shale, gray calcareous siltstone, gray blocky mudstone and some black shale. The members that comprise the formation are the Moreland (bottom), Millport, Dunn Hill, Beers Hill, and Roricks Glen (top). The Roricks Glen member, which lies below the Gardeau Formation (Section A-A, Figure 2.1-7) consists of approximately 30 percent black shale, the remainder being dark-gray shale and gray, thin-bedded calcareous siltstone(5).

2.1.8.3.1.3 Structure

The shale and siltstone beds of the area are essentially flat-lying and uniformly distributed throughout site. Except for small-scale joint features and locally minor folds, flow rolls, and variations in the dip of beds, no significant structural features are known in this area.

2.1.8.3.1.4 Engineering Characteristics

The physical characteristics of the shale and siltstone units are expected to be grossly similar to most black shales. For example, see the description of the Utica Shale in the discussion of Site 7-2-2. The rock is essentially impermeable and has adequate strength for a heavy foundation. The upper few feet of the rock is weathered, and shallow excavations can be opened by ripping and dozing. Joint planes are generally weathered and coated with oxidation minerals to a few 10's of feet in depth.

The shale is wet/dry sensitive(6) and surface exposures will disintegrate into brownish chips with scattered slabs of siltstone.

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The thin interbeds of siltstone are more resistant, stronger, and generally of higher quality than the shales. Because the interbeds are a small percentage of the total rock column/foundation material, the siltstone is included with the shale for evaluation and design purposes.

2.1.8.3.1.5 Groundwater Occurrence

The bedrock formations serve as the primary water source for farm and domestic purposes in the upland areas. Supplies of from 5 to 15 gallons per minute can be expected(7). Salt water exists at varying depths beneath much of the region and several wells near the site have intersected saline waters. The elevation of the salt water zone intersected in wells varied considerably and is probably related to the joint system and interconnections with the deeper, brine-bearing strata(7). Groundwater in the rock is controlled by the joint features and other open fissures, rather than by the permeability or porosity of the rock mass.

2.1.8.3.2 Surficial/Overburden Materials

A detailed discussion of the glacial history of the region is presented by Denny and Lyford(3). The entire area is dominated by a variably thick blanket of glacial till originally described as the Olean drift by MacClintock and Apfel(8).

2.1.8.3.2.1 Glacial Till

The loamy till is derived from the local bedrock and composed of silt and sand with abundant rock fragments and some clay. The grayish to light brown till, when dry, is somewhat compact and rests directly on the bedrock. Generally the till is thin and partially weathered throughout to a dark brown. Weathering usually progresses into the underlying bedrock. The abundant rock fragments consist of stones and slabs of siltstone and sandstone which are roughly tabular and increase in proportion near the base of the till.

2.1.8.3.2.2 Generalized Thickness

Bedrock is exposed in the channels of several small streams and in cuts in the hillside along the farm roads. The wet/dry sensitivity and somewhat soft nature of the shales accounts for the lack of outcrop. However, the rock beneath much of the site is close to the surface, from 1 to 2 ft, although in some parts rock may be up to 15 ft in depth. Along the steep slope of the Butson Creek valley, the glacial till has been plastered against the bedrock for over 100 ft; however, this is a false depth and the till is thin over the site. The till/overburden material is partly weathered bedrock, and ranges from 8 to 15 ft thick.

2.1.8.3.2.3 Drainage

The site is well drained. The glacial till has moderate permeability and the steep slopes quickly remove the surface water. Probably most of the infiltration of surface runoff moves as groundwater along the contact

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between the till and the weathered bedrock and/or uppermost, jointed rock. Where the slopes have been excavated or the till and weathered rock zones removed, small springs frequently develop from the groundwater movement.

2.1.8.3.2.4 Engineering Characteristics

The till is thin, relatively compact, and moderately permeable. This material has a moderate bearing capacity and is stable on low to moderate slopes. A large slide mass, however, was observed on the steeper slopes of Butson Creek where a thin veneer of till occurs on the valley wall. Other and larger slide masses are evident on the aerial photos of the general area. Such slides are related to the undercutting of the slope and toe of slide mass by the stream.

2.1.8.3.2.5 Groundwater Occurrence

The glacial till is thin and is not a reliable water source. However, shallow dug wells within the till/weathered rock zone may yield perched groundwater migrating along this contact. This water source is affected by climactic cycles and relatively short dry periods.

2.1.8.4 Some Potential Problems

No significant features relevant to heavy foundations or the proposed construction were recognized on Site 11-2-35 during the reconnaissance studies. The steep slopes and poor access roads may cause some short-term inconveniences.

2.1.8.5 Geological Evaluation

Bedrock possesses adequate bearing capacity to support heavy foundations and the proposed plant design. The overburden materials are generally thin. Any deep regional groundwater aquifers are protected from potential surface spills by a thick shale sequence.

Rating of the site is 2g.

2.1.8.6 Seismological Evaluation

The region surrounding the site is nearly aseismic. It is anticipated that an area can be selected so that the plant will be founded on bedrock.

2.1.8.7 References for Section 2.1.8

1. Fisher, D.W., Rickard, L.V., and Isachsen, Y.W., Geologic map of New York State: New York State Museum and Science Service, Map and Chart Series No. 15, 1970.

2. Coates, D.R., (ed.), 1963. General geology of south-central New York: Guidebook for 35th Annual Meeting, New York State Geological Association, SUNY, Binghamton, New York, 1963, p. 19-50.

3. Denny, C.S., and Lyford, W.H., Surficial geology and soils of the Elmira-Williamsport region, New York and Pennsylvania: U.S. Geological Survey, Prof. Paper 379, 1963, p. 60.

4. Sutton, R.G., Stratigraphy in the Appalachian and Binghamton Quadrangle. In: Coates, D.R., (ed.), Geology of south-central New York: Guidebook for the 35th Annual Meeting, New York State Geological Association, SUNY, Binghamton, New York, 1963.

5. Woodrow, D.L., and Nugent, R.C., Facies and the Rhinestreet formation in south-central New York. In: Coates, D.R., (ed.), Geology of south- central New York: Guidebook for the 35th Annual Meeting, New York State Geological Associatio SUNY, Binghamton, New York, 1963.

6. Dunn, J.R., Distress of aggregate by adsorbed water: Proceedings of the 17th Annual Highway Geological Symposium, Iowa State University, Publication 1, 1968.

7. Randall, A.D., Records of wells and test borings in the Susquehanna River Basin, New York: New York State Dept. Environmental Conservation, Bull. 69, 1972, p. 92.

8. MacClintock, P. and Apfel, E.T., Correlation of the drifts of the Salamanca reentrant, New York: Geol. Soc. Amer. Bull v. 55, 1944, p. 1143-1164.

2.1.9 Accident Analysis

2.1.9.1 Site Description and Population Distribution

The site is approximately 25 miles west of the City of Binghamton (1970 population 64,123).

The site consists of approximately 650 acres. The proposed site boundaries, shown on Figure 2.1-1, are coterminous with the minimum exclusion area. The boundary of the exclusion area would be expanded eastward to Ross Hill Road to meet general NRC guidelines of 0.4 mile distance for exclusion area. Two local minor arteries transverse the exclusion area.

The Low Population Zone (LPZ) outer radius is designated to be three miles, pursuant to NRC guidelines. Reconnaissance data for the LPZ are summarized in Table 2.1-6.

The nearest population center is the Town of Oswego, projected to have a population of 28,200 in 1985. The site is located nine miles west of the Town of Oswego.

Population density and distribution for 30 miles surrounding the site are summarized in Table 2.1-7.

2.1.9.2 Nearby Industrial, Transporation, and Military Facilities

Major transportation activities in the vicinity of Site 11-2-35 are summarized in Table 2.1-8. The nearest major airport is the Broome County Airport, located 25 miles to the east of the site.

No industrial or military facilities were identified which would impart a potential hazard in the site vicinity.

2.1.9.3 Analysis and Summary

Site 11-2-35 meets acceptability criteria for population density and distribution, as given in 10 CFR 100 and NRC Regulatory Guide 4.7. The activity and population within the LPZ is such that it appears that appropriate measures in event of serious accident could be taken to mitigate against harm within reasonable probability. The nearest population center is acceptable with respect to the 1.33 distance ratio beyond the LPZ outer radius.

The exclusion area boundary possibly would need to be expanded to insure operator control and authority of near-site activity in event of an emergency.

No significant safety hazards related to industrial, transportation or military facilities were identified in the vicinity of this site.

2.1.9.4 References for Section 2.1.9

1. USGS 7.5 Minute Series (topographic) quadrangle maps.

2. U.S. Department of Commerce, Bureau of the Census, 1970 Small Area Census Data for New York State.

3. New York State Executive Department Office of Planning Services, Demographic Projections for New York State, Unpublished report, 1974.

4. U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, Number of Inhabitants, 1970.

5. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation/Planning Maps, 1974.

6. Facilities Records for Airports in New York from the files of the Federal Aviation Administration, Eastern Regional Office.

7. Sectional Aeronautical Charts for Detroit, New York and Montreal, November 7, 1974, January 2, 1975, and October 10, 1974.

8. New York State Department of Transportation, Traffic Volume Report, 1973.

9. Motor Vehicle Manufacturer's Association, Motor Truck Facts, 1974.

10. New York State Parks and Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information," Section 4: "County Map User Guide," Appendix C: "Complete Activity Code List, 1975.

11. Cornell University, LUNR Inventory Map Overlays, 7.5 Minute Quadrangle, (1:24,000), for New York State Office of Planning Services, 1968-1974.

12. Major Natural Gas Pipelines, Federal Power Commission, June 1973.

13. U.S. Secretary of Transportation, Rail Service in the Midwest and Northeast Region, 1974.

14. U.S. Department of Commerce, Statistical Abstract of the United States, 1973.

15. U.S. Department of the Army, Principal Military Installations and Activities in the 50 States, 1974.

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2.1.10 Aesthetics

2.1.10.1 Site Characterization

The site topography is very irregular, with a ravine located in the southeast quadrant. The highest elevation of 1400 ft above msl occurs in the northeast corner, sloping steeply to approximately 1000 ft above msl in the southeast corner. The surrounding area's topography is characterized as undulating. Onsite forests are comprised of mixed hardwoods, running through the central portion of the site.

Although the topography of the site and surrounding area is irregular, the general lack of tree screening and the high elevation would increase the probability of visual intrusion on nearby sensitive land uses.

Several vantage points were evident in the site area, with the following selected as the most representative of the surrounding visually sensitive and intensive land uses:

Land Use	Distance from Site
Village of Barton	2.5 miles S
State Route 17C - scenic	1.5 miles S
City of Waverly	6.5 miles SW
Village of Nichols	4.0 miles SE

There were no known historic places or natural landmarks within the study area.

Relatively few recreational facilities existed wi hin 6 miles of the site. Those existing were: a hunting club, a camping area, an amusement park, and a state marina.

2.1.10.2 Aesthetics Analysis

Only moderate to negligible visual impacts were anticipated at the identified land uses. The impacts are summarized as follows:

State Route 17C - scenic	plant structures moderately visible distance of 1.5 miles (middle ground)
Village of Barton	plant structures slightly visible distance of 2.5 miles (middle ground)
Village of Nichols	plant structures slightly visible distance of 4 miles (background)
City of Waverly	plant structures could not be seen

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2.1.10.3 References for Section 2.1.10

1. U.S. Department of the Interior, National Park Service, National Register of Historic Places, 1975, as amended.

2. U.S. Department of the Interior, National Park Service, National Registry of Natural Landmarks, 1975, as amended.

3. The University of the State of New York, the State Education Department, A Guide to the Historical Markers of New York State, 1970.

4. The University of the State of New York, the State Education Department, New York State Historical Places, 1975.

5. New York State Parks & Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information", Section 4: "County Map User Guide", Appendix C: "Complete Activity Code List", 1975.

6. LUNR Inventory Map Overlays, 7.5 Minute Quadrangle (1:24,000), Cornell University for New York State Office of Planning Services, 1968-1974.

7. USGS 7.5 Minute Series (topographic) quadrangle maps.

8. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation Planning Maps, 1974.

9. Site visits.

2.1.11 Land Use Planning

2.1.11.1 Background

The Southern Tier East Regional Planning Board has developed a general plan for Broome and Tioga Counties to identify areas which should be developed for recreation/open space and urban growth, conservation lands to be protected, and viable agricultural lands which should be perpetuated.

Subsequent to this, the Regional Planning Board conducted a comprehensive growth area study for population, economic activity, community facilities, and transportation to determine high growth potential areas. The study and any updates were to be used for future regional planning.

2.1.11.2 Site and Local Description

For the site, the general plan did not designate any viable agricultural lands and conservation land which should be preserved or recreation and urban growth development areas. Land south of the site along the Susquehanna River was designated as viable agricultural land and for recreation/open space.

The results of the growth study indicated that the Town of Barton will experience low population growth and high future economic activity from anticipated industrial and commercial expansion. Projected new growth and development was centered around Waverly and the Susquehanna River, southwest of the site.

The Town of Barton, in 1975, had not adopted a zoning ordinance.

2.1.11.3 Compatibility

The site did not appear to be in conflict with the regional plans or projected growth areas. Preservation and development projections were centered around existing urban centers and riverbanks, distant from Site 11-2-35.

2.1.11.4 References for Section 2.1.11

1. Southern Tier East Regional Planning and Development Board, Development Pattern I - General Plan Map, 1972.

2. Southern Tier East Regional Planning and Development Board, Growth Areas, Vols. 1-5, 1974.

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2.1.12 Costs

Table 2.1-9 provides cost data associated with the development of Site 11-2-35.

2.1.13 Conclusions

As described in Section 2.1.6.5 herein, consumptive use restrictions of the Susquehanna River were proposed and eventually adopted at the end of Stage 5 of the siting study. Even neglecting these restrictions, the Susquehanna River area was judged to be the most costly for nuclear plant development. Furthermore, it did not exhibit any significant environmental-related benefits, in comparison to other areas considered.

Recognizing the now in-force consumptive use restrictions, a relatively large impoundment would have to be constructed to allow development at Site 11-2-35 for a nuclear plant. The cost and environmental impacts associated with this impoundment substantially detract from the comparative favorability of the Susquehanna River site.

Other than the consumptive use restrictions, no legal restraints to plant siting were identified.

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TABLE 2.1-1

SITE 11-2-35, WIND DISTRIBUTION BY STABILITY CLASS, BINGHAMTON, N.Y.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

JOB NO. 01772 (W 1279)

SEASONAL AND ANNUAL
WIND DISTRIBUTION BY PASQUILL STABILITY CLASSES/5
(STAR PROGRAM)

STATION: Binghamton, New York (04725)

PERIOD: Jan 1964 - Dec 1964

SOURCE: TDF 1440/24 Obs/Day

DATE Mar 14, 1971

NATIONAL CLIMATIC CENTER
FEDERAL BUILDING, ASHEVILLE, N.C.

U.S. COMM-NOAA-ASHEVILLE

Prepared For: Dept Transportation N.Y., N.Y.

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SUSQUEHANNA RIVER AREA

TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #04725 BINGHAMTON N.Y. 1964 24 OBS

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000114
NNE	0.000000	0.000228	0.000000	0.000000	0.000000	0.000000	0.000228
NE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ENE	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000114
E	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SE	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000114
SSE	0.000114	0.000114	0.000000	0.000000	0.000000	0.000000	0.000228
S	0.000000	0.000228	0.000000	0.000000	0.000000	0.000000	0.000228
SSW	0.000000	0.000228	0.000000	0.000000	0.000000	0.000000	0.000228
SW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
WSW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
W	0.000000	0.000114	0.000000	0.000000	0.000000	0.000000	0.000114
WNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
NNW	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
TOTAL	0.000114	0.001256	0.000000	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.001370

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.000000

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #04725 BINGHAMTON N.Y. 1964 24 OBS

DIRECTION	SPEED(KTS) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000583	0.001598	0.001370	0.000000	0.000000	0.000000	0.003551
NNE	0.000231	0.000228	0.000114	0.000000	0.000000	0.000000	0.000573
NE	0.000003	0.000571	0.000114	0.000000	0.000000	0.000000	0.000688
ENE	0.000460	0.000114	0.000000	0.000000	0.000000	0.000000	0.000574
E	0.000580	0.001027	0.000228	0.000000	0.000000	0.000000	0.001836
ESE	0.000349	0.000799	0.000000	0.000000	0.000000	0.000000	0.001148
SE	0.000005	0.000913	0.000457	0.000000	0.000000	0.000000	0.001375
SSE	0.000231	0.000228	0.000114	0.000000	0.000000	0.000000	0.000573
S	0.000348	0.000571	0.000685	0.000000	0.000000	0.000000	0.001603
SSW	0.000461	0.000342	0.000799	0.000000	0.000000	0.000000	0.001603
SW	0.000583	0.001598	0.001027	0.000000	0.000000	0.000000	0.003209
WSW	0.000703	0.002397	0.001027	0.000000	0.000000	0.000000	0.004128
W	0.000353	0.001484	0.001027	0.000000	0.000000	0.000000	0.002864
WNW	0.000346	0.000228	0.000799	0.000000	0.000000	0.000000	0.001373
NW	0.000235	0.000913	0.000342	0.000000	0.000000	0.000000	0.001491
NNW	0.000350	0.000913	0.000799	0.000000	0.000000	0.000000	0.002062
TOTAL	0.005822	0.013927	0.008904	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.028653

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH B STABILITY = 0.000114

TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #04725 BINGHAMTON N.Y. 1964 24 OBS

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000010	0.001027	0.004224	0.001256	0.000114	0.000000	0.006631
NNE	0.000012	0.001256	0.000799	0.000114	0.000000	0.000000	0.002181
NE	0.000123	0.000799	0.000457	0.000000	0.000000	0.000000	0.001379
ENE	0.000124	0.000913	0.000685	0.000000	0.000000	0.000000	0.001722
E	0.000356	0.001027	0.001256	0.000114	0.000000	0.000000	0.002753
ESE	0.000009	0.000913	0.000799	0.000000	0.000000	0.000000	0.001721
SE	0.000357	0.001142	0.002263	0.000228	0.000000	0.000000	0.004010
SSE	0.000121	0.000571	0.002169	0.000342	0.000000	0.000000	0.003203
S	0.000596	0.002055	0.005708	0.001370	0.000000	0.000000	0.009728
SSW	0.000124	0.000913	0.003082	0.000571	0.000000	0.000000	0.004690
SW	0.000245	0.001484	0.005365	0.000685	0.000000	0.000000	0.007779
WSW	0.000249	0.001941	0.006963	0.001484	0.000114	0.000000	0.010751
W	0.000370	0.002511	0.004338	0.001370	0.000000	0.000000	0.008589
WNW	0.000015	0.001598	0.003767	0.000571	0.000114	0.000000	0.006066
NW	0.000240	0.001027	0.002626	0.000228	0.000228	0.000000	0.004350
NNW	0.000247	0.001712	0.002740	0.000799	0.000457	0.000000	0.005955
TOTAL	0.003196	0.020890	0.047260	0.009132	0.001027	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.081507

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.000228

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TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #04725 BINGHAMTON N.Y. 1964 24 OBS

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001301	0.005622	0.017466	0.014726	0.001598	0.000000	0.040713
NNE	0.000479	0.003052	0.004338	0.000685	0.000000	0.000114	0.008698
NE	0.000013	0.002055	0.004680	0.001027	0.000000	0.000000	0.007776
ENE	0.000359	0.002169	0.005023	0.000571	0.000000	0.000000	0.008121
E	0.000251	0.003311	0.006279	0.002283	0.000228	0.000228	0.012580
ESE	0.000131	0.002511	0.006393	0.005365	0.001027	0.000114	0.015542
SE	0.000594	0.003082	0.010731	0.012215	0.001370	0.000228	0.028220
SSE	0.000496	0.005708	0.019178	0.020205	0.003196	0.000228	0.049012
S	0.001221	0.011301	0.031164	0.030137	0.002740	0.000228	0.076792
SSW	0.000951	0.005023	0.024543	0.018037	0.000685	0.000114	0.049353
SW	0.000743	0.008447	0.022374	0.015068	0.000342	0.000114	0.047090
WSW	0.000612	0.005936	0.021575	0.017123	0.000913	0.000685	0.046845
W	0.000730	0.006279	0.019521	0.027511	0.006621	0.001256	0.061917
WNW	0.000386	0.006507	0.018721	0.033333	0.007078	0.000685	0.066710
NW	0.000599	0.003767	0.017009	0.032877	0.006963	0.000228	0.061443
NNW	0.000608	0.005251	0.025571	0.035274	0.004110	0.001027	0.071841
TOTAL	0.009475	0.080251	0.254566	0.266438	0.036872	0.005251	

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.652854

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.000571

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NYSE&G ASA
SITE II-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #04725 BINGHAMTON N.Y. 1964 24 OBS

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001433	0.006621	0.009018	0.000000	0.000000	0.000000	0.017073
NNE	0.001085	0.006279	0.000457	0.000000	0.000000	0.000000	0.007821
NE	0.000960	0.004909	0.000799	0.000000	0.000000	0.000000	0.006667
ENE	0.000632	0.007192	0.000000	0.000000	0.000000	0.000000	0.007824
E	0.000835	0.003767	0.001142	0.000000	0.000000	0.000000	0.005744
ESE	0.000146	0.003881	0.001142	0.000000	0.000000	0.000000	0.005169
SE	0.000873	0.008447	0.002169	0.000000	0.000000	0.000000	0.011489
SSE	0.001488	0.013470	0.005251	0.000000	0.000000	0.000000	0.020209
S	0.003370	0.018607	0.005479	0.000000	0.000000	0.000000	0.027456
SSW	0.000866	0.007648	0.004680	0.000000	0.000000	0.000000	0.013195
SW	0.001218	0.008447	0.007078	0.000000	0.000000	0.000000	0.016743
WSW	0.001474	0.011758	0.009475	0.000000	0.000000	0.000000	0.022707
W	0.002281	0.011986	0.008447	0.000000	0.000000	0.000000	0.022715
WNW	0.002047	0.0114[illegible]	0.005365	0.000000	0.000000	0.000000	0.018828
NW	0.000866	0.007648	0.006164	0.000000	0.000000	0.000000	0.014679
NNW	0.000973	0.006621	0.009703	0.000000	0.000000	0.000000	0.017297
TOTAL	0.020548	0.138698	0.076370	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.235616

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E STABILITY = 0.001256

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION =04725 BINGHAMTON N.Y. 1964 24 OBS

DIRECTION	SPEED(KTS) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.003333	0.015183	0.032078	0.015982	0.001712	0.000000	0.068287
NNE	0.001807	0.011073	0.005708	0.000799	0.000000	0.000114	0.019501
NE	0.001097	0.008333	0.006050	0.001027	0.000000	0.000000	0.016508
ENE	0.001573	0.010502	0.005708	0.000571	0.000000	0.000000	0.018354
E	0.002023	0.009132	0.008904	0.002397	0.000228	0.000228	0.022913
ESE	0.000635	0.008105	0.008333	0.005365	0.001027	0.000114	0.023580
SE	0.001827	0.013699	0.015639	0.012443	0.001370	0.000228	0.045206
SSE	0.002449	0.020091	0.026712	0.020548	0.003196	0.000228	0.073225
S	0.005533	0.032763	0.043037	0.031507	0.002740	0.000228	0.115807
SSW	0.002405	0.014155	0.033105	0.018607	0.000685	0.000114	0.069072
SW	0.002793	0.019977	0.03[illegible]45	0.015753	0.000342	0.000114	0.074825
WSW	0.003039	0.022032	0.039041	0.018607	0.001027	0.000685	0.084431
W	0.003731	0.022374	0.033333	0.028881	0.006621	0.001256	0.096197
WNW	0.002792	0.019749	0.028653	0.033904	0.007192	0.000685	0.092974
NW	0.001939	0.013356	0.026142	0.033105	0.007192	0.000228	0.081962
NNW	0.002176	[illegible]4498	0.038813	0.036073	0.004566	0.001027	0.097155
TOTAL	0.039155	0.255023	0.387100	0.275571	0.037900	0.005251	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000000

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.002169

NYSE&G ASA
SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-2

TRANSMISSION CORRIDOR DATA
SITE 11-2-35

Criteria	Acres	Miles	Number
Physical Features			
1. Land Use			
Industrial	0	0	
Commercial	0	0	
Institutional	0	0	
Residential	971	8	
Airfield Zone	0	0	
Central Business District	0	0	
Radio & TV Towers	---	---	0
2. Vegetative Cover			
Agricultural & Forest Brushland	96,242	75.2	
Mature Forest	30,706	24	
Forest Plantation	1,686	1.3	
3. Recreational/Cultural			
State Forest & Wildlife Mgt. Area	0	0	
State, County, Town Parks	445	0.3	
Historical Sites (National or State)	---	---	0
4. Natural Features			
Wetlands	1,790	1.4	
Lakes	0	0	
Slopes 25%+	7,972	6.2	
Streams & Rivers (Named)		0.4	

NYSE&G ASA
SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-2 (Cont'd)

Criteria	Miles
Aesthetics	
1. Exposure	
Scenic Hwy - Overlook	0
Interstate Hwy	5
NYS Hwy More Than 3000 V/D	14
NYS Hwy Less Than 3000 V/D	22
2. Visual Quality	Line Miles
Unique	0
High	0
Medium	8
Low	4
Generally Characteristic of the Area	
3. Structure Size (new)	
115kV Single or Double Circuit	
230kV Single Circuit	
230kV Double Circuit	
345kV Single Circuit	100
345kV Double Circuit	8
765kV Single Circuit	
4. Sensitivity (importance)	
National (interstate)	
State	
Regional	12
Local	42

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-3

SUSQUEHANNA RIVER BASIN
IMPOUNDMENT DESIGN ASSUMPTIONS

1. Low Flow -- 7 day, 10 year low flow at USGS gaging station 5150 = 345 cfs
2. Amount of Storage -- 12800 acre-feet, based on the requirements in the worst drought year, 1964
3. Maximum Drawdown -- 50% by volume with the change in reservoir acreage minimized
4. Proposed Regulations --
    a. All preliminary work is based on a minimum flow restriction of 518 cfs = (1.50 x Q7 - 10)
    b. All withdrawals when the flow is less than 518 cfs must be accompanied by compensation which brings the flow to 518 cfs or which equals consumptive use, whichever is less
    c. The minimum flow from a reservoir constructed to compensate for minimum flow must equal or exceed 0.15 cms at all times (cms = cfs per square mile of drainage area above reservoir)
5. Dam Height -- A maximum dam height of 200 feet
6. Materials -- Dam construction materials are readily available
7. Costing -- Unit prices are similar to those described in Section 1.4.12

NYSE&G ASA
SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-4

IMPOUNDMENT DATA

Site	Drainage Area (mi^2)	Impoundment Area (acres)	Storage (acre-ft)	Impoundment Elev. (ft)	Dam Elev. (ft)	Dam Width (ft)
Ellis Creek	11.9	546	31,300	1,130	1,140	3,000
Ross Hill	2.2	391	24,915	1,260	1,267	3,500
Pipe Creek	44	882	37,970	940	950	2,400

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-5

POTENTIAL IMPACTS OF IMPOUNDMENTS*

Parameter	Ellis Creek	Ross Hill	Pipe Creek	Units
LUNR Data				
Brushland	116	70	220	Acres
Forests	110	139	64	"
Tree Plantation	0	0	35	"
Inactive Agri.	104	75	23	"
Cropland	209	81	551	"
Pasture	52	0	0	"
USGS Data				
No. houses	13	6	31	-
Roads	3.1	1.2	4.1	miles
Land Use Plans				
NYS "agricultural district" designation	no	no	no	-
Ecology				
50% drawdown exceeded	no	yes	no	-
NYS water quality classification	D	C	C-D	-
NYS "trout stream" designation	no	yes	in parts	-

*This information was compiled from published reference materials. Field verification via site visits was not conducted.

NYSE&G ASA
SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-6

LOW POPULATION ZONE (LPZ)
EVALUATION
SITE 11-2-35

Towns -- Barton, Nichols, Tioga

Recreation Facilities -- Total population 100

Hidden Lake -- Size 50 acres, Population 100
(Marina, Camping, Picnic Facilities)

Dwelling Units -- 296

Number Roads Exiting LPZ -- 18

Schools, Institutional Population -- 0

NYSE&G ASA
SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-7

POPULATION DENSITY AND DISTRIBUTION SITE 11-2-35

	1985	2025
Cumulative Population (0-30 miles)	514,600	661,600
Population Density (persons/mi^2) (0-30 miles)	182	234
Site Population Factor SPF (30)	0.116	0.160

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-8

NEARBY TRANSPORTATION ACTIVITIES
SITE 11-2-35

Identification	Distance (mi)	Type
State Route 17C	1.5	Road
Erie Lacakwanna and Lehigh Valley	1.5	Rail
State Route 17	2.5	Road
05A	9.5	Airport
Chemung V.	7.5	Airport
Blue Swan	8.5	Airport
Tioga	7.5	Airport
Kohn	6.5	Airport
Saikkonen	9.0	Airport
V72-270	4.0	Airlane
J68	8.5	Airlane

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SITE 11-2-35
SUSQUEHANNA RIVER AREA

TABLE 2.1-9

COST DATA SITE 11-2-35

	Component	Cost $ X 10^6 (1987)	Subtotal	Notes
1.	Railroad	5.4		
2.	Highway	---		
3.	Land & Land Rights	0.2*		
4.	Excavation & Foundations	2.2		Rock Excavation = 114,000 yd^3
5.	Seismic Design	---		
6.	Intake Discharge	18.5*		
7.	Impoundments	0.8**		Excavation = 50,000 yd^3 Fill = 40,000 yd^3
8.	Piping Installation	15.3		
9.	Pumping Equipment	1.7		
10.	Ultimate Heat Sink	21.0		
11.	Labor Rates	---		Base
12.	SUBTOTAL - SITE RELATED COSTS		28.0	
13.	PLANT CONSTRUCTION COST		2,880.0	
14.	TOTAL CONSTRUCTION COST (lines 12 & 13)		2,908.0	
15.	Transmission Construction	128.0		Grid = 140 miles, Offsite = 0 Substation $20,400,000
16.	TOTAL CAPITAL COST (lines 14 & 15)		3,036.0	
17.	Nuclear Fuel & O&M	723.0		
18.	Transmission Losses (Capitalized)	258.0		
19.	Pumping Cost (Capitalized)	6.0		
20.	TOTAL OPERATING COST		987.0	
21.	TOTAL EVALUATED COST (lines 16 & 20)		4,023.0	

* Subtracted from cost components in base plant.

**This impoundment cost was calculated prior to the more detailed investigations described in Section 2.1.6.5 of this report.

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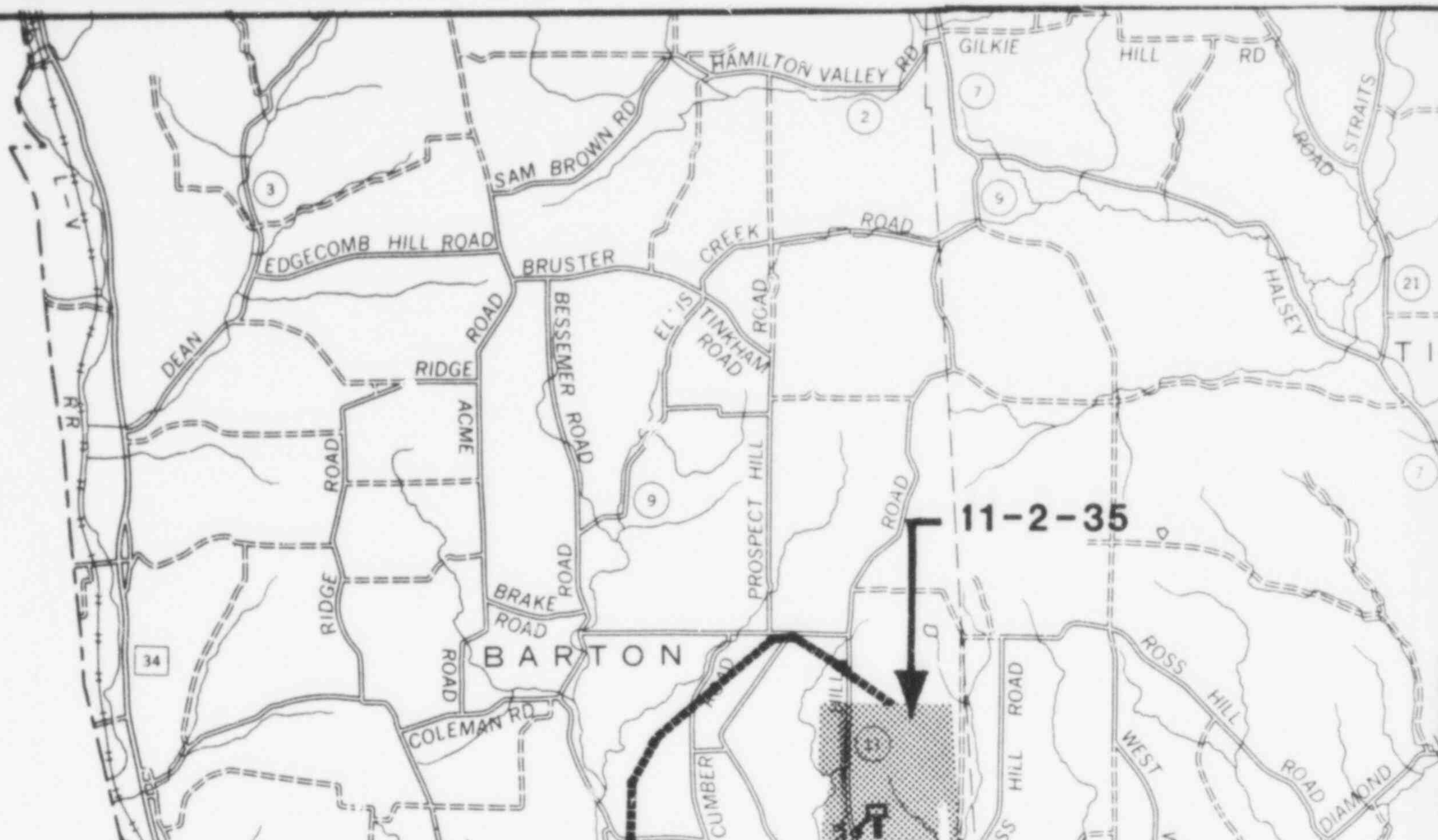

POOR ORIGINAL

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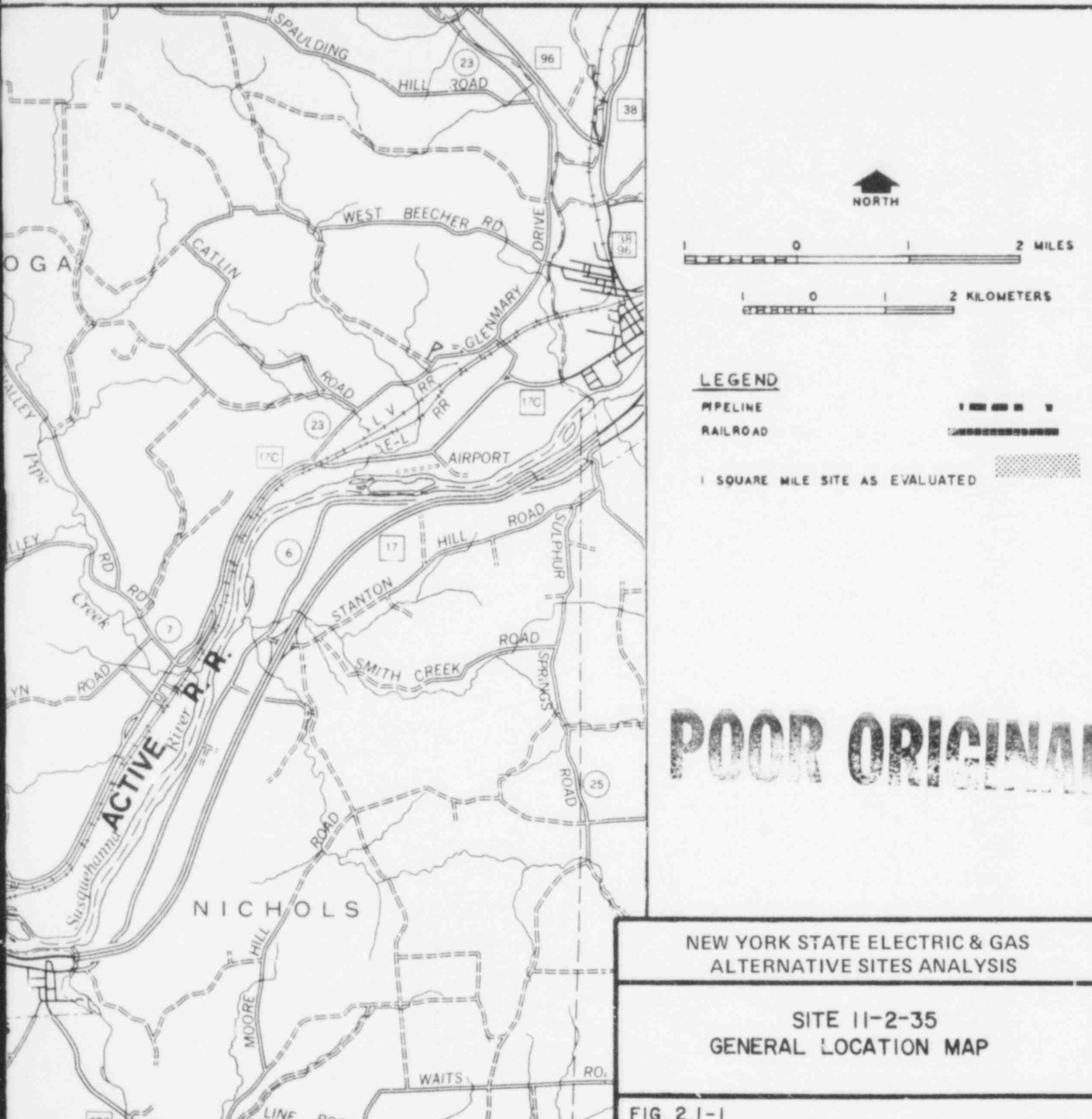
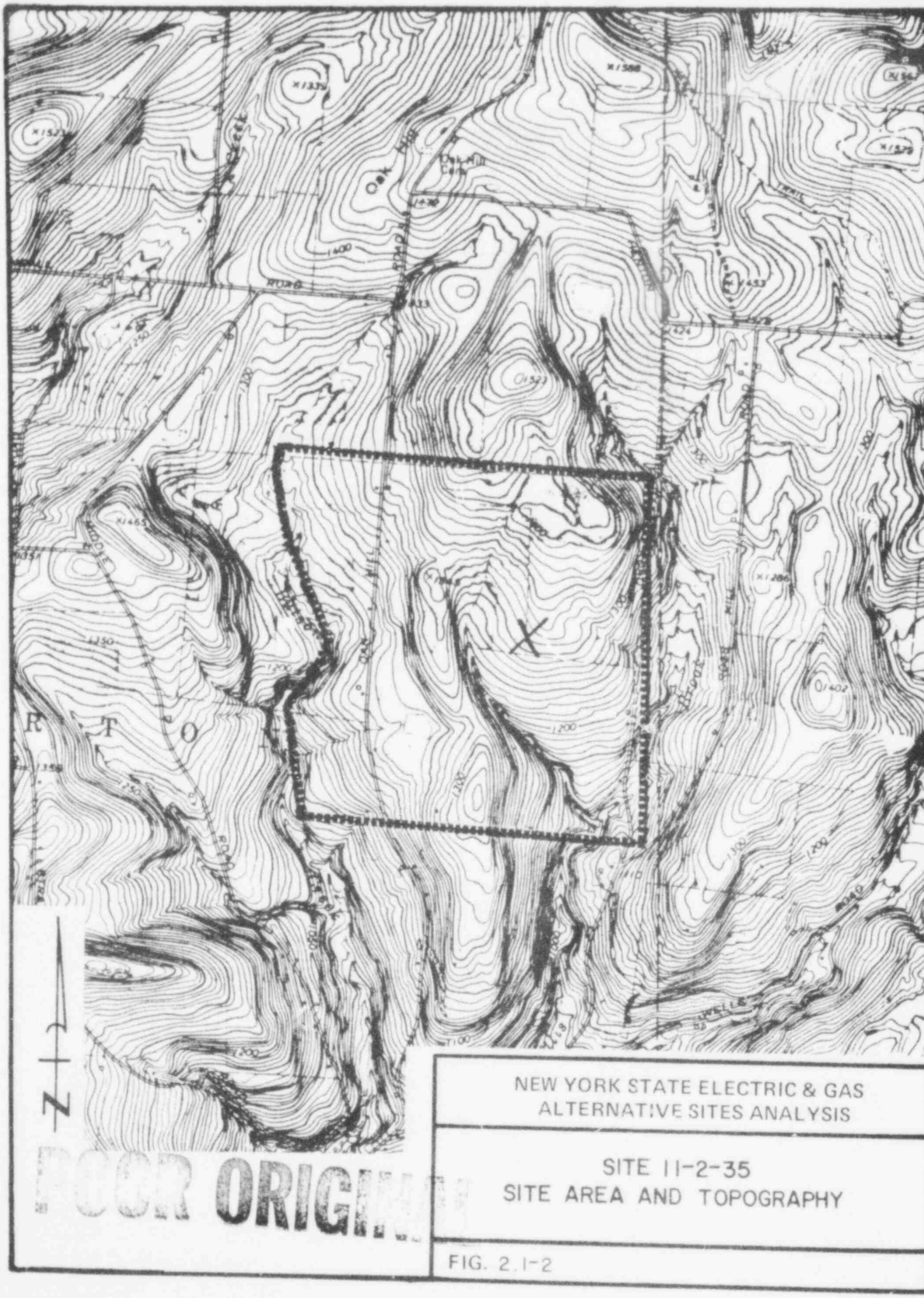


NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 11-2-35
GENERAL LOCATION MAP

FIG. 2.1-1

BASE MAP=N.Y.S TIOGA COUNTY MAP



NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 11-2-35
SITE AREA AND TOPOGRAPHY

FIG. 2.1-2

BASE MAP=USGS BARTON QUADRANGLE 1969

SCALE (MILES): 0 — 1/2 — 1

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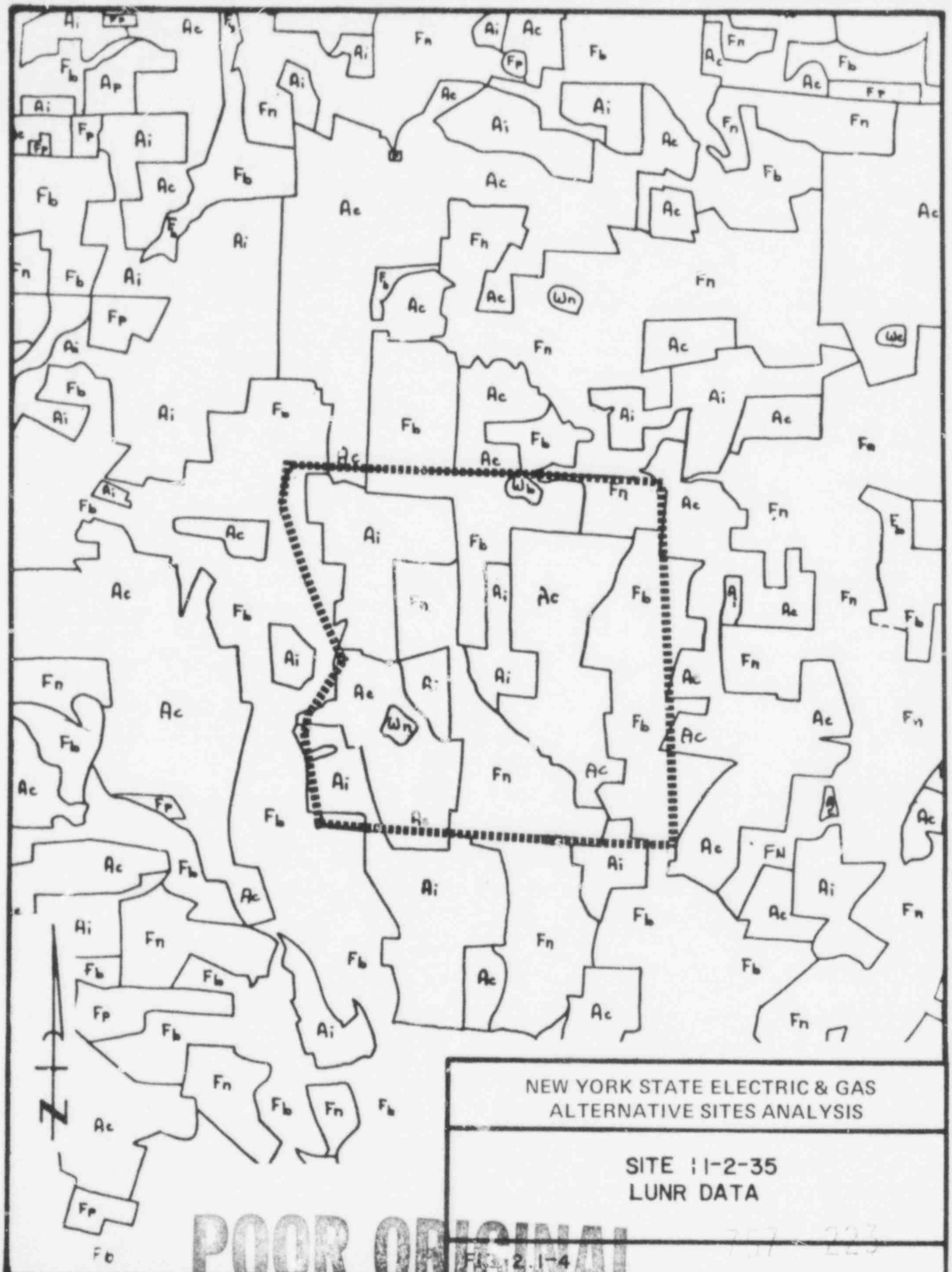

NOTE: REFER TO TABLE 1.4-1 FOR AN EXPLANATION OF LUNR SYMBOLS.

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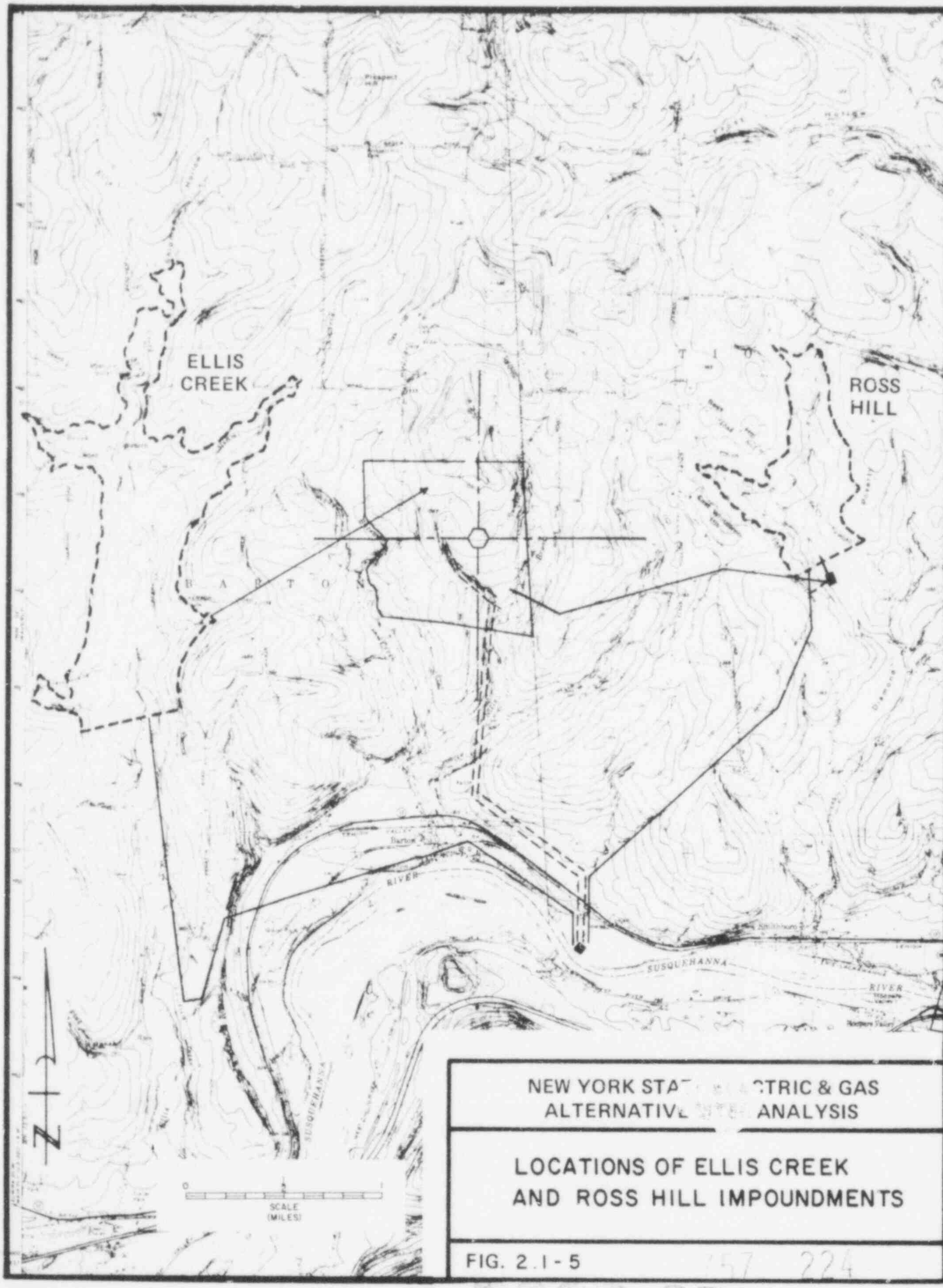

NEW YORK STAT[illegible]CTRIC & GAS
ALTERNATIVE [illegible] ANALYSIS

LOCATIONS OF ELLIS CREEK AND ROSS HILL IMPOUNDMENTS

FIG. 2.1-5 257 224

BASE MAP=USGS BARTON QUADRANGLE 1969

POOR ORIGINAL

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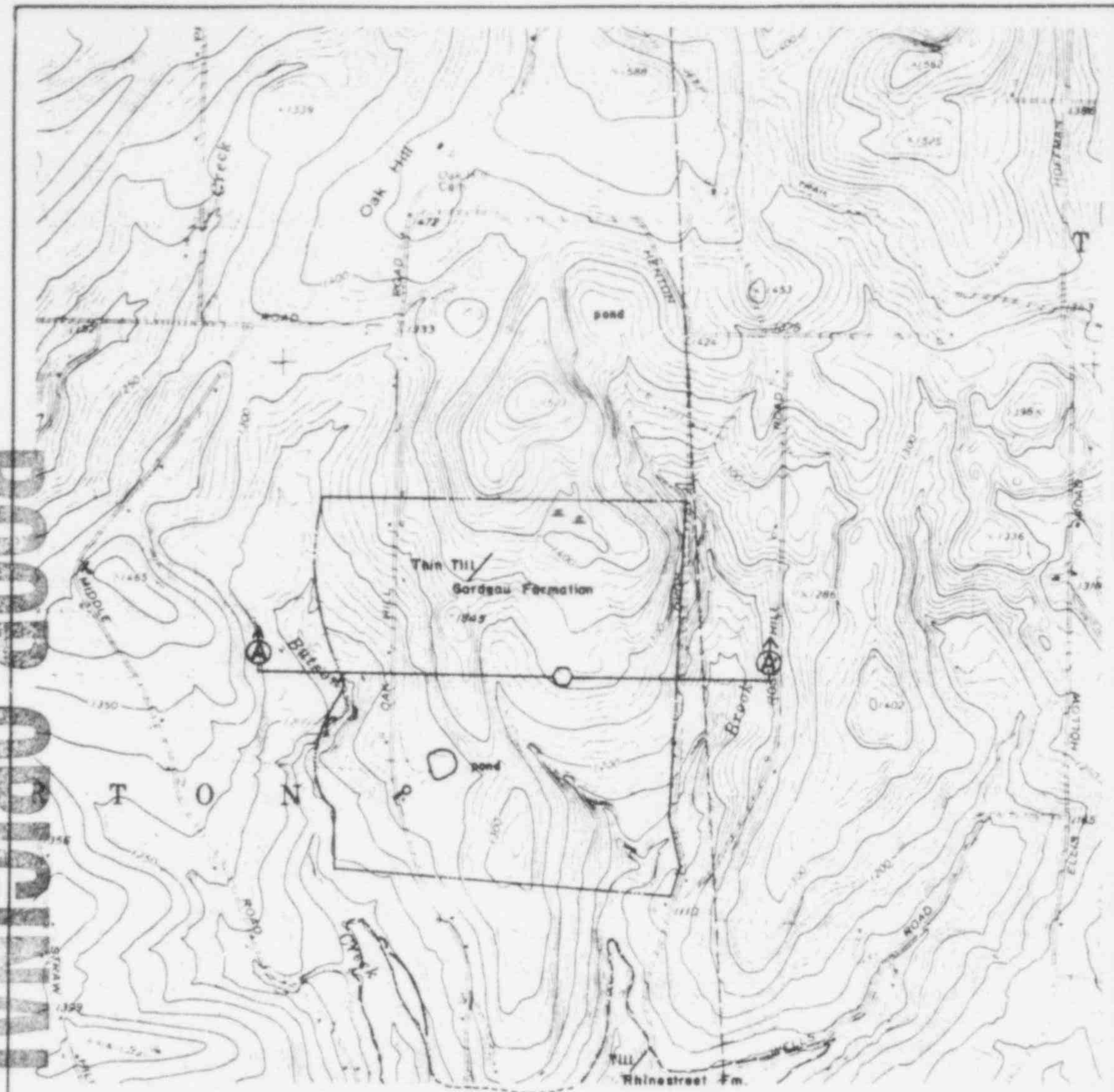
NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

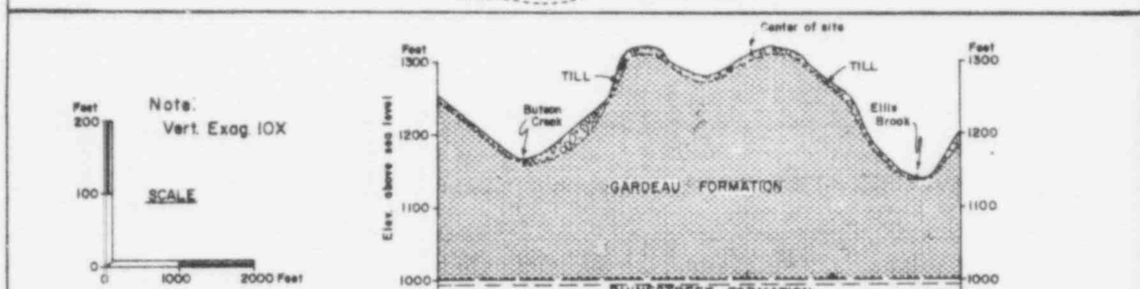
LOCATION OF PIPE CREEK IMPOUNDMENT

FIG. 2.1-6

POOR ORIGINAL

BASE MAP = USGS BARTON & OWEGO QUADRANGLES 1969





SCHEMATIC SECTION A-A'

EXPLANATION

PLAN MAP

SURFICIAL / OVERBURDEN MATERIALS

TILL - Thin, silty clay and sand with abundant rock fragments. Compact. Parts may be weathered bedrock.

BEDROCK UNITS

GARDEAU FORMATION - Gray, thin-bedded, fissile shale with thin to medium interbeds of gray siltstone.

RHINESTREET FORMATION - Sequence of interbedded -- black thin-bedded silty shale; medium-bedded calcareous siltstone; and gray thin-bedded siltstone alternating with thin blackish silty shale. Total thickness 600 - 800 feet.

SYMBOLS

- Contact, dashed where approximately located
- Spring, flowing
- Alignment of schematic cross section, arrow indicates direction of view.
- Outline of general site area
- Center of site
- Wet area
- Borrow pit, abandoned
- Scarp of small slope failures along stream valleys

SECTION

- TILL -
- GARDEAU FORMATION -
- RHINESTREET FORMATION -
- Generalized location of contact between surficial materials and/or bedrock.
- Approximate contact between bedrock units

SCALE:

0 1000 2000 3000 feet

0 100 250 500 1000 meter

Contour interval 10 feet

N

BASE MAP: U.S. Geological Survey, Barton (1969) Quadrangle

GEOLOGIC DATA: Sources Given Accompanying Report This Site.

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 11-2-35
GEOLOGIC RECONNAISSANCE MAP

FIG. 2.1-7

MOHAWK RIVER
VALLEY

2.2 SITE 7-6-6, MOHAWK RIVER VALLEY AREA

2.2.1 Site Description

Site 7-6-6 is located in the Town of Charleston, Montgomery County, 12 miles southwest of Amsterdam and 6 miles south of the Mohawk River. Canajoharie and St. Johnsville, both situated along the Mohawk River, are 10 and 12 miles, respectively, northwest. Figure 2.2-1 shows the general location of the site. Figure 2.1-2 depicts the site boundary and area topography, and Figure 2.2-3 is an aerial photograph of the site.

Most of the site land use is dedicated to farm usage, cropland/pasture. Forests, shrub-cover, and a small wooded wetland are also onsite. A small creek crosses the eastern section of the site. Figure 2.2-4 is a copy of the LUNR map for the site and surrounding area.

Scattered farm and nonfarm residential dwellings are located along Polin Road which crosses the site and along the roads bordering the site.

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2.2.2 Meteorology

The meteorological evaluation of the Mohawk Valley site (7-6-6) considered the ground level dispersive capability and the potential for cooling tower impacts on sensitive receptors.

2.2.2.1 Topography

Site 7-6-6 is located on a ridge at an elevation of about 1100 ft msl about 6.0 miles south of the Mohawk River. The site lies about 800 ft above the river elevation and thus is well outside of the immediate river valley. Elevations within 10 miles of the site are generally at or below site grade to the east, north, and west. The ridge on which the site is located gently rises to the southeast to an elevation of 1447 ft msl about 4 miles south of the site. Otherwise elevations to the south of the site are generally no higher than 1200 ft msl within 10 miles of the site. Of note concerning the regional topography is the presence of elevations in excess of 2000 ft (foothills of the Catskill Mountains) about 15 miles south of the site and Adirondack foothills in excess of 2000 ft about 20 miles north of the site.

2.2.2.2 Meteorological Data

There are two sources of meteorological data potentially representative of the site, the Albany County Airport, located about 30 miles east of the site, and Griffiss Air Force Base (Rome, New York) located about 60 miles west-northwest of the site.

The Albany County Airport is located near the confluence of the Mohawk and Hudson Rivers at an elevation of about 280 ft msl. The local topography within 5-10 miles of the site does not present any undue potential topographic influences on airflow. However, the airport is located in the wide-scale north-south Hudson Valley bounded on the east by Taconic Range and to the west by the Helderberg escarpment.

Griffiss Air Force Base is located at an elevation of about 500 ft msl in the Upper Mohawk River Valley. Elevations in excess of 1500 ft msl are found about 10 miles north and about 20 miles south of the base.

The wind distribution by stability class for the Albany County Airport for 1966-1970 as calculated with the NCC STAR Program is presented in the Table 2.2-1. The wind distribution showed a rather pronounced frequency (channelling) for south winds (22%). The overall wind speed distribution revealed a frequency of speeds from 0-3 knots of 19%, from 4-6 knots of 25%, and from 7-10 knots of 28%. The frequency of stable atmospheric conditions was 25%, with a frequency of stable conditions with wind speeds from 0-3 knots of 11%, from 4-6 knots of 10%, and from 7-10 knots of 4%.

The wind distribution by stability class for Griffiss Air Force Base for 1966-1970 as calculated with the NCC STAR Program is presented in Table 2.2-2. The wind direction distribution showed a distinctive river valley wind channelling effect, with an overall frequency of ESE and SE winds of

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25%, and an overall frequency of W and WNW winds of 27%. The overall wind speed distribution revealed a frequency of speeds from 0-3 knots of 44%, from 4-6 knots of 25%, and from 7-10 knots of 20%. The frequency of stable atmospheric conditions was 31%, with a frequency of stable conditions with wind speeds from 0-3 knots of 22%, from 4-6 knots of 8%, and from 7-10 knots of 1%. The tendency for lower wind speeds in the Griffiss data may have been influenced by the fact that the Griffiss wind measurement height was only 13 ft (4 meters), which was 40% less than the standard NWS measurement height of 23 ft (7 meters).

2.2.2.3 Ground Level Dispersive Capability

The location of Site 7-6-6 on a ridge above the immediate Mohawk Valley would tend to minimize the potential for wind channelling and cold air drainage at the site. The widescale E-W Mohawk Valley between the Adirondack and Catskill foothills may cause some tendency for channelling of regional wind patterns, but should not cause any significant local airflow obstruction or cold air drainage due to the favorable site exposure.

Neither the Albany County Airport or Griffiss AFB are judged to have been very representative of the site meteorological conditions. The location of both of them in more pronounced valley situations differentiate them from the exposure of Site 7-6-6. Also, the principal valley of significance for the Albany County Airport is the N-S Hudson Valley, and not the Mohawk.

2.2.2.4 Cooling Tower Evaluation

The favorable exposure of the site would minimize any potential problems with moisture dispersion. The only potential sensitive receptors are several local roads near the site.

2.2.2.5 References for Section 2.2.2

1. USGS Topographic Maps, 1:24,000 scale, Carlisle and Esperance, N.Y.

2. USGS Topographic Maps, 1:250,000 scale, Binghamton, N.Y., Albany, N.Y., and Utica, N.Y.

3. U.S. Department of Commerce, NOAA, NCC, EDS, Wind Distribution by Pasquill Stability Class 5, STAR Program, Albany, N.Y., 1966-1970, and Rome, N.Y., 1966-1970.

4. U.S. Department of Commerce, NOAA, NCC, EDS, Local Climatological Data - Annual Summary with Comparative Data, Albany, N.Y., 1974.

5. U.S. Department of Commerce, Station History and Wind Equipment Information, Rome, N.Y./Griffiss AFB, 1966.

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2.2.3 Hydrology

2.2.3.1 Water Availability and Supply

The source of cooling water is the Mohawk River between Locks 12 and 13. The intake is located approximately 32 miles downstream of Gaging Station 3470. Records (October 1927 to September 1973) at this station indicated a mean flow of 2728 over the period of record, a minimum daily flow of 463 cfs, a minimum monthly flow of 642 cfs, and a 7-day, once-in-ten-years low flow of 613 cfs.

There is enough flow available for water supply, except for very dry periods when the minimal depth requirements in the canal have to be maintained. To maintain water supply for power generation during these periods, a water supply reservoir probably would be needed. For a nuclear plant, 9000 acre-ft of storage would be required. Other alternative methods of dealing with the low flow problem considered were increasing the capacities of existing reservoirs and modifications to existing canal operations. Section 2.2.6.5 describes these methods in greater detail.

2.2.3.2 Flood Protection Requirements

The site is located approximately 800 ft in elevation above the Mohawk River and Schoharie Creek and 100 ft above the nearest stream, Auries Creek. Therefore, there is no problem with flooding at the site and flood protection requirements were not considered.

2.2.3.3 Effects of Construction

No significant problems related to dewatering, erosion, or river bottom dredging during construction were identified. There are no onsite streams which might be affected by construction.

2.2.3.4 Effects of Operation

Generally river flows are large enough and the river in the site vicinity is deep enough to provide good dispersion of the discharge effluent.

2.2.3.5 References for Section 2.2.3

1. Tice, R.H., Magnitude and Frequency of Floods in the United States, Part 1-B: North Atlantic Slope Basins, New York to York River, U.S. Geological Survey, 1968.

2. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States through September 1950, Part 1, 1954.

3. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States, October 1950 to September 1960, Part 1, 1964.

4. U.S. Geological Survey, Water Resources Data, Part 1: Surface Water Records in New York State, 1966-1974.

5. U.S. Geological Survey, 7.5 Minute Series New York State Topographic Maps. Carlisle and Esperance Quadrangles.

6. Lake Survey Center, National Oceanic and Atmospheric Administration, Department of Commerce, New York State Barge Canal System: Chart No. 180, 1974.

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2.2.4 Water Quality

2.2.4.1 General Description and Analysis

The analysis of the water quality of the Mohawk River water source for Site 7-6-6 was based on the review of the state stream classification, appropriate USGS maps, and a water source visit.

The Mohawk River, in the vicinity of Site 7-6-6, has a Stream Classification of C, non-trout waters(1). It was anticipated that with completion and operation of municipal wastewater treatment facilities, water quality would have improved in this stretch of the Mohawk River.

Construction practices utilized and all discharges would be in conformance with 40 CFR 423(2) to minimize potential impact to water quality due to turbidity, siltation, and runoff. Monitoring and treating in-plant waste streams would insure that the facility's liquid effluent and cooling tower blowdown would be maintained in compliance with appropriate state and federal guidelines and regulations. Thus, if measures are taken to control possible increases in siltation, turbidity, suspended solids levels, and reduction in dissolved oxygen production from suppressed photosynthesis, existing water quality conditions are not likely to be aggravated by the operation of a closed-cycle plant.

2.2.4.2 References for Section 2.2.4

1. New York State Department of Environmental Conservation, 6 NYCRR, Subchapter B, "Classes and Standards of Quality and Purity Assigned to Fresh Water and Tidal Salt Waters," 1966, as amended.

2. 40 CFR 423, "Steam Electric Power Generating Point Source Category," October 1974, as amended.

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2.2.5 Aquatic Ecology

This analysis of the aquatic ecology and resources of the Mohawk River waters source for Site 7-6-6 was based on a review of background literature, publications of and meetings and conversations with personnel of the New York State Department of Environmental Conservation, and a water source visit.

2.2.5.1 Preexisting Stress

Preexisting stress on the water source biota appeared to have been chiefly from maintenance dredging of the canal channel and previously unregulated discharges from earlier industrial expansion.

2.2.5.2 Aquatic Resources

The stretch of the Mohawk River to be used as a water source is the pool between Lock 12 and Lock 13, east of Fonda and west of the mouth of Schoharie Creek.

The entire Mohawk formerly had excellent fishing, however, with population increase, industrialization and canalization much of the original river bed had been modified. At the time of the study, fish were present near the mouths of tributaries and in all but the most polluted areas of the river.

Most fishing was at the mouth of streams and in currents below locks and "Mohawk dams". Warm water fish, such as largemouth and smallmouth bass, perch, bullheads and sunfish, were found in the river. Carp were also present[1]. At the time of the study, the New York State Canal Recreation Development Program through coordinate government action was in the process of protecting and enhancing the environmental value of the Mohawk River/Erie Canal. This included management of the fish resource[2].

The following fish have been reported in the Mohawk River[3,4,5].

Lamprey (Petromyzon marinus)
Gizzard shad (Dorosoma cepedianum)
Brown trout (Salmo trutta)
Chain Pickerel (Esox niger)
Northern Pike (Esox lucius)
Carp (Cyprinus carpio)
Cutlips minnow (Exoglossum maxillingua)
Silvery minnow (Hybognathus nuchalis)
Golden shiner (Notemigonus crysoleucas)
Comely shiner (Notropis amoneus)
Emerald shiner (Notropis atherinoides)
Common shiner (Notropis cornutus)
Spottail shiner (Notropis hudsonius)
Rosyface shiner (Notropis rubellus)
Bluntnose minnow (Pimephales notatus)
Fathead minnow (Pimephales promelas)

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Creek Chub (Semotilus atromaculatus)
Walleye (Stizostedion vitreum)
Crappies (Pomoxis sp.)
Fall Fish (Semotilus corporalis)
Longnose sucker (Catostomus commersoni)
Hogsucker (Hypentelium nigricans)
Freshwater drum (Aplodinotus grunniens)
Brown bullhead (Ictalurus nebulosus)
Margined madtom (Noturus insignis)
American eel (Anguilla rostrata)
Banded killifish (Fundulus diaphanus)
Brook stickleback (Culaea inconstans)
Trout-perch (Percopsis omiscomaycus)
White perch (Morone americana)
Rock bass (Ambloplites rupestris)
Pumpkinseed (Lepomis gibbosus)
Smallmouth bass (Micropterus dolomieui)
Largemouth bass (Micropterus salmoides)
Fantail darter (Etheostoma flabellare)
Johnny darter (Etheostoma nigrum)
Yellow perch (Perca flavescens)
Logperch (Percina caprodes)

Spawning, nursery, resting, feeding, and wintering areas in the Mohawk River were not specifically known. Review of the habitat preference and reproductive habits of fish reported from the Mohawk(6,7,8) indicates that some spawning activity would be expected in the main stream and in the vicinity of mouths of tributaries.

Migratory routes may be present. The Lamprey (Petromyzon marinus) and American eel (Anguilla rostrata) were reported upstream in the Oneida County stretch of the Mohawk(4). They probably migrated through the various stretches of the river. The American eel (Anguilla rostrata) is catadromous and the sea lamprey (Petromyzon marinus) is anadromous(6,7,8).

In the vicinity of the Fonda bridge, the river appeared to have been shallow and muddy. No fishing activity was noted.

The following information was obtained during a visit to the Region 4, Fish and Wildlife Office(9).

During the summers of 1970 and 1971, fifteen sections of the Mohawk River between Cohoes and St. Johnsville were electrofished. This survey showed that the river supported a diverse warm water fish population. Except in the portion of river adjacent to and immediately below Amsterdam fish were abundant throughout the Region 4 of the Mohawk. From Amsterdam to St. Johnsville (this stretch of the Mohawk River, within which the site lay, fell within these bounds) the primary game fish species were the smallmouth bass

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(*Micropterus dolomieui*) and walleye (*Stizostedion vitreum*). The smallmouth bass were abundant throughout this section, and the walleye were abundant near St. Johnsville, but relatively rare near Amsterdam. Panfish species in decreasing order of abundance were: rock bass (*Ambloplites rupestris*) (common), brown bullhead (*Ictalurus nebulosus*) (common), yellow perch (*Perca flavescens*) (common), and pumpkinseed (*Lepomis gibbosus*) (common)(9).

2.2.5.3 Potential Impacts of Construction

Environmental impacts of construction were expected to be primarily short term and reversible for organisms inhabiting the Mohawk River. The primary unavoidable but reversible effects would be associated with dredging and construction of intake and discharge structures.

The aquatic impact associated with the dredging operations would involve short term turbidity increases as a result of sediment removal. Some benthic organisms would be lost with spoil removal; however, any backfilling would provide suitable habitat for some recolonization. Thus, the impact was considered short term and reversible.

Effects of dredging activities on organisms other than the displaced macroinvertebrates would be localized and temporary. Dredging operations would be scheduled reasonably to avoid spawning and other biologically active periods. Increased turbidity levels could have a short term impact on plankton populations. However, because of the limited area involved in dredging, the potential adverse affects are considered to be inconsequential.

Fish would be largely unaffected because their mobility would enable them to avoid construction activities. Because of the short duration and limited area affected by construction activities, no impact upon or blockage of fish migration in the water source in the site vicinity is anticipated.

2.2.5.4 Potential Impacts of Operation

The potential impacts of plant operation on aquatic biota in this stretch of the Mohawk River are mainly dependent upon the specific location and design of the intake and discharge structures. Potential impacts would result from impingement of adult fish, entrainment of ichthyoplankton, phytoplankton, zooplankton, macroinvertebrates and juvenile fish, and thermal and chemical discharges.

The potential operational impacts were expected to be minimal if the intake and discharge structures were located away from any unique habitats or areas of this stretch of the river conducive to fish congregating, feeding, or spawning.

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2.2.5.5 References for Section 2.2.5

1. New York State Dept. of Health, Water Pollution Control Board. Mohawk River Drainage Basin Survey Series Report No. 2. Mohawk River Drainage Basin except Sauquoit Creek, West Canada Creek, East Canada Creek and Schoharie Creek - Recommended Classification and Assignments of Standard of Quality and Purity for Designated Waters of New York State, 1952.

2. New York State Canal Recreation Development Program, New York Statewide Recreation Planning Program, State of New York, Parks and Recreation, and Department of Transportation, May 1975.

3. Bishop, S.C., Fisheries investigations in the centralized Mohawk and Hudson Rivers, In Biological Survey of the Mohawk - Hudson Watershed, (Supplemental to Twenty-fourth Annual Report, 1934) No. IX, State of New York, Conservation Department, 1934.

4. Chamberlain, J.L., Mohawk River Flood Plain, Oneida County New York, Oneida County, Department of Planning, Utica pp. 27-30, 1974.

5. Freshwater Fishing in New York. Prepared by Division of Educational Services, State of New York Department of Environmental Sciences.

6. Eddy, S. and J.C. Underhill, Northern Fishes, 1974.

7. Hubbs C.L. and K.F. Lagler, Fishes of the Great Lakes Region, 1974.

8. Scarola, J.F., Freshwater Fishes of New Hampshire, New Hampshire Fish and Game Department, Division of Inland and Marine Fisheries, 1973.

9. Personal Communication, Mr. Russell Fieldhouse, Regional Fisheries Manager, New York Department of Environmental Conservation, Stamford Regional Office, 12-3-75.

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2.2.6 Terrestrial Resources

The following summary and analysis of Site 7-6-6 is based on a review of these sources of data: USGS topographic maps (7.5 minute series), aerial photographs, pertinent literature, contacts with state resource agencies, LUNR maps, and a site visit.

2.2.6.1 Land Use

2.2.6 1.1 Dedicated Areas

1. federal lands -- none on or near the site

2. natural landmarks -- none on or near the site

3. state and local forests -- state forest lands within a mile of the site on the east and on the west. These areas are not part of the site and should not be affected by development of the site.

4. privately dedicated areas -- none on or near the site

5. endangered species -- at the time of the study, the U.S. Fish and Wildlife Service (USFWS) had not ruled that any plant taxa were endangered or threatened. The State of New York did not have an endangered plant regulation but did have a regulation prohibiting removal of certain plant species without the consent of the landowner.

   The animals considered endangered by the USFWS, at the time of the study, which might have occurred in the site vicinity included the bald eagle, the peregrine falcon, and the Indiana bat. None of these were known to have bred in the vicinity of the site but may have migrated through the site area. The State of New York also considered the osprey and the bog turtle as endangered species. The osprey may have migrated through the site area but did not breed in the area. The bog turtle did not occur in the county.

6. critical habitat -- none on or near the site

2 2.6.1.2 Vegetation

The major plant communities as shown on the LUNR maps include forest brushland, agricultural cropland, and inactive agricultural land. There is a small wet area (wet woods) near the center of the site. The woodland is mixed hardwood and conifer and appears to have been second growth.

2.2.6.1.3 Wildlife Habitat

The plant communities on the site probably do not support a variety of wildlife. Game animals present include deer, rabbit, squirrels, pheasants,

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grouse, mourning dove, and woodcock. Also present are raccoon, skunk, woodchuck, and fox. No waterfowl are expected to use the site area and few would migrate near the site.

2.2.6.1.4 Farmland

During the time of the study, portions of the site area were active cropland and pasture.

2.2.6.1.5 Wetlands, Coastal Zone Management Program, and State Wetlands Act

There is a small wet woodland on the site. This area does not represent a significant habitat for aquatic animals. The site is not within the coastal zone.

2.2.6.1.6 Floodplains

No floodplain is identified onsite based upon field inspections and review of maps and photographs.

2.2.6.2 Transmission Corridors

Grid transmission facilities required for Site 7-6-6 would consist of two single-circuit 765kV transmission lines extending from the site in a northeasterly direction for a distance of 6.5 miles. These transmission lines would be on a common right-of-way (ROW), and would tie into the existing 765kV Edic-New Scotland transmission line.

Land uses crossed by the two-mile-wide study corridor are predominatly agricultural and forest brushland, which would result in minimal land use impact. Less than one linear mile of the corridor traverses mature forest or forest plantations.

In the vicinity of the connection of the Edic-New Scotland line, the proposed facilities would be visible from portions of the New York State Thruway (Interstate 90). The Auriesville Shrine, a religious and historical site located just south of the thruway, is contained within the study corridor; depending on final routing, some of the transmission structures may be visible from this site.

Offsite transmission facilities for a nuclear station at Site 7-6-6 would consist of two 230kV transmission lines on a common ROW, extending approximately 2.5 miles from the site in a northeasterly direction to tie into the existing 230kV Porter-Rotterdam transmission line. These 230kV lines would parallel the proposed 765kV grid transmission facilites.

Additional impact from these offsite facilities would be minimal except for some added visual intrusion at viewpoints close to the ROW.

Table 2.2-3 presents the transmission corridor data for Site 7-6-6.

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2.2.6.3 Pipeline Route

The pipeline route to the site begins at the Mohawk River. Exact location of the intake depends on aquatic ecological and engineering considerations. The route selected for the evaluation is 6.5 miles long. The line crosses predominantly agricultural land, with some brushland and forest land. The line crosses 6 small streams. Roads crossed by the line include Interstate 90 (12,700 vehicles per day (V/D)), State Route 55 (1150 V/D), and State Route 30A (1200 V/D). In addition, the pipeline crosses the New York Central railroad. Figure 2.2-1 shows the pipeline route.

2.2.6.4 Railroad Route

The railroad route to the site begins at the New York Central (Amtrack) line northwest of the site. The line would require the construction of 10 miles of track. Based on LUNR maps, the vegetation crossed is mainly agricultural with some forest and brushland. The line crosses nine small streams. No state roads are crossed. Selection of the final railroad route would depend on engineering considerations. There are no unique ecological areas along the proposed route. Figure 2.2-1 shows the railroad route.

2.2.6.5 Impoundments

As described in Section 9.2.2.6.3.1 of the ER, detailed investigations of Mohawk River water availability were conducted in Stage 5 of the site selection process. The Mohawk River is part of the New York Barge Canal System, and is under New York State Department of Transportion (DOT) control.

Preliminary meetings with the DOT during the siting study indicated that they foresaw no problems associated with the amount of consumptive water use necessary for plant operation. Any water above that required for operation of the canal system was considered surplus; however, consumptive use permits could have been issued only on a revocable basis, with navigational needs taking precedence over all other uses. Because reliable plant operation is conditional upon an adquate and continuous water supply, studies of the flow of the Mohawk/Canal and the methods of water level control were made. Impoundments were considered as a supplemental means of supplying makeup; calculations showed that an impoundment with approximately 9000 acre-ft of storage would be required to maintain plant operation during low flow conditions*. It was felt, however, that an impoundment would not be

*This estimate was based on assumptions concerning the minimum flow requirements during the navigation season mid-April to mid-December. Based on experience, DOT estimated this requirement to be 650 cfs. Recorded low flows during the canal operation season indicated that about 4500 acre-ft of storage was required. Assuming 50% drawdown, an impoundment of about 9000 acre-ft storage capacity would be required.

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necessary if water were released from the DOT reservoirs at appropriate times, and if the leakage (estimated to have been 470 cfs) through the locks were reduced.

In addition to the studies of flows and storage requirements, other investigations were undertaken to further determine the implications of attempting long-term plant operation with a revocable water use permit. The withdrawal of water from the Mohawk River requires a Department of Environmental Conservation (DEC) permit by virtue of Section 15-1705 (1) of the Environmental Conservation Law. DEC has the power to issue permits, for the diversion of water controlled by the state, to all corporations which furnish or sell power in New York. DOT has permitting power for industrial users of canal waters, but DEC can have priority when the applicant is a utility. In this case, however, the DOT has to approve any permit before it can be used by the DEC. Various restrictions, therefore, can apply to the license:

1. DOT has the right to draw off any water held in an impoundment when the water's original source was the canal

2. DOT can forbid further temporary withdrawal of canal water

3. DOT can permanently terminate the withdrawal of waters; require the return of waters removed; and require the removal of facilities constructed within canal lands

Additional investigation indicated that, regardless of DOT's willingness to issue a permit, and regardless of their assurance that adequate water should be available for plant operation, the DOT is forbidden by the New York State Constitution to issue irrevocable water use permits. A conditional permit could be issued which states the circumstance under which the permit could be revoked, that being a lack of surplus water, but it would be impossible to list all circumstances which might lead to a lack of surplus water.

Concurrent with the legal investigations, several alternative schemes were studied to find a means of providing water from sources other than the Mohawk/Canal. The various alternatives were:

1. <u>Oneida-Rome</u> -- water would be pumped from Lake Oneida, 10.5 miles, to the Mohawk/Canal near Rome

2. <u>Ontario-Oneida-Rome</u> -- water would be piped 20 miles from Lake Ontario to Lake Oneida, and pumped 10.5 miles from Lake Oneida to the Mohawk/Canal, in the vicinity of Rome

3. <u>Ontario-Rome</u> -- a 45-mile direct pipeline would carry water from Lake Ontario to the Mohawk/Canal, in the vicinity of Rome

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4. Hudson Pipeline Along Canal -- water would be piped from the Hudson 46 miles along the canal, to the Mohawk sites

5. Hudson Direct Pipeline -- a 36-mile pipeline would carry water directly from the Hudson River to the Mohawk sites

It was determined that pumping from Lake Oneida would have no effect on the permit requirements since Lake Oneida is also under DOT jurisdiction. Even if water were pumped from a water body not under DOT control (such as Lake Ontario or the Hudson), once the water is placed in the Mohawk/ Canal, it would be under the jurisdiction of the DOT, and a permit would be required for withdrawal. Of the alternatives listed above, only a pipeline from the Hudson River to the Mohawk sites would circumvent the need for a DOT permit.

Of the two schemes to provide water from the Hudson River, the "Hudson Direct Pipeline" was estimated to be less costly and have a lower potential environmental impact, and therefore is the preferred alternative. The cost of the "Hudson Direct Pipeline" scheme for a 35.6 mile pipeline from the Hudson River to Site 7-6-6 is shown below:

Total Capital Cost	Operating Cost Capitalized Over Plant Life
$ 166×10^6	$ 18.5×10^6

Certain environmental impacts would be associated with pipeline construction in addition to those evaluated for the Mohawk sites. The added costs and potential environmental impacts due to the pipeline result in the Mohawk sites (including Site 7-6-6) judged as less attractive than the remaining sites in Stage 5. The Mohawk sites offer no clear advantages over siting plants directly on the Hudson.

The risks associated with constructing a major power plant on a water body, where the permit for water supply could be revoked for reasons not under the control of the owner, were not acceptable. This is especially true where there are other available sites not subject to such conditions.

2.2.6.6 Construction Impacts

During site preparation and facility construction, the terrestrial community would be affected by clearing and grubbing, excavation, dewatering, placement of roads, railroads and pipelines, and operation of construction equipment.

The impacts expected from these activities to the terrestrial ecology include the alteration of existing vegetation, causing changes in wildlife population onsite and within terrestrial communities surrounding the site, and introduction of barriers to wildlife movement.

Site 7-6-6 is located in an area of open, flat terrain, typical to the region. No unique habitats to the region would be expected on the

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site, therefore, removal of cover types from Site 7-6-6 would result in insignificant regional impacts.

In general, large open areas do not support much fauna, both in terms of numbers and diversity. Construction onsite would cause major impacts to fauna onsite, but these impacts would become insignificant from a regional perspective.

A pipeline corridor running from the Mohawk would disturb a small amount of land and associated impacts would be small.

2.2.6.7 Operation Impacts

Impacts on terrestrial ecology from operation of a nuclear power plant at the site would be limited to the potential effects of cooling tower drift deposition and noise. No expected levels of harmful materials known to cause damage to flora and fauna would be deposited as a result of operation of the nuclear facility.

2.2.6.8 References for Section 2.2.6

1. Black River Basin Regional Water Resources Planning Board, Summary Report on the Board Plan Black River Basin, 1974.

2. National Ocean Survey, Lake Survey Center, Barge Canal System Charts, Chart No. 180, 1974.

3. New York State Department of Transportation, Barge Canal System & Connecting Waterways Map, 1975.

4. New York State Parks and Recreation and New York State Department of Transportation, New York State Canal Recreation Development Program, 1975.

5. TAMS, Excerpts from Reconnaissance of Water Resources Potentials, Hudson, Mohawk and Long Island Areas, For NYS Water Resources Commission, 1966.

6. U.S. Army Corps of Engineers, North Atlantic Region, North Atlantic Regional Water Resources Study, Appendix S: Legal & Institutional Environment, Appendix K: Navigation, Appendix F: Upstream Flood Prevention and Water Management and Appendix R: Water Supply, 1972.

7. USGS, 7.5 Minute Series (topographic) quadrangle maps.

8. U.S. Geological Survey, Surface Water Supply of the United States. Part 1, Volume 2 & 3 and Part 4, Volume 2, 1970.

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10. Burt, W.H., Mammals of the Great Lakes Regions, 1957.

11. Burt, W.H. and R.P. Grossenheider, A Field Guide to the Mammals, 1964.

12. Conant, R., A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 1975.

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14. Hall, E.R. and K.R. Kelson, The Mammals of North America, 1959.

15. New York State Department of Environmental Conservation, "Protected Native Plants.", 6 NYCRR 193.3, 1974.

16. New York State Office of Planning Services, Land Use and Natural Resources Inventory Map Overlays (1:24,000), 1968-1974.

17. Palmer, E.L., Fieldbook of Mammals, 1957.

18. Peterson, R.T., A Field Guide to the Birds, 1947.

19. Peterson, R.T. and M. McKenney, A Field Guide to Wildflowers of Northeastern and North Central North America, 1968.

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21. Robbins, C.S., B. Brunn, and H.S. Zim, Birds of North America, 1966.

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23. U.S. Fish and Wildlife Service, "Review of Endangered Species Status." Federal Register, 1975.

24. U.S. Fish and Wildlife Service, "Review of Status of Vascular Plants and Determination of 'Critical Habitat'." In: Federal Register, 1975.

25. U.S. Fish and Wildlife Service, Threatened Wildlife of the United States, 1973.

26. U.S. Fish and Wildlife Service, Office of Endangered Species and International Activities, United States List of Endangered Fauna, 1974.

27. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Maps.

28. New York State Department of Environmental Conservation, Division of Educational Services, Environmental Deterioration and Declining Species, 1970.

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2.2.7 Socioeconomics

2.2.7.1 Displacement and Disruption of Onsite Resources

There are no designated historic, scenic, cultural, or natural resources on the site. Construction of a power plant would not adversely affect access to any other resource in the site vicinity.

2.2.7.2 Displacement of Residential and Economic Activities

Development of a power plant on this site would necessitate the acquisition of 11 dwellings and the relocation of the respective households.

A large percentage of the site is used for agricultural production. No other economic activities are conducted onsite.

2.2.7.3 Origin and Size of the Labor Pool

The eight-county New York State Capital Economic District in which the site is located, and the four-county Mohawk Valley area are expected to provide the major portion of the construction labor requirements for the site. The labor pool include the major Cities of Schenectady, Albany, Troy, Utica, and Rome, New York.

The construction labor force in this area was estimated to have been in excess of 30,000 workers (1970). Significant inmigration of labor was not expected to have been necessary in order to supply the site's construction trades labor requirements.

2.2.7.4 Anticipated Points of Vehicular Congestion

The major roads providing transportation access to the site vicinity are Interstate 90 and U.S. 20. State Route 30A would carry most of the construction traffic to the site.

Points along U.S. 20 from Albany to Sloansville near the site would experience rush-hour traffic congestion as westbound construction traffic flow against the eastbound commuter traffic into the state capital area and intersect with eastbound traffic on State Route 7 at Duanesburg.

2.2.7.5 Potential Impacts on Housing and Services

The housing vacancy rate in the site's commuting area was estimated as 5.66% (1970), more than 24,000 vacant year-round units. This was considered indicative of adequate housing stock to absorb the construction workers likely to migrate into the area. Adverse effects on the local housing market were not anticipated.

Because of the low potential for inmigration of construction workers, there is no significant potential for impacting local services.

2.2.7.6 Analysis

Good highway access, adequate vacant housing, and a large pool of construction labor combine to produce an acceptable location for development of a power plant. A migration of construction workers, the primary vehicle for socioeconomic impacts, was not expected to have exceeded acceptable levels. Many roads provide access to the site such that traffic management could minimize any impacts of vehicle congestion. The primary adverse socioeconomic effects at this site would result from the necessity to relocate households inhabiting the dwellings onsite.

2.2.7.7 References for Section 2.2.7

1. Department of Commerce, Syracuse Area Business Fact Book, Part 2, New York State.

2. New York State Department of Commerce, Captial District Business Fact Book, Part 2, 1974.

3. Montgomery County Planning Boards, Economic Base Study, October 1973.

4. New York State Department of Transportation, Transportation/Planning Map, New York State-Central, 1974.

5. USGS, 7.5 Minute Series (topographic) Map, Esperance Quadrangle, 1943.

6. New York State Department of Transportation, 7.5 Minute Series Planimetric Map, Esperance Quadrangle.

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2.2.8 Geology and Seismology

2.2.8.1 Introduction

The setting of Site 7-6-6 is rural. Much of the site is gently rolling pastureland, with small woods scattered between the fields.

2.2.8.2 Regional Geologic Setting

2.2.8.2.1 Rocks

The site lies at the southern edge of the Mohawk Valley physiographic province (Figure 1.4-2). The area is underlain by Ordovician graywacke sandstones, siltstones, and shales, over 450 million years old (Figures 1.4-3 and 2.2-5).

2.2.8.2.2 Structural Features

The bedrock regionally strikes east-southeast, and dips gently (less than five degrees) to the south. Several high-angle, normal faults occur within the rocks of the region (Figure 1.4-4). One of these paleo-faults occurs some two miles west of the site. The paleo-faults are inactive and considered to be more than 350 million years old; last associated movement was apparently during pre-Devonian tectonic activity(1,2). Extending southwest through the Little Falls area to the west of the site is the Adirondack arch, which gently tilts the overlying beds, bringing igneous and metamorphic rocks close to the surface. This early structural feature was active during Ordovician time and during deposition of the Trenton Formation sediments. The regional arching of the basement rocks affected the types of sediments deposited around the structure(3).

The principal structures associated with the arch in the area are a series of short, small-displacement faults that were active about 450 million years ago. These paleo-faults broke the Ordovician and older rocks into a series of blocks; the failure planes/faults followed pre-existing Pre-Cambrian lines of weakness(2). During the doming of the Adirondacks in the Ordovician time, the numerous blocks moved independently while adjusting to the uplift stresses.

2.2.8.2.3 Glacial Features

The area was glaciated several times during Pleistocene time, with ice movement in an easterly direction down the Mohawk Valley. Glacial till deposits in the area are generally thick, commonly over 100 ft, and occasionally reaching over 200 ft thick(4,5).

2.2.8.2.4 Groundwater

The area is underlain by a section of low permeability rocks which protects any deep regional aquifers from possible accidental contamination (Figure 2.2-5).

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2.2.8.3 Areal/Site Geology

A summary of the well logs at this site is presented in Table 2.2-4.

2.2.8.3.1 Bedrock Units

2.2.8.3.1.1 Schenectady Formation

The site is underlain by several hundred feet of alternating beds of blue-gray, fine-grained, thick-bedded sandstones, and black to olive-gray, platey shales of the Ordovician Schenectady Formation (Figure 2.2-5). The sandstones are generally well cemented, quartzose, and cross-bedded. The shales are somewhat sandy[6].

One small bedrock outcrop was located at the northeast edge of the site (Figure 2.2-6). The rock is medium gray, thin-bedded sandstone. The beds are nearly horizontal with a slight dip to the south. In the vicinity, exposures along Schoharie Creek in the southern part of the county have been described in the literature[6]. Bedrock is at a shallow depth northeast of site about 2 miles. Well No. 282 reports rock at depth of 10 ft.

2.2.8.3.1.2 Engineering Characteristics

The sandstone/shales are expected to provide adequate strength for foundation design. The unconfined compressive strength is anticipated to be fairly high, ranging from 16,000 to 30,000 psi; the shales are at the lower end of this strength range. Bedrock surfaces on the sandstones should be hard and unweathered. Where shale is encountered directly below overburden, weathering may extend a few feet into the shale.

2.2.8.3.1.3 Groundwater Occurrence

The Schenectady Formation will yield low amounts of groundwater (average five gpm) to wells due to the low permeability of the poorly sorted, well-cemented sandstone beds[6]. Groundwater flow is essentially restricted to bedding planes and open, vertical-joint features.

2.2.8.3.2 Surficial/Overburden Materials

2.2.8.3.2.1 Glacial Tills

The site is entirely blanketed by varying thicknesses of a stiff, clayey, silty, bouldery glacial till. Numerous cobbles and boulders occur scattered over the fields. Most boulders were flaggy sandstones of local origin. Some exceeded three feet in diameter.

2.2.8.3.2.2 Generalized Thickness

Four wells with logs were available on the site. Two wells had penetrated some 200 ft. of till and continued into the underlying shales. Bedrock is estimated to be greater than 50 ft below the surface over most of the

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site and may be some 200 ft below the surface along the southern edge of the site. Till thickness are expected to be shallow, less than 50 ft thick throughout the northeastern corner of the site and in the vicinity of small bedrock outcrops (Figure 2.2-6).

2.2.8.3.2.3 Engineering Characteristics

The glacial tills of the site are very similar to those of a nearby site investigated near Charleston Four Corners(7). Both sites are underlain by the same bedrock units, with comparable thick glacial till overlying rock.

The glacial tills at the site near Charleston were stiff and compact, with N values (blows per foot) averaging 40 at five ft, and increasing with depth to near 100. Auger boring and sampling was difficult because of the numerous cobbles encountered.

Seismic velocities for the glacial till ranged from 6,000 to 7,500 feet per second, with rock velocity (Schenectady Formation) onsite some 11,500 ft per second.

2.2.8.3.2.4 Groundwater Occurrence

The glacial tills studied at Charleston Four Corners had low average permeabilities (horizontal 10^{-6} cm/sec, vertical 10^{-4} cm/sec). These values are expected to be typical for the till materials at Site 7-6-6.

The perched water table on Site 7-6-6 occurs some 10 to 15 ft below the surface, with production of poor-quality water from the near-surface glacial gravels overlying the main till mass.

Deep wells, such as K-1 (see Table 2.2-4), produce a low to modest flow of good-quality water from a zone at bottom of till/top of bedrock. One well in the area along the southern edge of the site intercepted a small artesian aquifer within the till materials.

Drainage off the site is provided by several small stream channels flowing westward (Figure 2.2-6).

2.2.8.4 Some Potential Problems

A significant feature of Site 7-6-6 determined by the reconnaissance studies was that the overburden thickness exceeds 50 ft throughout much of the site and in parts the glacial till materials are possibly up to 200 ft thick.

To avoid the deep overburden throughout the site, consideration should be given to moving the site eastward and/or northeastward one to one and one-half miles where bedrock is apparently near the surface*.

*Subsequent to the evaluation, the site was relocated to the northeast approximately one mile. The relocated site was the one depicted in Figure 2.2-1 to 2.2-4, and except for this evaluation, is the site described in Section 2.2.

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2.2.8.5 Geological Evaluation

The glacial tills onsite, although thick, are well compacted, cohesive and may, with proper design, provide a good base for heavy foundations and construction.

A good-quality bedrock foundation is possibly available throughout the area one to one and one-half miles east and northeastward; this area should be investigated.*

The glacial till thickness is considered an adverse feature of the original site; therefore, it was assigned a rating of 1g. At the relocated site, the bedrock is at a shallow depth; the rating of this site is 2g.

2.2.8.6 Seismological Evaluation

The site is located near the border of the Adirondack Uplift with its slightly seismic character. The till overlying the bedrock, although a good foundation material, could have a thickness which would have a "soils column period" close to the dominant periods produced by a local or intermediately distant earthquake. These potential site characteristics can be accommodated in design.

2.2.8.7 Some Suggested Methods of Further Investigation

Cored borings could be supplemented by some seismic refraction survey lines across the site. Depth of glacial till and surficial materials is irregular. Conceivably some deep, glacially-filled channels or fault-blocks traverse the site, while some parts may have bedrock as "ridges" at a shallow depth.

2.2.8.8 References for Section 2.2.8

1. Fisher, D.W., Rickard, L.V., and Isachsen, Y.W., Geologic map of New York State: New York State Museum and Science Service, Map and Chart Series No. 15, 1970.

2. Dunn, J.R., Summary of the geology of the Little Falls Quadrangle; In: Hawley, D. and Potter, D.B., (eds.), Guidebook for Field Trips: 32nd Annual Meeting of the New York State Geological Association, Clinton, N.Y., 1960.

3. Hawley, D. and Potter, D.B., Guidebook for Field Trips: New York State Geological Association, 32nd Annual Meeting, Clinton, New York, 1960.

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*Subsequent to the evaluation, the site was relocated to the northeast approximately one mile. The relocated site was the one depicted in Figures 2.2-1 to 2.2-4, and except for this evaluation, is the site described in Section 2.2.

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4. Bringham, A.P., Glacial geology and geographic conditions of the lower Mohawk Valley: New York State Museum Bulletin 280, 1929.

5. LaFleur, R.G., Personal communication: R.G. LaFleur, November 19, 1975.

6. Jeffords, R.M., The groundwater resources of Montgomery County: U.S. Geological Survey Bull. GW-23, 1950, p. 63.

7. Thompson, J.D., Okwari Park project, Montgomery County, New York: Dunn Geoscience Corporation, Latham, New York (November, 1972, unpublished).

8. Cameron, B., Stratigraphy of the marine limestones and shales of the Ordovician Trenton Group in central New York: In: McLelland, J., (ed.), Field Trip Guidebook: New York Geological Association, 44 Annual Meeting, Utica, New York, 1972.

9. Cushing, H.P., Geology of the vicinity of Little Falls, Herkimer County: New York State Museum Bull. 77, 1905, p. 95.

10. Dunn, J.R., Personal communication file data: Dunn Geoscience Corporation, November, 1975.

11. Kay, M., Geology of the Utica Quadrangle, New York: New York State Museum Bull. 347, 1953, p. 126.

12. Lewis, H.G., Brookins, E.F., Howe, F.B., and Kinsman, D.F. Soil survey, Herkimer County area, New York: U.S. Dept. Agriculture, Bureau of Chemicals and Soils, Bull. No. 46, Series 1923, 1929, p. 1601-1648.

13. Riva, J., Utica and Canajoharie Shales in the Mohawk Valley: In: Bird, J.M., (ed.), Guidebook for Field Trips: New England Intercollegiate Conference, 61st Annual Meeting, Albany, New York, 1969.

2.2.9 Accident Analysis

2.2.9.1 Site Description and Population Distribution

The site consists of approximately 800 acres. The proposed site boundaries, shown in Figure 2.2-2, are coterminous with the exclusion area boundary. A minor local artery transverses the exclusion area.

The Low Population Zone (LPZ) outer radius is designated to be 3 miles, pursuant to NRC guidelines. Reconnaissance level data for the LPZ are summarized in Table 2.2-5.

The nearest population center is Amsterdam, NY (1970 population 25,524) located 13 miles to the northeast. New York State demographic projections show that the population is expected to decline by 1985 to below the 25,000 population threshold given in 10 CFR 100. The next nearest major population center is Schenectady, NY (1970 population, 77,859), located 20 miles to the east.

The population distribution for 30 miles surrounding the site is summarized in Table 2.2-6.

2.2.9.2 Nearby Industrial, Transportation, and Military Facilities

Major transportation activities in the vicinity of Site 7-6-6 are summarized in Table 2.2-7. The nearest major airport is Albany County Airport, located approximately 30 miles to the east. No military facilities are located within 10 miles of the site.

A 16-inch gas pipeline located 3500 ft north of the reactor center, is considered to pose a minor hazard potential.

2.2.9.3 Analysis and Summary

Site 7-6-6 meets acceptability criteria for the population distribution, as given in 10 CFR 100 and NRC Reg Guide 4.7. The activity and population within the LPZ is such that appropriate measures, in event of a serious accident, could be taken, within reasonable probability, to mitigate against harm. The nearest population center is acceptable with respect to the 1.33 distance ratio beyond the LPZ outer radius as required by 10 CFR 100.

For the most part, no significant potential hazards related to industrial, transportation, or military facilities are identified. A 16-inch gas pipeline 3500 ft north of the site presents a minor hazard potential and may require relocation. The extent of the pipeline hazard could only be determined by conducting the detailed studies required in the Preliminary Safety Analysis Report.

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2.2.9.4 References for Section 2.2.9

1. New York State Department of Commerce, Profile of People, Jobs, and Housing; Mid Hudson Area, Part 2, 1974.

2. USGS 7.5 Minute Series (topographic) quadrangle maps.

3. U.S. Department of Commerce, Bureau of the Census, 1970 Small Area Census Data for New York State.

4. New York State Executive Department Office of Planning Services, Demographic Projections for New York State, Unpublished report, 1974.

5. U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, Number of Inhabitants, 1970.

6. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation/Planning Maps, 1974.

7. Facilities Records for Airports in New York from the files of the Federal Aviation Administration, Eastern Regional Office.

8. Sectional Aeronautical Charts for Detroit, New York and Montreal, November 7, 1974, January 2, 1975, and October 10, 1974.

9. New York State Department of Transportation, Traffic Volume Report, 1973.

10. Motor Vehicle Manufacturer's Association, Motor Truck Facts, 1974.

11. New York State Parks and Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information," Section 4: "County Map User Guide," Appendix C: "Complete Activity Code List," 1975.

12. Cornell University, LUNR Inventory Map Overlays, 7.5 Minute Quadrangle, (1:24,000), for New York State Office of Planning Services, 1968-1974.

13. Major Natural Gas Pipelines, Federal Power Commission, June 1973.

14. U.S. Secretary of Transportation, Rail Service in the Midwest and Northeast Region, 1974.

15. U.S. Department of Commerce, Statistical Abstract of the United States, 1973.

16. U.S. Department of the Army, Principal Military Installations and Activities in the 50 States, 1974.

2.2.10 Aesthetics

2.2.10.1 Site Characterization

The site topography of Site 7-6-6 is flat, varying from 1000 to 1200 ft above msl. The surrounding area is also relatively flat. The onsite forest cover is comprised of mixed hardwoods and conifers, located in the center and southeast quadrant of the site.

The absence of topographic relief and the predominance of open spaces and minimal natural screening would increase the potential for visual intrusion on nearby sensitive land uses. Several vantage points are evident in the site area, with the following selected as the most representative of the surrounding visually sensitive and intensive land uses:

Land Use	Distance from Site
Scenic U.S. 20	7 miles S
Village of Sloansville	7 miles SSE
Village of Glen	2.5 miles NNE
Village of Rural Grove	3.5 miles W
Charleston 4 Corners	3.5 miles SW
Montgomery State Forest	1 mile E & W

There are no known national historic places or natural landmarks within the study area. It is to be noted, however, that the home and grave of Lt. Samuel Tallmadge, revolutionary war hero, is located immediately to the south of the site. In 1975, the home and grave seemed to be of local importance only.

Relatively few recreational facilities exist within 6 miles of the site, the most significant being reforestation areas.

2.2.10.2 Aesthetics Analysis

The anticipated impacts range from moderate to none as follows:

Village of Rural Grove	plant structures highly visible distance of 3.5 miles (middle ground)
Village of Glen	plant structures moderately visible distance of 2.5 miles (middle ground)
Charleston 4 Corners	plant structures moderately visible distance of 3.5 miles (middle ground)

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Montgomery State Forest	plant structures slightly visible distance of 1.3 miles (middle ground)
Village of Sloansville	plant structures could not be seen
Scenic Rt. 20	plant structures could not be seen

2.2.10.3 References for Section 2.2.10

1. Montgomery County Department of Planning & Development, Land Use Analysis and Plan, June 1975.

2. State of New York, Department of Environmental Conservation, State Forest Map: Montgomery County, March 1968.

3. U.S. Department of the Interior, National Park Service, National Register of Historic Places, 1975, as amended.

4. U.S. Department of the Interior, National Park Service, National Registry of Natural Landmarks, 1975, as amended.

5. The University of the State of New York, the State Education Department, A Guide to the Historical Markers of New York State, 1970.

6. The University of the State of New York, the State Education Department, New York State Historical Places, 1975.

7. New York State Parks & Recreation, New York State Outdoor Recreation Facilities Inventory, Section ?: "General Site Information", Section 4: "County Map User Guide", Appendix C: "Complete Activity Code List", 1975.

8. LUNR Inventory Map Overlays, 7.5 Minute Quadrangle (1:24,000), Cornell University for New York State Office of Planning Services, 1968-1974.

9. USGS 7.5 Minute Series (topographic) quadrangle maps.

10. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation Planning Maps, 1974.

11. Site visits.

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2.2.11 Land Use Planning

The Montgomery County Department of Planning and Development has identified long range goals to establish the basis for proposed future land use plans for the County(1). Some of these goals, listed below, specifically apply to the proposed 7-6-6 area:

1. Develop a land use plan which is compatible with predominant existing land use patterns.

2. Recognize the importance of agricultural land.

3. Establish open space preservation and recreation programs and programs for conservation, enhancement, and effective use of natural land features.

The Department has also identified one of the greatest problems in the county, that viable agricultural land is threatened by development.

2.2.11.2 Site and Local Description

The site is located in an area of the County not designated for future urban development. Most of the Town of Charleston is designated for preservation which includes agricultural activity, a use compatible with the open space concept. The adjoining Town of Glen to the north is generally designated as maintaining its present agricultural activity.

Specifically for Site 7-6-6, the land use plan designates over half of the site area for preservation and the remaining area for agricultural use. Similar land use plans apply to the surrounding site area.

The proposed zoning map Town of Charleston designates most of the site area for rural residential development and a small portion of the site for preservation.

2.2.11.3 Compatibility

In view of the goals listed previously and the land use plan for the site and surrounding areas, the use of the site for a nuclear power generating facility is not considered to have been completely compatible with the plan. The planning designation for Site 7-6-6 is not unique, and in fact almost all of the surrounding area is planned for agricultural, rural residential, or preservation usage. At the time of the siting study, the Town of Charleston was on the verge of going bankrupt and it was judged that the revenues associated with plant development therein would alleviate the then current financial problems.

2.2.11.4 References for Section 2.2.11

1. Montgomery Department of Planning and Development; Land Use Analysis and Plan, June 1975.

2. Town of Charleston, Proposed Zoning Map, 1974. 757 257

2.2.12 Costs

Table 2.2-8 presents cost data associated with the development of Site 7-6-6.

2.2.13 Conclusions

As described in Section 2.2.6.5 herein, extensive investigations of alternative means of supplying plant water requirements were conducted, after it was determined that the plant water supply permit could be revoked. Because of the risks associated with curtailing or terminating plant opera- tion due to water supply difficulties, and because none of the alternative water supply schemes appeared to offer any distinct advantage over siting in other geographic areas, the Mohawk River area sites are judged less favor- able than those in the Lake Ontario and Hudson River areas.

With the exception of water supply concerns, no legal restraints to plant siting were identified.

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-1

SITE 7-6-6, WIND DISTRIBUTION BY STABILITY CLASS, ALBANY, N.Y.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

JOB NO. 12910

WIND DISTRIBUTION BY PASQUILL STABILITY CLASSES (5)
STAR PROGRAM

Monthly and Annual

Station: #14735, Albany, N. Y./WBAS

Period: Jan. 1966 - Dec. 1970

Source: TDF 1440 (8 Obs/Day)

DATE Sept. 16, 1971

NATIONAL CLIMATIC CENTER

FEDERAL BUILDING, ASHEVILLE, N.C.

U.S.COMM-NOAA-ASHEVILLE

Prepared for: Con. Ed. NYC

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL   RELATIVE FREQUENCY DISTRIBUTION   STATION #14735 ALBANY, NEW YORK/WBAS 1966-1970

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000377	0.000206	0.000000	0.000000	0.000000	0.000000	0.000582
NNE	0.000114	0.000274	0.000000	0.000000	0.000000	0.000000	0.000388
NE	0.000211	0.000274	0.000000	0.000000	0.000000	0.000000	0.000485
ENE	0.000086	0.000206	0.000000	0.000000	0.000000	0.000000	0.000291
E	0.000183	0.000206	0.000000	0.000000	0.000000	0.000000	0.000388
ESE	0.000126	0.000069	0.000000	0.000000	0.000000	0.000000	0.000194
SE	0.000126	0.000069	0.000000	0.000000	0.000000	0.000000	0.000194
SSE	0.000057	0.000137	0.000000	0.000000	0.000000	0.000000	0.000194
S	0.000268	0.000411	0.000000	0.000000	0.000000	0.000000	0.000679
SSW	0.000057	0.000137	0.000000	0.000000	0.000000	0.000000	0.000194
SW	0.000057	0.000137	0.000000	0.000000	0.000000	0.000000	0.000194
WSW	0.000086	0.000206	0.000000	0.000000	0.000000	0.000000	0.000291
W	0.000057	0.000137	0.000000	0.000000	0.000000	0.000000	0.000194
WNW	0.000097	0.000000	0.000000	0.000000	0.000000	0.000000	0.000097
NW	0.000057	0.000137	0.000000	0.000000	0.000000	0.000000	0.000194
NNW	0.000097	0.000000	0.000000	0.000000	0.000000	0.000000	0.000097
TOTAL	0.002055	0.002603	0.000000	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.004658

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.001370

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NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14735 ALBANY,NEW YORK/WBAS 1966-1970

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001812	0.001987	0.000822	0.000000	0.000000	0.000000	0.004621
NNE	0.001155	0.001028	0.000822	0.000000	0.000000	0.000000	0.003004
NE	0.001403	0.001507	0.000548	0.000000	0.000000	0.000000	0.003458
ENE	0.001584	0.001165	0.000548	0.000000	0.000000	0.000000	0.003296
E	0.001684	0.000822	0.000206	0.000000	0.000000	0.000000	0.002711
ESE	0.000596	0.000617	0.000069	0.000000	0.000000	0.000000	0.001281
SE	0.001280	0.000822	0.000343	0.000000	0.000000	0.000000	0.002444
SSE	0.000949	0.001233	0.000754	0.000000	0.000000	0.000000	0.002936
S	0.003609	0.002535	0.001987	0.000000	0.000000	0.000000	0.008130
SSW	0.001758	0.001233	0.000411	0.000000	0.000000	0.000000	0.003402
SW	0.000682	0.001096	0.000617	0.000000	0.000000	0.000000	0.002395
WSW	0.000956	0.000822	0.000411	0.000000	0.000000	0.000000	0.002189
W	0.000930	0.001576	0.000480	0.000000	0.000000	0.000000	0.002985
WNW	0.000584	0.000548	0.000685	0.000000	0.000000	0.000000	0.001817
NW	0.001074	0.001028	0.000548	0.000000	0.000000	0.000000	0.002650
NNW	0.000564	0.000691	0.000274	0.000000	0.000000	0.000000	0.001729
TOTAL	0.020619	0.018907	0.009522	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.049048

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH B STABILITY = 0.006028

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NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14735 ALBANY,NEW YORK/WBAS 1966-1970

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000679	0.003288	0.004042	0.000274	0.000000	0.000000	0.008282
NNE	0.000530	0.002192	0.002535	0.000274	0.000000	0.000000	0.005531
NE	0.000667	0.002055	0.002329	0.000343	0.000000	0.000000	0.005394
ENE	0.000519	0.000959	0.001370	0.000274	0.000000	0.000000	0.003122
E	0.000397	0.000959	0.000480	0.000000	0.000000	0.000000	0.002035
ESE	0.000317	0.000617	0.000069	0.000000	0.000000	0.000000	0.001002
SE	0.000615	0.001096	0.000548	0.000000	0.000000	0.000000	0.002259
SSE	0.000743	0.000891	0.002809	0.000685	0.000000	0.000000	0.005127
S	0.001707	0.005138	0.010618	0.002261	0.000000	0.000000	0.0197[illegible]3
SSW	0.000677	0.002124	0.002877	0.000137	0.000000	0.000000	0.005814
SW	0.000559	0.000685	0.001028	0.000206	0.000000	0.000000	0.002478
WSW	0.000335	0.000754	0.001165	0.000206	0.000000	0.000000	0.002459
W	0.000282	0.001507	0.004110	0.001165	0.000069	0.000000	0.007132
WNW	0.000295	0.001028	0.003768	0.001576	0.000206	0.000000	0.006871
NW	0.000587	0.000891	0.003151	0.000754	0.000069	0.000000	0.005451
NNW	0.000276	0.000891	0.001850	0.000206	0.000000	0.000000	0.003222
TOTAL	0.009385	0.025072	0.042746	0.008357	0.000343	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.035902

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.004110

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NYSE&G ASA
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MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14735 ALBANY, NEW YORK/WBAS 1966-1970

POOR ORIGINAL

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.007091	0.020277	0.020414	0.008357	0.000754	0.000000	0.056892
NNE	0.0030[illegible]	0.008494	0.011029	0.008494	0.000617	0.000000	0.031712
NE	0.003324	0.006919	0.005275	0.006302	0.000411	0.000069	0.022300
ENE	0.002957	0.003768	0.002603	0.001576	0.000069	0.000000	0.010972
E	0.002597	0.002329	0.001302	0.000274	0.000000	0.000000	0.006502
ESE	0.001688	0.001987	0.001028	0.000411	0.000069	0.000000	0.005182
SE	0.002204	0.003973	0.003494	0.001507	0.000000	0.000000	0.011178
SSE	0.002291	0.005138	0.010481	0.008700	0.000548	0.000000	0.027157
S	0.007304	0.021236	0.057474	0.054391	0.004590	0.000137	0.145131
SSW	0.001967	0.006165	0.011782	0.012125	0.001233	0.000000	0.033272
SW	0.002097	0.003768	0.004316	0.001850	0.000137	0.000000	0.012167
WSW	0.001286	0.003562	0.004864	0.003220	0.000274	0.000069	0.013274
W	0.001754	0.004658	0.016715	0.032128	0.006987	0.001781	0.064022
WNW	0.001363	0.004110	0.016304	0.055556	0.019318	0.003836	0.100486
NW	0.001802	0.005001	0.010755	0.024661	0.005206	0.000685	0.048110
NNW	0.001655	0.005069	0.006919	0.004247	0.000617	0.000206	0.018712
TOTAL	0.044458	0.106453	0.184751	0.223798	0.040827	0.006782	

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.607069

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.018701

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NYSE&G ASA
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MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14735 ALBANY, NEW YORK/WBAS 1966-1970

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.010753	0.012262	0.006097	0.000000	0.000000	0.000000	0.029111
NNE	0.004383	0.003288	0.001731	0.000000	0.000000	0.000000	0.009453
NE	0.005030	0.003562	0.001096	0.000000	0.000000	0.000000	0.009688
ENE	0.005203	0.003083	0.000480	0.000000	0.000000	0.000000	0.008765
E	0.005515	0.001850	0.000137	0.000000	0.000000	0.000000	0.007502
ESE	0.003538	0.001781	0.000069	0.000000	0.000000	0.000000	0.005387
SE	0.005818	0.002672	0.000069	0.000000	0.000000	0.000000	0.008558
SSE	0.005534	0.005206	0.001302	0.000000	0.000000	0.000000	0.012042
S	0.023706	0.020482	0.007672	0.000000	0.000000	0.000000	0.051860
SSW	0.009440	0.008563	0.001165	0.000000	0.000000	0.000000	0.019167
SW	0.007988	0.005412	0.000959	0.000000	0.000000	0.000000	0.014359
WSW	0.004749	0.005275	0.001576	0.000000	0.000000	0.000000	0.011600
W	0.006347	0.006439	0.007878	0.000000	0.000000	0.000000	0.020664
WNW	0.005563	0.006302	0.007946	0.000000	0.000000	0.000000	0.019812
NW	0.006043	0.005617	0.003494	0.000000	0.000000	0.000000	0.015154
NNW	0.004927	0.003768	0.001507	0.000000	0.000000	0.000000	0.010201
TOTAL	0.114536	0.095561	0.043225	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.253322

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E STABILITY = 0.069393

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-1 (Cont'd)

ANNUAL — RELATIVE FREQUENCY DISTRIBUTION — STATION #14735 ALBANY, NEW YORK/WBAS 1966-1970

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.022118	0.038019	0.031374	0.008631	0.000754	0.000000	0.100896
NNE	0.010320	0.015276	0.016167	0.008768	0.000617	0.000000	0.051147
NE	0.011456	0.014317	0.009248	0.006645	0.000411	0.000069	0.042145
ENE	0.010571	0.009179	0.005001	0.001830	0.000069	0.000000	0.026669
E	0.010663	0.006165	0.002124	0.000274	0.000000	0.000000	0.019225
ESE	0.006267	0.005069	0.001233	0.000411	0.000069	0.000000	0.013049
SE	0.010145	0.008631	0.004453	0.001507	0.000000	0.000000	0.024736
SSE	0.009537	0.012604	0.015345	0.009385	0.000548	0.000000	0.047419
S	0.035932	0.049801	0.077750	0.056652	0.004590	0.000137	0.224862
SSW	0.013220	0.018222	0.016235	0.012262	0.001233	0.000000	0.061172
SW	0.010690	0.011097	0.006919	0.002055	0.000137	0.000000	0.030898
WSW	0.007007	0.010618	0.008015	0.003425	0.000274	0.000069	0.029407
W	0.008976	0.014317	0.029132	0.033292	0.007056	0.001781	0.094604
WNW	0.007320	0.011988	0.028703	0.057131	0.019523	0.003836	0.128501
NW	0.009292	0.012673	0.017948	0.025414	0.005275	0.000685	0.071286
NNW	0.007538	0.010618	0.010549	0.004453	0.000617	0.000206	0.033980
TOTAL	0.191053	0.248595	0.280244	0.232155	0.041170	0.006782	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000000

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.099603

POOR ORIGINAL

757 266

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2

SITE 7-6-6, WIND DISTRIBUTION BY STABILITY CLASS, ROME, N.Y.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

JOB NO. 50784 (W-1379)

SEASONAL AND ANNUAL
WIND DISTRIBUTION BY PASQUILL STABILITY CLASSES (5)
STAR PROGRAM

Station: #14717, Rome, NY/Griffiss AFB

Period: 1/66-12/70 (24 Obs/Day)

Source: TDF 1440

DATE Nov. 22, 1974

NATIONAL CLIMATIC CENTER

FEDERAL BUILDING, ASHEVILLE, N.C.

U.S. COMM-NOAA-ASHEVILLE

NOAA Form 81-332
(5-73)

PREPARED FOR: State Univ. College
Oswego, NY

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL — RELATIVE FREQUENCY DISTRIBUTION — STATION #14717 ROME N Y — 1/65-12/70

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000638	0.000208	0.000000	0.000000	0.000000	0.000000	0.000846
NNE	0.000278	0.000093	0.000000	0.000000	0.000000	0.000000	0.00037[illegible]
NE	0.000053	0.000000	0.000000	0.000000	0.000000	0.000000	0.000053
ENE	0.000106	0.000000	0.000000	0.000000	0.000000	0.000000	0.000106
E	0.000271	0.000046	0.000000	0.000000	0.000000	0.00000[illegible]	0.0003[illegible]7
ESE	0.000578	0.000162	0.000000	0.000000	0.000000	0.000000	0.000740
SE	0.000803	0.000255	0.000000	0.000000	0.000000	0.000000	0.001057
SSE	0.001203	0.000278	0.000000	0.000000	0.000000	0.000000	0.001480
S	0.0015[illegible]9	0.000440	0.000000	0.000000	0.000000	0.000000	0.002009
SSW	0.000714	0.000185	0.000000	0.000000	0.000000	0.000000	0.000899
SW	0.000819	0.000185	0.000000	0.000000	0.000000	0.000000	0.001005
WSW	0.001027	0.000347	0.000000	0.000000	0.000000	0.000000	0.001375
W	0.002504	0.001250	0.000000	0.000000	0.000000	0.000000	0.003754
WNW	0.001444	0.000671	0.000000	0.000000	0.000000	0.000000	0.002115
NW	0.000819	0.000185	0.000000	0.000000	0.000000	0.000000	0.001005
NNW	0.000436	0.000093	0.000000	0.000000	0.000000	0.000000	0.000529
TOTAL	0.0[illegible]261	0.004397	0.000000	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.017659

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.009929

POOR ORIGINAL

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL — RELATIVE FREQUENCY DISTRIBUTION — STATION =14717 ROME N Y — 1/66-12/70

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001439	0.000879	0.000347	0.000000	0.000000	0.000000	0.002665
NNE	0.000714	0.000370	0.000139	0.000000	0.000000	0.000000	0.001223
NE	0.000306	0.000116	0.000023	0.000000	0.000000	0.000000	0.000445
ENE	0.000255	0.000046	0.000000	0.000000	0.000000	0.000000	0.000301
E	0.002096	0.000463	0.000023	0.000000	0.000000	0.000000	0.002582
ESE	0.005133	0.001852	0.000231	0.000000	0.000000	0.000000	0.007216
SE	0.005773	0.002476	0.000486	0.000000	0.000000	0.000000	0.008735
SSE	0.004246	0.002106	0.000532	0.000000	0.000000	0.000000	0.006885
S	0.003843	0.001365	0.000393	0.000000	0.000000	0.000000	0.005602
SSW	0.002228	0.000903	0.000231	0.000000	0.000000	0.000000	0.003362
SW	0.001872	0.001018	0.000347	0.000000	0.000000	0.000000	0.003237
WSW	0.002020	0.001412	0.000486	0.000000	0.000000	0.000000	0.003918
W	0.005911	0.005138	0.002523	0.000000	0.000000	0.000000	0.013572
WNW	0.004347	0.003541	0.001065	0.000000	0.000000	0.000000	0.008952
NW	0.003174	0.001944	0.000393	0.000000	0.000000	0.000000	0.005511
NNW	0.002099	0.000972	0.000324	0.000000	0.000000	0.000000	0.003395
TOTAL	0.045455	0.024602	0.007545	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.077601

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH B STABILITY = 0.016201

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NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL   RELATIVE FREQUENCY DISTRIBUTION   STATION #14717 ROME N Y   1/66-12/70

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001548	0.000903	0.001875	0.000046	0.000000	0.000000	0.004372
NNE	0.000413	0.000208	0.000463	0.000000	0.000000	0.000000	0.001084
NE	0.000464	0.000255	0.000093	0.000000	0.000000	0.000000	0.000811
ENE	0.000426	0.000162	0.000023	0.000000	0.000000	0.000000	0.0006[illegible]
E	0.002414	0.001180	0.000579	0.000046	0.000000	0.000000	0.004219
ESE	0.004618	0.004073	0.002662	0.000046	0.000000	0.000000	0.01139[illegible]
SE	0.004325	0.003680	0.002800	0.000116	0.000000	0.000000	0.010921
SSE	0.002313	0.001967	0.001296	0.000046	0.000000	0.000000	0.005623
S	0.001150	0.001366	0.001967	0.000093	0.000000	0.000000	0.004576
SSW	0.000954	0.000810	0.000764	0.000093	0.000000	0.000000	0.002621
SW	0.000711	0.000694	0.000671	0.000069	0.000000	0.000000	0.002146
WSW	0.001476	0.001203	0.001481	0.000046	0.000000	0.000000	0.004207
W	0.003183	0.003842	0.008100	0.000903	0.000023	0.000000	0.016051
WNW	0.002805	0.003240	0.006156	0.000370	0.000046	0.000000	0.012618
NW	0.002354	0.001828	0.003101	0.000231	0.000046	0.000000	0.007561
NNW	0.001673	0.001365	0.001828	0.000185	0.000000	0.000000	0.005052
TOTAL	0.030828	0.026777	0.033859	0.002291	0.000116	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.093872

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.016802

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NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL — RELATIVE FREQUENCY DISTRIBUTION — STATION #14717 ROME N Y — 1/66-12/70

DIRECTION	SPEED(KTS) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.005588	0.004166	0.004744	0.001828	0.000162	0.000046	0.016535
NNE	0.002294	0.001620	0.002476	0.000671	0.000069	0.000000	0.007131
NE	0.001701	0.000833	0.000393	0.000046	0.000000	0.000000	0.002974
ENE	0.002730	0.001088	0.000417	0.000301	0.000046	0.000023	0.004605
E	0.015324	0.012012	0.007591	0.001805	0.000162	0.000046	0.036941
ESE	0.023826	0.024301	0.024810	0.006874	0.000764	0.000116	0.080690
SE	0.015564	0.016039	0.014303	0.004282	0.000278	0.000023	0.050489
SSE	0.005608	0.004883	0.004073	0.001296	0.000116	0.000000	0.015977
S	0.003755	0.003657	0.004282	0.002060	0.000116	0.000000	0.013869
SSW	0.002196	0.001782	0.002962	0.001111	0.000093	0.000000	0.008144
SW	0.002082	0.001736	0.001296	0.000301	0.000000	0.000000	0.005415
WSW	0.003173	0.003148	0.003240	0.001504	0.000069	0.000000	0.011135
W	0.011719	0.015553	0.025713	0.0[illegible]862	0.004420	0.000926	0.077193
WNW	0.013648	0.016062	0.027240	0.026592	0.006249	0.001736	0.091527
NW	0.010570	0.010253	0.014696	0.013909	0.003472	0.001065	0.053965
NNW	0.007534	0.005717	0.006388	0.004420	0.000532	0.000139	0.024730
TOTAL	0.127314	0.122847	0.144626	0.085864	0.016548	0.004120	

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.501319

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.069709

NYSE&G ASA
SITE 7-G-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14717 ROME N Y 1/66-12/70

	SPEED(KTS)						
DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.016713	0.003842	0.000903	0.000000	0.000000	0.000000	0.021457
NNE	0.009956	0.001713	0.000116	0.000000	0.000000	0.000000	0.011784
NE	0.015542	0.003217	0.000069	0.000000	0.000000	0.000000	0.018827
ENE	0.012025	0.002291	0.000046	0.000000	0.000000	0.000000	0.014362
E	0.034066	0.012428	0.001203	0.000000	0.000000	0.000000	0.047698
ESE	0.033426	0.014280	0.001481	0.000000	0.000000	0.000000	0.049187
SE	0.020867	0.008170	0.000625	0.000000	0.000000	0.000000	0.029661
SSE	0.007543	0.002106	0.000208	0.000000	0.000000	0.000000	0.009857
S	0.002751	0.001018	0.000139	0.000000	0.000000	0.000000	0.003909
SSW	0.001911	0.000602	0.000023	0.000000	0.000000	0.000000	0.002536
SW	0.001558	0.000417	0.000023	0.000000	0.000000	0.000000	0.001998
WSW	0.002081	0.000926	0.000069	0.000000	0.000000	0.000000	0.003076
W	0.009084	0.005277	0.001736	0.000000	0.000000	0.000000	0.016097
WNW	0.012440	0.007082	0.003333	0.000000	0.000000	0.000000	0.022855
NW	0.021333	0.006851	0.001967	0.000000	0.000000	0.000000	0.030151
NNW	0.018916	0.005902	0.001273	0.000000	0.000000	0.000000	0.026091
TOTAL	0.220214	0.076120	0.013215	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.309549

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E STABILITY = 0.143515

NYSE&G ASA
~~SITE 7-6-6~~
MOHAWK RIVER VALLEY AREA

TABLE 2.2-2 (Cont'd)

ANNUAL[1] RELATIVE FREQUENCY DISTRIBUTION STATION =14717 ROME N Y 1/66-12/70

	SPEED(KTS)						
DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.024181	0.009998	0.007869	0.001875	0.000162	0.000046	0.044131
NNE	0.012314	0.004004	0.003194	0.000671	0.000069	0.000000	0.020252
NE	0.015205	0.004420	0.000579	0.000046	0.000000	0.000000	0.020250
ENE	0.013613	0.003587	0.000486	0.000301	0.000046	0.000023	0.018056
E	0.050645	0.026129	0.009396	0.001852	0.000162	0.000046	0.088231
ESE	0.068344	0.044668	0.029184	0.006920	0.000764	0.000116	0.149996
SE	0.049169	0.030619	0.018214	0.004397	0.000278	0.000023	0.102701
SSE	0.022177	0.011340	0.006110	0.001342	0.000116	0.000000	0.041086
S	0.014316	0.007846	0.006781	0.002152	0.000116	0.000000	0.031211
SSW	0.008765	0.004282	0.003981	0.001203	0.000093	0.000000	0.018324
SW	0.007747	0.004050	0.002338	0.000370	0.000000	0.000000	0.014505
WSW	0.010826	0.007036	0.005277	0.001551	0.000069	0.000000	0.024758
W	0.035940	0.031059	0.038072	0.019765	0.004444	0.000926	0.130204
WNW	0.037321	0.030596	0.037794	0.026963	0.006295	0.001736	0.140705
NW	0.037521	0.021061	0.020158	0.014141	0.003518	0.001065	0.097464
NNW	0.028988	0.014045	0.009813	0.004606	0.000532	0.000139	0.058126
TOTAL	0.437072	0.254744	0.199245	0.088155	0.016664	0.004120	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000001

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.256156

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NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-3

TRANSMISSION CORRIDOR DATA
SITE 7-6-6

Criteria	Acres	Miles	Number
Physical Features			
1. Land Use			
Industrial	0	0	
Commercial	3	0	
Institutional	0	0	
Residential	33	0	
Airfield Zone	0	0	
Central Business District	0	0	
Radio & TV Towers	---	---	0
2. Vegetative Cover			
Agricultural & Forest Brushland	6,050	4.7	
Mature Forest	660	0.5	
Forest Plantation	93	0.1	
3. Recreational/Cultural			
State Forest & Wildlife Mgt. Area	126	0.1	
State, County, Town Parks	0	0	
Historic Sites (National or State)	---	---	0
4. Natural Features			
Wetlands	75	0.1	
Lakes	0	0	
Slopes 15%+	60	0	
Streams & Rivers (Named)	0	0	

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-3 (Cont'd)

Criteria	Miles
Aesthetics	
1. Exposure	
Scenic Hwy - Overlook	
Interstate Hwy	2
NYS Hwy More Than 3000 V/D	
NYS Hwy Less Than 3000 V/D	7
2. Visual Quality	Line Miles
Unique	
High	2
Medium	
Low	16
Generally Characteristic of the Area	
3. Structure Size (new)	
115kV Single or Double Circuit	
230kV Single Circuit	5
230kV Double Circuit	
345kV Single Circuit	
345kV Double Circuit	
765kV Single Circuit	13
4. Sensitivity (importance)	
National (interstate)	2
State	
Regional	
Local	16

TABLE 2.2-4

WELL LOGS AT SITE 7-6-6*

Well No.	Log
282	Total depth 60 ft, rock at ten ft; water level nine ft, yield 19 gallons per minute
284	Total depth 73 ft, rock at unknown depth
285	Total depth 33 ft in glacial till; water level 200 ft
K-1	0-198 ft, glacial till with minor gravels (cased); 198 ft to 212 ft shale; yields four gallons per minute, good quality (report Tabor's Farm well, verbal)
K-2 & K-3	0-200 ft (estimated) till with minor gravels, 200 to around 300 ft shale. Low yields (reports on two new wells verbal, located near corner Green and Brand Roads)

SOURCE:

*Jeffords, R.M., The groundwater resources of Montgomery County: U.S. Geological Survey Bull. GW-23, 1950, p. 63.

?57 270

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-5

LOW POPULATION ZONE (LPZ) EVALUATION
SITE 7-6-6

Towns -- Glen, Charlestown

Recreational Facilities -- Total Population 338

Montgomery County Reforestation Area -- Size 160, Population 160
(Trails, Hunting Activities)

Montgomery County Forest -- Size 329 acres, Population 178
(Trails, Hunting Activities)

Dwelling Units -- 78

Number Roads Exiting LPZ -- 18

Schools, Institutional Population -- 0

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-6

POPULATION DISTRIBUTIONS AND DENSITY SITE 7-6-6

	1985	2025
Cumulative Population (0-30 miles)	485,000	590,950
Projection Density (persons/mi^2) (0-30 miles)	162	209
Site Population Factor SPF (30)	0.096	0.128

NYSE&G ASA
SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-7

NEARBY TRANSPORTATION ACTIVITIES
SITE 7-6-6

Identification	Distance (mi)	Type
NY 161	3.3	Road
NY 30A	1.2	Road
NY 162	4.8	Road
Coya	9.5	Airport
V 2 Alb. - Utica	1.0	Airlane
V 14 Alb. - Georgetown	6.0	Airlane
J 16-94 Alb. - Buff.	4.0	Airlane
J 82 Alb. - Chauta Co.	9.0	Airlane

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SITE 7-6-6
MOHAWK RIVER VALLEY AREA

TABLE 2.2-8

COST DATA SITE 7-6-6

	Component	Cost $ X 10^6 (1987)	Subtotal	Notes
1.	Railroad	8.5		
2.	Highway	---		
3.	Land & Land Rights	0.4		
4.	Excavation & Foundations	---		
5.	Seismic Design	---		
6.	Intake Discharges	18.5*		
7.	Impoundments	---**		
8.	Piping Installation	51.1		
9.	Pumping Equipment	3.3		
10.	Ultimate Heat Sink	21.0		
11.	Labor Rates	112.0		
12.	SUBTOTAL - SITE RELATED COSTS		178.0	
13.	PLANT CONSTRUCTION COST		2,880.0	
14.	TOTAL CONSTRUCTION COST (lines 12 & 13)		3,053.0	
15.	Transmission Construction	25.0		Grid = 13 miles Offsite = 5 miles
16.	TOTAL CAPITAL COST (lines 14 & 15)		3,083.0	
17.	Nuclear Fuel & O&M	723.0		
18.	Transmission Losses (Capitalized)	47.0		
19.	Pumping Cost (Capitalized)	12.0		
20.	TOTAL OPERATING COST		782.0	
21.	TOTAL EVALUATED COST (lines 16 & 20)		3,865.0	

* Subtracted from cost components in base plant.
**This impoundment cost was calculated prior to the more detailed investigations described in Section 2.1.6.6 herein.

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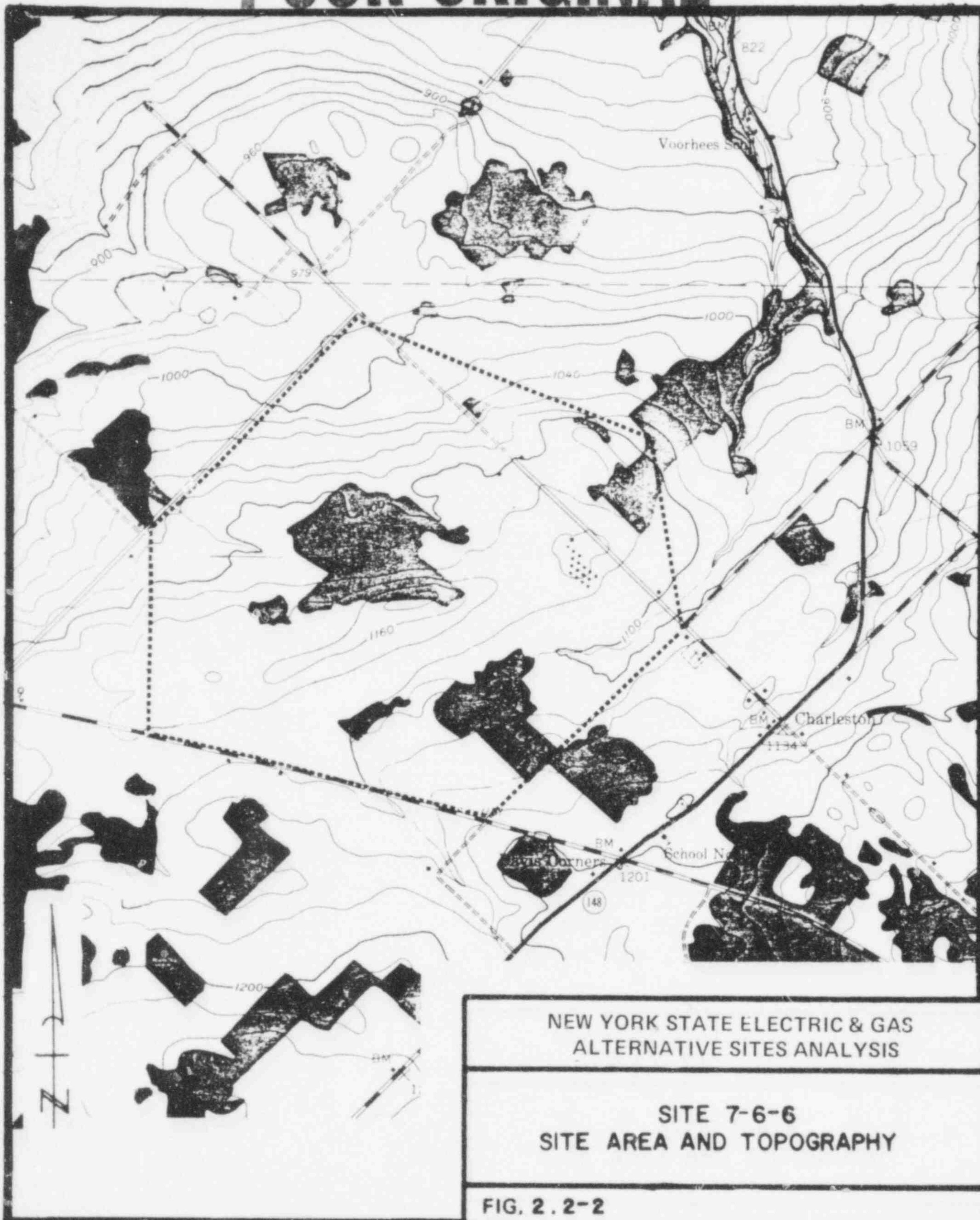


NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

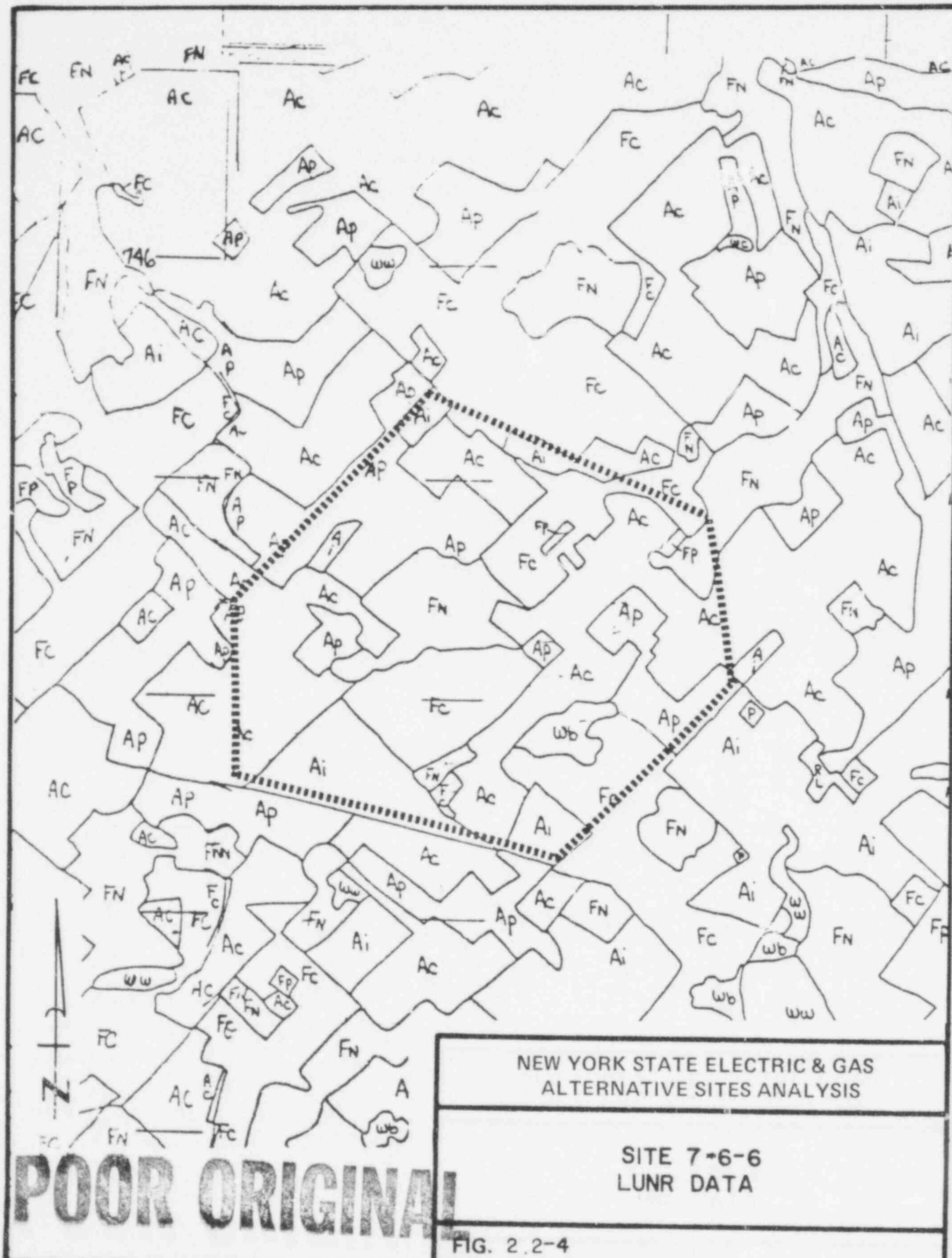
SITE 7-6-6
SITE AREA AND TOPOGRAPHY

FIG. 2.2-2

BASE MAP = USGS ESPERANCE AND CARLISLE QUADRANGLES 1943

0 ½ 1
SCALE
(MILES)

757 281



NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

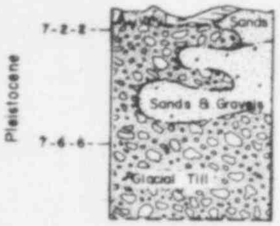
SITE 7-6-6
LUNR DATA

FIG. 2.2-4

NOTE: REFER TO TABLE 1.4-1 FOR AN EXPLANATION OF LUNR SYMBOLS.

0 ½ 1
SCALE
(MILES)

SURFICIAL/OVERBURDEN MATERIALS



SOIL: with sandy, silty clays and some angular rock fragments. Thin cover, low permeability. Locally includes thin loess deposits.

ALLUVIAL SILT & CLAY (FLOODPLAIN): Grayish silts and clays with some sands and fine gravel; generally thin deposits. Locally water-bearing.

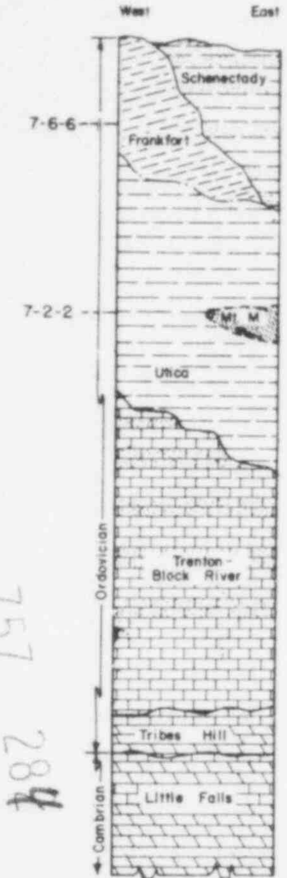
GLACIAL SANDS (OUTWASH DEPOSITS): Grayish, fine to coarse sands and varied gravels, some silts and clays. Deltaic deposits with gradational contacts, may occur as wedges and intertonguing lenses with fluvial deposits. Where thick, water-bearing and good yield.

GLACIAL SANDS & GRAVELS (FLUVIAL): Grayish, fine to coarse sands and gravels with some silts and clays, stratified. Generally water-bearing with good yields.

GLACIAL TILL: Brown to grayish, heterogeneous mixture sands, gravels and some boulders in a matrix of silt and clay; compact, cohesive. Frequent silty/sandy zones, permeable with ground water yield wells and/or springs. Otherwise, low permeability.

The till varies in thickness from a few feet to more than 300-feet thick in the region.

BEDROCK UNITS



SCHENECTADY FORMATION / SANDSTONE & SHALE: Blue-gray, fine-grained, hard, thick- to massive-bedded sandstones alternating with black to olive-gray, arenaceous, firm, shale; upper part more sandy in Montgomery County.

Thickness ranges from some 500-feet in western section to 2600-feet in the east.

FRANKFORT FORMATION / SHALE & SANDSTONE: Greenish-gray shale comprises basal Harter member some 100-feet thick; interbedded greenish shales and green, fine-grained, thin-bedded and finely cross-laminated sandstone, comprise middle Hasenclever member of 40-feet and this weathers buff; and gray sandy shale with scattered medium beds (to 1-foot). Gray, fine-grained sandstone, comprising upper Moyer member some 400-feet thick.

UTICA FORMATION / SHALES: Blackish calcareous, slightly fissile, shale; becomes grayish upper parts and a gradational contact with overlying Frankfort/Schenectady Formations. Sharp lower contact with Trenton Group.

Mount Merino Formation / Shale: Dark purplish-gray, slaty, strongly cleaved shale occurs as thrust block, wedge-shaped overlying Utica Shale at 7-2-2 site; contains scattered thin sandstones.

Thickness Utica Shale estimated to be 700-800 feet (no total section).

TRENTON-BLACK RIVER GROUP: Consists of the Dolgeville, Shoreham, Amsterdam and Lowville Formations. The upper three consist of a series of bluish-gray to gray, fine- to coarse-grained, thin to thick limestones and silty, sandy, limey beds; usually distinctive partings. Parts blackish shales. Gradational contacts with intertonguing and wedging of units common.

Lowville Formation, lowest unit, consists of light bluish-gray, fine-grained, dense, medium-bedded limestone (abundance 1/8"-3/16" calcite-filled tubes). Thickness varies from 10-30 feet.

Thickness entire Group about 100 feet this area.

Locally may yield some natural gas, low flows.

BEEKMANTOWN GROUP: Consists of –

Tribes Hill Formation, dark-blue, fine-grained, limestones interbedded with medium-gray, medium-grained, massive dolomites and a dark-gray to black, weakly arenaceous limestone.

Thickness of Tribes Hill is some 40 feet in central part of region.

Little Falls Formation, light to dark-gray, partly crystalline, thick-bedded to massive dolomitic limestone and dolomite; scattered beds of quartz sand and some chert layers.

Thickness of Little Falls unit varies with more than 300 feet in central part of region.

POOR ORIGINAL

NOTE:

Generalized full thickness of surficial overburden materials and/or bedrock units shown may not occur at any site.

GEOLOGIC DATA:

Sources given in accompanying Site Reports and Section in Bibliography.

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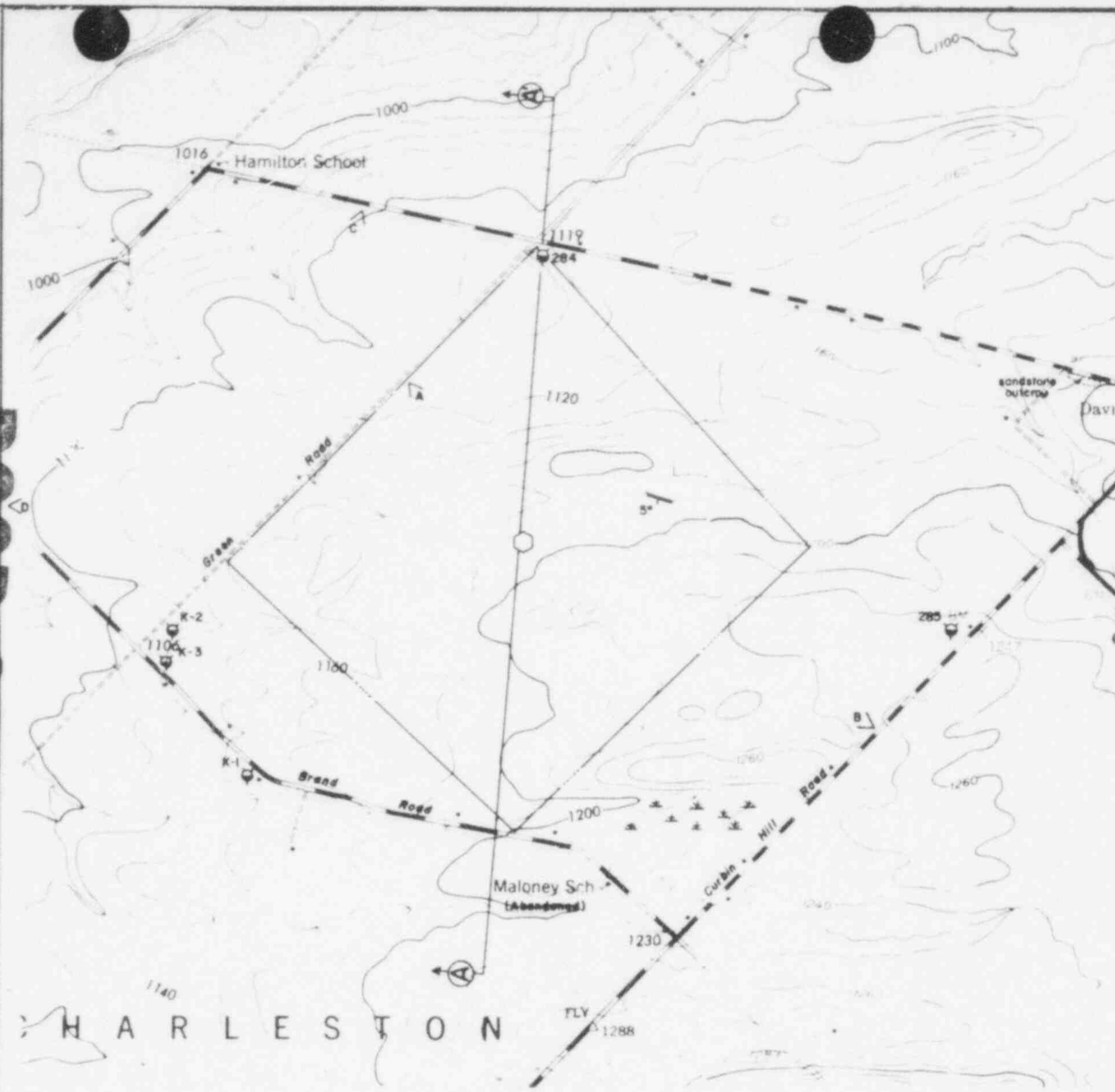
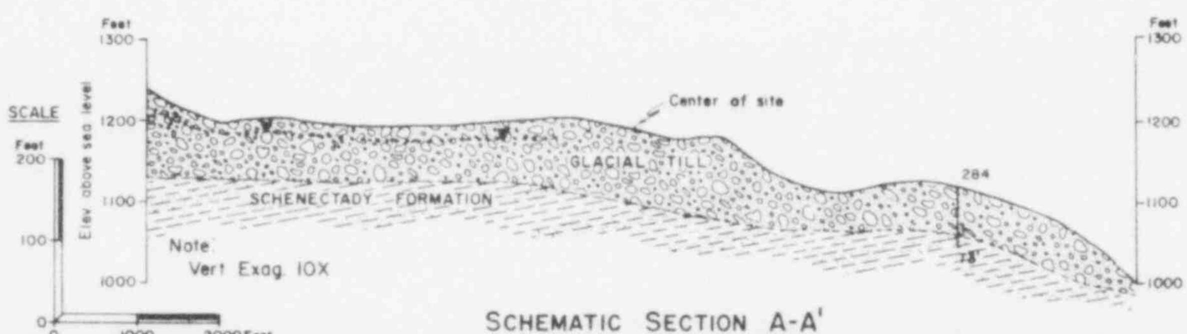
NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

REGIONAL GEOLOGIC COLUMN
MOHAWK RIVER AREA

FIG. 2.2-5





SCHEMATIC SECTION A-A'

EXPLANATION

PLAN MAP

SURFICIAL / OVERBURDEN MATERIALS

GLACIAL TILL - Clay and silt with cobbles and boulders to 3 feet. Dense, compacted with thickness generally over 50 feet. Water table at some 10-20 feet.

BEDROCK UNIT

SCHENECTADY FORMATION - Blue-gray, thick-bedded quartzose sandstone alternating with dark-gray, platey shale.

SYMBOLS

- 5° Regional strike and dip
- 282 Water well, drilled, log in files, with well number
- (A) Alignment of schematic cross section, arrow indicates direction of view.
- Outline general site area
- Center of site
- B Photograph, apex at point picture taken
- Wet area, soft, part swampy
- Approximate limit of bedrock outcrop

SECTION

- GLACIAL TILL -
- SCHENECTADY FORMATION -
- Generalized location of contact between surficial materials and/or bedrock.
- Water level, approximate
- Well, showing depth (73')

SCALE

0 1000 2000 3000 feet

0 100 250 500 1000 meter

Contour interval 20 feet

N

BASE MAP: U.S. Geological Survey, Carlisle (1943) & Esperance (1943) Quads.

GEOLOGIC DATA: Sources Given Accompanying Report This Site.

THIS SITE WAS RELOCATED APPROXIMATELY 1 MILE NORTHEAST OF THE LOCATION INDICATED

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-6-6
GEOLOGIC RECONNAISSANCE MAP

FIG. 2.2-6

NORTHERN
NEW YORK

POOR ORIGINAL

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2.3 SITE 7-2-2, NORTHERN NEW YORK AREA

2.3.1 Site Description

Site 7-2-2 is located in the Town of Northumberland, Saratoga County, 7 miles south of Glens Falls and 1 mile west of the Hudson River. The community of Fort Miller is 3 miles southeast, and Fort Edwards is 5 miles northeast. Adirondack Park is 10 miles north. Figure 2.3-1 shows the general location of the site. Figure 2.3-2 depicts the site boundary and area topography, and Figure 2.3-3 is an aerial photograph of the site.

The major land use is agricultural land. There are a few stands of forest land and shrub cover. Intermittent streams cross the site, and there are several small wooded wetland areas. Figure 2.3-4 is a copy of the LUNR map for the site and surrounding area.

Scattered farm and nonfarm residential dwellings are found along Kobor Road, which is onsite, and the periphery roads, Jewell and Peters.

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2.3.2 Meteorology

The meteorological evaluation of the Upper Hudson Site (7-2-2) considered the ground level dispersive capability and the potential for cooling tower impacts on sensitive receptors.

2.3.2.1 Topography

Site 7-2-2 is located in the Upper Hudson River Valley at an elevation of about 230 ft msl. The Hudson River itself is located about 1 mile east of the site. The Upper Hudson Valley is fairly wide at this point, and elevations within 5 miles of the site are generally 150-300 ft msl. To the west and east the valley is bordered by higher elevations, in excess of 1000 ft msl 6 miles to the northwest and 8 miles to the east. At farther distances the elevations climb to the Adirondacks in the west and Green Mountains to the east in Vermont.

2.3.2.2 Meteorological Data

The only available meteorological data potentially representative of the site are found somewhat farther south in the Hudson Valley. These locations are at the Albany County Airport, located about 40 miles south of the site, and the Power Authority of the State of New York's Athens and Cementon meteorological towers located about 70 miles and 80 miles south of the site, respectively.

The location and data from the Albany County Airport are discussed in Section 2.2.2. The Athens and Cementon locations are both well within the Mid-Hudson Valley between the Catskill Mountains (in excess of 3000 ft msl) to the west and southwest and elevations approaching 2000 ft msl at the Massachusetts border to the east. The Athens tower is located about a mile west of the river at an elevation of about 120 ft msl, and the Cementon tower is located on a rise directly adjacent to the river at an elevation of about 40 ft msl.

The wind distribution by stability class for the Athens meteorological tower for the year 7/1/73-6/30/74 is presented in Table 2.3-1. This distribution is based on the 33 ft tower elevation winds and the ΔT stability class from 200-33 ft. The Athens overall wind distribution reveals a tendency for southerly wind channelling, with a frequency of south and SSW winds of 30%. The overall speed distribution reveals a frequency of speeds from 0-3 mph of 18%, from 4-7 mph of 35%, and from 8-12 mph of 25%. Additionally, the data also include a separate frequency of variable winds of 14%, many of which conceivably occurred with lighter winds. The Athens data also indicate that stable conditions occurred with a frequency of 48%. The frequency of stable conditions with wind speeds from 0-3 mph was 13%, from 4-7 mph was 15%, and from 8-12 mph was 6%. Additionally, the Athens data report a separate frequency of stable conditions with variable winds of 13%, many of which conceivably occurred with lighter winds.

The wind distribution by stability class for the Cementon tower for the year 6/1/73-5/31/74 is presented in Table 2.3-2. This distribution is based on

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the 33 ft tower elevation winds and the ΔT stability class from 200-33 ft. The Cementon overall wind distribution reveals a tendency for southerly wind channelling, with a frequency of south and SSW winds of 31%. The overall speed distribution reveals a frequency of speeds from 0-3 mph of 22%, from 4-7 mph of 38%, and from 8-12 mph of 26%. The data include a separate frequency of variable winds of 8%, many of which conceivably occurred with lighter winds. The Cementon data indicate that stable conditions occurred with a frequency of 51%. The frequency of stable conditions with wind speeds from 0-3 mph was 15%, from 4-7 mph was 19%, and from 8-12 mph was 9%. Additionally, the Cementon data report a separate frequency of stable conditions with variable winds of 7%, many of which conceivably occurred with lighter winds.

2.3.2.3 Ground Level Dispersive Capability

At this site, the wide Upper Hudson Valley would contribute to the frequency of wind channelling and cold air drainage. The meteorological data locations well to the south of the site in the Hudson Valley are considered to be of qualitative value only for the site due to the distance involved to the locations and somewhat different relative valley situations found there.

2.3.2.4 Cooling Tower Evaluation

The wide Upper Hudson Valley would tend somewhat to inhibit the potential moisture dispersion. The only potential sensitive receptors near the site are several local highways.

2.3.2.5 References for Section 2.3.2

1. USGS Topographic Map, 1:24,000 scale, Fort Miller, New York.

2. USGS Topographic Maps, 1:250,000 scale, Glens Falls, New York, and Albany, New York.

3. Power Authority of the State of New York, Application to the New York State Board on Electric Generation Siting and the Environment, Greene County Nuclear Plant, October, 1975. Part III, Vol. 1, Part IV, Vol. 1.

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2.3.3 Hydrology

2.3.3.1 Water Availability and Supply

The source of cooling water is the Upper Hudson River. The intake would be located approximately 18 miles upstream of USGS Gaging Station No. 3355, at Mechanicville, New York. Records (October 1887 to September 1956) at this station indicate a mean flow of 7431 cfs over the period of record, a minimum daily flow of 170 cfs, a minimum monthly flow of 1020 cfs, and a 7-day, once-in-ten-years low flow of 1037 cfs.

USGS Gaging Station No. 3185 at Hadley, New York is located approximately 30 miles upstream of the intake. Records (October 1921 to September 1973) indicate a mean flow of 2840 cfs over the period of record, a minimum daily flow of 292 cfs, a minimum monthly flow of 384 cfs, and a 7-day, once-in-ten-years low flow of 420 cfs.

These records indicate that generally adequate flow is available for water supply. However, during extreme low flow periods, the water availability may be only marginally adequate.

2.3.3.2 Flood Protection Requirements

The site is located approximately 100 ft in elevation above the Upper Hudson River and approximately 50 ft above the nearest significant stream. Therefore, there is no problem with flooding at the site and no flood protection requirements were considered.

2.3.3.3 Effects of Construction

No problems related to dewatering or erosion during construction were identified. There were two small intermittent streams on the site that might be relocated. Dredging operations for intake and discharge construction might result in the release of polychlorinated biphenyls (PCBs) from bottom sediments due to the high concentration of PCBs in the sediments in the Upper Hudson River. However, dredging effects should be local and temporary, and proper handling of dredge spoil wastes will prevent excessive concentration of PCBs from entering the water.

2.3.3.4 Effects of Operation

Generally river flows are large enough and the river in the site vicinity is deep enough to provide good dispersion of the discharge effluent. However, during low flow periods there would be significantly less dispersion of the effluent, which is a potential problem.

2.3.3.5 References for Section 2.3.3

1. Tice, R.H., Magnitude and Frequency of Floods in the United States, Part 1-B. North Atlantic Slope Basins, New York to York River, U.S. Geological Survey, 1968.

2. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States through September 1950, Part 1, 1954.

3. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States, October 1950 to September 1960, Part 1, 1964.

4. U.S. Geological Survey, Water Resources Data, Part 1: Surface Water Records in New York State, 1966-1974.

5. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Map. Fort Miller Quadrangle.

6. Lake Survey Center, National Oceanic and Atmospheric Administration, Department of Commerce, New York State Barge Canal System: Chart No. 180, 1974.

2.3.4 Water Quality

2.3.4.1 General Description and Analysis

The analysis of the water quality of the Upper Hudson River water source for Site 7-2-2 is based on review of the state stream classification, appropriate USGS maps, and a water source visit.

The Upper Hudson River in the vicinity of Site 7-2-2 has a Stream Classification of C, non-trout waters[1].

Construction practices utilized and all discharges would be in conformance with 40 CFR 423[2] to minimize potential impact to water quality due to turbidity, siltation, and runoff. Monitoring and treating in-plant waste streams would insure that the facility's liquid effluent and cooling tower blowdown would be maintained in compliance with appropriate state and federal guidelines and regulations. Thus, if measures are taken to control possible increases in siltation, turbidity, suspended solids levels, and reduction in dissolved oxygen production from suppressed photosynthesis, existing water quality conditions are not likely to be aggravated by the operation of a closed-cycle plant.

2.3.4.2 References for Section 2.3.4

1. New York State Department of Environmental Conservation, 6 NYCRR, Subchapter B, "Classes and Standards of Quality and Purity Assigned to Fresh Water and Tidal Salt Waters," 1966, as amended.

2. 40 CFR 423, "Steam Electric Power Generating Point Source Category," October 1974, as amended.

2.3.5 Aquatic Ecology

This analysis of the aquatic ecology and resources of the Upper Hudson River water source for Site 7-2-2 is based on a review of background literature, publications of and meetings and conversations with personnel of the New York State Department of Environmental Conservation, and a water source visit.

2.3.5.1 Preexisting Stress

Preexisting stress on the water source biota appeared to be from unrestricted discharges of toxic substances into the river and substrate disturbance from maintenance dredging of the canal channel.

2.3.5.2 Aquatic Resources

The stretch of the Upper Hudson considered as the water source is in the vicinity of Billings Island and Moses Kill. This is a relatively shallow area which may be attractive to fish.

There is very little information available on aquatic life in the Upper Hudson. Historically, after the initial dam construction at Troy in 1926, the sea run (anadromous) fish species were effectively eliminated from the Upper Hudson[(1)]. The earliest record inventory of the Upper Hudson was documented in the biological surveys[(2)]. The economically important species listed then were as follows:

- brown trout (Salmo trutta)
- brook trout (Salvelinus fontinalis)
- common sucker (Catostomus commersoni)
- carp (Cyprinus carpio)
- bullhead (Ictalurus nebulosus)
- chain pickerel (Esox niger)
- northern pike (Esox lucius)
- eel (Anguilla rostrata)
- yellow perch (Perca flavescens)
- walleye (Stizostedion vitreum)
- smallmouth bass (Micropterus dolomieui)
- largemouth bass (M. salmoides)
- bluegill sunfish (Lepomis macrochirus)
- pumpkinseed sunfish (L. gibbosus)
- redbellied sunfish (L. auritus)
- rock bass (Ambloplites rupestris)
- black crappie (Pomoxis nigromaculatus)

No documented data, from 1932 to 1959 exists for the fish species composition or the status of the fishery in the subject area. A report prepared by the Conservation Department in June, 1960 states that the fishery declined in the period between approximately 1949-1959[(1)]. Reports during a 6-year period (1969-1975) indicate an improved fishery in the area from Ft. Miller to Troy. Bass, walleye, yellow perch, crappies, and bullhead catches were reported. The age composition was characterized by a predominance of juvenile fish. From above Lock No. 1 to Hudson Falls, fishing was poor because of low numbers of adult fish in the low standing crop of the rather diverse fish population. The improvement over time in the aquatic ecosystem in this 40 mile stretch of the Hudson was due to a partial reduction of industrial contaminant discharge. More industrial clean-up still had to be done. This stretch of the river was not a free-flowing, undisturbed river. Dams created "flat-water" areas, reducing productive riffle and littoral areas. With clean-up of domestic discharge problems and serious industrial polluters, the DEC Bureau of Fisheries expected a desirable fishery to develop after the abatement objectives were reached[(1)].

2.3.5.3 Potential Impacts of Construction

Environmental impacts of construction are expected to have been primarily short term and reversible for organisms inhabiting the Upper Hudson River. The primary unavoidable but reversible effects would be associated with dredging and construction of intake and discharge structures.

The aquatic impact associated with dredging operations would involve short term turbidity increases as a result of sediment removal. The dredging would result in a temporary resuspension of some of the sediments that were previously deposited in the area. Suspended sediments would be introduced through direct bottom disturbance. This temporary increase in suspended sediments would be accompanied by an increase in chemical compounds associated with these sediments. Of primary interest in this portion of the Hudson River are concentrations of PCBs. The principal sources of PCB have been industrial wastes discharged into the Upper Hudson River in the vicinity of Fort Edward and Hudson Falls from about 1930 to 1975[(3)]. PCB compounds have a strong affinity for small sediment particles; therefore, most of the PCB in the Hudson River remains in the sediments. Any increase of PCB concentrations caused by resuspension of sediments in the water column would be local and temporary. Because the PCBs have a high affinity for sediment particles, they would be redeposited along with the sediment on the bottom after a short time. The resulting local and temporary increase in PCBs in the water column is expected to be insignificant compared to increases in PCB levels caused by other factors. For example, high flows resuspend sediments and associated PCBs. When such phenomena occur, they dwarf any temporary and local increase that could have been caused by the proposed dredging. Thus, there would be minimal impact on water quality and aquatic biota due to dredging.

Some benthic organisms would be lost with spoil removal; however, any backfilling would provide suitable habitat for some recolonization. Thus, the impact is considered short term and reversible.

Effects of dredging activities on organisms other than the displaced macroinvertebrates would be localized and temporary. Dredging operations would be scheduled seasonally to avoid spawning and other biologically active periods. Increased turbidity levels could have a short term impact on plankton populations. However, because of the limited area involved in dredging, the potential adverse affects would be inconsequential.

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Fish would be largely unaffected because their mobility would enable them to avoid construction activities. Because of the short duration and limited area affected by construction activities, no impact upon or blockage of fish migration in the water source in the site vicinity is anticipated.

2.3.5.4 Potential Impacts of Operation

The potential impacts of plant operation on aquatic biota in this stretch of the Upper Hudson River is mainly dependent upon the specific location and design of the intake and discharge structures. Potential impacts would result from impingement of adult fish, entrainment of ichthyoplankton, phytoplankton, zooplankton, macroinvertebrates and juvenile fish, and thermal and chemical discharges.

The channel area would be best for location of the intake and discharge as the shallower near shore area had marsh and flat areas which could be favorable spawning areas. The potential operational impacts are expected to be minimal if the intake and discharge structures are located away from any unique habitats or areas of this stretch of the river conducive to fish congregating, feeding, or spawning.

2.3.5.5 References for Section 2.3.5

1. Summary Review of the Past, Present and Potential Fishery Resource of the Upper Hudson River between Hudson Falls, New York and the Lock No. 1 Dam above Waterford, New York. Region 5 - South, Warrensburg, Inland Fisheries Management Unit, October 8, 1975.

2. State of New York Conservation Department, A Biological Survey of the Upper Hudson Watershed, 1932.

3. Research Triangle Institute, Center for Technology Applications, National Conference on Polychlorinated Biphenyls, Sponsored by the U.S. EPA, November 19-21, 1975.

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2.3.6 Terrestrial Resources

The following summary and analysis of Site 7-2-2 is based on a review of these sources of data: USGS topographic maps (7.5 minute series), aerial photographs, pertinent literature, contacts with state resource agencies, LUNR maps, and a site visit.

2.3.6.1 Land Use

2.3.6.1.1 Dedicated Areas

1. federal lands -- none on or near the site

2. natural landmarks -- none on or near the site

3. state and local parks and forests -- Moreau Lake State Park 4 miles northwest, state forest preserve, and fish hatchery 3.5 miles northwest. These areas are not part of the site and should not be affected by development of the site.

4. privately dedicated areas -- none on or near the site

5. endangered species -- at the time of the study, the U.S. Fish and Wildlife Service (USFWS) had not ruled that any plant taxa were endangered or threatened. The State of New York did not have an endangered plant regulation but did have a regulation prohibiting removal of certain plant species without the consent of the landowners.

   The animals considered endangered by the USFWS at the time of the study, which might have occurred in the site vicinity, included the bald eagle, the peregrine falcon, and the Indiana bat. None of these were known to have bred in the vicinity of the site, but may have migrated through the area. The State of New York also considered the osprey as endangered, and this bird may have also migrated through the area but it was unlikely it would have nested.

6. critical habitat -- none on or near the site

2.3.6.1.2 Vegetation

The major plant communities on the site are cropland, pastures, and brushland. There are small woodlots on the site as well as a small wetland (wet woods). Because of the agricultural activities there is little land not disturbed.

2.3.6.1.3 Wildlife Habitat

The large percentage of land directed to agricultural activities limited the variety of wildlife to those such as mourning doves, blackbirds, sparrows, raccoon, rabbits, fox, deer, and others associated with farms. There are limited numbers of game animals present with deer, pheasant, mourning dove, woodcock, squirrels, and rabbits probably present, and few waterfowl even though they migrate along the Hudson River adjacent to the site. Some Canadian geese may visit the site area. The presence of the landfill may attract species such as raccoon, skunk, and rats.

2.3.6.1.4 Farmland

At the time of the study, over half of the site area was active cropland and pasture. The site is situated within a State Agricultural District.

2.3.6.1.5 Wetlands, Coastal Zone Management Program, and State Wetlands Act

There is a small freshwater wetland (wet woodlot) in the area near the landfill. Because of its size and its proximity to the landfill, this wetland does not represent a significant habitat for aquatic animals. The site is not within the coastal zone.

2.3.6.1.6 Floodplains

No floodplain was identified onsite based upon field inspections and review of maps and photographs.

2.3.6.2 Transmission Corridors

Transmission facilities for Site 7-2-2 would consist of two single-circuit 345kV transmission lines extending from the site in a northerly direction for a distance of approximately 3.8 miles to tie into the proposed 345kV Mohican-Reynolds Road transmission line. A third single-circuit 345kV transmission line would be constructed from the site in a southwesterly direction to the proposed West Rotterdam Substation, a distance of approximately 37 miles; of this distance, approximately 2.2 miles would be constructed underground where the proposed corridor crosses the Mohawk River and the New York State Thruway. A fourth single-circuit 345kV line would be constructed in a southerly direction from the site for a distance of approximately 40.5 miles to the existing Reynolds Road Sub-station; approximately 1.3 miles of this line would be constructed underground where the corridor crosses the Hudson River north of Schuylerville. This transmission corridor would parallel the proposed 345kV Mohican-Reynolds Road 345kV transmission line. An additional 345kV transmission line would be required from Reynolds Road Substation to New Scotland Substation, a distance 26.5 miles. No additional offsite transmission facilities would be required for a nuclear station at Site 7-2-2.

Land uses crossed by the two-mile-wide study corridor are predominantly agricultural and forest brushland (77 miles) and mature forest (24 miles). Some residential land uses are crossed (5.9 miles), as was forest plantation (1.3 miles). Approximately 15 miles of the corridors traverse areas of slopes in excess of 25%, and 31 corridor miles cross wetland areas. No national or state-designated historic sites are contained within the study

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corridors, nor are any state forest or management areas or state, county, or town parks crossed.

Approximately 0.7 miles of streams and rivers are contained within the study corridors, including the Hudson, Mohawk, and Hoosic Rivers and the Battenkill.

The study corridors cross a number of roadways including the New York State Thruway and Interstate 87. Approximately 27 linear miles of the corridors cross areas of unique or high visual quality, and approximately 61 miles of the corridors traverse areas of national or state importance.

Data for the transmission corridor for Site 7-2-2 are presented in Table 2.3-3.

2.3.6.3 Pipeline Route

The pipeline route to the site begins at the Hudson River 1 mile east of the site. Exact location of the intake would depend on aquatic ecological and engineering considerations. The route crosses agricultural land. No state roads or railroads are crossed. Figure 2.3-1 shows the location of the pipeline route.

2.3.6.4 Railroad Route

The railroad route to the site begins at the Delaware and Hudson line near the northwest corner of the site. The vegetation along the route is agricultural and forest. The route crosses one large stream (Snook Kill). No state highways are crossed by the railroad. Selection of the final railroad route would depend on engineering aspects. There are no unique ecological areas along the potential route although care would have to be exercised in crossing the stream. Figure 2.3-1 shows the location of the railroad route.

2.3.6.5 Impoundments

No impoundments are determined to be required for development of this site.

2.3.6.6 Construction Impacts

During site preparation and facility construction, the terrestrial community would be affected by clearing and grubbing, excavation, dewatering, placement of roads, railroads and pipelines, and operation of construction equipment.

The impacts that are expected from these activities include the alteration of existing vegetation, causing changes in wildlife populations onsite and within terrestrial communities surrounding the site, and introduction of barriers to wildlife movement.

Site 7-2-2 is located in an area of flat, open terrain, therefore, the amount of excavation needed would be low. In addition, this open terrain probably does not support much wildlife, and disturbance to this area and surrounding terrestrial communities would be negligible from a regional perspective. None of the cover types or habitats are unique to the region; consequently construction on Site 7-2-2 would not produce significant habitat losses to the region.

Intermittent streams in the site would probably be rerouted or filled in. Presence of many streams in the region make their significance to the region minor.

A pipeline corridor from the Hudson River west of the site could be placed in relatively flat terrain, in an open area causing little disturbance and minor impact to the area.

2.3.6.7 Operation Impacts

Impacts on terrestrial ecology from operation of a nuclear power plant at the site would be limited to the potential effects of cooling tower drift deposition and noise. No expected levels of harmful materials known to cause damage to flora and fauna would be deposited as a result of operation of the nuclear facility.

2.3.6.8 References for Section 2.3.6

1. Britton N.L. and A. Brown, An Illustrated Flora of the Northern United States and Canada, 1913.

2. Burt, W.H., Mammals of the Great Lakes Regions, 1957.

3. Burt, W.H. and R.P. Grossenheider, A Field Guide to the Mammals, 1964.

4. Conant, R., A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 1975.

5. Fernald, M.L., Gray's Manual of Botany, 1950.

6. Hall, E.R. and K.R. Kelson, The Mammals of North America, 1959.

7. New York State Department of Environmental Conservation, "Protected Native Plants.", 6 NYCRR 193.3, 1974.

8. New York State Office of Planning Services, Land Use and Natural Resources Inventory Map Overlays (1:24,000), 1968-1974.

9. Palmer, E.L., Fieldbook of Mammals, 1957.

10. Peterson, R.T., A Field Guide to the Birds, 1947.

11. Peterson, R.T. and M. McKenney, A Field Guide to Wildflowers of North-eastern and North Central North America, 1968.

12. Rickett, H.W., Wildflowers of the United States, Vol. 1: The Northeastern States, 1966.

13. Robbins, C.S., B. Brunn, and H.S. Zim, Birds of North America, 1966.

14. U.S. Fish and Wildlife Service, "Endangered and Threatened Species Notice on Critical Habitats." In: Federal Register, 1975.

15. U.S. Fish and Wildlife Service, "Review of Endangered Species Status." Federal Register, 1975.

16. U.S. Fish and Wildlife Service, "Review of Status of Vascular Plants and Determination of 'Critical Habitat'." In: Federal Register, 1975.

17. U.S. Fish and Wildlife Service, Threatened Wildlife of the United States, 1973.

18. U.S. Fish and Wildlife Service, Office of Endangered Species and International Activities, United States List of Endangered Fauna, 1974.

19. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Maps.

20. New York State Department of Environmental Conservation, Division of Educational Services, Environmental Deterioration and Declining Species, 1970.

2.3.7 Socioeconomics

2.3.7.1 Displacement and Disruption of Onsite Resources

There are no designated historic, scenic, cultural, or natural resources on the site. Construction of a power plant would not adversely affect access to any other resource in the site vicinity.

2.3.7.2 Displacement of Residential and Economic Activities

Development of a power plant on this site would require that two dwellings be acquired and the households be relocated offsite.

Approximately 70% of the site is agriculturally productive land, mostly cropland. No other economic activity is conducted onsite.

2.3.7.3 Origin and Size of the Labor Pool

The eight-county New York State Capital Economic District in which the site was located is expected to provide the major portion of the construction labor requirements for the site. The labor pool would also include Fulton county. The major cities in this area are Schenectady, Albany, and Troy, New York.

The construction labor force in this area was estimated to be in excess of 24,000 workers (1970). Significant inmigration of labor was not expected to be necessary in order to supply the sites construction trades labor requirements.

2.3.7.4 Anticipated Points of Vehicular Congestion

The major roads providing transportation access to the site vicinity are U.S. 4, and Interstate 87 which would carry most of the construction traffic. It would also be necessary for traffic to use State Routes 32 and 50 which provide access to the site. The small community of Gansevoort is at the intersection of these two routes and would experience some increase in traffic activity during periods of peak construction traffic.

2.3.7.5 Potential Impacts on Housing and Services

The housing vacancy rate in the site's commuting area was estimated to be 5.63% (1970), more than 18,000 vacant year-round units. This was considered indicative of adequate housing stock to absorb the construction workers likely to migrate into the area. Adverse effects on the local housing market were not anticipated.

Because of the projected low potential for inmigration of construction workers there is no significant potential for impacting local services.

2.3.7.6 Analysis

Good highway access, adequate vacant housing, and a large pool of construction labor would combine to produce an acceptable location for development of a power plant. Immigration of construction workers, the primary vehicle for socioeconomic impacts, is not expected to exceed acceptable levels. A sufficient number of transportation routes provide access to the site such that traffic management would minimize any impacts of vehicle congestion. The contribution of this site to the local economy is not an important factor affecting its development.

2.3.7.7 References for Section 2.3.7

1. New York State Department of Commerce, Capital District Business Fact Book, 1974.

2. New York State Department of Transportation, Transportation/Planning Map, New York State-Central, 1974.

3. U.S. Geological Survey, 7.5 Minute Series (Topographic) Map, Fort Miller Quadrangle, 1967.

4. New York State Department of Transportation, 7.5 Minute Series Planimetric Map, Fort Miller Quadrangle.

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2.3.8 Geology/Seismology

2.3.8.1 Introduction

Site 7-2-2 is just east of the Village of Gansevoort, on a terrace feature overlooking the west bank of the Hudson River. A shale pit for roadfill by the Town of Northumberland is located onsite. Just east of the site, the land surface slopes down approximately 100 ft to the floodplain of the Hudson River.

2.3.8.2 Regional Geologic Setting

2.3.8.2.1 Rocks

The site is located at the northern end of the Hudson Lowlands physiographic province (Figure 1.4-2). The area is underlain by a thick sequence (mo e than 500 ft) of Ordovician black shales (Figures 1.4-3 and 2.2-5).

2.3.8.2.2 Structural Features

The bedrock sequence is somewhat deformed, tightly folded and faulted (Figure 1.4-4), the result of tectonic activity more than 400 million years ago (pre-Silurian). This long interval of structural deformation, known as the "Taconic Orogeny", moved huge thrust sheets of Cambrian and Ordovician rocks from the east, over the younger rocks of the Hudson Valley area on the west, along a series of paleo-thrust planes referred to as Logan's Line(1). At least four different theories, not all involving thrusting, have been proposed to expla'' the field relationships(2). The thrust theory, however, is the most commonly accepted geologic explanation.

Subsequent erosion has removed much of this overthrust rock, which in this area consists of deformed shales, slates, phyllites, and minor cherts. Some remnant out''ers of these paleo-thrust sheets have been recognized and are plotted on th. recent Geologic Map of New York State(3).

2.3.8.2.3 Glacial Features

During much of the late Pleistocene time, a lake occupied the glacial-carved Hudson Valley in this area. This ancestral lake, known as Lake Albany, was formed by ice blocking the valley south of Kingston, New York. Large amounts of clay, silt, and fine sands were deposited in the lake, creating extensive flat lake terraces which are commonly preserved along the Hudson Valley today(4). As the ice melted and the lake drained, surface waters eroded through the soft sediments, frequently cutting down to bedrock, or forming steep, narrow valleys in the sediments.

2.3.8.2.4 Groundwater

The region is underlain by a thick section of low permeability shale which will protect any possible deep regional aquifer from possible accidental contamination (Figure 2.2-5).

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2.3.8.3 Areal/Site Geology

A summary of the well logs at this site is presented in Table 2.3-4.

2.3.8.3.1 Bedrock Units

2.3.8.3.1.1 Utica Shale

The site is underlain by a thick sequence of black, argillaceous, thin-bedded, fissile shales of the Utica Formation. The shales are fairly uniform, with occasional thin calcareous and sandy interbeds(5). (The Utica was referred to as Snake Hill Formation in this early report.)

The Utica Shale is strongly cleaved, with the feature generally parallel to bedding. The bedding sometimes appears near vertical, when the cleavage follows the regional north-northeast structural trend.

2.3.8.3.1.2 Mount Merino Formation

Directly overlying the Utica Shales over most of the site (Figure 2.3-5) is a paleo-thrust sheet of dark, purplish-gray, well-cleaved, shales of the Ordovician Mount Merino Formation.

The thrust contact, as shown on Figure 2.3-5, was taken from the New York State Geologic Map(3) and is not apparent in the field. The western edge of the contact roughly coincides with an apparent linear feature seen on the aerial-photos of the site, which has been plotted on Figure 2.3-5.

The Mount Merino is exposed in the large shale pit at the center of the site, and along the road at the south edge. The Mount Merino shales are very similar in appearance to the underlying Utica Shales. A well developed, near vertical cleavage is noted, trending north-northeast. The outcrops near the edge of the thrust contact demonstrate that slippage has occurred along cleavage planes, and slickensides developed. The shales had a distinctive waxy luster, and a slaty appearance.

Section A-A' (Figure 2.3-5) indicates that the Mount Merino shales attain a thickness of between 50 and 100 ft on the eastern side of the site.

Engineering Characteristics Mount Merino Formation

A cursory field examination indicated that the Mount Merino shales were similar in composition and structure to the underlying Utica Shales. Thus, in general, engineering characteristics of both units were expected to be similar. The Mount Merino rocks are probably not competent near the thrust contact, where shearing and deformation may be intensive. The near-surface exposures can be ripped with a dozer, as is the current practice in the shale pits onsite.

Permeability

Permeability within the Mount Merino and the Utica Shales is low and restricted to the open joints and/or bedding planes within the rock.

Wells pumping from the two shale units in the county(6) have an average yield of less than ten gallons per minute.

2.3.8.3.1.3 Engineering Characteristics Utica Shale

An extensive exploration and testing program was conducted on the Utica Shale (Canajoharie Shale) at the Kesselring Site, West Milton, New York(7) which is located several miles southwest of Site 7-2-2. The bedrock underlying the Kesselring Site was Utica Shale (older name of Canajoharie Shale used in the report), and is expected to have had very similar engineering characteristics to the shales beneath Site Area 7-2-2. Some of the engineering data on the shale as compiled by the 1973 investigation(7) are:

1. unconfined compression strength ranges from 7,200 to 16,700 psi

2. compression wave velocity of weathered shale ranges from 11,000 to 15,000 ft/sec

3. compression wave velocity of unweathered shale ranges from 15,000 to 24,600 ft/sec

4. shear wave velocity of weathered shale ranges from 3,000 to 7,000 ft/sec

5. shear wave velocity of unweathered shale ranges from 6,600 to 8,100 ft/sec

6. minimum measured direct shear strength is 65 psi

D'Appolonia(7) concluded that the Canajoharie (Utica) Shale is a highly competent material, and capable of supporting very heavy structures. Considering the test results obtained, a safe allowable design bearing value of 25 tons per square foot was recommended.

Swelling and weathering tests were also conducted on the Utica Shale and the following conclusion was reached by D'Appolonia: during construction, when shales were more likely to undergo water content changes, the Canajoharie (Utica) Shale should not deteriorate unless exposed for prolonged periods of time under extreme weather conditions.

2.3.8.3.2 Surficial/Overburden Materials

2.3.8.3.2.1 Glacial Tills

Most of the bedrock on the site was overlain by thin (less than a 15-ft thickness) silty, clayey glacial till deposits that contained cobbles and boulders to two ft. The till and topsoil on the site included abundant fragments of locally derived shale, indicating the generally shallow nature of the glacial till.

In the central portion of the site, the glacial till is likely to be shallow and around five ft thick.

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2.3.8.3.2.2 Glacial Lake Sands

Throughout the northwest portion of the site are thick deposits of fine sands. These sands blanketed a wide area north and west of the site, below an elevation of 200 ft. These uniform, non-cohesive fine sands, with some fine gravel, are part of the ancient Lake Albany deposits. As much as 20 ft of fine sand deposits were exposed in the stream banks just north of the site.

The lowlands just east of the site are also underlain by fine sand deposits as shown on Figure 2.3-5 and the Hudson River floodplain silt and clay deposits.

2.3.8.3.2.3 Drainage

Drainage off the site is poorly developed in the central, flatter area. On the day of the field visit, the ground was saturated, indicating the water table was at or near the surface.

2.3.8.3.2.4 Engineering Characteristics

The engineering characteristics of the glacial till and the lake sands vary considerably. The glacial till is cohesive and bearing strengths should be moderately high at depth. The till normally stands well in shallow, vertical slopes. Infiltration of surface runoff in the till is low.

The glacial lake sands are non-cohesive, with low to moderate bearing strengths. When the sands are at or near saturation, they tended to have had a low shear strength and could cause foundation problems.

2.3.8.4 Some Potential Problems

A paleo fault apparently pass beneath the site at a shallow depth (Figure 2.3-5). Although the fault is inactive, and considered more than 350 million years old, little is known about the actual rock conditions, degree of fracturing or alteration along the fault zone, and other aspects of concern should a plant be considered. A thorough investigational program of the fault would be required at this site.

The sand deposits in the northwest corner of the site are weak foundation materials. These materials should be removed or avoided during any construction.

2.3.8.5 Geological Evaluation

This is largely a shallow bedrock site, with bedrock suitable for the proposed plant design. However, should a geologic structure occur within the bedrock at a fairly shallow depth, this feature would influence the plant foundation design.

No other significant features of Site 7-2-2 were determined by the reconnaissance studies.

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Rating for this site is 1 because of a paleo-fault zone beneath the site (Section 2.3.8.4).

2.3.8.6 Seismological Evaluation

This site is close to the foothills of the Adirondack Uplift which is slightly seismic. It is also at an intermediate distance from a zone of activity which extends from the northern Adirondacks through Ottawa, Canada, in a northwesterly direction. Additionally, from a licensing consideration, the hypothesized Boston-Ottawa zone could have some influence on the site.

2.3.8.7 References for Section 2.3.8

1. Goldring, W., Geology of the Coxsackie Quadrangle, New York: New York State Museum, Bull. 332, 1943.

2. Fisher, D.W., Stratigraphy and structure in the southern Taconics: . LaFleur, R.G., (ed.), Guidebook to Field Trips: New York State Geological Association, 33rd Annual Meeting, Troy, New York, 1961, p. D-1 - D-22.

3. Fisher, D.W., Rickard, L.V., and Isachsen, Y.W., Geologic map of New York State: New York State Museum and Science Service, Map and Chart Series No. 15, 1970.

4. LaFleur, R.G., Glacial geology of the Troy, New York, Quadrangle: New York State Museum and Science Service, Map and Chart Series No. 7, 1965.

5. Cushing, H.P., Ruedemann, R., Geology of Saratoga Springs and vicinity: New York State Museum, Bull. 169, 1919.

6. Heath, R.C., Mack, F.K., and Tannenbaum, J.A., Groundwater studies in Saratoga County, New York: U.S. Geological Survey, Bull. GW-49, 1963.

7. EDCE, Site evaluation report, S8G project, Knolls Atomic Power Laboratory, Kesselring Site, West Milton, New York: E. D'Appolonia Consulting Engineers, Inc./United Engineers & Constructors Inc. (December, 1973).

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2.3.9 Accident Analysis

2.3.9.1 Site Description and Population Distribution

Site 7-2-2 consists of approximately 700 acres. The proposed site boundaries, shown in Figure 2.3-2, are coterminous with the exclusion area boundary. Minor local arteries traverse the exclusion area.

The Low Population Zone (LPZ) outer radius for Site 7-2-2 is designated to have been 3 miles, pursuant to NRC guidelines. Reconnaissance level data for the LPZ are presented in Table 2.3-5.

The combined communities of Glens Falls, Hudson Falls, South Hudson Falls, and Fort Edward form the nearest population center (1970 population 30,969). The population center is located approximately 4 miles from the site.

The population distribution for 30 miles surrounding Site 7-2-2 is summarized in Table 2.3-6.

2.3.9.2 Nearby Industrial, Transportation, and Military Facilities

Major transportation activities in the vicinity of Site 7-2-2 are summarized in Table 2.3-7. Of note is the close proximity of State Route 32. The nearest major airport is Albany County Airport, located 40 miles to the south. Saratoga Air Force Station is located 14 miles to the south.

No industrial facilities are identified which would impart a potential hazard in the site vicinity.

2.3.9.3 Analysis and Summary

Site 7-2-2 meets acceptability criteria for the population density and distribution, as given in 10 CFR 100 and NRC Guide 4.7. The activity and population within the LPZ is such that appropriate measures in the event of a serious accident could be taken to mitigate against serious harm, within reasonable probability. The nearest population center is marginal with respect to the 1.33 distance ratio beyond the LPZ outer radius as required by 10 CFR 100.

For the most part, no significant potential hazards related to industrial, transportation, or military facilities are identified.

2.3.9.4 References for Section 2.3.9

1. New York State Department of Commerce, Profile of People, Jobs and Housing; Capital District, Part 2, 1974.

2. USGS 7.5 Minute Series (topographic) quadrangle maps.

3. U.S. Department of Commerce, Bureau of the Census, 1970 Small Area Census Data for New York State.

4. New York State Executive Department Office of Planning Services, Demographic Projections for New York State, unpublished report, 1974.

5. U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, Number of Inhabitants, 1970.

6. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation/Planning Maps, 1974.

7. Facilities Records for Airports in New York from the files of the Federal Aviation Administration, Eastern Regional Office.

8. Sectional Aeronautical Charts for Detroit, New York and Montreal, November 7, 1974, January 2, 1975, and October 10, 1974.

9. New York State Department of Transportation, Traffic Volume Report, 1973.

10. Motor Vehicle Manufacturer's Association, Motor Truck Facts, 1974.

11. New York State Parks and Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information," Section 4: "County Map User Guide," Appendix C: "Complete Activity Code List," 1975.

12. Cornell University, LUNR Inventory Map Overlays, 7.5 Minute Quadrangle, (1:24,000), for New York State Office of Planning Services, 1968-1974.

13. Major Natural Gas Pipelines, Federal Power Commission, June 1973.

14. U.S. Secretary of Transportation, Rail Service in the Midwest and Northeast Region, 1974.

15. U.S. Department of Commerce, Statistical Abstract of the United States, 1973.

16. U.S. Department of the Army, Principal Military Installations and Activities in the 50 States, 1974.

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2.3.10 Aesthetics

2.3.10.1 Site Characterization

The site and surrounding area are flat, and open, with elevations varying generally from 200 to 500 ft above msl. The onsite forests are comprised of mixed woods and are concentrated in the center of the site.

Due to the lack of topographic relief and vegetative cover on and adjacent to the site, there is an increased probability of visual intrusion on nearby sensitive land uses. Some forest cover does occur along the west bank of the Upper Hudson River; however, due to the higher elevation of the site, these trees would provide minimal screening.

Several vantage points are evident in the site area, with the following selected as the most representative of the surrounding visually sensitive and intensive land uses:

Land Use	Distance from Site
City of Fort Edward	5.3 miles NE
Rt. 87 Thruway	4.1 miles NW (closest approach)
Saratoga Forest	2.5 miles S
Village of Fort Miller	2.8 miles SE
Rt. 4 Scenic Road	1.25 miles E
Moreau Lake State Park	5.5 miles NW
Hudson River	1 mile E

Additionally, there are two historic properties of interest within the study area. Fort Edward, Rogers Island, is listed on the National Register, and is located 5 miles NE from the site in the Hudson River at Fort Edward. The Saratoga Spa State Area Marker is located 1 mile from the site. No designated natural landmarks are within the study area.

There are relatively few recreational facilities within 6 miles of the site. The existing facilities include a campground, golf course, marina, and a state forest area which offers hunting, fishing, and picnicking.

2.3.10.2 Aesthetics Analysis

The greater visual impacts would be experienced from the Hudson River and Rt. 4 Scenic Road. In both cases, the plant structures would be extremely visible -- with a viewing distance of 1 mile for the Hudson River and approximately 1.25 miles from Rt. 4.

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The remaining 5 vantage points would experience moderate to negligible impacts as follows:

Village of Fort Miller	plant structures moderately visible distance of 2.8 miles (middle ground)
Saratoga Forest	plant structures moderately visible distance of 2.5 miles (middle ground)
Moreau Lake State Park	plant structures slightly visible distance of more than 5 miles (back ground)
Rt. 87 Thruway	plant structures could not be seen
City of Fort Edward	plant structures could not be seen

Additionally, the plant structures would not be visible from Fort Edward, Rogers Island.

2.3.10.3 References for Section 2.3.10

1. U.S. Department of the Interior, National Park Service, National Register of Historic Places, 1975, as amended.

2. U.S. Department of the Interior, National Park Service, National Registry of Natural Landmarks, 1975, as amended.

3. The University of the State of New York, the State Education Department, A Guide to the Historical Markers of New York State, 1970.

4. The University of the State of New York, the State Education Department, New York State Historical Places, 1975.

5. New York State Parks & Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information", Section 4: "County Map User Guide", Appendix C: "Complete Activity Code List", 1975.

6. LUNR Inventory Map Overlays, 7.5 Minute Quadrangle (1:24,000), Cornell University for New York State Office of Planning Services, 1968-1974.

7. USGS 7.5 Minute Series (topographic) quadrangle maps.

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8. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation Planning Maps, 1974.

9. Site visits.

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2.3.11 Land Use Planning

2.3.11.1 Introduction

Capital District Regional Planning Commission undertook an assessment of key regional indicators and how these factors will have influenced future development. From this assessment a set of comprehensive goals for regional development were identified and from this a regional development plan defined. One of these goals which specifically related to Site 7-2-2 is:

> to preserve and promote the optimal use of natural resources, specifically to encourage the creation of agricultural districts.

2.3.11.2 Site and Local Description

The site as well as the general area surrounding is classified for agricultural district usage. This agricultural district area is set within a larger vacant/rural residential development land use area. Rural residential development ensures that the open space character of the land would be maintained.

The Town of Northumberland had not adopted a zoning ordinance in 1975.

2.3.11.3 Compatibility

The site is not preempting agricultural land which the Capital District has identified as "prime farmland". For land falling within the District's "prime farmland" classification, non-agricultural land uses are strongly discouraged. The site is located within an agricultural district.

2.3.11.4 References for Section 2.3.11

1. Capital District Regional Planning Commission, Regional Developments Plan, (Preliminary), 1975.

2.3.12 Costs

Table 2.3-8 presents cost data associated with developing Site 7-2-2.

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2.3.13 Conclusions

In the vicinity of Site 7-2-2, no legal restraints to plant siting were identified.

TABLE 2.3-1

SITE 7-2-2, WIND DIRECTION BY STABILITY CLASS

ATHENS SITE

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - A - 33 FT WINDS,PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	0	0	0	2	0	0	2
N-NE	0	1	1	3	0	0	5
NE	0	0	0	0	0	0	0
E-NE	1	1	0	0	0	0	2
E	1	0	0	0	0	0	1
E-SE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
S-SE	0	3	0	0	0	0	3
S	0	7	24	13	0	0	44
S-SW	0	2	9	2	0	0	13
SW	0	2	3	0	0	0	5
W-SW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
W-NW	0	1	1	0	0	0	2
NW	0	1	3	7	0	0	11
N-NW	0	2	2	3	0	0	7
TOT.	2	20	43	30	0	0	95

NUMBER OF CALM HOURS - 0
NUMBER OF VARIABLE DIRECTIONS - 0
TOTAL NUMBER OF OBSERVATIONS - 95

POOR ORIGINAL

V

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NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - B - 33 FT WINDS, PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	0	0	5	4	0	0	9
N-NE	0	3	12	7	1	0	23
NE	0	3	7	3	0	1	14
E-NE	1	1	1	0	0	0	3
E	0	2	0	0	0	0	2
E-SE	0	2	0	0	0	0	2
SE	0	2	0	0	0	0	2
S-SE	0	7	4	0	0	0	11
S	1	9	31	13	0	0	54
S-SW	0	6	20	3	0	0	29
SW	0	1	0	0	0	0	1
W-SW	0	0	0	0	0	0	0
W	0	2	2	0	0	0	4
W-NW	0	0	3	2	0	0	5
NW	0	1	13	15	3	0	32
N-NW	0	0	4	13	1	0	18
TOT.	2	39	102	60	5	1	209

NUMBER OF CALM HOURS - 0
NUMBER OF VARIABLE DIRECTIONS - 3
TOTAL NUMBER OF OBSERVATIONS - 212

POOR ORIGINAL

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NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - C - 33 FT WINDS,PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	2	13	16	5	1	0	37
N-NE	2	15	20	20	0	1	58
NE	2	14	15	2	1	0	34
E-NE	3	9	1	0	0	0	13
E	2	7	0	0	0	0	9
E-SE	3	3	0	0	0	0	6
SE	1	3	0	0	0	0	4
S-SE	1	7	5	1	0	0	14
S	1	41	27	6	0	0	75
S-SW	2	18	33	4	0	0	57
SW	1	4	2	2	0	0	9
W-SW	0	2	3	1	0	0	6
W	0	2	3	0	0	0	5
W-NW	0	3	7	4	1	0	15
NW	0	2	29	13	4	0	48
N-NW	1	3	16	18	1	0	39
TOT.	21	146	177	76	8	1	429

NUMBER OF CALM HOURS - 1
NUMBER OF VARIABLE DIRECTIONS - 1
TOTAL NUMBER OF OBSERVATIONS - 431

V

POOR ORIGINAL

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - D - 33 FT WINDS, PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	42	128	163	54	1	0	388
N-NE	38	151	143	34	2	1	369
NE	19	102	66	9	1	0	197
E-NE	13	56	9	0	0	0	78
E	10	37	6	0	0	0	53
E-SE	8	35	6	0	0	0	49
SE	11	26	3	0	0	0	40
S-SE	26	73	22	1	0	0	122
S	39	282	194	23	1	0	539
S-SW	41	202	109	20	0	0	372
SW	28	45	15	7	0	0	95
W-SW	18	22	16	7	1	0	64
W	7	20	27	3	0	0	57
W-NW	13	43	73	15	0	0	144
NW	27	66	186	99	7	0	385
N-NW	27	99	201	82	5	0	414
TOT.	367	1387	1239	354	18	1	3366

NUMBER OF CALM HOURS - 10
NUMBER OF VARIABLE DIRECTIONS - 94
TOTAL NUMBER OF OBSERVATIONS - 3470

V

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - E - 33 FT WINDS, PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	51	117	45	0	0	0	213
N-NE	42	95	27	4	0	0	168
NE	27	34	5	1	0	0	67
E-NE	14	9	1	0	0	0	24
E	4	6	0	0	0	0	10
E-SE	3	8	0	0	0	0	11
SE	9	7	0	0	0	0	16
S-SE	16	29	10	0	0	0	55
S	25	177	82	11	0	0	295
S-SW	83	230	87	9	0	0	409
SW	54	53	20	2	0	0	129
W-SW	30	31	5	1	0	0	67
W	19	20	5	2	0	0	46
W-NW	19	23	15	0	1	0	58
NW	21	54	68	15	0	0	158
N-NW	25	110	86	8	1	0	230
TOT.	442	1003	456	53	2	0	1956

NUMBER OF CALM HOURS - 20
NUMBER OF VARIABLE DIRECTIONS - 184
TOTAL NUMBER OF OBSERVATIONS - 2160

V.

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - F - 33 FT WINDS, PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	33	26	3	0	0	0	62
N-NE	29	19	1	0	0	0	49
NE	14	2	0	0	0	0	16
E-NE	3	0	0	0	0	0	3
E	0	1	0	0	0	0	1
E-SE	2	1	0	0	0	0	3
SE	0	0	0	0	0	0	0
S-SE	3	0	0	0	0	0	3
S	9	17	0	0	0	0	26
S-SW	53	40	5	0	0	0	98
SW	37	16	1	0	0	0	54
W-SW	29	9	2	1	0	0	41
W	16	6	0	0	0	0	22
W-NW	17	10	0	0	0	0	27
NW	15	6	2	0	0	0	23
N-NW	14	13	0	0	0	0	27
TOT.	274	166	14	1	0	0	455

NUMBER OF CALM HOURS - 40
NUMBER OF VARIABLE DIRECTIONS - 264
TOTAL NUMBER OF OBSERVATIONS - 759

V

POOR ORIGINAL

757 322

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - G - 33 FT WINDS,PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	18	3	0	0	0	0	21
N-NE	16	5	0	0	0	0	21
NE	10	3	0	0	0	0	13
E-NE	9	0	0	0	0	0	9
E	8	0	0	0	0	0	8
E-SE	0	1	0	0	0	0	1
SE	3	1	0	0	0	0	4
S-SE	3	0	0	0	0	0	3
S	11	3	0	0	0	0	14
S-SW	35	4	0	0	0	0	39
SW	40	10	0	0	0	0	50
W-SW	25	5	0	0	0	0	30
W	19	3	0	0	0	0	22
W-NW	14	5	0	0	0	0	19
NW	15	2	0	0	0	0	17
N-NW	10	1	0	0	0	0	11
TOT.	236	46	0	0	0	0	282

NUMBER OF CALM HOURS - 58
NUMBER OF VARIABLE DIRECTIONS - 609
TOTAL NUMBER OF OBSERVATIONS - 949

V

757 323

TABLE 2.3-1 (Cont'd)

ATHENS WIND - STABILITY SUMMARY

STABILITY CLASS - ALL- 33 FT WINDS,PERIOD 7/ 1/73 TO 6/30/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	146	287	232	65	2	0	732
N-NE	[illegible]	289	204	68	3	2	693
NE	72	158	93	15	2	1	341
E-NE	44	76	12	0	0	0	132
E	25	53	6	0	0	0	94
E-SE	16	50	6	0	0	0	72
SE	24	39	3	0	0	0	66
S-SE	49	119	41	2	0	0	211
S	86	536	358	66	1	0	1047
S-SW	214	502	263	38	0	0	1017
SW	160	131	41	11	0	0	343
W-SW	102	69	26	10	1	0	208
W	61	53	37	5	0	0	156
W-NW	63	85	99	21	2	0	270
NW	73	132	301	149	14	0	674
N-NW	77	228	309	124	8	0	746
TOT.	1344	2807	2031	574	33	3	6792

NUMBER OF CALM HOURS - 129
NUMBER OF VARIABLE DIRECTIONS - 1155
TOTAL NUMBER OF OBSERVATIONS - 8076

v

POOR ORIGINAL

757 324

TABLE 2.3-2

SITE 7-2-2, WIND DISTRIBUTION BY STABILITY CLASS

CEMENTON SITE

TABLE 2.3-2 (Cont'd)

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - A , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total	
N	3	3	24	15	0	0	45	5
NNE	2	7	17	5	0	0	31	
NE	4	18	22	1	0	0	45	
ENE	5	23	5	0	0	0	33	
E	5	7	0	0	0	0	12	5
ESE	2	7	0	0	0	0	9	
SE	2	3	0	0	0	0	5	
SSE	3	20	6	0	0	0	29	
S	2	48	42	8	0	0	100	
SSW	1	14	9	2	0	0	26	5
SW	2	0	1	0	0	0	3	
WSW	1	0	0	0	0	0	1	
W	0	1	0	0	0	0	1	
WNW	0	1	3	1	0	0	5	
NW	0	1	7	1	0	0	9	
NNW	0	1	0	16	2	0	19	5
Total	32	154	136	49	2	0	373	

Number of Calm Hours - 0
Number of Variable Directions - 3 5
Total Number of Observations - 376

TABLE 2.3-2 (Cont'd)
CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - B , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
N	2	4	10	9	0	0	25
NNE	0	3	8	4	0	0	15
5 NE	2	14	11	3	0	0	30
ENE	1	19	0	0	0	0	20
E	6	4	0	0	0	0	10
ESE	4	0	0	0	0	0	4
SE	6	2	0	0	0	0	8
SSE	10	21	3	1	0	0	35
S	5	37	24	8	0	0	74
5 SSW	1	7	6	1	0	0	15
SW	1	0	3	1	0	0	5
WSW	2	0	1	0	0	0	3
W	1	1	1	2	0	0	5
WNW	0	1	5	5	0	0	11
5 NW	3	6	7	5	2	0	23
NNW	1	2	12	4	1	0	20
Total	45	121	91	43	3	0	303

5 Number of Calm Hours - 0
Number of Variable Directions - 6
Total Number of Observations - 309

V

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA
TABLE 2.3-2 (Cont'd)

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - C , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
N	3	4	13	8	0	0	28
NNE	4	12	7	0	0	0	23
NE	5	18	19	5	0	0	47
ENE	6	14	0	0	0	0	20
E	5	6	0	0	0	0	11
ESE	8	2	0	0	0	0	10
SE	5	3	0	0	0	0	8
SSE	10	18	2	0	0	0	30
S	6	44	29	6	0	0	85
SSW	1	12	9	3	0	0	25
SW	1	3	4	0	0	0	8
WSW	0	0	1	0	0	0	1
W	1	1	2	1	0	0	5
WNW	1	2	9	6	0	0	18
NW	2	4	11	3	0	0	20
NNW	2	9	13	5	3	0	32
Total	60	152	119	37	3	0	371

Number of Calm Hours - 0
Number of Variable Directions - 7
Total Number of Observations - 378

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V

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - D , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

	Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
	N	48	119	104	23	1	0	295
	NNE	49	184	188	36	10	0	467
	NE	36	103	71	8	0	0	218
	ENE	25	40	2	0	0	0	67
	E	24	12	0	0	0	0	36
	ESE	17	8	0	0	0	0	25
	SE	22	19	1	0	0	0	42
5	SSE	32	77	30	2	0	0	141
	S	36	253	232	45	0	0	566
	SSW	17	132	109	18	0	0	276
	SW	15	50	18	2	0	0	85
	WSW	16	14	14	7	0	0	51
	W	17	28	25	13	0	0	83
	WNW	19	45	87	27	1	0	179
	NW	9	56	79	16	1	0	161
	NNW	18	45	100	46	3	0	212
	Total	400	1185	1060	243	16	0	2904

5 Number of Calm Hours - 0
Number of Variable Directions - 114
5 Total Number of Observations - 3018

V

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - E , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
N	131	237	77	1	0	0	446
NNE	75	214	53	4	0	0	346
NE	22	42	5	0	0	0	69
ENE	9	3	1	0	0	0	13
E	8	2	0	0	0	0	10
ESE	5	1	1	0	0	0	7
SE	16	4	1	0	0	0	21
SSE	34	59	19	4	0	0	116
S	71	220	159	23	3	0	476
SSW	79	262	185	27	1	0	554
SW	80	90	22	5	1	0	198
WSW	82	34	10	3	0	0	129
W	64	33	7	0	0	0	104
WNW	75	54	36	4	1	0	170
NW	86	69	45	0	0	0	200
NNW	121	101	75	6	0	0	303
Total	958	1425	696	77	6	0	3162

Number of Calm Hours - 0
Number of Variable Directions - 435
Total Number of Observations - 3597

757 380

V

TABLE 2.3-2 (Cont'd)

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - F , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

	Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
	N	44	14	1	0	0	0	59
5	NNE	19	13	0	0	0	0	32
	NE	3	2	0	0	0	0	5
	ENE	1	0	0	0	0	0	1
	E	1	0	0	0	0	0	1
	ESE	4	0	0	0	0	0	4
	SE	1	0	0	0	0	0	1
	SSE	6	5	0	0	0	0	11
	S	14	25	9	3	0	0	51
	SSW	18	38	20	14	0	0	90
	SW	21	13	3	0	0	0	37
	WSW	21	16	2	0	0	0	39
	W	29	10	0	0	0	0	39
5	WNW	29	12	0	0	0	0	41
	NW	29	15	3	0	0	0	47
	NNW	27	13	1	0	0	0	41
	Total	267	176	39	17	0	0	499

Number of Calm Hours - 0
Number of Variable Directions - 119
Total Number of Observations - 618

V

TABLE 2.3-2 (Cont'd)

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - G , 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total	
N	10	1	0	0	0	0	11	
NNE	2	1	0	0	0	0	3	
NE	0	0	0	0	0	0	0	
ENE	1	0	0	0	0	0	1	
E	0	0	0	0	0	0	0	
ESE	0	0	0	0	0	0	0	
SE	1	0	0	0	0	0	1	
SSE	3	0	0	0	0	0	3	5
S	7	3	0	2	0	0	12	
SSW	8	0	2	1	0	0	11	5
SW	7	0	0	0	0	0	7	
WSW	3	0	0	0	0	0	3	
W	0	2	0	0	0	0	2	5
WNW	2	2	0	0	0	0	4	
NW	7	0	0	0	0	0	7	
NNW	3	0	0	0	0	0	3	
Total	54	9	2	3	0	0	68	5

Number of Calm Hours - 0
Number of Variable Directions - 25
Total Number of Observations - 93 | 5

757 332

V

TABLE 2.3-2 (Cont'd)

CEMENTON WIND - STABILITY SUMMARY
STABILITY CLASS - ALL, 33 FT WINDS
PERIOD: 6/01/73 TO 5/31/74

Number of Hourly Observations

Winds From	Wind Speed (mph) 1-3	4-7	8-12	13-18	19-24	25+	Total
N	241	382	229	56	1	0	909
NNE	151	434	273	49	10	0	917
NE	72	197	128	17	0	0	414
ENE	48	99	8	0	0	0	155
E	49	31	0	0	0	0	80
ESE	40	18	1	0	0	0	59
SE	53	31	2	0	0	0	86
SSE	98	200	60	7	0	0	365
S	141	630	495	95	3	0	1364
5 SSW	125	465	340	66	1	0	997
SW	127	156	51	8	1	0	343
WSW	125	64	28	10	0	0	227
W	112	76	35	16	0	0	239
WNW	126	117	140	43	2	0	428
NW	136	151	152	25	3	0	467
NNW	172	171	201	77	9	0	630
Total	1816	3222	2143	469	30	0	7680

Number of Calm Hours - 0
Number of Variable Directions - 709
Total Number of Observations - 8389

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-3

TRANSMISSION CORRIDOR DATA
SITE 7-2-2

Criteria	Acres	Miles	Number
Physical Features			
1. Land Use			
Industrial	35	0	
Commercial	1,216	1.0	
Institutional	0	0	
Residential	7,529	5.9	
Airfield Zone	0	0	
Central Business District	0	0	
Radio & TV Towers	---	---	2
2. Vegetative Cover			
Agricultural & Forest Brushland	98,574	77	
Mature Forest	30,418	23.8	
Forest Plantation	1,623	1.3	
3. Recreational/Cultural			
State Forest & Wildlife Mgt. Area	0	0	
State, County, Town Parks	0	0	
Historic Sites (National or State)	---	---	1
4. National Features			
Wetlands	3,992	3.1	
Lakes	0	0	
Slopes 25%+	19,195	15.0	
Streams & Rivers (Named)	---	0.7	

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TABLE 2.3-3 (Cont'd)

Criteria	Miles
Aesthetics	
1. Exposure	
Scenic Hwy - Overlook	0
Interstate Hwy	7
NYS Hwy More Than 3000 V/D	47
NYS Hwy Less Than 3000 V/D	63
2. Visual Quality	Line Miles
Unique	8
High	19
Medium	33
Low	20
Generally Characteristic of the Area	32
3. Structure Size (new)	
115kV Single or Double Circuit	
230kV Single Circuit	
230kV Double Circuit	
345kV Single Circuit	112
345kV Double Circuit	
765kV Single Circuit	
4. Sensitivity (importance)	
National (interstate)	7
State	54
Regional	10
Local	41

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-4

WELL LOGS AT SITE 7-2-2*

Well No.	Log
24	Dug well; 0-3 ft, clay; 3-13 ft, till; water level six ft.
25	Dug well; 0-18 ft, sand; water level 12 ft.
26	Total depth 144 ft; 0-11 ft, till; 11-144 ft, shale; water level 11 ft; yield 15 gallons per minute.

SOURCE:

*Heath, R.C., Mack, F.K., and Tannenbaum, J.A., Groundwater Studies in Saratoga County, New York: U.S. Geological Survey, Bull. GW-49, 1963.

TABLE 2.3-5

LOW POPULATION ZONE (LPZ) EVALUATION
SITE 7-2-2

Towns -- Ft. Edward, Morcan, Northumberland

Recreation Facilities -- Total Population 80

Lake George Fish Hatchery - Size 86 acres, Population 30
(Camping Facilities)

Lock 7 - Population 50 (estimated)
(Marine Facilities)

Dwelling Units -- 388

Number Roads Exiting LPZ --16

Schools, Institutional Population -- 0

NYSE&G ASA
SITE 7-2-2
NORTHERN NEW YORK AREA

TABLE 2.3-6

POPULATION DENSITY AND DISTRIBUTION
SITE 7-2-2

	1985	2025
Cumulative Population (0-30 miles)	361,900	551,350
Population Density (persons/mi) (0-30 miles)	128	195
Site Population Factor SPF (30)	0.144	0.201

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TABLE 2.3-7

NEARBY TRANSPORTATION ACTIVITIES
SITE 7-2-2

Identification	Distance (mi)	Type
NY 32	0.5	Road
NY 50	1.8	Road
US 4	1.6	Road
Delaware & Hudson	1.4	Rail
Hudson River	1.5	Canal
Warren Company	9.5	Airport
Barnes	9.0	Airport
Garnsey	10.0	Airport
V 91-489 Glens Falls - Albany	2.5	Airlane
V 431 Glens Falls - Keene	8.0	Airlane
J 75 - 563 Albany - Platts	5.0	Airlane

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SITE 7-2-2
NORTHERN NEW YORK AREA

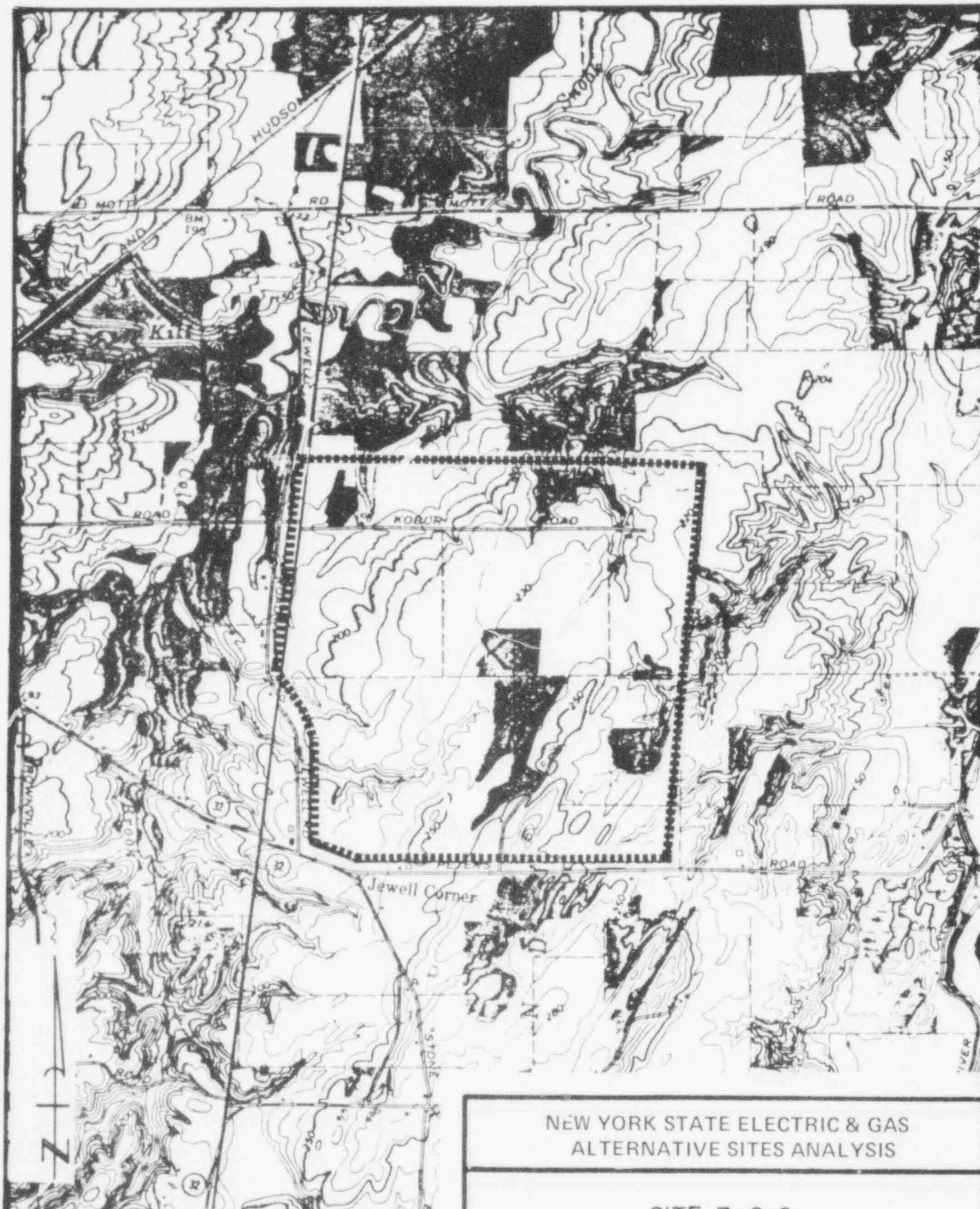
TABLE 2.3-8

COST DATA SITE 7-2-2

	Component	Cost $ X 10^6 (1987)	Subtotal	Notes
1.	Railroad	1.2		
2.	Highway	---		
3.	Land & Land Rights	0.7*		
4.	Excavation & Foundations	1.5		Rock Excavation = 77,320 yd^4
5.	Seismic Design	---		
6.	Intake Discharge	18.5*		
7.	Impoundments	---		
8.	Piping Installation	4.7		
9.	Pumping Equipment	0.5		
10.	Ultimate Heat Sink	21.0		
11.	Labor Rates	112.0		
12.	SUBTOTAL - SITE RELATED COSTS		122.0	
13.	PLANT CONSTRUCTION COST		2,880.0	
14.	TOTAL CONSTRUCTION COST (lines 12 & 13)		3,002.0	
15.	Transmission Construction	141.0		Grid = 119 miles Offsite = 0 Substation = 10,400,000
16.	TOTAL CAPITAL COST (lines 14 & 15)		3,143.0	
17.	Nuclear Fuel & O&M	723.0		
18.	Transmission Losses (Capitalized)	68.0		
19.	Pumping Cost (Capitalized)	2.0		
20.	TOTAL OPERATING COST		793.0	
21.	TOTAL EVALUATED COST (lines 16 & 20)		3,936.0	

*Subtracted from cost components in base plant.

757 340



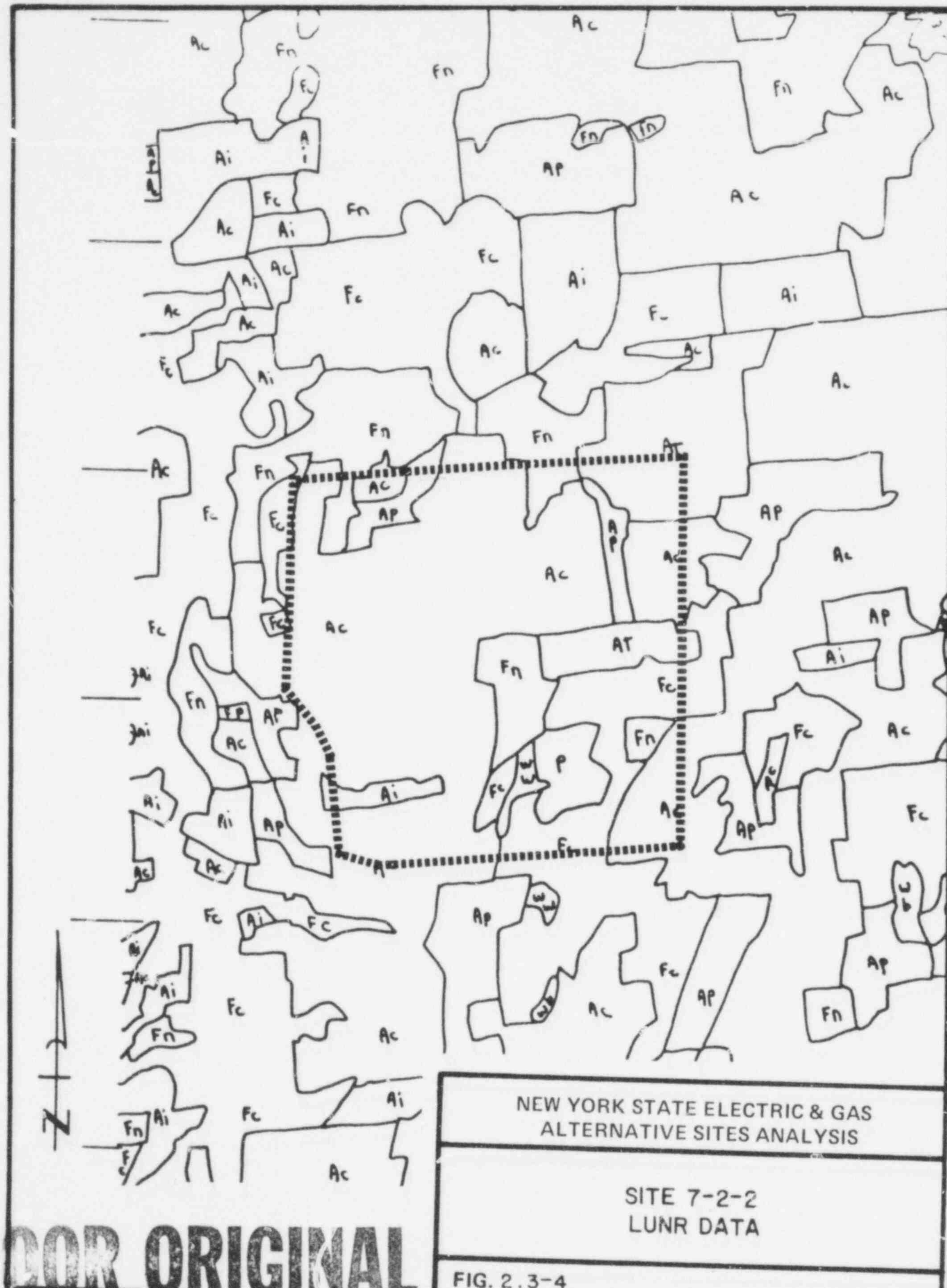
NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-2-2
SITE AREA AND TOPOGRAPHY

FIG. 2.3-2

BASE MAP=USGS FORT MILLER AND
GANESVOORT QUADRANGLES 1967 & 1968

SCALE
(MILES)
0 1/2 1



NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-2-2
LUNR DATA

FIG. 2.3-4

NOTE: REFER TO TABLE 1.4-1 FOR AN EXPLANATION OF LUNR SYMBOLS.

SCALE (MILES): 0, ½, 1

757 342

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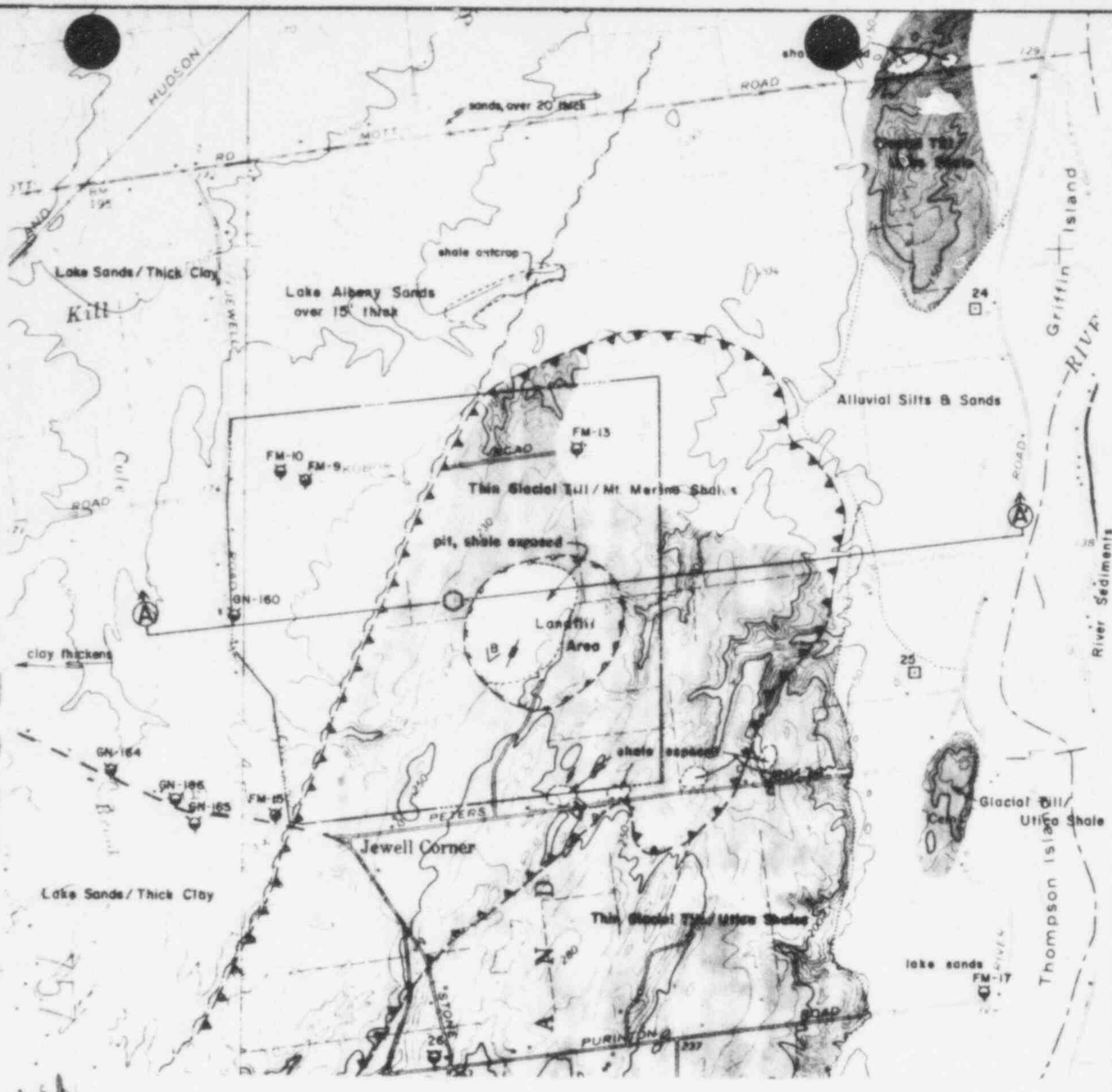

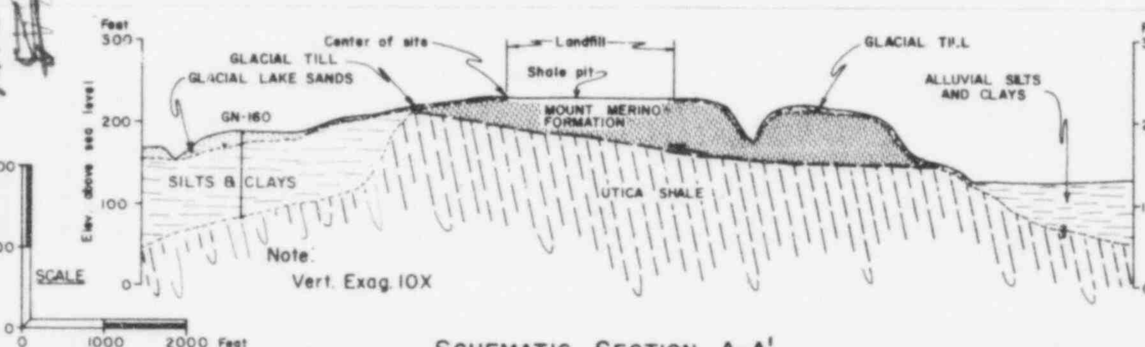

SCHEMATIC SECTION A-A'

EXPLANATION

PLAN MAP

SURFICIAL / OVERBURDEN MATERIALS

ALLUVIAL SILTS AND CLAYS - Interbedded silts and clays with gravels; floodplain deposits of Hudson River.

GLACIAL LAKE SANDS - Fine sands with minor fine gravels, uniform, non-cohesive. Generally more than 15 feet thick.

GLACIAL TILL - Silt and clay with some cobbles and boulders to 2 feet. Generally less than 15 feet thick.

BEDROCK UNITS

MOUNT MERINO FORMATION - Dark purplish-gray shales; slatey, well developed cleavage.

UTICA SHALE - Blackish, thin-bedded, fissile shales with scattered thin limey sandstone beds. (Thrust contact with overlying Mount Merino Formation).

SYMBOLS

Indefinite contact, surficial materials.

Paleo-fault, dashed where approximate. Saw tooth pattern on upper thrust plate. Forms contact Mount Merino / Utica Formations.

Linear structure / fault, possible; aerial-photo interpretation.

Strike of vertical joint.

26 Water well, drilled, log in files, with number.

Dug well, log in files, with numbers.

A Alignment of schematic cross section, arrow indicates direction of view.

Outline general site area.

Center of site.

<A Photograph, apex at point picture taken.

Perimeter of landfill.

Approximate limits of bedrock exposure.

Surficial materials thin over bedrock (Under 15 feet).

SECTION

Generalized location of contact between surficial materials and bedrock.

Paleo-fault, arrow on upper thrust plate.

Note: See description above, and cross section A-A' for Surficial and Bedrock units.

SCALE:

0 1000 2000 3000 feet

0 100 250 500 1000 meter

Contour interval 10 feet

N

BASE MAP: U.S. Geological Survey, Fort Miller (1967) & Gansevoort (1968) Quads.

GEOLOGIC DATA: Sources Given Accompanying Report This Site.

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-2-2
GEOLOGIC RECONNAISSANCE MAP

FIG. 2.3-5

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LOWER HUDSON RIVER

2.4 SITE 8-4-2, LOWER HUDSON RIVER AREA

2.4.1 Site Description

Site 8-4-2 is located in the Town of Gardiner, Ulster County, 11 miles west of the City of Poughkeepsie and 10 miles west of the Hudson River. The community of Gardiner is 1.5 miles north, and New Paltz, 5 miles northeast. Approximately 0.5 miles south of the site is the Wallkill State Prison. Figure 2.4-1 shows the general location of the site. Figure 2.4-2 depicts the site boundary and area topography, and Figure 2.4-3 is an aerial photograph of the site.

Land uses are a mixture of stands of forest, shrub cover, cropland, pasture, small water body, and gravel pits. The Delaware and Catskill Aqueducts form the northern and eastern boundaries. Figure 2.4-4 is a copy of the LUNR map for the site and surrounding area.

Scattered farm and nonfarm residential dwellings are located along Denniston, Marabac, Route 129, and Route 208 roads surrounding the site.

757 346

2.4.2 Meteorology

The meteorological evaluation of Site 8-4-2 considered the ground level dispersive capability and the potential for cooling tower impacts on sensitive receptors.

2.4.2.1 Topography

Site 8-4-2 is located at an elevation of about 360 ft msl in the Wallkill River Valley. The Wallkill River itself is located about 1 mile west of the site at an elevation of 200 ft msl. The Wallkill Valley is situated NNE-SSW. To the west and northwest of the site the valley is relatively flat for about 5 miles and then the Shawangunk Mountains rise sharply to elevations in excess of 2000 ft msl 7 miles from the site. To the east of the site there are several hills about 500-600 ft msl less than 1 mile from the site, and the Marlboro Mountains (in excess of 1000 ft msl) are found about 7 miles from the site.

2.4.2.2 Meteorological Data

There are two sources of meteorological data from the area potentially representative of the site. They are the Dutchess County (Poughkeepsie) Airport, located 14 miles east of the site, and the Power Authority of the State of New York (PASNY) Quarry site meteorological tower located 11 miles east of the site.

The Dutchess County Airport is located adjacent to Wappinger Creek at an elevation of about 160 ft msl in the shallow Wappinger Creek Valley; with elevations on the order of 200-250 ft msl within 1 mile of the airport. The Quarry meteorological tower is located at an elevation of 50 ft msl in the shallow Casper Creek Valley with elevations on the order of 200 ft msl within 1 mile of the tower. Both the Dutchess and Quarry locations are within the wide N-S Hudson Valley, bounded on the east by elevations exceeding 1000 ft about 15 miles away, and bounded on the west by the Marlboro Mountains about 5-7 miles away and the Shawangunk Mountains about 20 miles away.

The wind distribution by stability class for the Dutchess County Airport for 1950-1954 as calculated with the NCC Star Program is presented in Table 2.4-1. The Dutchess overall wind distribution reveals some tendency towards a NNE-S wind channelling, with a frequency of NNE winds of 12% and a frequency of SSE-S-SSW winds of 27%. The Dutchess overall wind speed distribution reveals a frequency of speeds from 0-3 knots of 41%, from 4-6 knots of 21%, and from 7-10 knots of 26%. There is a frequency of stable atmospheric conditions of 35%, with the frequency of stable conditions with speeds from 0-3 knots of 24%, from 4-6 knots of 7%, and from 7-10 knots of 4%. The Dutchess wind measurement height is at 31 ft (9.4 meters), or 35% higher than the standard NWS 7 meter height.

The wind distribution by stability class for the Quarry meteorological tower for the year 7/20/73-7/19/74 is presented in Table 2.4-2. The Quarry distribution presented is based on the winds from the 33 ft elevation of the tower and the ΔT stability class from 180-33 ft. The Quarry overall wind

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distribution also reveals some tendency for wind channelling, with a frequency of north winds of 14% and a frequency of southwest winds of 12%. The overall speed distribution reveals a frequency of speeds from 0-3 mph of 36%, from 4-7 mph of 33%, and from 8-12 mph of 7%. The Quarry data include a separate frequency of variable winds of 22%, many of which conceivably occurred with lighter wind speeds. The Quarry data also indicate that stable atmospheric conditions occurred with a frequency of 54%, and the frequency of stable conditions with wind speeds from 0-3 mph is 24%, from 4-7 mph was 11% and from 8-12 mph was 1%. Additionally, the Quarry data report a separate frequency of stable conditions with variable winds of 18%, many of which conceivably occurred with lighter winds.

In addition to the Dutchess and Quarry data, there are also meteorological tower data from farther north in the Hudson available at the PASNY Athens and Cementon locations. These data have been discussed in Section 2.3.2.

2.4.2.3 Ground Level Dispersive Capability

The valley location of the site would contribute to the potential for wind channelling and cold air drainage. The Dutchess Airport and Quarry meteorological data locations were judged to be fairly representative of the site. The valley orientation and exposure of the data sites and Site 8-4-2 are somewhat similar. The Athens and Cementon data are also of qualitative value in evaluating the site since they are from a somewhat analagous valley situation, albeit farther to the north.

2.4.2.4 Cooling Tower Evaluations

The valley location of the site would inhibit the dispersion of moisture and contributed to fog formation potential. There are also several potential sensitive receptors in the vicinity of the site, including the New York State Thruway 3 miles to the east of the site, a small airport about 1 mile north, the Town of Wallkill about 4 miles south, and several other local highways.

2.4.2.5 References for Section 2.4.2

1. USGS Topographic Maps, 1:24,000 scale; Gardiner, New York and Poughkeepsie, New York.

2. USGS Topographic Maps, 1:250,000 scale, Scranton, Pennsylvania and Hartford, Connecticut.

3. U.S. Department of Commerce, NOAA, NCC, EDS, Wind Distribution by Pasquill Stability Class/5, STAR Program, Poughkeepsie, N.Y., 1950-1954.

4. U.S. Department of Commerce, Weather Bureau, Station History, Poughkeepsie, New York, February 1, 1954.

5. Power Authority of the State of New York, Application to the New York State Board on Electric Generation Siting and the Environment, 1980 - 700 MW Fossil Fueled Unit, June 1975, Part IV, Volume 1, and Part VII, Volume 1.

2.4.3 Hydrology

2.4.3.1 Water Availability and Supply

The source of cooling water is the Hudson River. The intake would be located approximately 83 miles downstream of USGS Gaging Station No. 3580 near Troy, New York. Records (February 1946 to September 1973) at this station indicate a mean freshwater discharge of 13,060 cfs over the period of record, a minimum daily freshwater discharge of 882 cfs, a minimum monthly freshwater discharge of 2875 cfs, and a 7-day, once-in-ten-years low freshwater discharge of 2730 cfs.

The intake would be located in the estuarine portion of the Hudson River (downstream of the Troy Dam). Tidal flows in the vicinity of the intake have been estimated to be over 100,000 cfs.

Due to the amount of water available at this site, there should be adequate water supply.

2.4.3.2 Flood Protection Requirements

The site is located approximately 10 miles from the Hudson River and approximately 100 ft in elevation above the nearest stream, the Wallkill River. Therefore, there is no problem with flooding at the site and flood protection requirements are not considered.

2.4.3.3 Effects of Construction

No problems related to dewatering or erosion during construction were identified. There are no onsite streams that might have been affected by construction. Dredging operations for intake and discharge construction might result in the release of polychlorinated biphenyls (PCBs) from bottom sediments. However, the concern here is less than that of the Upper Hudson. Dredging effects should be local and temporary, and proper handling of dredge spoil wastes would prevent excessive concentrations of PCBs from entering the water.

2.4.3.4 Effects of Operation

Generally, flows are large enough and the river is deep enough to provide good dispersion of the discharge effluent.

2.4.3.5 References for Section 2.4.3

1. Tice, R.H., Magnitude and Frequency of Floods in the United States, Part 1-B: North Atlantic Slope Basin, New York to York River, U.S. Geological Survey, 1966.

2. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States through September 1950, Part 1, 1954.

3. U.S. Geological Survey, Compilation of Surface Wat[illegible] of the United States, October 1950 to September 1960, Part 1, 1964.

4. U.S. Geological Survey, Water Resources Data, Part 1: Surface Water Records in New York State, 1966-1974.

5. U.S. Geological Survey 7.5 Minute Series New York State Topographic Map. Gardiner Quadrangle.

6. Lake Survey Center, National Oceanic and Atmospheric Administration, Department of Commerce, New York State Barge Canal Sytem: Chart No. 180, 1974.

7. Lawler, Matusky and Skelly Engineers, Hudson River Study - Aquatic Factors Governing Siting of Power Plants For Empire State Electric Energy Research Corporation, 1975.

2.4.4 Water Quality

2.4.4.1 General Description and Analysis

The analysis of the water quality of the Lower Hudson River water source for Site 8-4-2 is based on review of the state stream classification, appropriate USGS maps, and a water source visit.

The Lower Hudson River in the vicinity of Site 8-4-2 has a Stream Classification of A, non-trout waters[1].

Construction practices utilized and all discharges would be in conformance with 40 CFR 423[2] to minimize potential impact to water quality due to turbidity, siltation, and runoff. Monitoring and treating in-plant waste streams would insure that the facility's liquid effluent and cooling tower blowdown would be in compliance with appropriate state and federal guidelines and regulations. Thus, if measures were to be taken to control possible increases in siltation, turbidity, suspended solids levels, and reduction in dissolved oxygen production from suppressed photosynthesis, existing water quality conditions would not likely be aggravated by the operation of a closed-cycle plant.

2.4.4.2 References for Section 2.4.4

1. New York State Department of Environmental Conservation. 6 NYCRR, Subchapter B, "Classes and Standards of Quality and Purity Assigned to Fresh Water and Tidal Salt Waters," 1966, as amended.

2. 40 CFR 42? "Steam Electric Power Generating Point Source Category," October 1974, as amended.

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2.4.5 Aquatic Ecology

This analysis of the aquatic ecology and resources of the Lower Hudson River water source for Site 8-4-2 is based on a review of background literature, publications of and meetings and conversations with personnel of the New York State Department of Environmental Conservation, and a water source visit.

2.4.5.1 Preexisting Stress

Preexisting stress on the water source biota appeared to be from previously unrestricted industrial discharges into the river.

2.4.5.2 Aquatic Resources

The stretch of the Lower Hudson to be used as a water source is the western portion of the river at RM 70-71. The channel section of the river in this stretch has depths ranging from 40-70 ft. There is a shallow area near the shoreline before depths drop to 45 ft.

The lower portion of the Hudson River is classified as an estuary since there is an average tidal rise and fall of 4.8 ft below the dam at Troy where the river bed is still several feet below sea level. The estuarine portion of the river extends upstream 20 to 70 miles from the mouth, depending on freshwater flow(1).

A microfaunal and macrofloral population investigation of the Hudson River in the vicinity of RM 69-70 was conducted in the summer of 1971, between June 29 and August 10. Major producers were the algae Cyclotella, Anacystis, and Pediastrum. Minor producers were the algae Melosira, Fragilaria, and Surirella. Primary consumers of importance were the rotifer Keratella cochlearis and the protozoan, Condonella cratera. Numerous Suctoria in the genera Acineta, Metacineta, and Tokophyra, and other protozoa were recovered from glass slides. Principal benthic organisms noted were the mollusc Sphaerium, the insect Chaoborus, the annelid Tubifex, the insect Chironomus, and the crustacean Gammarus(2).

Longitudinal distribution of phytoplankton taxonomic groups were studied and found to be related to salinity. At the mouth of the Hudson River, the phytoplankton community was dominated by centric diatoms and dinoflagellates. In the mesohaline section of the river, both centric and pennate diatoms were dominant and green algae and blue-green algae contributed to the algal community primarily during the warmer months of the year. In the oligohaline section of the river, pennate diatoms were more abundant than centric diatoms, and green algae and blue-green algae composed a large percentage of the phytoplankton community during the late summer and fall(3).

Total phytoplankton abundance in the river reach between New York and Poughkeepsie tended to increase with distance from the mouth of the river. The Tappan Zee was an exception to the pattern: during the winter and spring total abundance was greater there than farther north or south, whereas

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during the fall, abundance in the Tappan Zee was just slightly greater than abundance at the mouth of the river. Many reports showed that there were usually two major seasonal pulses of phytoplankton in the mesohaline, oligohaline, and freshwater sections of the estuary, the first occurring during the April-July period and the second during the October-December period[3].

It was found that potential nuisance forms were common components of the phytoplankton community. The possibility that these forms may have achieved nuisance proportions was negligible at the levels of phytoplankton abundance usually found in the Lower Hudson River. However, since algal abundance in the freshwater section of the estuary approached the magnitude at which nuisance effects were noticeable, it was probable that nuisance algal abundance could have become troublesome during the most productive months of the year (May-October)[3].

The invertebrate zooplankton community consisted of microzooplankton, including protozoans and rotifers, and macrozooplankton, such as amphipods and isopods. Zooplankton were more abundant in the mesohaline and oligohaline sectors of the Lower Hudson River. Longitudinal taxonomic succession patterns were apparently salinity dependent. In the saline and brackish water regions of the estuary, a mixture of marine and salinity tolerant freshwater organisms was common. The proportion of marine to freshwater organisms at a particular location on the river depended on the season of the year and the volume of freshwater flow. The zooplankton community reached maximum levels of abundance during the late spring and summer; a smaller fall maximum was common. The various taxonomic groups composing the community usually had different seasonal patterns[3].

Benthic fauna were usually classified according to salinity tolerances and, therefore, to the estuarine zone in which they were normally found. The faunal assemblage in the mesohaline zone was similar through all the years, with a slight shift noted to dominance by less salt-tolerant organisms. Studies conducted on the pollution intolerant isopod Cyathura polita suggested a widespread distributional pattern, indicating low levels of pollution. Seasonal shifts in organisms, with halophilic organisms more prevalent during the late summer-early fall, reflected recruitment from more marine waters in conjunction with lower freshwater flow. The dominant fish food item was the amphipod, Gammarus. Annelid worms were a dominant benthic taxon with oligochaetes more prevalent in the upper mesohaline zone and polychaetes more abundant toward the estuary mouth[3].

The oligohaline zone of Newburgh Bay had been studied and showed that the dominant benthic organisms collected in the oligohaline zone were oligochaetes and dipterans. The major fish food item was the gammarid amphipod, Gammarus. Dipteran density was highest during the winter and lowest during the spring. All other benthic organisms had highest densties during the spring and lowest densities during the fall. The benthic fauna were similar over all years studied with maximum yearly similarity observed during the spring and the most dissimilar groupings during the fall months[3].

The fish of the Hudson can be divided into four categories based on their distribution in relation to salinity. These categories are (1) fresh-

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water fishes, (2) marine migrant fishes, (3) truly estuarine fishes, and (4) anadromous and catadromous fishes. These fish are as follows[3]:

Freshwater Species

white sucker (*Catostamus commersoni*)
chubsucker (*Erimyzon sp.*)
redbreast sunfish (*Lepomis auritus*)
pumpkinseed (*Lepomis gibbosus*)
bluegill (*Lepomis macrochirus*)
smallmouth bass (*Micropterus dolomieui*)
largemouth bass (*M. salmoides*)
white crappie (*Pomoxis annularis*)
black crappie (*P. nigromaculatus*)
silvery minnow (*Hybognathus nuchalis*)
goldfish (*Carassius auratus*)
carp (*Cyprinus carpio*)
golden shiner (*Notemigonus crysoleucas*)
emerald shiner (*Notropis atherinoides*)
common shiner (*N. cornutus*)
spottail shiner (*N. hudsonius*)
rosy face shiner (*N. rubellus*)
redfin pickerel (*Esox americanus*)
northern pike (*E. luchalis*)
chain pickerel (*E. niger*)
grass pickerel (*E. vermiculatus*)
white catfish (*Ictalurus catus*)
black bullhead (*I. melas*)
yellow bullhead (*I. natalis*)
brown bullhead (*I. nebulosus*)
johnny darter (*Etheostoma nigrum*)
white bass (*Morone chrysops*)
central mudminnow (*Ubra limi*)
brook trout (*Salvelinus fontinalis*)
brown trout (*Salmo trutta*)

Marine Migrant Species

tidewater silverside (*Menidia beryllina*)
atlantic silverside (*M. menidia*)
rough silverside (*Membras martinica*)
atlantic needlefish (*Strongylura marina*)
crevalle jack (*Caranx hippos*)
lookdown (*Selene romer*)
atlantic menhaden (*Brevoortia tyrannus*)
gizzard shad (*Dorosoma cepedianum*)
striped killifish (*Fundulus majalis*)
silver hake (*Merluccius bilinearis*)
red hake (*Urophycis chuss*)
fourspine stickleback (*Apeltes quadracus*)
threespine stickleback (*Gasterosteus aculeatus*)
striped mullet (*Mugil. cephalus*)
white mullet (*M. curema*)

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Marine Migrant Species (continued)

winter flounder (*Pseudopleuronectes americanus*)
bluefish (*Pomatomus saltatrix*)
weakfish (*Cynoscion regalis*)
spot (*Leiostomus xanthurus*)
scup (*Stenotomus chrysops*)
northern pipefish (*Syngnathus fuscus*)
sea robin (*Prionotus carolinus*)

Estuarine Species

gizzard shad (*Dorosoma cepedianum*)
banded killifish (*Fundulus diaphanus*)
mummichog (*Fundulus heteroclitus*)
white perch (*Morone americana*)
hogchoker (*Trinectes maculatus*)

Anadromous Species

shortnose sturgeon (*Acipenser brevirostrum*)
atlantic sturgeon (*A. oxyrhynchus*)
american shad (*Alosa sapidissima*)
alewife (*A. pseudoharengus*)
blueback herring (*A. aestivalis*)
bay anchovy (*Anchoa mitchilli*)
atlantic tomcod (*Microgadus tomcod*)
rainbow smelt (*Osmerux mordax*)
striped bass (*Morone saxatilis*)

Catadromous Species

american eel (*Anguilla rostrata*)

A study(4) carried out in the vicinity of RM 69-70 had the followng 29 juvenile, yearling, and older fish species collected by all gear from May 1973 through May 1974:

atlantic sturgeon (*Acipenser oxyrhynchus*)
american eel (*Anguilla rostrata*)
blueback herring (*Alosa aestivalis*)
alewife (*A. pseudoharengus*)
american shad (*A. sapidissima*)
gizzard shad (*Dorosoma cepedianum*)
bay anchovy (*Anchoa mitchilli*)
chain pickerel (*Esox niger*)
goldfish (*Carassium auratus*)
carp (*Cyprinus carpio*)
golden shiner (*Notemigonus crysoleucas*)
spottail shiner (*Notropis hudsonicus*)
white sucker (*Catostomus commersoni*)
white catfish (*Ictalurus catus*)
brown bullhead (*I. nebulosus*)

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atlantic tomcod (*Microgadus tomcod*)
banded killifish (*Fundulus diaphanus*)
white perch (*Morone americana*)
striped bass (*M. saxatilis*)
rock bass (*Ambloplites rupestris*)
redbreast sunfish (*Lepomis auritus*)
pumpkinseed (*L. gibbosus*)
bluegill (*L. macrochirus*)
smallmouth bass (*Micropterus dolomieui*)
largemouth bass (*M. salmoides*)
black crappie (*Pomoxis nigromaculatus*)
tessellated darter (*Etheostoma olmstedi*)
yellow perch (*Perca flavescens*)
hogchoker (*Trinectes maculatus*)

Studies[5] have shown that larval white perch (4 to 10 mm) concentrated in RM 70 to 110. Early juvenile white perch (about 15 to 40 mm) were the predominant life stage throughout July from RM 50 to 110. Striped bass were noted to have spawned from late April to mid-June from RM 40-100. Atlantic tomcod were noted to have spawned during late December and January from RM 40 to 70.

A study[4] carried out in the vicinity of RM 69-70 showed that striped bass apparently spawned during late April through June from RM 27 to RM 145. Highest egg and larval concentrations in 1966 were between RM 44 and RM 82; in 1967 between Hyde Park (RM 82) and Saugerties (RM 102) and 1973 from Hyde Park (RM 77-86) to the Croton region (RM 34-39).

In the river stretch in the vicinity of RM 69-70[4], eggs, yolk-sac larvae, and/or postlarvae of six anadromous species (alewife, blueback herring, american shad, rainbow smelt, atlantic tomcod, and striped bass); two resident species (white perch and tessellated darter); and two adventitious species (atlantic menhaden and bay anchovy) were collected. The alewife and blueback herring (combined) accounted for 76 percent of the total eggs collected with one-meter gear; american shad eggs counted for 24 percent; and a few atlantic tomcod eggs were collected in half-meter epibenthic sled samples in late February. White perch eggs were taken only with the half-meter epibenthic sled in May[4]. Nearly 77 percent of all yolk-sac larvae and 93 percent of all post larvae collected with one-meter gear were alewife and blueback herring (combined). American shad accounted for 9 percent of all yolk-sac larvae and 4 percent of all post larvae. Peak spawning for alewife, blueback herring, american shad, striped bass, and white perch occurred either upstream or downstream of RM 69 or prior to sampling[4].

Most american shad eggs were found from RM 86 to 125 with the highest egg concentration reported from the Saugerties area (RM 94 to 107) in mid-April. Very few shad eggs were collected in the Poughkeepsie region (RM 62 to 77). Most alewife and blueback herring spawned upriver to RM 69 with the peak concentrations of alewife-blueback herring eggs occurring in the Catskill and Albany regions[4].

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Striped bass spawned in 1973 primarily downriver from RM 69. The highest striped bass catches were from RM 39 to 47 during May 13-19. In 1967, most spawning occurred upriver in the vicinity of Hyde Park (RM 82)[4]. Studies by Lawler, et al.[6] showed that striped bass eggs were made most abundant in the Hudson River in the Saugerties area (RM 102), striped bass larvae were most abundant in the Hudson River in the Cornwall/Marlboro area (RM 56-69), and striped bass juveniles were most abundant in the Peekskill area (RM 45).

Studies[7] in the vicinity of the Roseton and Danskammer Power Plants (RM 69) showed that with the exception of the atlantic tomcod, which spawned in December and January, the main spawning period for the Hudson River fish populations in the Roseton/Danskammer Point vicinity occurred from May through July. This period encompassed the spawning of the anadromous blueback herring, alewife, american shad, striped bass, white perch, rainbow smelt, tessellated darter, sunfish, and cyprinids. White perch was found to have been the dominant resident species in the area. The average number of white perch larvae for the 1973 peak was $174/1000m^3$, and in 1972 it was greater than $700/1000m^3$. Peak abundance of the white perch larvae occurred on June 19-20 with the peak abundance in 1972 approximately 4 times the peak abundance in 1973.

For adult fish, approximately 60 percent of the total 1973 catch (21,369) was blueback herring and white perch. During three years of sampling the present composition of the white perch ranged from 28.5 to 28.9 percent of the total. This tended to be a strong indication of a stable population. American shad represented a small proportion of the total catch over 3 years. Atlantic tomcod composed 34 percent of the 1972 catch, and approximately 3 percent for each of the other two years[7].

Six anadromous species (alewife, blueback herring, american shad, rainbow smelt, atlantic tomcod, and striped bass) occurred in the Hudson and were known to have had migratory routes through this stretch of the river[4].

The shortnose sturgeon (_Acipenser_ _brevirostrum_) is considered to be an endangered species. The shortnose sturgeon had a former distribution of Atlantic seaboard rivers from New Brunswick to Florida, including the Hudson, Delaware, Potomac, Connecticut, Salmon Creek (North Carolina), and St. Johns River watershed (Florida). Probably the major factor contributing to the decline of the shortnose sturgeon is pollution. Overfishing is likely since this species has been intensively fished in spawning areas, and has been taken in shad gill nets over a wide area of the Hudson and other rivers[8]. The atlantic sturgeon (_Acipenser_ _oxyrhynchus_) is considered to be rare[9].

2.4.5.3 Potential Impacts of Construction

Environmental impacts of construction are expected to be primarily short term and reversible for organisms inhabiting the Lower Hudson River. The primary unavoidable but reversible effects would be associated with dredging and construction of intake and discharge structures.

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The aquatic impact associated with dredging operations would involve short term turbidity increases as a result of sediment removal. The dredging would result in a temporary resuspension of some of the sediments that had been deposited previously in the area. Suspended sediments would be introduced through direct bottom disturbance. This temporary increase in suspended sediments might be accompanied by an increase in chemical compounds associated with these sediments. Polychlorinated biphenyl (PCB) would be of concern but not as great a concern as in the Upper Hudson(3). PCB compounds have a strong affinity for small sediment particles; therefore, most of the PCB in the Hudson River remain in the sediments. Any increase of PCB concentrations caused by resuspension of sediments in the water column would be local and temporary. Because the PCBs have a high affinity for sediment particles, they would be redeposited along with the sediment on the bottom after a short time.

Some benthic organisms would be lost with spoil removal, however any backfilling would provide suitable habitat for some recolonization. Thus, the impact is considered short term and reversible.

Effects of dredging activities on organisms other than the displaced macroinvertebrates would be localized and temporary. Dredging operations would be scheduled reasonably to avoid spawning and other biologically active periods. Increased turbidity levels could have a short term impact on plankton populations. However, because of the limited area involved in dredging, the potential adverse effects would be inconsequential.

Fish would be largely unaffected because their mobility would enable them to avoid construction activities. Because of the short duration and limited area affected by construction activities, no impact upon or blockage of fish migration in the water source in the site vicinity is anticipated.

2.4.5.4 Potential Impacts of Operation

The potential impacts of plant operation on aquatic biota in this stretch of the Lower Hudson are mainly dependent upon the specific location and design of the intake and discharge structures. Potential impact would result from impingement of adult fish, entrainment of ichthyoplankton, phytoplankton, zooplankton, macroinvertebrates and juvenile fish, and thermal and chemical discharges.

The channel area would be best for location of the intake and discharge. The potential operational impacts would be minimal if the intake and discharge structures were located away from any unique habitats or areas of this stretch of the river that are conducive to fish congregating, feeding, or spawning.

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2.4.5.5 References for Section 2.4.5

1. Heffner, R.L., Phytoplankton Community Dynamics in the Hudson River Estuary Between Mile Points 39 and 77 In: Hudson River Ecology, Third Symposium on Hudson River Ecology held at Bear Mountain, New York, March 22-23, 1973, sponsored by the Hudson River Environmental Society, Inc.

2. Feldman, A.E., A Microfaunal and Microfloral Population Investigation of the Hudson River in the vicinity of Roseton, New York In: Hudson River Ecology, Third Symposium on Hudson River Ecology held at Bear Mountain, New York, March 22-23, 1973, sponsored by the Hudson River Environmental Society, Inc.

3. Lawler, Matusky and Skelly Engineers, Hudson River Study, Aquatic Factors Governing the Siting of Power Plants, Empire State Electric Energy Research Corporation, Volume 1.

4. Application of the New York State Board on Electric Generation Siting and the Environment, 1980-700 MW Fossil Fueled Unit, Power Authority of the State of New York, Part IV, Volume 2, Section 3.3 (Quarry).

5. Fisheries Survey of the Hudson River, March-December 1973, Volume IV, prepared for Consolidated Edison Company of New York, Inc. by Texas Instruments, Incorporated, Ecological Services, Dallas, Texas, 1974.

6. Lawler, J.P. et al., "Hudson River Striped Bass Life Cycle Model" In: Report No. 15, Entrainment and Intake Screening Workshop, Loren Jensen, Editor, sponsored by Edison Electric Institute, Cooling Water Discharge Research Project (RP-49) and Maryland Power Plant Siting Program, 1974, pp. 83-94.

7. 1973 Hudson River Aquatic Ecology Studies at Roseton and Danskammer Point, Volume II (Plankton, Benthos and Fish Larvae) and Volume III (Fish), October 1974 (Revised April 1975), Lawler, Matusky and Skelly, Engineers, Central Hudson Gas and Electric Corporation.

8. Bureau of Sport Fisheries and Wildlife, Threatened Wildlife of the United States, U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife Resources Publication 114, 1973, 289 pp.

9. New York State Department of Environmental Conservation, Conservation Education, Information Leaflet, Environmental Deterioration and Declining Species, August-September 1970.

10. Research Triangle Institute, Center for Technology Applications, National Conference on Polychlorinated Biphenyls, sponsored by U.S. EPA, November 19-21, 1975.

2.4.6 Terrestrial Resources

The following summary and analysis of Site 8-4-2 is based on a review of these sources of data: USGS Topographic maps (7.5 minute series), aerial photographs, pertinent literature, contacts with state resource agencies, LUNR maps, and site visits.

2.4.6.1 Land Use

2.4.6.1.1 Dedicated Areas

1. federal lands -- none on or near the site

2. natural landmarks -- none on or near the site

3. state and local parks -- Shawangunk Town Park 5.5 miles south. This area is not part of the site and should not be affected by development of the site.

4. privately dedicated areas -- none on or near the site

5. endangered species -- at the time of the study, the U.S. Fish and Wildlife Service (USFWS) had not ruled that any plant taxa were endangered or threatened. The State of New York did not have an endangered plant regulation but did have a regulation prohibiting removal of certain plant species without the consent of the landowner.

   The animals considered endangered by the USFWS at the time of the study which might have occurred in the site vicinity included the peregrine falcon, the bald eagle, and the Indiana bat. None of these were known to be in the vicinity of the site but may have migrated through the site area. The State of New York also considered the bog turtle and the osprey to be endangered. The osprey did not nest in the site area. The bog turtle may have occurred in Ulster County; however, suitable habitat did not occur on or adjacent to the site.

6. critical habitat -- none on or near the site

2.4.6.1.2 Vegetation

According to the LUNR map, the site is mostly cropland and pasture with some woodlots and shrub areas. Based on the site visit the woodlots are mixed hardwoods and conifers. The woodlots appear to be second growth on land which is not suitable for farming.

2.4.6.1.3 Wildlife Habitat

Since the major plant communities are agricultural cropland and pasture, there is a limited amount of wildlife habitat available. Those species present on the site include squirrels, rabbits, woodchucks, and deer.

Other species present would include sparrows, blackbirds, robin, rock dove, starling, and other species associated with farm and pastures. There should be very few, if any, waterfowl and few gamebirds on the site. Gamebirds possibly present could include pheasant, woodcock, and mourning dove. There are limited wet areas (one small wetland, three small ponds, and one artificial pond) on the site. These areas probably do not support large numbers of reptiles or amphibians nor do they support waterfowl.

2.4.6.1.4 Farmland

At the time of the study, over half of the site was active cropland and pasture. The site is in a State Agricultural District.

2.4.6.1.5 Wetlands, Coastal Zone Management Program, and State Wetlands Act

There is a small freshwater wetland in the northeastern portion of the site. This area does not represent a significant habitat for aquatic animals. The site is not within the coastal zone.

2.4.6.1.6 Floodplains

No floodplain was identified onsite based upon field inspection and review of maps and photographs.

2.4.6.2 Transmission Corridors

For this site, approximately 55 circuit miles of 345kV transmission facilities would be required. One transmission line would be constructed from the site northeasterly for approximately 11.8 miles to the Ohioville Substation; a second transmission line would be constructed in a southerly direction for a distance of 14.6 miles to Rock Tavern Substation. A third transmission line would be constructed easterly from the site to Pleasant Valley Substation, a distance of 28.4 miles, of which 1.5 miles would be constructed underground where the corridor crosses the Hudson River Valley. For the first 1.2 miles from the site, all three of these transmission lines would be constructed on a common right-of-way.

Offsite transmission facilities for a nuclear station at Site 8-4-2 would consist of two 115kV lines on a common right-of-way extending from the site for a distance of 1.5 miles to tie into the existing Modena-East Walden 115kV transmission line.

Land uses crossed by the two-mile-wide study corridors are predominantly agricultural and forest brushland (22.8 miles) and mature forest (16.4 miles) with some residential (3.6 miles) and commercial (0.7 mile) uses. Approximately 5.2 miles of the study corridors cross wetlands, and 1 mile crosses slopes in excess of 25%. The corridors cross the New York State Thruway and U.S. Routes 9 and 9W.

The corridors cross areas of generally low or medium visual quality with only 6 miles crossing areas of medium or high visual quality. Approximately 18 corridor miles cross areas of national or state importance.

Table 2.4-3 presents the transmission corridor data for Site 8-4-2.

2.4.6.3 Pipeline Route

The pipeline route to the site begins on the bank of the Hudson River in the Town of Marlborough. Exact location of the intake would depend on aquatic ecological and engineering considerations. The route selected for the evaluation is approximately 11 miles long. The line crosses approximately 4 miles of forest land, 1 mile of brushland, and approximately 3 miles of agricultural land including orchards and vineyards. Approximately 1 mile of the route crosses five wetlands; however, some can be avoided after final route selection. The pipeline crosses 11 streams. The line would cross the tracks of the New York, New Haven, and Hartford Railroad (Amtrack). Four roads would be crossed; Interstate 87 (22,100 vehicles per day (V/D)), NY Route 9W (6650 V/D), NY Route 32 (3650 V/D) and NY Route 208 (3750 V/D). The final selection of a pipeline route would require detailed engineering and environmental studies because of the number of transportation routes crossed, the wetlands present and the agricultural activities. Figure 2.4-1 shows the location of the pipeline route.

2.4.6.4 Railroad Route

The railroad route to the site begins at the Penn Central Railroad (Amtrack) line southwest of the Town of Wallkill. The line would require the construction of approximately 2 miles of track. Based on LUNR maps the railroad route crosses relatively equal distances of agricultural cropland, orchard, brushland, and forest. Two small streams would be crossed as would one state route, NY State 208, used by 3750 vehicles per day. Selection of the final railroad route would depend on engineering aspects. There are no unique ecological areas along the potential route. Figure 2.4-1 shows the location of the railroad route.

2.4.6.5 Impoundments

Impoundments are not required for development of this site.

2.4.6.6 Construction Impacts

During site preparation and facility construction, the terrestrial community would be affected by clearing and grubbing, excavation, dewatering, placement of roads, railroads and pipelines, and operation of construction equipment.

The impacts expected from these activities include the alteration of existing vegetation, causing changes in wildlife populations onsite and within terrestrial communities surrounding the site, and introduction of barriers to wildlife movement.

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Site 8-4-2 is located in an area of open, flat terrain 0.5 miles E of the Wallkill River. The site terrain is typical for the area. Construction in this area would probably require minimal excavation and impacts associated with excavation would be small. In general, large open areas do not support much wildlife or disturbance to open areas, and subsequent loss to fauna would not be significant.

No site cover types or habitats are unique to the region.

Pipeline and railroad corridors from the site would only disturb a small area of open fields. Impacts would be small.

2.4.6.7 Operation Impacts

Impacts on terrestrial ecology from operation of a nuclear power plant at the site would be limited to the possible effects of cooling tower drift deposition and noise. No expected levels of harmful materials known to cause damage to flora and fauna would be deposited as a result of operation of the nuclear facility.

2.4.6.8 References for Section 2.4.6

1. Britton N.L. and A. Brown, An Illustrated Flora of the Northern United States and Canada, 1913.

2. Burt, W.H., Mammals of the Great Lakes Regions, 1957.

3. Burt, W.H. and R.P. Grossenheider, A Field Guide to the Mammals, 1964.

4. Conant, R., A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 1975.

5. Fernald, M.L., Gray's Manual of Botany, 1950.

6. Hall, E.R. and K.R. Kelson, The Mammals of North America, 1959.

7. New York State Department of Environmental Conservation, "Protected Native Plants.", 6 NYCRR 193.3, 1974.

8. New York State Office of Planning Services, Land Use and Natural Resources Inventory Map Overlays (1:24,000), 1968-1974.

9. Palmer, E.L., Fieldbook of Mammals, 1957.

10. Peterson, R.T., A Field Guide to the Birds, 1947.

11. Peterson, R.T. and M. McKenney, A Field Guide to Wildflowers of Northeastern and North Central North America, 1968.

12. Rickett, H.W., Wildflowers of the United States, Vol. 1: The Northeastern States, 1966.

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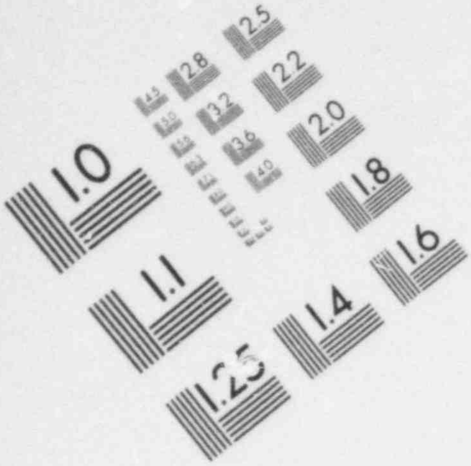

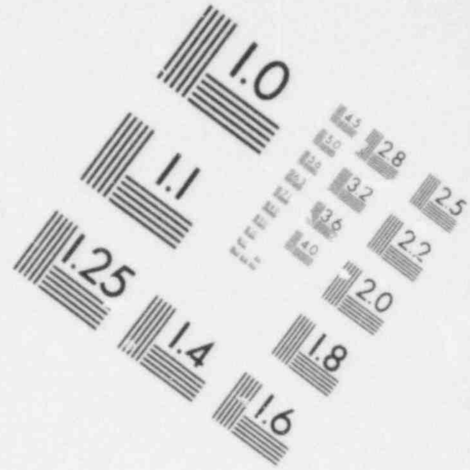

IMAGE EVALUATION TEST TARGET (MT-3)

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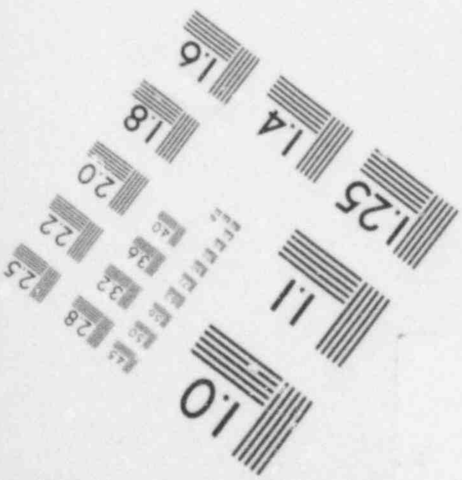

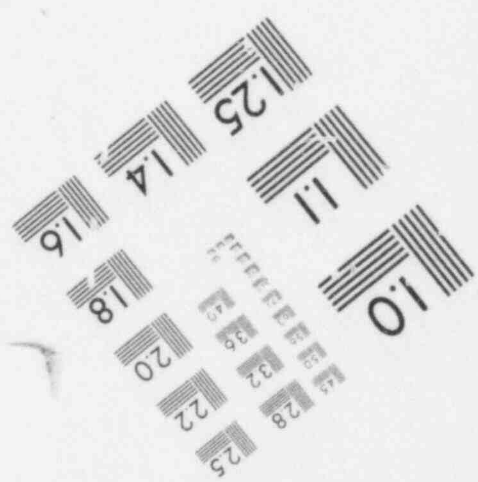

13. Robbins, C.S., B. Brunn, and H.S. Zim, Birds of North America, 1966.

14. U.S. Fish and Wildlife Service, "Endangered and Threatened Species Notice on Critical Habitats." In: Federal Register, 1975.

15. U.S. Fish and Wildlife Service, "Review of Endangered Species Status." Federal Register, 1975.

16. U.S. Fish and Wildlife Service, "Review of Status of Vascular Plants and Determination of 'Critical Habitat'." In: Federal Register, 1975.

17. U.S. Fish and Wildlife Service, Threatened Wildlife of the United States, 1973.

18. U.S. Fish and Wildlife Service, Office of Endangered Species and International Activities, United States List of Endangered Fauna, 1974.

19. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Maps.

20. New York State Department of Environmental Conservation, Division of Educational Services, Environmental Deterioration and Declining Species, 1970.

2.4.7 Socioeconomics

2.4.7.1 Displacement and Disruption of Onsite Resources

There are no designated historic, scenic, cultural, or natural resources on the site. Construction of a power plant would not adversely affect access to any other resources in the site vicinity.

2.4.7.2 Displacement of Residential and Economic Activities

Development of a power plant on this site would require that ten dwellings be acquired and the households be relocated offsite.

Approximately 64% of the site is agriculturally productive land, mostly cropland and pasture. Two commercial sand and gravel removal operations occupy a small portion of the site.

2.4.7.3 Origin and Size of the Labor Pool

The six-county Mid-Hudson Economic Area of New York State which contains the site is expected to provide most of the construction labor requirements. The labor pool would also include Putman, Westchester, and Rockland Counties. The major cities in this area are Poughkeepsie, Kingston, and Newburgh, New York.

The construction labor force in this area was estimated to be in excess of 50,000 workers (1970). Significant inmigration of labor is not expected to be necessary in order to supply the site's construction trades labor requirements.

2.4.7.4 Anticipated Points of Vehicular Congestion

The major roads providing transportation access to the site vicinity are Interstates 87 and 84, State Route 17, and U.S. 44. Access to the site would be provided by State Route 208. The communities of Walden, Wallkill, and New Hurley would experience increases in through traffic along Route 208.

2.4.7.5 Potential Impacts on Housing and Services

The housing vacancy rate in the site's commuting area was estimated to have been 6.37% (1970), more than 39,000 vacant year-round units. This is considered indicative of adequate housing stock to absorb the construction workers likely to migrate into the area. Adverse effects on the local housing market are not anticipated.

Because of the projected low potential for inmigration of construction workers there is no significant potential for impacting local services.

2.4.7.6 Analysis

Good highway access, adequate vacant housing, and a large pool of construction labor combine to produce an acceptable location for development of a power plant. Inmigration of construction workers, the primary vehicle for socioeconomic impacts, is not expected to exceed acceptable levels. The primary adverse socioeconomic effects at this site would result from the necessity to relocate the households currently inhabiting the site, and the two small sand and gravel operations.

2.4.7.7 References for Section 2.4.7

1. New York State Department of Commerce, Mid-Hudson Area Business Fact Book, Part 2, 1974.

2. New York State Department of Commerce, Westchester-Rockland-Putman District Business Fact Book, Part 2, 1974.

3. New York State Department of Transportation, Transportation/Planning Map, New York State-South, 1974.

4. New York State Department of Transportation, 7.5 Minute Series Planimetric Map, Gardiner Quadrangle.

5. U.S. Geologic Survey, 7.5 Minute Series (Topographic) Map, Gardiner Quadrangle, 1957.

2.4.8 Geology/Seismology

2.4.8.1 Introduction

The site area is gently rolling farm land and prima-ily used for grazing and forage crops. Scattered stands of trees are locatec on low ridges, where thin soil and/or till is on bedrock. A modest-sized, active crushed stone operation is located on the east edge of the propert where material is being removed from an old aqueduct tunnel spoil pile (Figure 2.4-6). The site drains into the Wallkill River by way of several small streams, and ultimately into the Hudson River near Kingston. One of the small drainage streams had been dammed, creating a lake of about six acres.

2.4.8.2 Regional Geologic Setting

2.4.8.2.1 Rocks

The area is par the Hudson Valley section of the Valley and Ridge physiographic province (Figure 1.4-2) and is set in the broad valley of the Wallkill River. The skyline is dominated by the escarpment of the Shawangunk ridge.

The principal rock types are the shale, siltstone, and graywacke sandstone of the Normanskill Formation[1]. These rocks underlie the entire valley. The Shawangunk Conglomerate forms the ridge to the west (Figure 1.4-3).

2.4.8.2.2 Structural Features

The major structural trend is close, soclinal folds that strike north to northeastward[2]. No known faults are r-ognized or mapped[1] adjacent to the site (Figures 1.4-4 and 2.4-6).

2.4.8.2.3 Glacial Features

Glacial history was initiated with the advance of glacial ice, which abraded the bedrock and emphasized the general north-south bedrock structural trend. The advancing ice pushed up and overrode locally derived material to form a compact basal till. As the ice began to recede, meltwaters deposited sand and gravel along the valley walls creating kame terraces. As the ice melted, the mixture of rock materials carried by the ice was dropped, forming a widespread glacial till that was less compacted -- an ablation till. Subsequently, a series of ancient lakes developed in the Wallkill Valley as the northward drainage sought out progressively lower-level outlets -- as the ice front receded northward. The lake sediments formed a thick blanket over all earlier glacial deposits and bedrock below the lake level[3].

2.4.8.2.4 Groundwater

The area is underlain by a thick section of low permeability rocks which protects any deep regional aquifers from possible accidental contamination (Figure 2.4-5).

2.4.8.3 Areal/Site Geology

The site is on a gently westward dipping erosional terrace at an average elevation of 360 ft (Figure 2.4-6). Ridges have bedrock near the surface and reflect underlying structural trends. A 100-ft high ridge of bedrock forms a valley-like wall immediately east of the site. The fairly flat slope of the site is underlain by sandy lake deposits; a rather broadly spaced drainage pattern of low profile is developed in the soft sediments covering the site. One stream in the northwest corner of the site had cut and developed a steep bank.

A summary of well logs at this site is presented in Table 2.4-4.

2.4.8.3.1 Bedrock Units

2.4.8.3.1.1 Normanskill Formation

The only known bedrock unit in the vicinity of the site is the Normanskill Formation(1). The rock has also been designated the Mount Merino Shale(4) and the Martinsburg Formation(5). The unit had previously been designated the Hudson River Shales(2,6). The rocks are described as a monotonous series of dark bluish or greenish-gray shale, siltstone, slate and graywacke sandstone that weathers dark gray with locally a purple manganese stain; scattered limy zones weather to a dark rusty brown(2) (Figure 2.4-6).

Interbedded with the finer grained rocks are beds of graywacke sandstone which locally are very thick. This resistant rock tends to form topographic highs. Such units may underlie the bedrock highs situated immediately east of the site and are known to be responsible for the high ridge of Marlboro Mountain located about seven miles to the east.

2.4.8.3.1.2 Structure

The detailed exploration and exposure of the Normanskill rocks in the walls of the aqueduct provided much information on the structure of the bedrock. The dominant structure is close, isoclinal folds with generally steep dips to the east(6). A geologic section along the tunnel alignment across the Wallkill Valley(2), indicates a prevailing eastward dip interrupted by an occasional minor fault which also dips east. The latter has been thoroughly healed by calcite and other cementation. Observations on the site confirmed this general structural trend, and furthermore, revealed a northward plunging asymmetrical syncline with the eastern limb striking more northeastward than the western limb.

Except for the minor faults observed in the aqueduct, no faults have been mapped or reported in the area(1). Folds and faults associated with the Shawangunk Mountain area cannot be projected on trend into the Normanskill section of rocks at the site because correlative beds are not present.

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Excess strain energy is retained in some of the bedrock formations -- as evidenced by the occurrence of relaxation, and the formation of rebound fractures and features in the walls of Delaware aqueduct tunnels/open-cuts.

2.4.8.3.1.3 Engineering Characteristics

Bedding of the Normanskill rocks ranges from less than ¼ inch to several feet thick (sandstone beds). The shale beds have well developed cleavage, generally parallel to the bedding. Cleavage is not well developed in the sandstones. Joints are common and well developed in the sandstones, but only weakly developed in the shale. The shales weather to a depth of several feet, becoming stained/discolored and disintegrating into small chips and elongated pieces. The sandstone is more resistant and breaks into blocks of various sizes, depending on bed thickness and joint spacing. The shale/sandstone rocks will support steep slopes and are capable of providing adequate bearing capacity for a heavy foundation. The near-surface few feet may be ripped, but excavations in the deep, fresh rock will require drilling and blasting.

2.4.8.3.1.4 Groundwater Occurrence

Groundwater occurrence is controlled by joints and other open fractures, rather than porosity and permeability of the rock mass. Three domestic wells were recorded in the area; all penetrated rock, and reported yields of from eight to 25 gallons per minute[7]. The relatively high yield of 25 gallons per minute suggested that a local, well-developed joint system was intercepted and was recharged continuously.

2.4.8.3.2 Surficial/Overburden Materials

Two types of superficial deposits, silt, sand, gravel and cobbles (ice-contact deposits) and lake deposits, have been observed to occur throughout the site. However, a discontinuous basal till up to several feet thick is believed to occur overlying the bedrock as shown on Section A-A' (Figure 2.4-6).

2.4.8.3.2.1 Glacial Silt, Sand and Gravel (Ice-Contact Deposits)

When the glacial ice began to melt in the Wallkill Valley, a mixture of silt, sand, gravel, and cobbles was deposited by temporary outwash streams along the west wall of the valley. These deposits are responsible for the hummocky topography developed in the southeast corner of the site (Figure 2.4-6). This gravelly material is crudely bedded and consisted of silt, sand, gravel, and cobbles derived from local bedrock, with some quartzites from the Shawangunk ridge. An alignment of swampy areas located along the western edge of the valley and north of the site (Figure 2.4-6), may represent a portion of the former glacial drainage system that received no sediments.

2.4.8.3.2.2 Silt and Sand with Gravels (Lake Deposits)

A series of four former glacial lakes are believed to have backfilled in the Wallkill Valley; the 400-ft stage lake(3) was probably responsible for the deposit of lake sediments on the site. Weak and scattered exposures in old borrow pits (Figure 2.4-6) suggest that the sediments are horizontally bedded, sandy, and occasionally gravelly. The sediments thin to the east, but thicken rapidly and greatly in the bedrock channel of the Wallkill River on the west(6).

2.4.8.3.2.3 Basal Glacial Till

This unit is composed of clay and silt with some rock fragments The material is compact, very dense and hard due to ice action and overriding. The till is thin (Figure 2.4-6).

2.4.8.3.2.4 Generalized Thickness

The thickness of the surficial material varies, but is generally thin with bedrock close to the surface over much of the site, particularly the northern half. The lake deposits may average up to 40 ft thick in the southern portion but seemed to be only some 20 ft thick in the northern portion. The glacial silt, sand, and gravel (ice-contact) deposits are restricted to the southeast corner, and are steepsided. Their maximum thickness may be 70 ft; however, they were not involved with the main part of the site.

2.4.8.3.2.5 Drainage

The gently dipping surface of the site is underlain by sandy lake sediments with moderate permeability. The streams are broadly spaced in these deposits. Several consistently wet areas on the site are due primarily to poor surface drainage which is restricted by the glacial features. Swampy areas on the northeast side of the site are located in an abandoned glacial drainage channel. In addition, wet areas occur in the northwest and southwest corners of the site, as well as a small area near the center of the site. The latter may be due to bedrock near the surface that prevents the infiltration and movement of water.

2.4.8.3.2.6 Engineering Characteristics

The engineering characteristics of the silt and fine sands with local gravels that comprise the lake deposits, depends to a large extent on the degree of saturation. The material can provide stable slopes if well drained to minimize the hydrostatic pressure. The material is non-cohesive and has a low to-moderate bearing capacity. The coarser sands and gravels (ice-contact deposits) tend to be better drained and therefore more stable than the lake deposits. Where over ten ft thick, the materials may be a source of perched groundwater.

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2.4.8.3.2.7 <u>Groundwater Occurrence</u>

The fine sand of the lake deposits contains abundant water, but due to the fine grain size, yields from wells are low. The sands and gravels of ice-contact deposits probably have a higher yield, although the small size of the deposits limited recharge. Yields up to 60 gallons per minute from domestic wells have been reported from the sands and gravels in the area(7).

Several small springs were observed, suggesting local restriction to downward movement of water. This could be caused by either bedrock damming, or the local clay lenses within the fine sands of the lake deposits.

2.4.8.4 <u>Some Potential Problems</u>

No significant features relevant to heavy foundations or the proposed construction were recognized on Site 8-4-2 during the reconnaissance studies.

The Ramapo fault with some reportedly associated seismic activity is within 28 miles of the site. Because of questions raised before the appeals board of the Atomic Safety and Licensing Board hearings for the Indian Point plant, sites throughout the Southern Hudson River Valley area are subject to delay and/or lengthy hearings awaiting a clarification and decision.

The Delaware aqueduct is located on the surface along the northern edge of the site. This may be an additional licensing problem relative to a nuclear plant.

2.4.8.5 <u>Geological Evaluation</u>

The reconnaissance studies indicated that bedrock is at a relatively shallow depth and possesses an adequate bearing capacity for the proposed plant construction.

The rating for site is 1g for a nuclear power plant, due to the unresolved seismicity aspects associated with the nearby Ramapo fault.

2.4.8.6 <u>Seismological Evaluation</u>

It is anticipated that both regional and site investigations would be very intense, and this site could be subject to licensing delays.

2.4.8.7 <u>Suggested Methods of Further Investigation</u>

Cored borings could be supplemented by some seismic refractive survey lines to determine the varied thickness of the overburden materials.

Substantial subsurface and engineering/geologic data is probably available from the files and records on the two aqueducts bordering the site, and from the New York City Board of Water Supply, Office of Chief Engineer.

758 008

2.4.8.8 References for Section 2.4.8

1. Fisher, D.W., Richard, L.V., and Isachsen, Y.W., Geologic map of New York State: New York State Museum and Science Service, Map and Chart Series No. 15, 1970.

2. Holzwasser, F., Geology of Newburgh and vicinity: New York State Museum, Bull. No 270, 1926, p. 95.

3. Connally, G.G., and Sirkin, L.A., The Pleistocene geology of the Wallkill Valley. In: Waines, R.H., (ed.), Guidebook to Field Trips: New York State Geological Association, 39th Annual Meeting, New Paltz, New York, 1967, p. A-1 to A-21.

4. Offield, T.W., Bedrock geology of the Goshen-Greenwood Lake area, New York: New York State Museum and Science Service, Map and Chart Series No. 9, 1967, p. 77.

5. Moxham, L., Geochemical reconnaissance of surficial materials in the vicinity of Shawangunk Mountain, New York: New York State Museum and Science Service, Map and Chart Series No. 21, 1972, p. 20.

6. Berkey, C.P., Geology of the New York City (Catskill) aqueduct: New York State Museum, Bull. No 489, 1911, p. 283.

7. Frimpter, M.H., Groundwater basic data, Orange and Ulster Counties, New York: New York State Dept. Conservation Bull. No 65, 1970, p. 93.

758 009

2.4.9 Accident Analysis

2.4.9.1 Site Description and Population Distribution

The site consists of approximately 900 acres. The proposed site boundaries, shown in Figure 2.4-2, are coterminous with the exclusion area boundary. No roadways traverse the exclusion area.

The Low Population Zone (LPZ) outer radius is designated to be 3 miles, pursuant to NRC guidelines. Reconnaissance level data for the LPZ are summarized in Table 2.4-5.

The nearest population center is the City of Poughkeepsie (1970 population 32,029), located 11 miles to the east of Site 8-4-2.

Population distribution for 30 miles surrounding the site is summarized in Table 2.4-6.

2.4.9.2 Nearby Industrial, Transportation, and Military Facilities

Major transportation activities in the area of Site 8-4-2 are summarized in Table 2.4-7. Of note is the site's proximity to NY 208 and the NY Central Railroad line to the west of the site.

A U.S. Army Military Reservation is located 5 miles to the southwest of the site. It is used as a drop zone for parachute practice.

No industrial facilities were identified which would impart a potential hazard in the site vicinity.

2.4.9.3 Analysis and Summary

Site 8-4-2 meets acceptability criteria for population density and distribution, as given in 10 CFR 100 and NRC Reg Guide 4.7. The activity and population with the LPZ is such that special station design and accident procedures would be detailed to insure that appropriate measures can be taken within reasonable probability to mitigate against serious harm in case of accidental radiation release. The nearest population center distance is acceptable with respect to the 1.33 distance ratio beyond the LPZ outer radius as required by 10 CFR 100.

For the most part, no significant potential hazards related to industrial, transportation or military facilities are identified.

2.4.9.4 References for Section 2.4.9

1. New York State Department of Commerce, Profile of People, Jobs and Housing, Capital District, Part 2, 1974.

2. USGS 7.5 Minute Series (topographic) quadrangle maps.

3. U.S. Department of Commerce, Bureau of the Census, 1970 Small Area Census Data for New York State.

4. New York State Executive Department Office of Planning Services, Demographic Projections for New York State, unpublished report, 1974.

5. U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, Number of Inhabitants, 1970.

6. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation/Planning Maps, 1974.

7. Facilities Records for Airports in New York from the files of the Federal Aviation Administration, Eastern Regional Office.

8. Sectional Aeronautical Charts for Detroit, New York and Montreal, November 7, 1974, January 2, 1975, and October 10, 1974.

9. New York State Department of Transportation, Traffic Volume Report, 1973.

10. Motor Vehicle Manufacturer's Association, Motor Truck Facts, 1974.

11. New York State Parks and Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information," Section 4: "County Map User Guide," Appendix C: "Complete Activity Code List, 1975.

12. Cornell University, LUNR Inventory Map Overlays, 7.5 Minute Quadrangle, (1:24,000), for New York State Office of Planning Services, 1968-1974.

13. Major Natural Gas Pipelines, Federal Power Commission, June 1973.

14. U.S. Secretary of Transportation, Rail Service in the Midwest and Northeast Region, 1974.

15. U.S. Department of Commerce, Statistical Abstract of the United States, 1973.

16. U.S. Department of the Army, Principal Military Installations and Activities in the 50 States, 1974.

758 011

2.4.10 Aesthetics

4.10.1 Site Characterization

Topographically, the site and the surrounding area are relatively flat, characterized by elevations rising gradually from 220 ft above msl to 500 ft above msl at the eastern end of the study area. Forests within the site area are composed of mixed hardwoods and softwoods.

The absence of topographic relief and the general lack of vegetative cover on and adjacent to the site place no limitations on the number of vistas. Several vantage points are evident in the site area, with the following selected as the most representative of the surrounding visually sensitive and intensive land uses.

Land Use	Distance from Site
Village of Gardiner	1.9 miles N
Camp Thoreau	3.0 miles W
Golf Course	3.0 miles S
Village of Wallkill	3.6 miles SW
New York State Thruway (Rt.90)	3.8 miles E

Within the study area there is only one historic property of interest. Johannes Decker Farm, listed on the National Register, is located southwest of Gardiner on Red Mill Road and Shawangunk Hill -- approximately miles from the site. There are no designated natural landmarks within the study area.

There are 22 recreational facilities within 6 miles, the majority of which were rod and gun clubs and private campgrounds. Additionally, several golf courses and local parks are located within the 6-mile radius.

2.4.10.2 Aesthetics Analysis

Only moderate impacts are anticipated to be experienced by the vantage points listed in Section A -- summarized as follows:

Village of Gardiner	plant structures moderately visible distance of 1.9 miles (middle ground)
Golf Course	plant structures moderately visible distance of 3 miles (middle ground)
Village of Wallkill	plant structures highly visible distance of 3.6 miles (middle ground)

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Camp Thoreau	plant structures slightly visible distance of 3 miles (middle ground)
N.Y.S. Thruway	plant structures slightly visible distance of 3.8 miles (middle ground)

2.4.10.3 References for Section 2.4.10

1. U.S. Department of the Interior, National Park Service, National Register of Historic Places, 1975, as amended.

2. U.S. Department of the Interior, National Park Service, National Registry of Natural Landmarks, 1975, as amended.

3. The University of the State of New York, the State Education Department, A Guide to the Historical Markers of New York State, 1970.

4. The University of the State of New York, the State Education Department, New York State Historical Places, 1975.

5. New York State Parks & Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information", Section 4: "County Map User Guide", Appendix C: "Complete Activity Code List", 1975.

6. LUNR Inventory Map Overlays, 7.5 Minute Quadrangle (1:24,000), Cornell University for New York State Office of Planning Services, 1968-1974.

7. USGS 7.5 Minute Series (topographic) quadrangle maps.

8. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation Planning Maps, 1974.

9. Site visits.

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2.4.11 Land Use Planning

2.4.11.1 Background

Ulster County had not developed a comprehensive plan at the time of the study. A site compatibility assessment, on a more general broader scale, was undertaken by comparing the proposed usage of Site 8-4-2 to the New York State Development Plan. The purpose of this plan was to identify state problems, the goals and objectives needed to solve these problems and process for achieving the objectives.

Some of the land use goals which were applicable to the siting area were:

1. To maintain in farm use farm areas with good to excellent probability of economic success (areas the state has designated as medium to high economic viability) and to group farms into large contiguous blocks instead of allowing scattered farms surrounded by non-farm land uses.

2. To reserve suitable lands for natural open space usages (outdoor recreation, natural beauty, wildlife and wild vegetation, flood control, etc.)

2.4.11.2 Site and Local Description

The entire site area, as well as the surrounding land area, was classified by the state as high viability farmland. Natural open space usages were designated to the land area immediately east of Route 208, and for the steeper terrain areas found to the west of the site.

2.4.11.3 Compatibility

The development of Site 8-4-2 for a power plant is not considered compatible with the state plan. This is due to its location in land classified as high viability farmland, and also as a result of the surrounding land use classification. Neither of the two goals stated previously would be met if Site 8-4-2 were developed for power generation usage. It is noted there is a large amount of high viability farmland throughout this region.

2.4.11.4 References for Section 2.4.11

1. New York State, Office of Planning Coordination, New York Development Plan - 1, 1971.

758 014

2.4.12 Costs

Table 2.4-8 presents cost data associated with the development of Site 8-4-2.

2.4.13 Conclusions

In the vicinity of Site 8-4-2, no legal restraints to plant siting were identified.

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1

SITE 8-4-2, WIND DISTRIBUTION BY STABILITY CLASS, POUGHKEEPSIE, N.Y.

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ENVIRONMENTAL DATA SERVICE

JOB NO. 12910 (W-1379)

WIND DISTRIBUTION BY PASQUILL STABILITY CLASSES (5)
STAR PROGRAM (Monthly and Annual)

STATION: #14757 - Poughkeepsie, N. Y.

PERIOD: 1950-1954

SOURCE: TDF 1440 (8 obs/day)

DATE Aug. 31, 1971

NATIONAL CLIMATIC CENTER

FEDERAL BUILDING, ASHEVILLE, N.C.

Prepared for: Consolidated Edison Co. of New York, Inc
New York, N. Y.

NYSEGG ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION =14757 POUGHKEEPSIE, NEW YORK 50-54

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.000354	0.000000	0.000000	0.000000	0.000000	0.000000	0.000354
NNE	0.000620	0.000206	0.000000	0.000000	0.000000	0.000000	0.000826
NE	0.000453	0.000138	0.000000	0.000000	0.000000	0.000000	0.000590
ENE	0.000433	0.000275	0.000000	0.000000	0.000000	0.000000	0.000708
E	0.000167	0.000069	0.000000	0.000000	0.000000	0.000000	0.000236
ESE	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SE	0.000167	0.000069	0.000000	0.000000	0.000000	0.000000	0.000236
SSE	0.000384	0.000206	0.000000	0.000000	0.000000	0.000000	0.000590
S	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
SSW	0.000650	0.000413	0.000000	0.000000	0.000000	0.000000	0.001062
SW	0.000669	0.000275	0.000000	0.000000	0.000000	0.000000	0.000944
WSW	0.000758	0.000069	0.000000	0.000000	0.000000	0.000000	0.000826
W	0.000571	0.000138	0.000000	0.000000	0.000000	0.000000	0.000708
WNW	0.000551	0.000275	0.000000	0.000000	0.000000	0.000000	0.000826
NW	0.000453	0.000138	0.000000	0.000000	0.000000	0.000000	0.000590
NNW	0.000167	0.000069	0.000000	0.000000	0.000000	0.000000	0.000236
TOTAL	0.006397	0.002339	0.000000	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF A STABILITY = 0.008735

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH A STABILITY = 0.003645

758 018

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION =14757 POUGHKEEPSIE, NEW YORK 50-54

DIRECTION	SPEED(KTS) 0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.003216	0.001032	0.000344	0.000000	0.000000	0.000000	0.004592
NNE	0.005524	0.002889	0.001169	0.000000	0.000000	0.000000	0.009582
NE	0.002072	0.000344	0.000413	0.000000	0.000000	0.000000	0.002828
ENE	0.002438	0.000894	0.000275	0.000000	0.000000	0.000000	0.003607
E	0.001224	0.000275	0.000069	0.000000	0.000000	0.000000	0.001568
ESE	0.001709	0.000206	0.000206	0.000000	0.000000	0.000000	0.002122
SE	0.001347	0.000069	0.000206	0.000000	0.000000	0.000000	0.001622
SSE	0.003426	0.001238	0.000894	0.000000	0.000000	0.000000	0.005558
S	0.003882	0.001032	0.000481	0.000000	0.000000	0.000000	0.005396
SSW	0.004390	0.003439	0.002958	0.000000	0.000000	0.000000	0.010787
SW	0.003419	0.001995	0.001444	0.000000	0.000000	0.000000	0.006858
WSW	0.003640	0.001857	0.002132	0.000000	0.000000	0.000000	0.007629
W	0.002604	0.000894	0.000206	0.000000	0.000000	0.000000	0.003705
WNW	0.002083	0.001582	0.000619	0.000000	0.000000	0.000000	0.004284
NW	0.002850	0.000481	0.000413	0.000000	0.000000	0.000000	0.003744
NNW	0.004046	0.002201	0.001513	0.000000	0.000000	0.000000	0.007760
TOTAL	0.047871	0.020428	0.013343	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF B STABILITY = 0.081642

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH B STABILITY = 0.011899

POOR ORIGINAL

758 019

NYSE&G ASA
SITE 8-4-2
LOWER H ON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION =14757 POUGHKEEPSIE,NEW YORK 50-54

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.001873	0.001444	0.001720	0.000069	0.000000	0.000000	0.005105
NNE	0.001938	0.002689	0.005509	0.000619	0.000000	0.000000	0.012155
NE	0.001304	0.001100	0.000825	0.000000	0.000000	0.000000	0.003230
ENE	0.000736	0.000757	0.000894	0.000000	0.000000	0.000000	0.002387
E	0.000775	0.000138	0.000000	0.000000	0.000000	0.000000	0.000912
ESE	0.001507	0.000069	0.000413	0.000069	0.000000	0.000000	0.002057
SE	0.000334	0.000413	0.000413	0.000000	0.000000	0.000000	0.001159
SSE	0.001694	0.001788	0.002889	0.000344	0.000000	0.000000	0.006715
S	0.001116	0.002201	0.002339	0.000413	0.000000	0.000000	0.006068
SSW	0.003019	0.004196	0.011418	0.000825	0.000000	0.000000	0.019457
SW	0.001793	0.002270	0.005090	0.000481	0.000000	0.000000	0.009634
WSW	0.001201	0.002614	0.006603	0.000688	0.000069	0.000000	0.011174
W	0.000542	0.000619	0.001307	0.000069	0.000000	0.000000	0.002537
WNW	0.000876	0.001032	0.003370	0.000894	0.000138	0.000000	0.006309
NW	0.000928	0.000481	0.001444	0.000413	0.000000	0.000000	0.003267
NNW	0.001444	0.001376	0.005502	0.000757	0.000069	0.000000	0.009147
TOTAL	0.020978	0.023385	0.051035	0.005640	0.000275	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF C STABILITY = 0.101314

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH C STABILITY = 0.007566

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION =14757 POUGHKEEPSIE, NEW YORK 50-54

SPEED(KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.007742	0.008873	0.0[illegible]524	0.003301	0.000[illegible]57	0.000000	0.029202
NNE	0.010342	0.012587	0.024485	0.012656	0.001513	0.000000	0.061583
NE	0.005367	0.003439	0.003095	0.001238	0.000069	0.000000	0.013208
ENE	0.005572	0.005227	0.002270	0.000344	0.000000	0.000000	0.013413
E	0.004457	0.001857	0.001582	0.000206	0.000000	0.000069	0.008171
ESE	0.009273	0.005846	0.007094	0.001513	0.000206	0.000206	0.024130
SE	0.005355	0.003783	0.003508	0.000481	0.000000	0.000000	0.013127
SSE	0.009428	0.012587	0.019121	0.006678	0.000688	0.000206	0.048908
S	0.006187	0.008189	0.008529	0.003164	0.000069	0.000000	0.026133
SSW	0.006788	0.009079	0.019671	0.007979	0.001100	0.000206	0.044824
SW	0.004000	0.004058	0.010592	0.005159	0.000275	0.000000	0.024084
WSW	0.003287	0.003026	0.013137	0.015820	0.002751	0.000413	0.038434
W	0.001930	0.000894	0.003920	0.004746	0.000550	0.000206	0.012247
WNW	0.002591	0.001513	0.008666	0.015957	0.005365	0.001238	0.035131
NW	0.004542	0.002270	0.003508	0.004402	0.000688	0.000206	0.015616
NNW	0.008049	0.009148	0.012587	0.012518	0.002958	0.000550	0.045809
TOTAL	0.094711	0.092372	0.150265	0.096361	0.016989	0.003301	

RELATIVE FREQUENCY OF OCCURRENCE OF D STABILITY = 0.454020

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH D STABILITY = 0.032189

POOR ORIGINAL

758 021

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14757 POUGHKEEPSIE, NEW YORK 50-54

SPEED (KTS)

DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.013807	0.003026	0.001720	0.000000	0.000000	0.000000	0.018553
NNE	0.026409	0.007841	0.004127	0.000000	0.000000	0.000000	0.038377
NE	0.013869	0.002614	0.000688	0.000000	0.000000	0.000000	0.017170
ENE	0.016592	0.000825	0.000138	0.000000	0.000000	0.000000	0.017555
E	0.015932	0.000550	0.000000	0.000000	0.000000	0.000000	0.016482
ESE	0.030763	0.003370	0.000206	0.000000	0.000000	0.000000	0.034340
SE	0.016591	0.004333	0.000275	0.000000	0.000000	0.000000	0.021199
SSE	0.030135	0.013000	0.003301	0.000000	0.000000	0.000000	0.046436
S	0.014040	0.006534	0.002339	0.000000	0.000000	0.000000	0.022912
SSW	0.016741	0.008391	0.004608	0.000000	0.000000	0.000000	0.029741
SW	0.011111	0.005021	0.003233	0.000000	0.000000	0.000000	0.019364
WSW	0.006298	0.003989	0.007428	0.000000	0.000000	0.000000	0.017715
W	0.005274	0.001857	0.002820	0.000000	0.000000	0.000000	0.009951
WNW	0.004861	0.003439	0.006053	0.000000	0.000000	0.000000	0.014352
NW	0.005837	0.001995	0.00261[illegible]	0.000000	0.000000	0.000000	0.010446
NNW	0.011028	0.004402	0.004264	0.000000	0.000000	0.000000	0.019695
TOTAL	0.239287	0.071188	0.043813	0.000000	0.000000	0.000000	

RELATIVE FREQUENCY OF OCCURRENCE OF E STABILITY = 0.354288

RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE WITH E STABILITY = 0.127794

POOR ORIGINAL

158 024

N.SE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-1 (Cont'd)

ANNUAL RELATIVE FREQUENCY DISTRIBUTION STATION #14757 POUGHKEEPSIE, NEW YORK 50-54

	SPEED(KTS)						
DIRECTION	0 - 3	4 - 6	7 - 10	11 - 16	17 - 21	GREATER THAN 21	TOTAL
N	0.028406	0.014375	0.012312	0.003370	0.000757	0.000000	0.059219
NNE	0.045281	0.026412	0.036591	0.013275	0.001513	0.000000	0.123071
NE	0.022644	0.007635	0.005021	0.001238	0.000069	0.000000	0.036607
ENE	0.025523	0.007979	0.003577	0.000344	0.000000	0.000000	0.037422
E	0.021334	0.002869	0.001651	0.000206	0.000000	0.000069	0.026149
ESE	0.040908	0.009492	0.007910	0.001582	0.000206	0.000206	0.060304
SE	0.022296	0.008666	0.004402	0.000481	0.000000	0.000000	0.035846
SSE	0.043166	0.02[illegible]	0.026205	0.007222	0.000688	0.000206	0.106307
S	0.025806	0.017952	0.013687	0.003577	0.000069	0.000000	0.061090
SSW	0.032696	0.025516	0.038655	0.008804	0.001100	0.000206	0.106979
SW	0.021251	0.013619	0.020359	0.005640	0.000275	0.000000	0.061144
WSW	0.016086	0.011555	0.029300	0.016507	0.002820	0.000413	0.076682
W	0.010933	0.004402	0.008234	0.004815	0.000550	0.000206	0.029160
WNW	0.010912	0.007841	0.018708	0.016851	0.005502	0.001238	0.061053
NW	0.015244	0.005365	0.007979	0.004815	0.000688	0.000206	0.034296
NNW	0.026758	0.017195	0.023867	0.013275	0.003026	0.000550	0.084671
TOTAL	0.409244	0.209711	0.258477	0.102001	0.017264	0.003301	

TOTAL RELATIVE FREQUENCY OF OBSERVATIONS = 1.000000

TOTAL RELATIVE FREQUENCY OF CALMS DISTRIBUTED ABOVE = 0.183094

POOR ORIGINAL

758 023

TABLE 2.4-2

SITE 8-4-2, WIND DISTRIBUTION BY STABILITY CLASS

QUARRY SITE

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - A - 33 FT WINDS,PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL	
N	9	27	16	0	0	0	52	
NNE	16	17	6	0	0	0	39	
NE	2	9	3	0	0	0	14	
ENE	0	0	0	0	0	0	0	
E	0	2	0	0	0	0	2	
ESE	2	9	0	0	0	0	11	
SE	4	11	0	0	0	0	15	
SSE	5	13	3	0	0	0	21	1
S	13	38	0	0	0	0	51	
SSW	54	118	4	0	0	0	176	
SW	35	88	10	0	0	0	133	
WSW	19	49	20	0	0	0	88	
W	7	31	24	2	0	0	64	
WNW	12	27	24	2	0	0	65	
NW	12	26	16	3	1	0	58	
NNW	9	28	10	0	0	0	47	
TOT.	199	493	136	7	1	0	836	

NUMBER OF CALM HOURS - 11
NUMBER OF VARIABLE DIRECTIONS - 113
TOTAL NUMBER OF OBSERVATIONS - 960

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - B - 33 FT WINDS, PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

1

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	9	17	11	0	0	0	37
NNE	6	8	8	0	0	0	22
NE	3	3	0	0	0	0	6
ENE	0	1	1	0	0	0	2
E	0	0	0	0	0	0	0
ESE	1	2	1	0	0	0	4
SE	0	1	0	0	0	0	1
SSE	3	6	0	0	0	0	9
S	6	8	0	0	0	0	14
SSW	9	19	1	0	0	0	29
SW	11	21	1	0	0	0	33
WSW	11	19	7	0	0	0	37
W	2	10	16	3	0	0	31
WNW	3	7	12	0	0	0	22
NW	3	14	4	1	0	0	22
NNW	2	15	8	0	0	0	25
TOT.	69	151	70	4	0	0	294

NUMBER OF CALM HOURS - 11
NUMBER OF VARIABLE DIRECTIONS - 34
TOTAL NUMBER OF OBSERVATIONS - 339

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - C - 33 FT WINDS,PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL	
N	6	10	8	1	0	0	25	
NNE	9	6	5	0	0	0	20	
NE	3	1	0	0	0	0	4	
ENE	2	2	0	0	0	0	4	
E	0	1	0	0	0	0	1	
ESE	2	0	0	0	0	0	2	
SE	1	0	0	0	0	0	1	
SSE	0	1	0	0	0	0	1	1
S	1	1	0	0	0	0	2	
SSW	8	4	1	0	0	0	13	
SW	7	19	1	0	0	0	27	
WSW	1	9	2	0	0	0	12	
W	1	7	10	0	0	0	18	
WNW	3	13	2	0	0	0	18	
NW	1	5	1	0	0	0	7	
NNW	1	7	1	0	0	0	9	
TOT.	46	86	31	1	0	0	164	

NUMBER OF CALM HOURS - 2
NUMBER OF VARIABLE DIRECTIONS - 11
TOTAL NUMBER OF OBSERVATIONS - 177

758 027

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - D - 33 FT WINDS,PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	86	281	56	2	0	0	425
NNE	56	144	25	8	0	0	233
NE	45	28	0	0	0	0	73
ENE	20	14	0	0	0	0	34
E	17	7	0	0	0	0	24
ESE	20	25	0	0	0	0	45
SE	17	27	0	0	0	0	44
SSE	15	15	0	0	0	0	30
S	22	9	0	0	0	0	31
SSW	65	26	3	0	0	0	94
SW	64	101	12	0	0	0	177
WSW	44	54	27	2	0	0	127
W	48	65	71	5	0	0	189
WNW	37	57	27	1	0	0	122
NW	34	86	24	1	0	0	145
NNW	57	123	20	1	0	0	201
TOT.	647	1062	265	20	0	0	1994

1

NUMBER OF CALM HOURS - 29
NUMBER OF VARIABLE DIRECTIONS - 217
TOTAL NUMBER OF OBSERVATIONS - 2240

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - E - 33 FT WINDS, PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	62	58	1	0	0	0	121
NNE	63	57	5	3	0	0	128
NE	35	16	0	0	0	0	51
ENE	14	12	3	0	0	0	29
E	13	5	0	0	0	0	18
ESE	18	6	0	0	0	0	24
SE	15	17	0	0	0	0	32
SSE	20	22	2	0	0	0	44
S	25	19	0	0	0	0	44
SSW	62	49	2	0	0	0	113
SW	116	176	14	0	0	0	306
WSW	77	90	23	2	0	0	192
W	49	89	17	0	0	0	155
WNW	42	60	18	2	0	0	122
NW	58	54	7	1	0	0	120
NNW	58	41	0	0	0	0	99
TOT.	727	771	92	8	0	0	1598

1

NUMBER OF CALM HOURS - 100
NUMBER OF VARIABLE DIRECTIONS - 437
TOTAL NUMBER OF OBSERVATIONS - 2135

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - F - 33 FT WINDS, PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	39	8	0	0	0	0	47
NNE	28	7	1	0	0	0	36
NE	22	6	0	0	0	0	28
ENE	10	4	0	0	0	0	14
E	2	0	0	0	0	0	2
ESE	1	2	0	0	0	0	3
SE	2	1	0	0	0	0	3
SSE	0	0	0	0	0	0	0
S	5	2	0	0	0	0	7
SSW	10	2	0	0	0	0	12
SW	19	9	0	0	0	0	28
WSW	20	9	1	0	0	0	30
W	23	3	0	0	0	0	26
WNW	28	6	0	0	0	0	34
NW	39	6	0	0	0	0	45
NNW	48	4	0	0	0	0	52
TOT.	296	69	2	0	0	0	367

NUMBER OF CALM HOURS - 125
NUMBER OF VARIABLE DIRECTIONS - 355
TOTAL NUMBER OF OBSERVATIONS - 847

1

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - G - 33 FT WINDS,PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
N	106	17	1	0	0	0	124
NNE	130	27	0	0	0	0	157
NE	87	12	0	0	0	0	99
ENE	6	2	0	0	0	0	8
E	2	0	0	0	0	0	2
ESE	2	0	0	0	0	0	2
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	1	0	0	0	0	0	1
SSW	2	0	0	0	0	0	2
SW	4	1	0	0	0	0	5
WSW	4	3	0	0	0	0	7
W	16	3	1	0	0	0	20
WNW	18	4	0		0	0	22
NW	55	4	0	0	0	0	59
NNW	86	16	1	0	0	0	103
TOT.	520	89	3	0	0	0	612

1

NUMBER OF CALM HOURS - 184
NUMBER OF VARIABLE DIRECTIONS - 635
TOTAL NUMBER OF OBSERVATIONS - 1431

TABLE 2.4-2 (Cont'd)

QUARRY WIND - STABILITY SUMMARY

STABILITY CLASS - ALL- 33 FT WINDS,PERIOD 7/20/73 TO 7/19/74

NUMBER OF HOURLY OBSERVATIONS

WIND SPEED (MPH)

	WINDS FROM	1-3	4-7	8-12	13-18	19-24	25+	TOTAL
	N	317	418	93	3	0	0	831
	NNE	308	266	50	11	0	0	635
	NE	197	75	3	0	0	0	275
	ENE	52	35	4	0	0	0	91
	E	34	15	0	0	0	0	49
	ESE	46	44	1	0	0	0	91
	SE	40	57	0	0	0	0	97
1	SSE	43	57	5	0	0	0	105
	S	73	77	0	0	0	0	150
	SSW	210	218	11	0	0	0	439
	SW	256	415	38	0	0	0	709
	WSW	176	233	80	4	0	0	493
	W	146	208	139	10	0	0	503
	WNW	143	174	83	5	0	0	405
	NW	202	195	52	6	1	0	456
	NNW	261	234	40	1	0	0	536
	TOT.	2504	2721	599	40	1	0	5865

NUMBER OF CALM HOURS - 462
NUMBER OF VARIABLE DIRECTIONS - 1802
TOTAL NUMBER OF OBSERVATIONS - 8129

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-3

TRANSMISSION CORRIDOR DATA
SITE 8-4-2

Criteria	Acres	Miles	Number
Physical Features			
1. Land Use			
Industrial	1	0	
Commercial	839	0.7	
Institutional	0	0	
Residential	4,581	3.6	
Airfield Zone	64	0.1	
Central Business District	0	0	
Radio & TV Towers	---	---	1
2. Vegetative Cover			
Agricultural & Forest Brushland	29,237	22.8	
Mature Forest	21,000	16.4	
Forest Plantation	84	0.1	
3. Recreational/Cultural			
State Forest & Wildlife Mgt. Area	224	0.2	
State, County, Town Parks	0	0	
Historic Sites (National or State)	---	---	0
4. Natural Features			
Wetlands	6,612	5.2	
Lakes	67	0.1	
Slopes 25%+	640	1.0	
Streams & Rivers (Named)		0.6	

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TABLE 2.4-3 (Cont'd)

Criteria	Miles
Aesthetics	
1. Exposure	
Scenic Hwy - Overlook	0
Interstate Hwy	9
NYS Hwy More Than 3000 V/D	15
NYS Hwy Less Than 3000 V/D	14
2. Visual Quality	Line Miles
Unique	2
High	4
Medium	19
Low	3
Generally Characteristic of the Area	
3. Structure Size (new)	
115kV Single or Double Circuit	3
230kV Single Circuit	0
230kV Double Circuit	0
345kV Single Circuit	55
345kV Double Circuit	0
765kV Single Circuit	0
4. Sensitivity (importance)	
National (interstate)	13
State	5
Regional	0
Local	40

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-4

WELL LOGS AT SITE 8-4-2*

Well Number	Depth (feet)	Estimated Depth to Rock (feet)	Formation	Depth to Water (feet)	Yield (gpm)
138-409	175	20	Shale	15	25
139-408-1	130	10	Shale	50	2[illegible]
140-408-3	78	15	Shale	10	[illegible]

SOURCE:

*Frimpter, M.H., Groundwater basic data, Orange and Ulster Counties, New York: New York State Dept. Conservation Bull. No. 65, 1970, p. 93.

TABLE 2.4-5

LOW POPULATION ZONE (LPZ) EVALUATION
SITE 8-4-2

Towns -- Gardiner, Shawangunk, Plattekill

Recreation Facilities -- Total Population 1847

Midway Park -- Size 10 acres, Population 98
(Picnic Area)

Ganaghote Gun Club -- Size 1213 acres, Population 50
(Hunting Area)

Ganaghote Beach -- Population 512
(Camping Facilities)

Modena Country Club -- Population 325
(Camping Facilities)

Modena Rod & Gun Club -- Size 916 acres, Population 50
(Hunting Area)

Hudson Valley KOA -- Size 65 acres, Population 295
(Swimming, Camping, Trail Facilities)

Old Fort Riding -- Size 450 acres, Population 273
(Camping Area)

Kobelt Public Golf Course -- Population 122

Dwelling Units -- 738

Number Roads Exiting LPZ -- 16

Schools, Institutional Population -- 540

Wallkill State Correctional Facility -- 500 inmates

Gardiner School -- 40 students

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NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-6

POPULATION DENSITY AND DISTRIBUTION
SITE 8-4-2

	1985	2025
Cumulative Population (0-30 miles)	941,550	2,245,000
Population Density (persons/mi^2) (0-30 miles)	333	794
Site Population Factor SPF (30)	0.320	0.729

NYSE&G ASA
SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-7

NEARBY TRANSPORTATION ACTIVITIES
SITE 8-4-2

Identification	Distance (mi)	Type
NY Thruway (I-90)	3.8	Road
NY 208	0.6	Road
US 44	1.7	Road
NY 32	1.8	Road
Penn Central (E)	1.8	Rail
Penn Central (W)	0.5	Rail
Gardiner	0.5	Airport
Kobelt	1.5	Airport
Middle Hope	9.0	Airport
Marlboro	7.0	Airport
Stunwyck	9.5	Airport
Stewart	10.0	Airport
Stapton	6.5	Airport
V 249 - 483 Carmel (Teterboro) - Delancy (Uttica)	0.0	Airlane
V 167 Kingston - Hancock	2.0	Airlane
V 162-58-93-106 Pawling & Lake Herny	2.0	Airlane
V 34 Carmel - Hancock	7.0	Airlane
V 205-489 - Sparta-Pawling	8.0	Airlane
J 77 Huguenot - Boston	7.0	Airlane

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SITE 8-4-2
LOWER HUDSON RIVER AREA

TABLE 2.4-8

COST DATA SITE 8-4-2

	Component	Cost $\$ \times 10^6$ (1987)	Subtotal	Notes
1.	Railroad	1.6		
2.	Highway	---		
3.	Land & Land Rights	7.8		
4.	Excavation & Foundations	1.0		Rock Excavation = 51,550 yd^3
5.	Seismic Design	---		
6.	Intake Discharge	18.5*		
7.	Impoundments	---		
8.	Piping Installation	71.0		
9.	Pumping Equipment	4.0		
10.	Ultimate Heat Sink	21.0		
11.	Labor Rates	112.0		
12.	SUBTOTAL - SITE RELATED COSTS		200.0	
13.	PLANT CONSTRUCTION COST		2,880.0	
14.	TOTAL CONSTRUCTION COST (lines 12 & 13)		3,080.0	
15.	Transmission Construction	78.0		Grid = 58 miles Offsite = 3 Substation = $10,400,000
16.	TOTAL CAPITAL COST (lines 14 & 15)		3,158.0	
17.	Nuclear Fuel & O&M	723.0		
18.	Transmission Losses (Capitalized)	83.0*		
19.	Pumping Cost (Capitalized)	15.0		
20.	TOTAL OPERATING COST		655.0	
21.	TOTAL EVALUATED COST (lines 16 & 20)		3,813.0	

*Subtracted from cost components in base plant.

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NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 8-4-2
SITE AREA AND TOPOGRAPHY

FIG. 2.4-2

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BASE MAP=USGS GARDINER QUADRANGLE 1957

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SCALE
(MILES)

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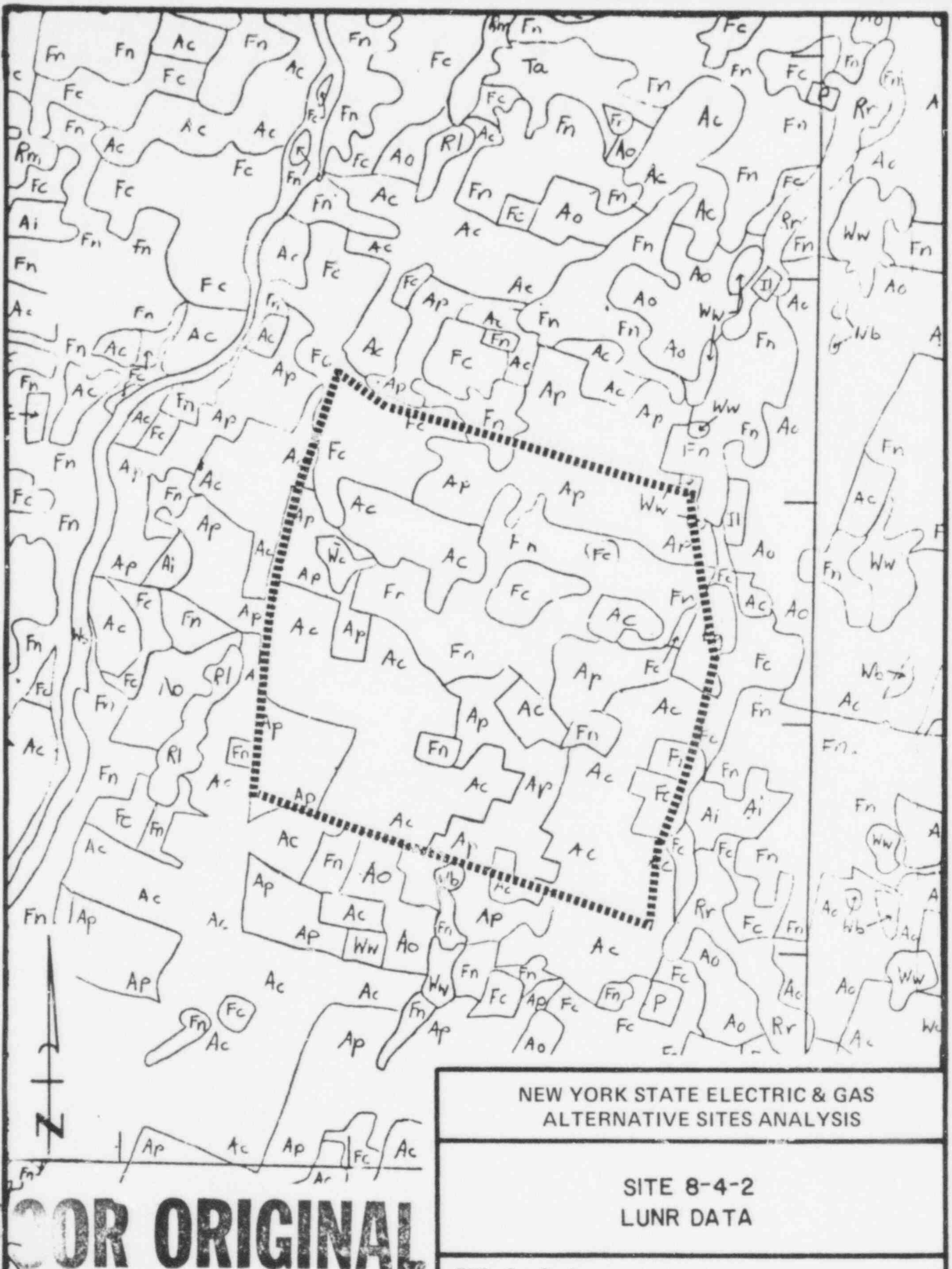


NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 8-4-2
LUNR DATA

FIG. 2.4-4

NOTE: REFER TO TABLE 1.4-1 FOR AN EXPLANATION OF LUNR SYMBOLS.

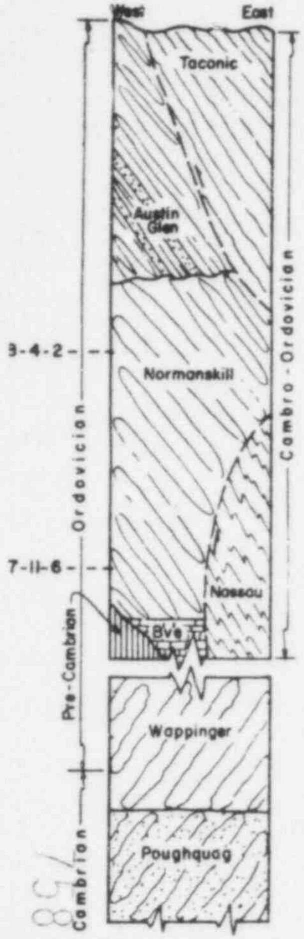
0 ½ 1
SCALE
(MILES)

SURFICIAL/OVERBURDEN MATERIALS

GLACIAL CLAYS & SILTS (LAKE DEPOSITS): Gray to bluish-gray, soft, clay, silt and fine sand, horizontally bedded. Includes buff to brown varve layers upper 6-10 feet, stiff. Locally water-bearing, small yields. Varied thickness.

GLACIAL SANDS & GRAVELS (ESKER, KAME, OUTWASH DEPOSITS): Grayish, fine to coarse sands and varied gravels, minor silt and clay. Crudely stratified, slightly cohesive, highly permeable.

GLACIAL TILL: Buff to dark brown, heterogeneous mixture of silty gravels and some cobbles and boulders in a matrix of silt and clay; compact, denser with depth, some silty/gravelly zones. Locally derived fragments graywacke, shales and slate predominate. Low permeability.



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BEDROCK UNITS

AUSTIN GLEN FORMATION/SHALE & GRAYWACKE: Medium to dark-gray shale with interbeds of medium to dark-gray, fine- to coarse-grained graywacke (sandstone). Strongly developed cleavage shales normally parallels bedding.

Thickness at least 1200 feet.

TACONIC FORMATIONS: Series of thin, similar rock units; Mettawee - green, purple or gray shale or slate with interbed of Stuyvesant - grayish, lenticular nodular limestone and limestone conglomerate; Stuyvesant Falls - grayish, locally red, blue or green shale, slate, argillite or chert. Strongly developed cleavage, silicified.

NORMANSKILL FORMATION/SHALE, SILTSTONE & GRAYWACKE: Sequence of dark gray, locally red or green shale and siltstone with interbeds of fine- to coarse-grained graywacke (sandstone). Includes Taconic Mélange - chaotic, gravity-slide, pebbly-bouldery masses emplaced during deposition of sediments.

Thickness of Normanskill exceeds 1,000 feet.

NASSAU FORMATION/SHALE: Green, red or gray quartzose, medium-hard shale with interbeds of green, hard quartzites.

Thickness several thousand feet.

BALMVILLE FORMATION/LIMESTONE: Dark gray, medium-crystalline, very thin- to medium-bedded, locally conglomeratic limestone; abundant fossil fragments and angular-rounded dolomite and chert pebbles. Gradation with overlying shale; locally absent.

WAPPINGER FORMATION: Sequence of buff to white, fine- to medium-grained, recrystallized limey dolomite and dolomitic limestone interbedded with silvery gray phyllite. Strongly deformed, partly metamorphosed.

POUGHQUAG FORMATION/QUARTZITE: Predominately white or pinkish, medium-grained, granular quartzite; locally grades into fine conglomerate at the base and a fine-grained quartzitic shale at top.

NOTE:

Generalized full thickness of surficial/overburden materials and/or bedrock units shown may not occur at any site.

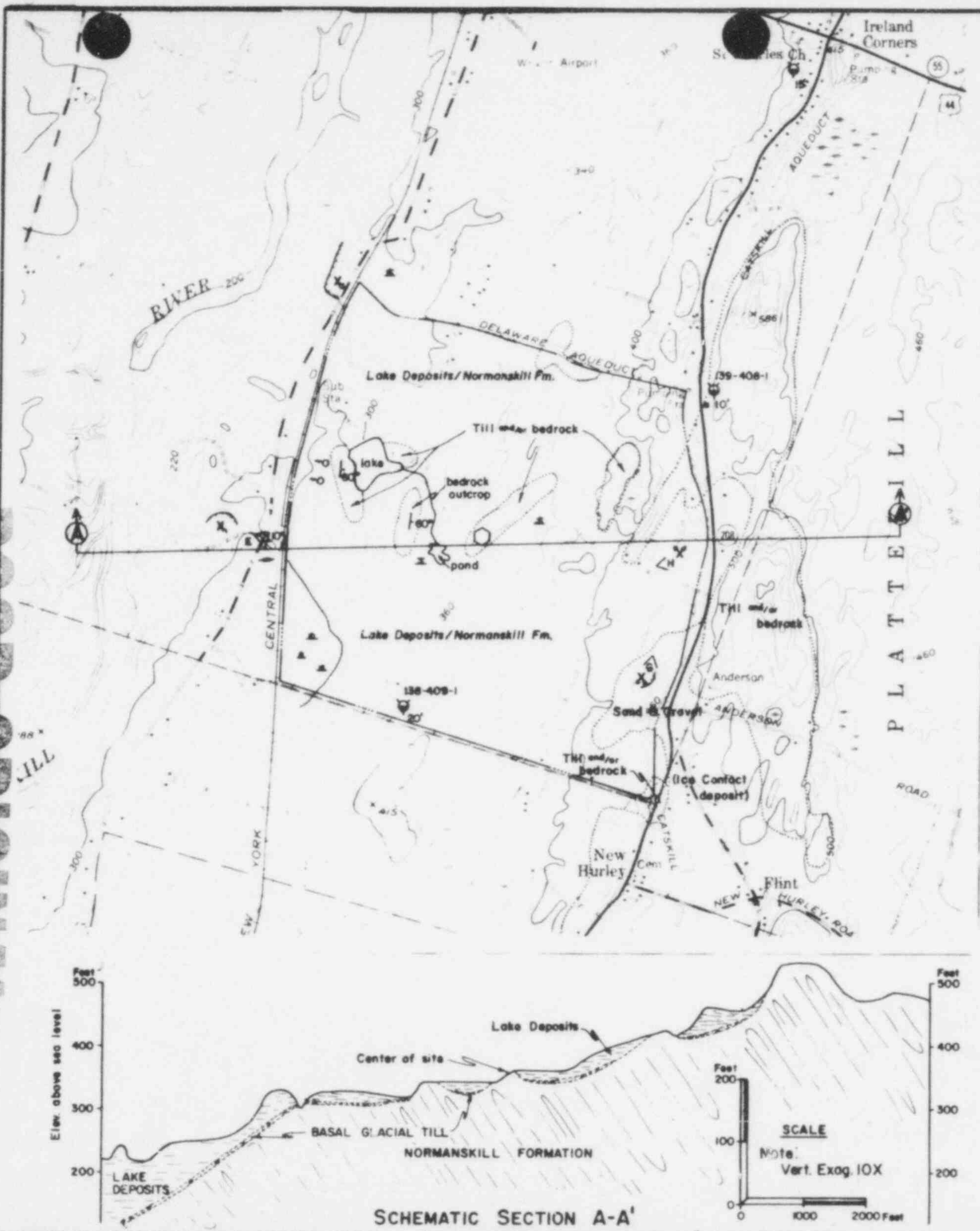
GEOLOGIC DATA:

Sources given in accompanying Site Reports and Section in Bibliography.

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

REGIONAL GEOLOGIC COLUMN
CENTRAL HUDSON RIVER VALLEY

FIG. 2.4-5



EXPLANATION

PLAN MAP

SURFICIAL / OVERBURDEN MATERIALS

LAKE DEPOSITS - Silt and sand with scattered gravel; horizontal beds.

GLACIAL SILT, SAND & GRAVEL - Silt, sand & gravel with cobbles, crudely bedded. Ice contact deposit.

BASAL GLACIAL TILL - Clay & silt with some rock fragments, compact, dense.

BEDROCK UNIT(S)

NORMANSKILL FORMATION - Bluish to greenish, interbedded shale, siltstone and graywacke sandstone, weathers dark gray.

SYMBOLS

- Indefinite contact surficial material
- Strike and dip of beds
- Strike of vertical joints
- Borrow pit, active
- Borrow pit, abandoned
- Tunnel spoil pit, active
- Water well, drilled, log in Appendix with well number and depth
- Spring, flowing
- Alignment of schematic cross section, arrow indicates direction of view
- Outline of general site
- Center of site
- Photograph, apex at point picture taken
- Wet area, soft, parts swampy
- Bedrock and/or basal glacial till at the surface

SECTION

- LAKE DEPOSITS -
- BASAL GLACIAL TILL -
- NORMANSKILL FORMATION -
- Generalized location of contact between surficial materials and/or bedrock

SCALE: 0 1000 2000 3000 feet; 0 100 250 500 1000 meter

Contour interval 20 feet

BASE MAP: U.S. Geological Survey, Gardner (1957) Quadrangle

GEOLOGIC DATA: Sources Given Accompanying Report This Site.

NEW YORK STATE ELECTRIC & GAS
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SITE 8-4-2
GEOLOGIC RECONNAISSANCE MAP

FIG. 2.4-6

STUYVESANT

POOR ORIGINAL

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2.5 SITE 7-11-6, STUYVESANT

2.5.1 Site Description

Site 7-11-6 is located in the Town of Stuyvesant, Columbia County, 12 miles south of Albany and less than a mile east of the Hudson River. The Catskill Park is located approximately 20 miles southwest. Figure 2.5-1 shows the general location of the site. Figure 2.5-2 depicts the site area and topography, and Figure 2.4-3 is an aerial photograph of the site.

Land uses are a mixture of many small parcels of farmland and forest land. Almost half of the site is cropland, pasture, and inactive agricultural land. Three streams cross the site. Figure 2.5-4 is a copy of the LUNR map for the site and surrounding area.

A few farm and nonfarm residential dwellings are located onsite and on the road bordering the site boundary.

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2.5.3 Hydrology

2.5.3.1 Water Availability and Supply

The source of cooling water is the Hudson River. The intake would be located approximately 25 miles downstream of USGS Gaging Station No. 3580 near Troy, New York. Records (February 1946 to September 1973) at this station indicate a mean freshwater discharge of 13,060 cfs over the period of record, a minumum daily freshwater discharge of 882 cfs, a minimum monthly freshwater discharge of 2875 cfs, and a 7-day, once-in-ten-years low freshwater discharge of 2730 cfs.

The intake would be located in the estuarine portion of the Hudson River (downstream of the Troy Dam). Tidal flows in the vicinity of the intake have been estimated at 30,000 cfs.

Due to the amount of water available at this site, no problem with water supply is anticipated.

2.5.3.2 Flood Protection Requirements

The site is located approximately 200 ft in elevation above the Hudson River. Therefore, no flooding problem for the site was identified and flood protection requirements were not considered.

2.5.3.3 Effects of Construction

No problems related to dewatering or erosion during construction were identified. There are three onsite streams that might be affected by construction activities. Dredging operations for intake and discharge construction might result in the release of PCBs from bottom sediments due to the concentration of PCBs in the sediments of the Hudson River. However, dredging effects should be local and temporary, and proper handling of dredge spoil would prevent excessive concentrations of PCBs from entering the water.

2.5.3.4 Effects of Operation

Generally, flows are large enough and the river is deep enough to provide good dispersion of the discharge effluent.

2.5.3.5 References for Section 2.5.3

1. Tice, R.H., Magnitude and Frequency of Floods in the United States, Part 1-B: North Atlantic Slope Basin, New York to York River, U.S. Geological Survey, 1966.

2. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States through September 1950, Part 1, 1954.

3. U.S. Geological Survey, Compilation of Records of Surface Waters of the United States, October 1950 to September 1960, Part 1, 1964.

2.5.4 Water Quality

2.5.4.1 General Description and Analysis

The analysis of the water quality of the Lower Hudson water source for Site 7-11-6 is based on review of state stream classification, appropriate USGS maps, and a water source visit.

The Lower Hudson in the vicinity of Site 7-11-6 has a Stream Classification of C, non-trout waters(1). It has been noted that the water quality classification changes abruptly just south of Houghtaling Island to a Stream Classification of A, non-trout waters(1).

Construction practices utilized and all discharges would be in conformance with 40 CFR 423(2) to minimize potential damage to water quality due to turbidity, siltation, and runoff. Monitoring and treating in-plant waste streams would insure that the facility's liquid effluent and cooling tower blowdown would be maintained in compliance with appropriate state and federal guidelines and regulations. Thus, if measures are taken to control possible increases in siltation, turbidity, suspended solid levels, and reduction in dissolved oxygen production from suppressed photosynthesis, existing water quality conditions are not likely to be aggravated by operation of a closed-cycle plant.

2.5.4.2 References for Section 2.5.4

1. New York State Department of Environmental Conservation. 6 NYCRR, Subchapter B, "Classes and Standards of Quality and Purity Assigned to Fresh Water and Tidal Salt Waters." 1966, as amended.

2. 40 CFR 423, "Steam Electric Power Generating Point Source Category," October 1974, as amended.

2.5.5 Aquatic Ecology

This analysis of the aquatic biology and resources of the Lower Hudson River water source for Site 7-11-6 is based on a review of background literature, publications of and meetings and conversations with personnel of the New York State Department of Environmental Conservation, and a water source visit.

2.5.5.1 Preexising Stress

Preexisting stress on the water source biota appear to be from previously unrestricted industrial and municipal discharges into the river.

2.5.5.2 Aquatic Resources

The lower portion of the Hudson River below the Troy Dam is classified as an estuary since there is an average tidal rise and fall of 4.8 ft below the dam at Troy where the river bed is still several feet below sea level[1]. The stretch of the Lower Hudson to be used as a water source is the main stem of the river at River Mile (RM) 131-132. This stretch of the river is narrow with the shipping channel occurring close to the eastern shoreline.

Studies[2] have shown that 284 phytoplankton taxa have been identified from samples taken in the vicinity of RM 115, 16-17 miles to the south. Chlorophyta (green algae) were represented by 144 taxa, the greatest number of any division. Eighty taxa of Crysophyta (yellow-green algae) were found, including 68 in the class of Bacillariophyceae (diatoms). Other taxa included 41 Cyanophyta (blue-green), 10 Euglenophyta (euglenophytes), 5 Pyrrhophyta (dinoflagellates) and 4 Cryptophyta (cryptomonads). The largest number of taxa recorded during any month was in August (170 taxa). Ten taxa (eight diatoms and two blue-greens) were present throughout the year[2].

In the vicinity of RM 115, 91 zooplankton taxa were found, 59 of which were identified to the species level. Only 5 taxa occurred during every month of the year. These permanent residents were Lophopodella carteri and Hyalinella punctata statoblasts (resistant reproductive bodies produced sexually by Bryozoa), Cyclops vernalis and C. scutifer (Copepoda), and Gammarus spp. (Amphipoda). Abundant cladocerans were found to have been Leptodora and Daphnia. Abundant copepods were Cyclops, Eurytemora, and Diaptomus. Cladocera accounted for 43 percent (40 taxa) of the total identified[2].

A total of 29 aquatic plant species were collected from the vicinity of RM 115[2].

One hundred seventeen taxa of benthic organisms were identified from 501 ponar grab samples taken in the vicinity of RM 115 from May 1973 through May 1974. Tubificidae (Oligochaeta) and Chironomidae (Diptera) were by number the most abundant taxa during the study, accounting for 38 percent and

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36 percent, respectively, of the organisms found. Gammaridae (Amphipoda) were third in numerical abundance, but comprised only eight percent of the organisms in the samples(2).

A study(2) carried out in the vicinity of RM 115 had the following 34 species representing juveniles and/or yearling and older fish of 14 families:

1. resident species

   a. estuarine species
      white perch (Morone americana)
      gizzard shad (Dorosoma cepedianum)

   b. freshwater species
      goldfish (Carassius auratus)
      carp (Cyprinus carpio)
      golden shiner (Notemigonus crysoleucas)
      yellow perch (Perca flavescens)
      spottail shiner (Notropis hudsonius)
      white sucker (Catostomus commersoni)
      banded killifish (Fundulus diaphanus)
      redbreast sunfish (Lepomis auritus)
      pumpkinseed (Lepomis gibbosus)
      bluegill (Lepomis macrochirus)
      tessellated darter (Etheostoma olmstedi)

2. migrant species

   a. anadromus species
      alewife (Alosa pseudoharengus)
      blueback herring (Alosa aestivalis)
      american shad (Alosa sapidissima)
      striped bass (Morone saxatilis)

   b. catadromous species
      american eel (Anguilla rostrata)

3. adventitious or low frequency occurrence species

   a. estuarine species
      bay anchovy (Anchoa mitchilli)
      atlantic tomcod (Microgadus tomcod)
      mummichog (Fundulus heteroclitus)
      hogchoker (Trinectes maculatas)

   b. freshwater species
      chain pickerel (Esox niger)
      cutlips minnow (Exoglossum maxillingua)
      silvery minnow (Hybognathus nuchalis)
      comely shiner (Notropis amoenus)
      emerald shiner (Notropis atherinoides)
      mimic shiner (Notropis volucellus)

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white catfish (Ictalurus catus)
brown bullhead (Ictalurus nebulosus)
rock bass (Ambloplites rupestris)
smallmouth bass (Micropterus dolomieui)
largemouth bass (Micropterus salnoides)
black crappie (Pomoxis nigromaculatus)

Studies(3) showed that RM 80-RM 120 was the spawning area of the alewife, blueback herring and american shad (April-June). Juveniles of these species dispersed throughout the water column and occurred in shore, shoal, and channel areas. RM 80-RM 120 have been shown as the spawning area of white perch during May and June with the eggs usually deposited in shallow waters near shore or in tributary streams.

Studies in the vicinity of Athens, New York, RM 115(2), showed that alewife and blueback herring eggs (combined) contributed between 85 and 99 percent of the total eggs. American shad contributed 0.6 percent to 15 percent. Eighty-five percent of the yolk-sac larvae and nearly 99 percent of all postlarvae collected were alewife and blueback herring. American shad made up 7 percent of the yolk-sac larvae and 1 percent of the post-larvae.

Earlier studies(4) showed that in the vicinity of RM 120 there were moderate numbers of striped bass eggs and light numbers or no early larval or juvenile stages of striped bass.

The shortnose sturgeon (Acipenser brevirostrum) is considered an endangered species in the Hudson River. The shortnose sturgeon had a former distribution of Atlantic seaboard rivers from New Brunswick to Florida, including the Hudson, Delaware, Potomac, Connecticut, Salmon Creed (North Carolina) and St. Johns River watershed (Florida). Probably the major factor contributing to the decline of the shortnose sturgeon is degradation of water quality. Overfishing is also likely since this species has been intensively fished on spawning areas, and has been taken in shad gill nets over a wide area of the Hudson and other rivers(5). The Atlantic sturgeon (Acipenser oxyrhynchus) is considered rare(6).

2.5.5.3 Potential Impacts of Construction

Environmental impacts of construction are expected to be primarily short term and reversible for organisms inhabiting the Lower Hudson River. The primary unavoidable but reversible effects would be associated with dredging and construction of intake and discharge structures.

The aquatic impact associated with dredging operations would involve short-term turbidity increases as a result of sediment removal. The dredging would result in a temporary resuspension of some of the sediments that were previously deposited in the area. Suspended sediments would be introduced through direct bottom disturbance. This temporary increase in suspended sediments might be accompanied by an increase in chemical compounds associated with these sediments. Polychlorinated biphenyl (PCB) would be of concern but not as great a concern as in the Upper Hudson. PCB compounds have a strong affinity for small sediment particles(7), therefore, most of the PCB concentrations caused by resuspension of sediments in the water column would be local and temporary. Because the PCBs have a high affinity for sediment particles, they would be redeposited along with the sediment on the bottom after a short time.

Some benthic organisms would be lost with spoil removal, however any backfilling would provide suitable habitat for some recolonization. Thus, the impact is considered short term and reversible.

Effects of dredging activities or organisms other than the displaced macroinvertebrates would be localized and temporary. Dredging operations should be scheduled reasonably to avoid spawning and other biologically active periods. Increased turbidity levels could have a short-term impact on plankton populations. However, because of the limited area involved in dredging, the potential adverse affects would be inconsequential.

Fish would be largely unaffected because their mobility would enable them to avoid construction activities. Because of the short duration and limited area affected by construction activities, no impact upon or blockage of fish migration in the water source in the site vicinity is anticipated.

2.5.5.4 Potential Impacts of Operation

The potential impacts of plant operation on aquatic biota in this stretch of the Lower Hudson is mainly dependent upon the specific location and design of the intake and discharge structures. Potential impact would result from impingement of adult fish, entrainment of ichthyoplankton, phytoplankton, zooplankton, macroinvertebrates and juvenile fish, and thermal and chemical discharges.

The channel area would be best for location of the intake and discharge. Minimal potential operational impacts would be expected if the intake and discharge structure were located away from any unique habitats or areas of this stretch of the river that were conducive to fish congregating, feeding, or spawning.

2.5.5.5 References for Section 2.5.5

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5. Bureau of Sport Fisheries and Wildlife. 1973. Threatened Wildlife of the United States, U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife Resource Publication 114, 289 pp.

6. New York State Department of Environmental Conservation, Conservation Education, Information Leaflet. August-September, 1970. Environmental Deterioration and Declining Species.

7. National Conference on Polychlorinated Biphenyls (November 19-21, Chicago, Illinois). Conference Proceedings - Envionmental Protection Agency, Office of Toxic Substances, Washington, D.C. 20460. EPA-560/6-75-004.

2.5.6 Terrestrial Resources

The following summary and analysis of Site 7-11-6 is based on a review of these sources of data: U.S. Geological Survey Topographic maps (7.5 minute series), aerial photographs, pertinent literature, contacts with state resource agencies, LUNR maps, and a site visit.

2.5.6.1 Land Use

2.5.6.1.1 Dedicated Areas

1. federal lands -- none on or near the site

2. natural landmarks -- none on or near the site

3. state and local parks and forests -- none on or near the site

4. privately dedicated areas -- none on or near the site

5. endangered species -- at the time of the study, the U.S. Fish and Wildlife Service (USFWS) had not ruled that any plant taxa were endangered or threatened. The State of New York did not have an endangered plant regulation but did have a regulation which prohibited removal of certain plant species without the consent of the landowners.

   The animals considered endangered by the USFWS at the time of the study, which might have occurred in the site vicinity, included the bald eagle, the peregrine falcon, and the Indiana bat. None of these were known to have bred in the vicinity of the site, but might have migrated through the area. the State of New York also considered the osprey to be endangered. This bird was known to migrate along the Hudson River but it was not likely to nest onsite.

6. critical habitat -- none on or near the site

2.5.6.1.2 Vegetation

The major plant communities on the site are agricultural: cropland, pasture, and abandoned fields. No extensive lumber tracts are present; however, the western portion of the site is mainly woodland. No wetlands appear to be on the site.

2.5.6.1.3 Wildlife Habitat

The large percentage of agricultural land limits the species of wildlife to those such as blackbirds, sparrows, doves, chipmunks, raccoon, rabbits, fox, deer, and others associated with farms. The game animals likely to be present onsite are deer, pheasant, grouse, mourning dove, woodchuck, squirrels, and rabbits. Few waterfowl should be present onsite because of the lack of wetland and open water onsite, even though they migrate along the Hudson River.

2.5.6.1.4 Farmland

At the time of the study, a little less than half of the site area was cropland and pasture. Most of the site was situated within a State Agricultural District. The 7-11-6 site area was identified by the County as a prime farmland area.

2.5.6.1.5 Wetlands, Coastal Zone Management Programs and State Wetlands Act

No wetlands were identified on the site. The site is within the coastal zone.

2.5.6.1.6 Floodplains

The site is not within the Hudson River floodplain, based upon field inspection and review of maps and photographs.

2.5.6.2 Transmission Corridors

For Site 7-11-6, a total of 3.4 circuit miles of new transmission facilities would be required. A single circuit 345kV transmission line would be constructed from the site. It would travel in a northerly direction for approximately 3.4 miles to a point of intersection with the existing New Scotland-Alps 345kV transmission line. In addition, a connection would be established to the proposed 765kV New Scotland-Pleasant Valley transmission line, which is assumed to pass through the site. No additional offsite transmission facilities would be required for a nuclear plant.

Land uses crossed by the proposed two-mile wide study corridor are predominantly agricultural, with some areas of mature forest. There are approximately 0.9 miles of named streams and rivers within the corridor. Approximately 0.3 linear miles of the study corridor traverses wetlands, and 0.1 miles traverses areas of steep slopes. None of these features would be significantly impacted by the proposed facility.

Because of the proximity of the proposed corridor to the Hudson River and the New York State Thruway, some minimal visual impact would occur.

The transmission arrangement proposed for this site assumes that the proposed New Scotland-Pleasant Valley 765kV transmission line exists, and is routed on the east side of the Hudson River.

Table 2.5-1 presents the transmission corridor data for Site 7-11-6.

2.5.6.3 Pipeline Route

The pipeline route begins at the Hudson River adjacent to the site. Exact location of the intake depends on aquatic ecological and engineering considerations. The route crosses Penn Central Railroad tracks State Rt. 9J, mature forest land, forest brushland, 2 wetlands (offsite), and 1 creek.

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2.5.6.4 Railroad Route

The railroad route to the site begins at the existing Penn-Central tracks north of the site. The route crosses mainly agricultural land, with forest brushland and mature forests also being crossed. The route crosses 3 creeks. No state highways are crossed by the railroad route. Selection of the final railroad route would depend on engineering aspects. There are no unique ecological areas along the potential route.

2.5.6.5 Impoundments

No impoundments are required for development of this site.

2.5.6.6 Construction Impacts

During site preparation and facility construction, the terrestrial community would be affected by clearing and grubbing, excavation, dewatering, placement of roads, railroads and pipelines, and operation of construction equipment.

The impacts expected from these activities include the alteration of existing vegetation, causing changes in wildlife populations onsite and within terrestrial communities surrounding the site, and introduction of barriers to wildlife movement.

Site 7-11-6 is located in an area of flat relatively open terrain; however, the topography on the west side of the site drops steeply down to the Hudson River floodplain. The level of excavation required is dependent on physical placement of structures. The abundance of similar biotic communities in the area of the site makes disturbance to Site 7-11-6 negligible from a regional perspective. None of the cover types or habitats is unique to the region; consequently construction on Site 7-11-6 would not produce significant habitat losses to the region.

Construction of a pipeline corridor from the Hudson River west to the site would cross the area of steep terrain, possibly causing some temporary erosion to the banks. The pipeline corridor would temporarily disturb a creek, causing minor impact to it. The railroad route crosses relatively flat terrain, causing little disturbance and minor impact to the area. Three streams would be temporarily disturbed, but impact could be minor.

2.5.6.7 Operation Impact

Impacts on terrestrial ecology from operation of a nuclear power plant at the site would be limited to the effects of cooling tower drift deposition, and noise. No expected levels of harmful materials known to cause damage to flora and fauna would be deposited as a result of operation of the nuclear facility.

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2.5.6.8 References for Section 2.5.6

1. Hunt, Oliver P., "Duration Curves and Low-Flow Frequency Curves of Streamflow in the Susquehanna River Basin, New York", State of New York Conservation Department, Water Resources Commission Bulletin 60, 1967.

2. Susquehanna River Basin Electric Utilities, "Master Siting Study, Susquehanna River Basin, Major Electric Generating Projects, 1975-1989", 1975.

3. Susquehanna River Basin Commission, "Comprehensive Plan for Management and Development of the Water Resources of the Susquehanna River Basin", 1973.

4. U.S. Army Corps of Engineers, North Atlantic Division, "Water Resources Development by the U.S. Army Corps of Engineers in New York", 1976.

5. New York State Conservation Department, Division of Water Resources, "Needs and Capabilities for Multipurpose Water Resources Development of the Susquehanna River Basin in New York", 1966.

6. Susquehanna River Basin Commission, "Review: Susquehanna River Basin Study", 1970.

7. Susquehanna River Basin Commission, "Susquehanna River Basin Study", Appendix H, Power, June 1970.

8. U.S. Geological Survey, "Water Resource Data for New York", 1974.

9. North Atlantic Regional Water Resources Study Coordinating Committee, "North Atlantic Regional Water Resources Study"; Appendix E, "Flood Damage Reduction and Water Management for Major Rivers and Coastal Areas", 1972.

10. Britton N.L. and A. Brown, An Illustrated Flora of the Northern United States and Canada, 1913.

11. Burt, W.H., Mammals of the Great Lakes Regions, 1957.

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14. Fernald, M.L., Gray's Manual of Botany, 1950.

15. Hall, E.R. and K.R. Kelson, The Mammals of North America, 1959.

16. New York State Department of Environmental Conservation, "Protected Native Plants", 6 NYCRR 193.3, 1974.

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17. New York State Office of Planning Services, Land Use and Natural Resources Inventory Map Overlays (1:24,000), 1968-1974.

18. Palmer, E.L., Fieldbook of Mammals, 1957.

19. Peterson, R.T., A Field Guide to the Birds, 1947.

20. Peterson, R.T. and M. McKenney, A Field Guide to Wildflowers of Northeastern and North Central North America, 1968.

21. Rickett, H.W., Wildflowers of the United States, Vol. 1: The Northeastern States, 1966.

22. Robbins, C.S., B. Brunn, and H.S. Zim, Birds of North America, 1966.

23. U.S. Fish and Wildlife Service, "Endangered and Threatened Species Notice on Critical Habitats." In: Federal Register, 1975.

24. U.S. Fish and Wildlife Service, "Review of Endangered Species Status." Federal Register, 1975.

25. U.S. Fish and Wildlife Service, "Review of Status of Vascular Plants and Determination of 'Critical Habitat'." In: Federal Register, 1975.

26. U.S. Fish and Wildlife Service, Threatened Wildlife of the United States, 1973.

27. U.S. Fish and Wildlife Service, Office of Endangered Species and International Activities, United States List of Endangered Fauna, 1974.

28. U.S. Geological Survey. 7.5 Minute Series New York State Topographic Maps.

29. New York State Department of Environmental Conservation, Division of Educational Services, Environmental Deterioration and Declining Species, 1970.

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2.5.7 Socioeconomics

2.5.7.1 Displacement and Disruption of Onsite Resources

There are no registered historic, archaeologic, scenic, cultural, recreational, or natural feature resources on the site.

2.5.7.2 Displacement of Residential and Economic Activities

Development of a power plant on the site would necessitate the acquisition of nine dwellings and the relocation of the respective households.

Approximately 47% of the site is active cropland.

2.5.7.3 Origin and Size of the Labor Pool

The site would draw construction labor from the Mid-Hudson area and the Capital District state economic areas.

The construction labor force in this area was estimated to be in excess of 43,000 workers (1970). No significant inmigration is considered necessary to satisfy the site's construction trades labor requirements.

2.5.7.4 Anticipated Points of Vehicular Congestion

Interstates 87 and 90, U.S. Route 9, and the Taconic State Parkway are the major roads serving the site vicinity. Access to the site is provided by State Route 9J and other local roads. Traffic congestion is considered to be possible near the intersection of Route 9 and Interstate 90, where traffic is funneled onto local roads.

2.5.7.5 Potential Impacts on Housing and Services

The housing vacancy rate in the site's commuting area was estimated to have been 7.2% (1970), more than 43,000 vacant year-round units. This is considered indicative of adequate housing stock to absorb the construction workers likely to migrate into the area. Significant adverse effects on the local housing market are not anticipated.

Because of the low potential for inmigration of construction workers, there is no significant potential for impacting local services.

2.5.7.6 Analysis

Good highway access, adequate vacant housing, and a large pool of construction labor would combine to produce an acceptable location for development of a power plant. The migration of construction workers, the primary vehicle for socioeconomic impacts, is not expected to exceed acceptable levels. Many roads provide access to the site such that traffic management could minimize any impacts of vehicle congestion. The major adverse socioeconomic effects at this site would result from the necessity to relocate households inhabiting the site.

2.5.7.7 References for Section 2.5.7

1. New York State Department of Commerce, Mid-Hudson Area Business Fact Book, Part 2, 1974.

2. New York State Department of Commerce, Capital District Business Fact Book, 1974.

3. New York State Department of Transportation, Transportation/Planning Map, New York State-South, 1974.

4. New York State Department of Transportation, Revena Quadrangle Map, Scale 1:24,000, 1973.

2.5.8 Geology and Seismology

2.5.8.1 Introduction

The topography of Site 7-11-6 is rolling and locally steep, with active farming on the flatter eastern portions, but almost entirely in woodland on the steeper western part. The site drains almost directly into the Hudson River by way of two small streams. Other than small farm ponds, there are no bodies of water on the site.

2.5.8.2 Regional Geologic Setting

2.5.8.2.1 Rocks

The site is located on a dissected terrace separated from the Hudson River by an erosional escarpment (Figure 1.4-2). The principal rock types are a series of Cambrian and Ordovician shales and graywacke sandstones overlain by a sequence of more or less contorted shale, slate, sandstone, and local thin limestone and limestone breccias (Figures 1.4-3 and 2.4-5). The limestone is interbedded with shale and not extensive areally.

2.5.8.2.2 Structural Features

The major structural trends are north-south (Figure 1.4-4). However, the site is near the western termination of a series of thrust blocks, and deformation of the beds is common. The trace of the paleo-thrust plates trend northeast in the vicinity of the site (Figure 2.5-5). These paleo-faults are inactive and considered to be more than 350 million years old; last associated movement was apparently during pre-Devonian tectonic activity[1].

2.5.8.2.3 Glacial Features

Glacial history is initiated with advancing ice abrading the bedrock. The more or less uniform resistance of the various rock types did not lead to extensive valley and ridge development, but did tend to accentuate the north-south structures. Debris pushed forward by the ice was locally trapped, especially to the south of rock projections, and overridden by the ice. Meltwaters, running on or within the ice, deposited sand and gravel in channels to form esker-type deposits as the ice melted.

As the ice receded, a blockage to the southward drainage developed south of Kingston, New York, creating a large body of water known as Lake Albany. Sediments carried into this lake covered the glacial till and bedrock and eventually created a flat, lake-bottom topography. As Lake Albany was drained, streams crossing the soft sediments quickly removed sediments overlying bedrock and locally eroded gorges in the underlying rocks.

2.5.8.2.4 Groundwater

The area is underlain by a section of low permeability rocks which protects any deep regional aquifers from possible accidental contamination (Figure 2.4-5).

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2.5.8.3 Areal/Site Geology

Topographically, the site is a rocky, dissected terrace rising to the east. A general terrace level at elevation 200 feet, underlain in part by clay, silt and fine sand (lake deposits), is cut by streams to form steep-sided valleys. Above the general terrace level are a series of low, north-south trending ridges underlain by bedrock that are covered by several feet of till or lake deposits (Figure 2.5-5). A more or less continuous exposure of bedrock forms the escarpment overlooking the Hudson River.

A summary of the well logs at this site is presented in Table 2.5-2.

2.5.8.3.1 Bedrock Units

The rock formations on the site are of two basic groups: the Normanskill Shale underlying a portion of the site and extending westward toward the Mohawk Valley; and a complex series of thin, contorted units, collectively called the Taconic Formations, thrust onto the first group over 350 million years ago(1).

2.5.8.3.1.1 Normanskill Shale

This unit consists of a sequence of predominantly dark-gray, locally red or green, shales and siltstones with interbeds of fine- to coarse-grained, dark-gray graywacke sandstone(2). Located within the Normanskill are gravity-slide masses known as Taconic Melange. This is a chaotic mixture of pebble to block size, angular to rounded rock fragments, introduced into the shales of the Normanskill by gravity sliding during its deposition, about 450 million years ago(1).

2.5.8.3.1.2 Taconic Formations

This grouping includes a series of thin formations with somewhat similar rock types, that is the Mettawee Slate, the Stuyvesant Conglomerate, the Stuyvesant Falls Formation, and the Nassau Formation(2).

Mettawee Slate

This unit consists of variegated green, purple and gray slate or shale with extremely well developed cleavage(2).

Stuyvesant Conglomerate

This is a 5- to 20-ft thick unit of lenticular, nodular limestone and limestone conglomerate located within the Mettawee Slate(2).

Stuyvesant Falls Formation

This unit consists of green, red, blue or medium-gray slate, argillite and chert with well developed cleavage(2).

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Nassau Formation

This unit consists of greenish and reddish gray, quartzose, medium-hard shales and interbedded green quartzites. The unit is estimated to be over 800 ft thick(2).

2.5.8.3.1.3 Engineering Characteristics

The rock formations have similar engineering characteristics. The shale and slate break down into thin plates that weather to a grayish brown. The sandstone beds are more resistant, but when attacked by weathering and erosion, break into block sizes controlled by the bed thickness and the joint spacing. The depth of the weathered zone rarely extends more than a few feet below the surface. The rock has a low permeability and infiltration potential, and water drains rapidly from any exposure. Bearing capacity potential of the rocks is good and will provide an adequate support for heavy foundations. Shallow excavations in the weathered rocks can be ripped, unless the rock has been silicified. Fresh-like rocks will require drilling and blasting techniques.

2.5.8.3.1.4 Groundwater Occurrence

The average well production reported from the shale and slate is five gallons per minute(3). The yield is controlled by open joints and other structures rather than the mass porosity/permeability of the rock.

2.5.8.3.2 Surficial/Overburden Materials

The glacial geology reflects the regional history. The advancing ice emphasized the general north-south trends of bedrock and as the ice receded, it deposited a sequence of glacial deposits(4).

2.5.8.3.2.1 Glacial Till

The ice pushed and distributed a mixture of materials derived from the nearby bedrock, and frequently overrode the deposited material, compacting it into a dense unbedded till mass lying directly on bedrock. The glacial till consists of silt, sand, gravel and boulders which form a thin cover, several feet thick, over the bedrock, with frequent isolated outcrops at the surface.

Drumlin Deposits

Locally, the advancing ice created deposits of glacial till up to 60 ft thick and formed the material into drumlin-shaped deposits. The till material, derived from local bedrock, is non-bedded, poorly sorted, dense, and deposited directly on the bedrock.

2.5.8.3.2.2 Lake Deposits

Clay, silt and fine sands were deposited over all other glacial deposits to an elevation of about 200 feet. The lake deposits consist of very thin, horizontal beds (varved) of light- to medium-gray and bluish, clay, silt and fine sand. The upper six to ten feet of this material is buff to brown, and stiff. Below, the material is gray to blue-gray and softer.

2.5.8.3.2.3 Sand and Gravel (Esker Deposits)

Within the melting ice, a long drainage way developed and flowing water eventually filled the temporary channel with bedded sand and gravel. As the ice melted away, the sand and gravel dropped onto the underlying till or bedrock to form the long esker which lies along the east boundary of the site (Figure 2.5-5).

2.5.8.3.2.4 Deltaic Sand and Gravel (Lake Deposits)

The final stage of deposition occurred as Lake Albany was being drained. Streams carrying the eroded glacial sediments redeposited the material, as deltas of sands and gravels, in the lower level lake. One such deposit of bedded sand and gravel occurs at Poolsburg (Figure 2.5-5).

2.5.8.3.2.5 Drainage

Surface drainage on the surficial deposits is good. The deeply incised channels quickly remove water from the terrace areas underlain by lake deposits and the steep-sided drumlins. The esker deposits rapidly drain the surface waters, and runoff infiltrates the relatively permeable sand and gravel units.

2.5.8.3.2.6 Engineering Characteristics

Glacial Till

The till is compact and quite impermeable. The thin till unit has a moderate bearing strength and is characterized by high blow counts. However, the till can be removed by a bulldozer particularly when wet. The drumlin deposits normally have characteristics similar to the glacial till. For additional information on these units see Figure 2.4-5.

Lake Deposits

The engineering characteristics of the silt and fine sands depend largely on water content. At the surface, the lake deposits may have low to moderate bearing strengths, but at depth, where saturated, they have very little strength and are reportedly subject to liquefaction. The lake deposits are also slide-prone.

Esker Deposits

The esker deposits are non-cohesive with low bearing strengths and a high permeability.

2.5.8.3.2.7 Groundwater Occurrence

The lake deposits are generally non-waterbearing. An average yield from the till is five gallons per minute. The esker deposits may supply large quantities of water locally, while the drumlin deposits usually yield only a few gallons per minute from sandy/gravelly zones. Well yields depend on the grain size, permeability and recharge areas of the surficial units(3). These deposits contain abundant water as evident by numerous flowing springs located along the slopes.

2.5.8.4 Some Potential Problems

Three significant features of Site 7-11-6 determined by the reconnaissance studies are: local deep overburden of lake deposits, parts of which are unstable; slope instability in some overburden cuts; and the full structural history and characteristics of the paleo-thrust faults.

2.5.8.4.1 Glacial Deposits

The glacial deposits, particularly at the southwest corner of the site, extend to a depth of approximately 40 to 70 ft although over most of the site bedrock is within 20 ft of the surface.

2.5.8.4.2 Large Open-Cut Excavations

Large open-cut excavations in the lake deposits must be carefully designed and excavated to avoid slope failure. Final slopes in this material must be carefully treated.

2.5.8.4.3 Paleo-Thrust Faults

The presence of paleo-thrust faults and associated structures on the site could create academic discussions and possible requests for detailed geologic investigations, even though the structures are widely accepted as over 350 million and up to 435 million years old and inactive.

2.5.8.5 Geological Evaluation

The recognized potential problem features can be eliminated by detailed exploration data and/or engineering design: locating areas where bedrock is shallow, or carefully designing and controlling the open cuts when overburden is up to 50 ft deep.

Rating for the site is 1.

2.5.8.6 Seismological Evaluation

This site is located in the mid-Hudson region removed from the near influence of any licensing impact attributable to the Adirondack province or the hypothesized Boston-Ottawa zone considered for the northern Hudson River Valley sites. Nor is this site affected by the Ramapo or subsidiary fault influences of the southern Hudson River Valley.

The seismicity of the region and immediate site area is low. However, because of the complex geology a greater than normal level of regional and site investigations may be necessary for licensing.

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2.5.9 Accident Analysis

2.5.9.1 Site Description and Population Distribution

The site consists of approximately 950 acres. The proposed site boundaries, shown in Figure 2.5-1, are coterminous with the exclusive area boundary. No roadways traverse the exclusion area.

The Low Population Zone (LPZ) is designated to be 3 miles, pursuant to NRC guidelines. Reconnaissance-level data for the LPZ are summarized in Table 2.5-3.

The nearest population center is the City of Albany (1970 population 115,781) located 12 miles from the site in a northerly direction. Population distribution for 30 miles surrounding the site is summarized in Table 2.5-4.

2.5.9.2 Nearby Industrial, Transportation and Military Facilities

Major transportation activities in the vicinity of Site 7-11-6 are summarized in Table 2.5-5. Of note are the two Penn Central mainlines west of the site and airlanes V91-489, J37, and J68.

No military or industrial facilities were identified which would impart a potential hazard in the site vicinity.

2.5.9.3 Analysis and Summary

Site 7-11-6 meets acceptability criteria for the population density and distribution, as given in 10 CFR 100 and Reg. Guide 4.7. The activity and population within the LPZ is such that appropriate measures can be taken in event of a serious accident to mitigate against serious harm, within reasonable probability. The nearest population center distance is acceptable with respect to the 1.33 distance ratio beyond the LPZ outer radius as required by 10 CFR 100.

The proximity of the site to airlanes V91-489, J37 and J68, and to the Penn Central mainlines presented a minor potential hazard. The extent of hazard associated with activities within the airlanes and railroad lines can only be determined by conducting detailed studies required in the Preliminary Safety Analysis Report.

2.5.9.4 References

1. New York State Dept. of Commerce, Profile of People, Jobs and Housing: Capitol District, Part 2, 1974.

2. New York State Dept. of Commerce, Profile of People, Jobs and Housing: Mid-Hudson Area, Part 2, 1974.

3. USGS 7.5 Minute Series (topographic) quadrangle maps.

2.5.8.7 Suggested Methods of Further Investigation

Cored borings could be supplemented by some seismic refractive survey lines across the site. Depth and character of overburden materials and the configuration of shallow-deep bedrock should be determined.

2.5.8.8 References for Section 2.5.8

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2. Fisher, D.W., Stratigraphy and structure in the southern Taconics (Rensselaer and Columbia Counties, New York): in LaFleur, R.G., (ed), Guidebook to Field Trips: New York State Geological Association, 33rd Annual Meeting, Troy, New York, p. D-1 to D-22. 1961.

3. Arnow, T., The groundwater resources of Columbia County, New Y :
New York State Dept. Conservation, Bull. GW-25, 48 p. 1951.

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4. U.S. Department of Commerce, Bureau of the Census, 1970 Small Area Census Data for New York State.

5. New York State Executive Department Office of Planning Services, Demographic Projections for New York State, Unpublished report, 1974.

6. U.S. Department of Commerce, Bureau of the Census, Characteristics of the Population, Number of Inhabitants, 1970.

7. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation/Planning Maps, 1974.

8. Facilities Records for Airports in New York from the files of the Federal Aviation Administration, Eastern Regional Office.

9. Sectional Aeronautical Charts for Detroit, New York and Montreal, November 7, 1974, January 2, 1975, and October 10, 1974.

10. New York State Department of Transportation, Traffic Volume Report, 1973.

11. Motor Vehicle Manufacturer's Association, Motor Truck Facts, 1974.

12. New York State Parks and Recreation, New York State Outdoor Recreation Facilities Inventory, Section 2: "General Site Information," Section 4: "County Map User Guide," Appendix C: "Complete Activity Code List, 1975.

13. Cornell University, LUNR Inventory Map Overlays, 7.5 Minute Quadrangle, (1:24,000), for New York State Office of Planning Services, 1968-1974.

14. Major Natural Gas Pipelines, Federal Power Commission, June 1973.

15. U.S. Secretary of Transportation, Rail Service in the Midwest and Northeast Region, 1974.

16. U.S. Department of Commerce, Statistical Abstract of the United States, 1973.

17. U.S. Department of the Army, Principal Military Installations and Activities in the 50 States, 1974.

2.5.10 Aesthetics

2.5.10.1 Site Characterization

The site topography is rolling at approximately 200 ft above msl. The highest elevation of 280 ft above msl occurs along the eastern side, sloping gradually across the site then dropping steeply on the western side to 70 ft above msl in the southwest corner. The surrounding area's topography can be characterized as rolling. Onsite forests occupy the western portion, and agricultural land and pastures occupy most of the eastern portion of the site.

There are minimal contour changes between the site and surrounding area, and there is a fair amount of vegetative screening, which would decrease the probability of visual intrusion on nearby sensitive land uses.

Several vantage points are evident in the site area, with the following selected as the most representative of the surrounding visually sensitive and intensive land uses:

Land Use	Distance from Site
Schodack Landing	1.5 miles N
Coeymans Village	2.0 miles NW
Village of Stuyvesant	4.5 miles S
Village of Kinderhook	4.5 miles SE
Hudson River	2.0 miles SW
Rt. 87	3.0 miles NE

There are no known historic places or natural landmarks within the study area.

Several recreational facilities exist within 6 miles of the site. Those include: 2 marinas, 3 parks, 2 clubs, a trailer camp, and a 160-acre recreation area.

2.5.10.2 Aesthetics Analysis

Only moderate to negligible impacts are anticipated at the identified land uses. The impacts are summarized as follows:

Schodack Landing	plant structures moderately visible distance of 1.5 miles (middle ground)
Coeymans Village	plant structures moderately visible distance 2.0 miles (middle ground)

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Village of Stuyvesant	plant structures slightly visible distance 4.5 miles (background)
Village of Kinderhook	plant sturctures slightly visible distance of 4.5 miles (background)
Hudson River	plant structurers slightly visible distance of 2.0 miles (middle ground)
Rt. 87	plant structures moderately visible distance of 3.0 miles (middle ground)

2.5.10.3 References for Section 2.5.10

1. U.S. Department of the Interior, National Park Service, National Register of Historic Places, 1975, as amended.

2. U.S. Department of the Interior, National Park Service, National Registry of Natural Landmarks, 1975, as amended.

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7. USGS 7.5 Minute Series (topographic) quadrangle maps.

8. New York State Department of Transportation, 1:250,000 Scale Planimetric Series Transportation Planning Maps, 1974.

9. Site visits.

758 041

2.5.11 Land Use Planning

2.5.11.1 Introduction

Columbia County Planning Department had begun a five year phased planning program for the county ultimately leading to the formulation of a final land use plan. At the time of the study, the county initiated the early stage of the program which was the generalized land use proposals, called "Preliminary Land Use Guide." The purpose for this plan was to serve as a guide for the County Planning Board in making decisions and undertaking reviews at the county level. Furthermore, the guide outlined specific land uses for the county. Land use designations specific to Site 7-11-6 were:

1. high economic viability agricultural--the guide called for the aid and encouragement of farming in this area

2. recreation and conservation--these areas, due to physical constraints such as topography, were designated for specialized development (ski slopes, hiking trails, etc.)

2.5.11.2 Site and Local Description

The site and a majority of the land area surrounding are classified as high economic viability farmland. The steeply sloping land area along the Hudson River and to the south are classified for recreation and conservation.

2.5.11.3 Compatibility

The purpose of this preliminary guide is to aid the Planning Board in making decisions. As conditions change in the county, the guide is expected to be modified accordingly. Therefore, the site is not interpreted as being in direct conflict with the county's plans. In addition, high economic viability farm designated land spaces are extensive in acreage in the county, and the site is preempting only a small segment of the land use.

Since the county's land use plan is in the early development stage, it is anticipated that the proposed use for the Site 7-11-6 area can be incorporated into the final planning stage of the county.

2.5.11.4 Reference for Section 2.5.11

1. Columbia County Planning Department, Generalized Land Use Plans, 1972.

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2.5.12 Costs

Table 2.5-6 provides cost data associated with the development of Site 7-11-6.

2.5.13 Conclusions

In the vicinity of Site 7-11-6, no legal constraints to plant siting were identified.

TABLE 2.5-1

TRANSMISSION CORRIDOR DATA
SITE 7-11-6

Criteria	Acres	Miles	Number
Physical Features			
1. Land Use			
Industrial	0	0	
Commercial	5	0	
Institutional	0	0	
Residential	50	0	
Airfield Zone	0	0	
Central Business District	0	0	
Radio & TV Towers	---	---	0
2. Vegetative Cover			
Agricultural & Forest Brushland	0	0	
Mature Forest	670	0.5	
Forest Plantation	0	0	
3. Recreational/Cultural			
State Forest & Wildlife Mgt. Area	0	0	
State, County, Town Parks	10	0	
Historic Sites (National or State)	---	---	0
4. Natural Features			
Wetlands	415	0.3	
Lakes	0	0	
Slopes 25%+	190	0.1	
Streams & Rivers (Named)	0	3.0	

TABLE 2.5-1 (Cont'd)

Criteria	Miles
Aesthetics	
1. Exposure	
Scenic Hwy - Overlook	0
Interstate Hwy	0
NYS Hwy More Than [illegible]00 V/D	0
NYS Hwy Less Than 3[illegible]0 V/D	4
2. Visual Quality	Line Miles
Unique	0
High	3.4
Medium	0
Low	0
Generally Characteristic of the Area	0
3. Structure Size (new)	
115kV Single or Double Circuit	
230kV Single Circuit	
230kV Double Circuit	
345kV Single Circuit	3.4
345kV Double Circuit	
765kV Single Circuit	
4. Sensitivity (importance)	
National (interstate)	0.5
State	3.0
Regional	
Local	

NYSE&G ASA
SITE 7-11-6
STUYVESANT

TABLE 2.5-2

WELL LOGS AT SITE 7-11-6*

Well Number	Depth (feet)	Depth to Rock (feet)	Rock Type	Water Level (feet)
2	203	67	Shale	43
83	127	23	Shale	27
164	132	48	Shale	?

SOURCE:

*Arnow, T. The groundwater resources of Columbia County, New York: New York State Department of Conservation, Bull. GW-25, 48 p. 1951.

NYSE&G ASA
SITE 7-11-6
STUYVESANT

TABLE 2.5-3

LOW POPULATION ZONE (LPZ) EVALUATION
SITE 7-11-6

Towns -- Stuyvesant, New Baltimore, Kinderhook, Coeymans, Schodack, Ravena City

Recreational Facilities -- Total Population 1600

Newton Hook Boat Club -- Population 300
(commercial marina)

Sandy Shore Marina -- Population 500

Rolling Meadows -- Size 160 acres, Population 60
(horseback riding, trails)

Gerry Finks Marina -- Population 370

Ravena Coeymans -- Population 370
(private marina)

Dwelling Units -- 624

Number Roads Exiting LPZ -- 15

Schools, Institutional Population -- 0

NYSE&G ASA
SITE 7-11-6
STUYVESANT

TABLE 2.5-4

POPULATION DENSITY AND DISTRIBUTION
SITE 7-11-6

	1985	2025
Cumulative Population (0-30 miles)	806,650	1,051,800
Population Density (persons/mi^2) (0 - 30 miles)	286	372
Site Population Factor SPF (30)	0.209	0.322

TABLE 2.5-5

NEARBY TRANSPORTATION ACTIVITIES
SITE 7-11-6

Identification	Distance (mi)	Type
NY 9J	0.8	Road
NY 144	1.9	Road
I 87	2.8	Road
Penn Central (E)	0.1	Rail
Penn Central (W)	1.0	Rail
Penn Central (spur to N-East)	3.6	Rail
Hudson R.	1.6	Canal
Barbus	5.0	Airport
Kline Kill	9.0	Airport
South Albany	9.0	Airport
V 91-489 Alb. - Pawling & Poughkeepsie	2.5	Airlane
J 37 Alb. - Kennedy	2.0	Airlane
J 68 Hancock - Providence	10.0	Airlane

NYSE&G ASA
SITE 7-11-6
STUYVESANT

TABLE 2.5-6

COST DATA SITE 7-11-6

	Component	Cost $ X 10^6 (1987)	Subtotal	Notes
1.	Railroad	2.0		
2.	Highway	---		
3.	Land & Land Rights	0.1		
4.	Excavation & Foundations	4.1		Rock Excavation = 209,000 yd^3
5.	Seismic Design	---		
6.	Intake & Discharge	18.5*		
7.	Impoundments	---		
8.	Piping Installation	7.3		
9.	Pumping Equipment	0.7		
10.	Ultimate Heat Sink	21.0		
11.	Labor Rights	112.0		
12.	SUBTOTAL - SITE RELATED COSTS		129.0	
13.	PLANT CONSTRUCTION COST		2,880.0	
14.	TOTAL CONSTRUCTION COST (lines 12 & 13)		3,009.0	
15.	Transmission Construction	3.0		Grid = 3 miles No substations
16.	TOTAL CAPITAL COST (lines 14 & 15)		3,012.0	
17.	Nuclear Fuel & O&M	723.0		
18.	Transmission Losses (Capitalized)	41.0		
19.	Pumping Cost (Capitalized)	3.0		
20.	TOTAL OPERATING COST		685.0	
21.	TOTAL EVALUATED COST (lines 16 & 20)		3,697.0	

*Subtracted from cost components in base plant.

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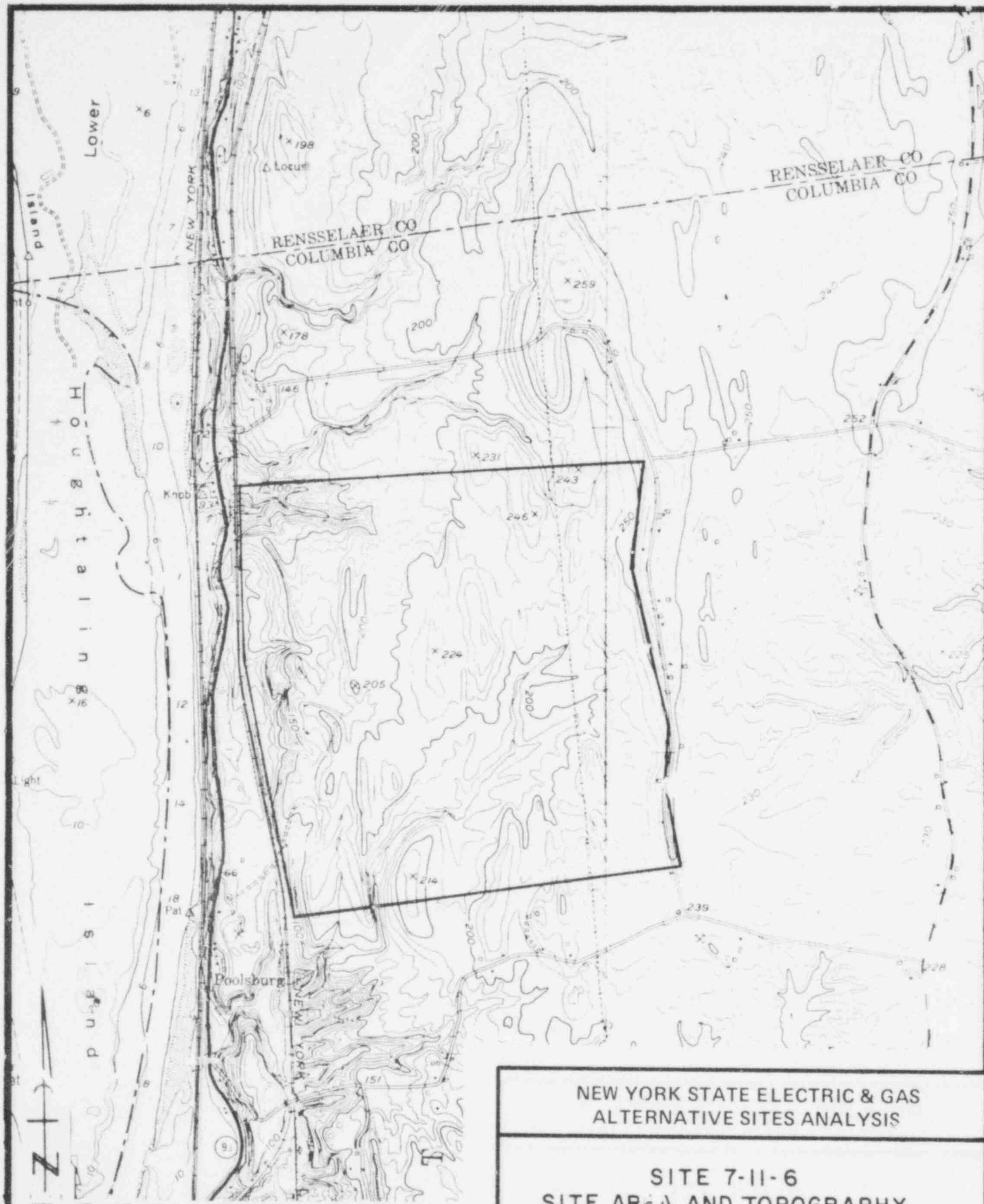

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-11-6
SITE AREA AND TOPOGRAPHY

FIG. 2.5-2

BASE MAP=USGS RAVENA AND KINDERHOOK QUADRANGLES 1953.

0 ½ 1
SCALE
(MILES)

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NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

POOR ORIGINAL

SITE [illegible]
LUNR DATA

FIG. 2.5-4

0 ½ 1
SCALE
(MILES)

NOTE: REFER TO TABLE 1.4-1 FOR AN EXPLANATION OF LUNR SYMBOLS.

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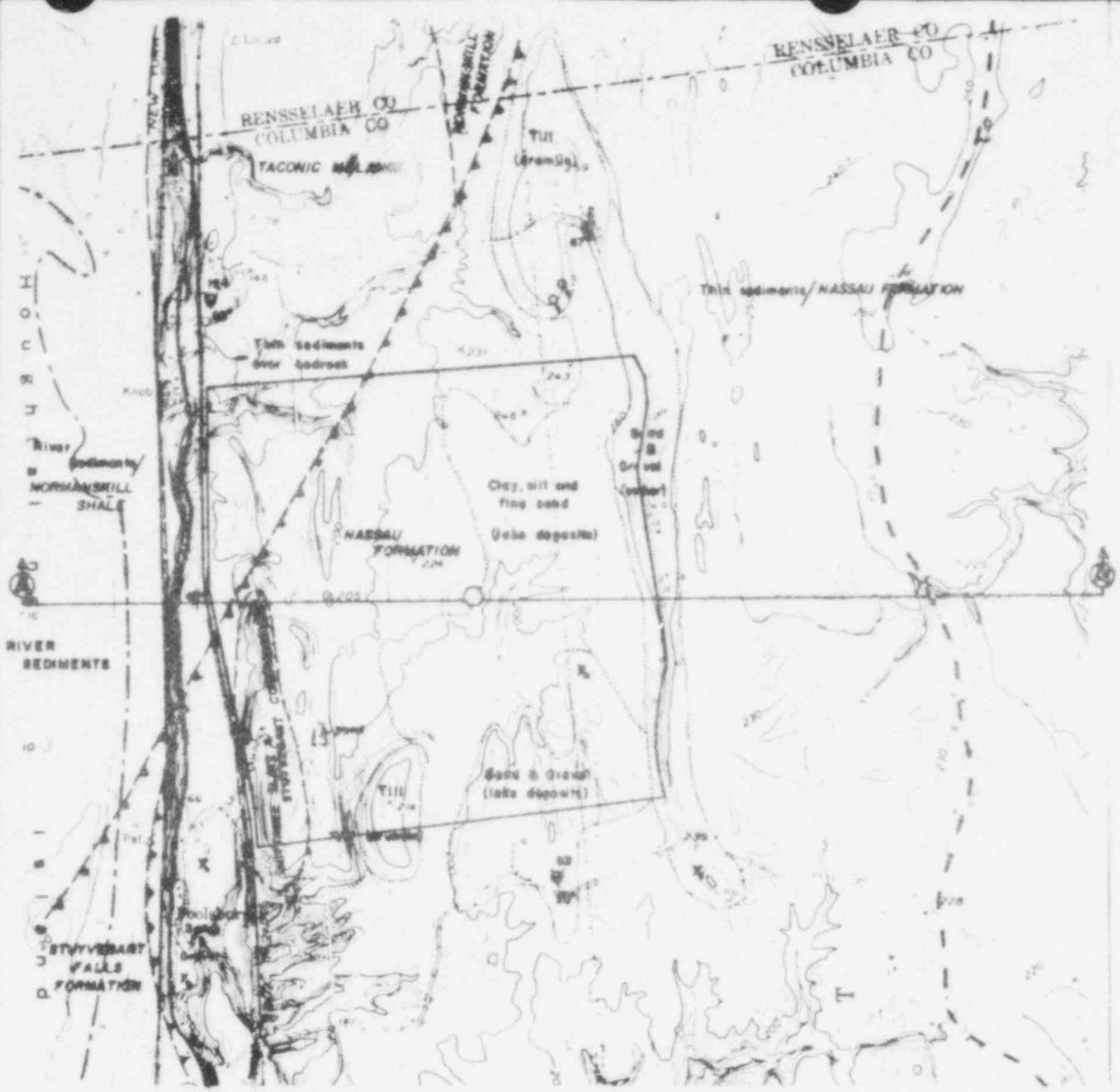


EXPLANATION

PLAN MAP

SURFICIAL / OVERBURDEN MATERIALS

LAKE DEPOSITS - Clay, silt and fine sand, horizontal beds under 1/2-inch thick.

SAND AND GRAVEL (ESKER DEPOSITS) - Bedded sands and gravels filling glacial channels.

GLACIAL TILL - Clay, silt, sand and gravel with some boulders, crudely sorted, non-bedded. Drumlin Deposits - locally till accumulated as low hills, ridges.

DELTAIC SAND AND GRAVEL (LAKE DEPOSITS) - interbedded and mixed sand and gravel; Lake Albany deposits.

BEDROCK UNITS

NORMANSKILL SHALE - Grayish to greenish, shales and siltstones interbedded with graywacke sandstone, weathers dark gray. Locally includes gravity-slide masses of Taconic Mélange.

TACONIC FORMATION - Primarily shales, slates and conglomerates of the Mettawee Slate, Stuyvesant Conglomerate, Stuyvesant Falls Formation and Nassau Formation.

SYMBOLS

- Contact, dashed where approximate.
- Indefinite contact between surficial materials.
- Paleo-fault, dashed where approximate. Sawtooth pattern on upper thrust plate.
- Strike and dip of bed.
- Sand and gravel pit, abandoned.
- Well water, drilled, log in appendix with number & depth to rock.
- Spring, flowing.
- Alignment of schematic cross section, arrow indicates direction of view.
- Outline of general site area.
- Corner of site.
- Photograph, apex at point picture taken.
- Bedrock and / or till at the surface.

SECTION

- METTAWEE SLATE AND STUYVESANT CONGLOMERATE -
- TACONIC MÉLANGE - Gravity-slide masses; mixture of fines to rock blocks and angular pieces within Normanskill Shales.
- Generalized location of contact between surficial materials and / or bedrock.
- Contact gradational.
- Paleo-thrust, arrow on upper thrust plate.

Note. Observation above and cross-section A-A' for Surficial and some Bedrock units.

SCALE

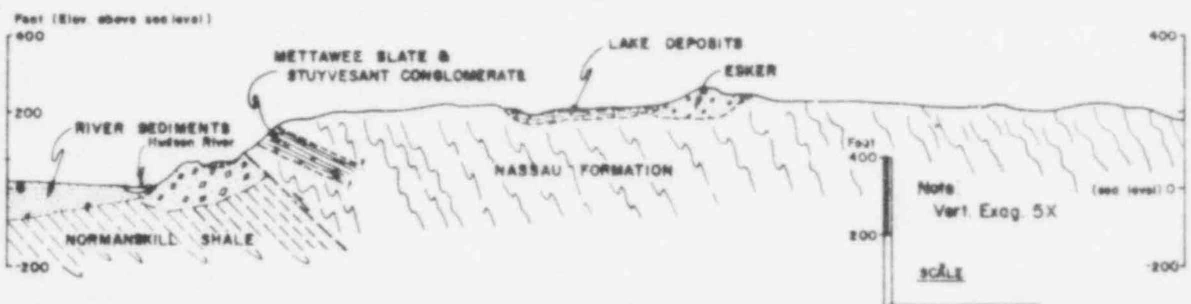
0 1000 2000 3000 feet

0 100 250 500 1K meter

Contour interval 10 feet

BASE MAP: U.S. Geological Survey, Ravena (1953) & Kinderhook (1953) Quads.

GEOLOGIC DATA: Sources Given Accompanying Report This Site



SCHEMATIC SECTION A-A'

NEW YORK STATE ELECTRIC & GAS
ALTERNATIVE SITES ANALYSIS

SITE 7-II-6
GEOLOGIC RECONNAISSANCE MAP

FIG. 2.5-5

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COMPREHENSIVE BIBLIOGRAPHY

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3.0 COMPREHENSIVE BIBIOGRAPHY

3.0 COMPREHENSIVE BIBLIOGRAPHY

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