Items 17 and 37

LRA ER Reference 2.1-9
Heritage Station Application for Certification of a Major Generating Facility Under Article X of the new York State Public Service Law, February 2000, Volume 1, Chapters 14 and 17)

(On Compact Disk)

HERITAGE STATION

Application for Certification of a Major Generating Facility Under Article X of the New York State Public Service Law

February 2000

Volume 1

Prepared by:

Earth Tech
196 Baker Avenue
Concord, MA 01742

Prepared for:

Heritage Power, LLC
59 Independence Way
Oswego, NY 13126

1. INTRODUCTION

1.1 The Applicant

Heritage Station will be developed, owned and operated by Heritage Power LLC, a joint undertaking of affiliates of Sithe and GE. New York-based Sithe, as lead developer of Heritage Station, develops, finances, owns and operates electric power plants that have set industry standards for clean, efficient and reliable power production. Following the completion of its most recent acquisition, the purchase of almost all of the non-nuclear generating assets of General Public Utilities (GPU), Sithe is one of the largest independent power producers in the United States and among the five largest in the world. Sithe is recognized throughout the industry for its use of state-of-the-art engineering and efficiency. Including the former GPU assets, Sithe owns and operates 49 power plants in North America with a total generating capacity of 11,572 gross MW using a variety of fuels (natural gas, oil, coal and water) to produce electricity and thermal energy. Sithe sells electricity from its operating plants to major electric utilities and thermal energy to governmental and industrial clients. Sithe also has over 8,000 MW of new generation under construction or advanced development within North America.

Sithe also has an extensive international portfolio of projects under operation, construction or development, including eight operating plants totaling 1,168 gross MW, and over 7,000 MW of new generation under construction or advanced development. Sithe has additional projects with more than 10,000 MW in the early stages of development. In total, including its domestic and international projects and the GPU transaction, Sithe expects to generate nearly 28,000 MW of electric power when its advanced development and expansion projects are completed several years from now.

Sithe is owned 60 percent by Vivendi, S.A., the world's leader in environmental services (formerly Compagnie Generale des Eaux); 29 percent by Marubeni Corporation, a major Japanese trading company; and 11 percent by management. Sithe is based in New York City with offices in Oswego, San Diego, Boston, London, Paris, Sydney, Beijing, Hong Kong, Bangkok, Rio de Janeiro, Manila and Seoul. Sithe employs approximately 2,500 people worldwide, including approximately 250 people in New York State.

GE, among numerous other businesses in which it is engaged, is one of the world's leading manufacturers of gas and steam turbines. GE Power Systems is a $9.5 billion unit of the General Electric Company and is a global leader in power generation technology, energy services and energy management systems. GE Power Systems employs 24,500 people worldwide.

GE Power Systems serves the changing needs of the global energy market through the following operations:

- GE Energy Products
- Nuclear Energy
- Industrial Products
- GE-Nuovo Pignone
- GE Nuovo Pignone Global Services
- S&S Energy Products
- GE Industrial AeroDerivatives
- GE Energy Services

Heritage Station will be the first facility in the United States to use GE's "H System™" gas turbine combined-cycle technology. The H System will be the most efficient power generation technology in the world, producing clean, low-cost electricity while meeting stringent environmental regulations. Additional details about this technology are provided in Section 3.2.2.3. It is anticipated that the Project will be viewed as an industry showcase maintaining upstate New York as a destination for international energy experts and industry leaders.

The Project's ownership and financing will be separate and distinct from the existing Independence Station, and it will be located on a separately leased parcel within the Independence Station site. Heritage Power LLC will be the entity responsible for the operation of the facility. Because Heritage Station is the launch project for the H System, as described above, GE will be the sole owner of Heritage Power LLC until after the plant has completed its performance and demonstration tests, at which time Sithe intends to participate in ownership of the Project.

1.2 The Project

The Project will be a natural gas-fired, combined-cycle generating plant with a nominal electric generating capacity of 800 MW. GE will be supplying the 7H gas turbine system for the Project, the first installation of these next generation gas turbine combined-cycle systems in the United States. It will be located in the town of Scriba, Oswego County, New York. The proposed site is owned by an affiliate of Sithe and is to be a separately leased area within the existing Independence Station site.

The Project will obtain water from the city of Oswego via an existing water main that currently supplies Independence Station. The main is owned by the town of Scriba and interconnected with the city of Oswego. Project wastewater will be treated on-site, conveyed to a holding pond and discharged to Lake Ontario via the existing

Independence Station discharge structure, pursuant to a new State Pollutant Discharge Elimination System (SPDES) permit.

The Project will be among the cleanest ever permitted. First of all, within the Project itself, low NO_x burners will be employed with SCR to control NO_x emissions. The use of SCR will allow the Project to emit only two parts per million dry volume (ppmvd) of NO_x, the lowest level proposed for a plant of this type in New York State, and more than 40 percent lower than any facility of its kind currently operating in the state. Furthermore, the Project has been designed to operate at unprecedented thermal efficiency and use natural gas exclusively as its fuel. With this high efficiency and use of natural gas, the Project will be economical in the state's competitive electricity market, and its operation will displace older, less efficient and higher emitting facilities and result in the significant reduction of regional emissions of air pollutants and greenhouse gases.

An existing 345 kV substation located on-site, the Independence Substation, will be utilized to interconnect the Project with the transmission grid. Therefore, the only new transmission line anticipated for the Project will be a new overhead 345 kV line located entirely on the Independence Station site connecting the Project to the substation about 1,200 feet away. Natural gas will also be supplied via an on-site interconnect.

1.3 Public Interest Considerations

1.3.1 The Competitive Markets and Consistency with the 1998 State Energy Plan

Section 1001.5 of the regulations implementing Article X of the PSL requires that the application for a Certificate of Public Convenience and Necessity:

> *Contain a statement demonstrating that construction of the proposed facility is reasonably consistent with the energy policies and long range energy planning objectives and strategies contained in the most recent State energy plan adopted pursuant to Article 6 of the energy law* ***or that the proposed facility was selected pursuant to an electric capacity procurement process approved by the Public Service Commission as reasonably consistent with the most recent State energy plan*** (emphasis added).

Construction of the Project is consistent with the energy policies and long range planning objectives and strategies contained in the most recent State Energy Plan (SEP). In addition, because the Project will operate as a merchant plant in the competitive electric markets, it was selected pursuant to an electricity capacity procurement process approved by the Public Service Commission (PSC) as reasonably consistent with the most recent SEP.[1]

The New York State Board on Electric Generation Siting and the Environment (Siting Board), in an Order issued January 28, 1999, found that Section 160.7 of the PSL was clear that an approved procurement process is one approved by the PSC.[2] The Siting Board found that the PSC acted within the authority given to it in concluding that competition in the electricity generation market is an approved procurement process consistent with the then most recent SEP.[3] The Siting Board stated:

> *The November 1998 State Energy Master Plan also expressly notes that plants that contribute to effective competition are consistent with long-range plans for expansion of the electric system and are likely to be in the public interest. This supports the Commission's determination that competition is an approved procurement process within the meaning of the PSL. Therefore, in addition to noting that PSL 160(7) empowers the Commission to approve procurement processes, we agree with the Commission's conclusion that competition is an approved procurement process.*

The Siting Board's Recommended Decision in the Athens case followed the Siting Board's order finding that the Athens facility was selected pursuant to an approved procurement process, "namely the competitive provision of alternative energy supply sources by independent power producers." (Recommended Decision at 10-11.)

Sithe has previously petitioned the PSC for a ruling declaring that, pursuant to Section 160.7 of the PSL, competition in the electricity supply market is an approved procurement process that is reasonably consistent with the 1998 SEP.[4] The Commission agreed, stating:

---

[1] This finding is consistent with PSC policy. In response to a petition filed by Athens Generating Company, L.P., for a ruling on whether competition is an approved procurement process within the meaning of Article X, the PSC ruled that: "Competition in the electricity generation market is an electricity capacity procurement process that is reasonably consistent with the 1994 SEP." Case 98-E-0096 – *Declaratory Ruling Concerning Approval Procurement Process* – Issued and effective April 16, 1998 (Declaratory Ruling).

[2] Case 97-F-1563 – Application by Athens Generating Company, L.P. for a Certificate of Environmental Compatibility and Public Need to Construct and Operate a 1,080 Megawatt Natural Gas-fired Combined-cycle Combustion Turbine Generating Facility in the Town of Athens, Greene County, *Order Concerning Interlocutory Appeals* (January 28, 1999).

[3] The PSC reached the conclusion in its April 16, 1998 Declaratory Ruling, designated in Footnote 1, above.

[4] New York State Energy Plan and Final Environmental Impact Statement, November 1998.

As previously decided PSL §160.7 gives us ample legal authority to decide that competition in the electricity supply market is an electric capacity procurement process. It is obvious as well that competition is reasonably consistent with the 1998 SEP.[5]

As demonstrated below, the Project is consistent with the 1998 SEP. The 1998 SEP states that market forces, rather than the regulatory process, will determine the need for new generating facilities (1998 SEP at 2-51).

The 1998 SEP finds that:

Siting of major electric facilities under Article X of New York's Public Service Law may be premised on a determination that the proposed facilities would promote or contribute to a competitive market for wholesale or retail provision of electricity (1998 SEP at 1-5).

The 1998 SEP also provides that, to promote competition, New York should:

Support market initiatives to develop new electric-generating facilities and encourage competitive procurement of energy supplies and services by regulated load-serving entities, mindful of short- and longer-term economic and environmental considerations (1998 SEP at 1-16).

The 1998 SEP also endorses competition as a procurement strategy for the electric generation market:

This SEP promotes competition as a long-range planning objective and strategy. It emphasizes competition as a procurement strategy in the electric generation market to a much greater extent than did the 1994 SEP (1998 SEP at 2-52).

The Project is fully compatible with the 1998 SEP's goals of promoting competition in New York State. Since, as a merchant plant, it will only be able to market its output if it meets or beats the offered prices of other electricity suppliers, the Project must operate on a competitive basis. Similarly, other electricity suppliers will only be able to market their output if their prices are attractive to consumers participating in price competition with new entrants in the generation market, such as the Project. Thus, the Project will contribute to increased price competition among suppliers. This outcome is fully consistent with the 1998 SEP, which embodies policy goals

---

[5] Case 99-E-0084 – Petition of Sithe Energies, Inc. for a Declaratory Ruling that Competition in the Electric Supply Market is an approved Procurement Process Reasonably Consistent with the 1998 State Energy Plan, *Declaratory Ruling Concerning Approved Procurement Process* (Issued and effective August 25, 1999). The Commission stated "other prospective Article X applicants need not file identical declaratory ruling petitions."

that are "designed to support efficient and effective competition in energy industries to ensure the benefits of competition and consumer choice are available to all New Yorkers" (1998 SEP at 1-2). As discussed in Section 1.3.3, the Project is expected to create significant electricity production cost savings for the state, through its participation in the state's competitive generation market.

In addition, an energy policy strategy in the 1998 SEP states:

> *Support the development of an independent system operator (ISO) and power exchange to ensure reliable operation of the bulk electricity transmission system while facilitating market-based power sales and transactions among market participants* (1998 SEP at 1-16).

The 1998 SEP also found that:

> *The competitive market, as envisioned in this SEP, will not cause a decline in system reliability* (1998 SEP at 1-7).

As more fully discussed in Section 1.3.2, the Project is fully consistent with the 1998 SEP's policy on the New York Independent System Operator (NYISO) and system reliability. The Project will operate under the rules of the NYISO. It will be dispatched under the Security Constrained Unit Commitment and Security Constrained Dispatch rules of the NYISO which will ensure that the operating criteria and standards for system reliability will be met. The Project will enhance the supply portfolio from which the NYISO will select competitive energy supplies and services in order to minimize the total cost of electricity generation to New York State. The Project will expand the choices of load-serving entities to obtain electricity, help minimize system costs, and will operate under rules that will assure system reliability.

The Project also meets the 1998 SEP's environmental goals and objectives. An energy policy objective of the 1998 SEP is to encourage market-based strategies as a means to meet environmental requirements (1998 SEP at 1-15). First, while the Project itself will be subject to and will comply with all traditional environmental regulations, including all state and federal Clean Water Act requirements, and it will use the Best Available Control Technology (BACT) and/or the Lowest Achievable Emission Rate (LAER), its participation in the competitive power market will also help ensure that New York State's air quality standards are met. The NYISO's dispatch of the Project, described further below, should cause older, less efficient and less environmentally desirable plants to reduce output, thereby providing net benefits to the air quality of New York. The PSC has already acknowledged this benefit, stating that "under current air regulations (particularly the emissions offset policy of NO_x) construction of new generating facilities tends to *improve air quality.*"[6]

Overall, the 1998 SEP goals, along with the important competitive initiatives of the PSC, are transforming the traditional regulatory framework that has guided the electric industry for the last 90 years to respond to and enable the emerging competitive marketplace. The PSC, referring to recent federal and state laws and federal regulatory determinations promoting competition, said:

> *Together, these developments herald a new competitive environment in which generators, power marketers, and energy service providers are actively seeking ways to serve end users with economical sources of power and related products and services. It is to the forces of this emerging marketplace that electric utilities must adapt to survive and prosper. Utility regulators, too, must change and respond to the evolving competitive environment in the best interests of ratepayers. In securing the future of safe, reliable power at reasonable cost, government not only may, but must respond to these pragmatic considerations. Consequently, as the electric industry becomes more competitive, it is appropriate to adjust the regulatory framework.*[7]

According to the PSC's April 16, 1998 Declaratory Ruling in the Athens case, a determination by the Siting Board that a proposed major electric generating facility was selected pursuant to an approved procurement process must be based on a statement by the applicant, as provided in PSL 164(1)(e)(ii), that its proposed facility was selected pursuant to an approved procurement process (Declaratory Ruling, p.7). The Applicant, therefore, makes the following statement: Because it will operate as a merchant plant in the competitive electric markets and is fully consistent with the 1998 State Energy Plan, the Project was selected pursuant to an approved procurement process. By motion filed concurrently herewith, the Applicant requests the Presiding Examiner to make this finding, pursuant to PSL 168(2)(a)(ii).

1.3.2 Dispatch of the Plant by the NYISO

The Project will be offering to sell its electricity in the competitive electric market. Therefore, its economic success will be directly dependent upon how efficiently it can operate and how effectively it can compete. The Project's output will be offered to and committed by the NYISO. The NYISO is designed to be an independent entity that will coordinate the safe and reliable flow of electricity throughout New

---

[6] Case 96-E-0909 - Opinion and Order Adopting Terms of Settlement Subject to Modification and Conditions, Op. No. 98-13 (June 30, 1998) at 17 (emphasis added).

[7] Case 94-E-0952, Opinion and Order Regarding Opportunities for Electric Service, Opinion No. 96-12 at 30.

York and operate the state's spot markets in an economically efficient manner. It will also ensure that all market participants have open, non-discriminatory access to utility transmission systems. Under tariffs approved by the Federal Energy Regulatory Commission (FERC), the output will be offered to and committed by the NYISO. The NYISO will commit generating units in New York to assure reliable operation of the transmission system at the lowest total bid cost to the state. The Project will be chosen to run only if there is a net economic benefit to New York's power system. The NYISO will determine the operating schedule for the power plants that provide the most benefit to New York State, consistent with the safe and reliable operation of the transmission system.

All plants chosen to operate will receive the market-clearing price for their output. This price will be based on the highest accepted bid in New York State, adjusted for transmission costs and losses at the generator's location. It is referred to as the Location Based Marginal Price (LBMP).

The NYISO-coordinated market is designed to encourage suppliers to bid into the energy market at their variable operating costs (i.e., primarily fuel costs). This incentive is provided by paying the generators the market-clearing price for their generation rather than paying each generator its own bid price for generation. Under this pricing rule, a generator maximizes its revenues by bidding the price at which it is indifferent between generating and not generating. By bidding in this manner, the generator can be assured that it will operate whenever the market price is above its indifference price. The NYISO's cost-minimizing dispatch of plants is designed to produce a least-cost generation mix for the state, subject to transmission constraints. During operation, transmission reliability will be assured by the NYISO directing generators that have offered dispatch service to increase or decrease their generation levels as necessary to balance the transmission system.

Should the Project sell under bilateral contracts (arrangements for sales to specific purchasers), the result will be similar to selling under the NYISO coordinated energy market except that the Project will be paid by the bilateral contract customer rather than at the NYISO market clearing price. Since the NYISO market-clearing price is a highly visible alternative to bilateral contracts, the contracts are expected to closely track the expected prices in the NYISO coordinated market. Moreover, the NYISO tariff does not require a generator to serve a bilateral contract with generation from its own unit; it may also supply it from a lower cost supply if one exists, or it may bid its operating costs into the NYISO energy market price and allow the NYISO the option of substituting other less expensive resources for the generator's own operation. Therefore, selling under bilateral contracts should not result in a generator operating materially differently than if it was bidding in and selling all its energy in the NYISO coordinated market.

1.3.3 Production Cost Savings

The Applicant has performed analyses to determine what cost savings could be expected in consumers' electricity supply costs on a statewide basis due to operation of the Project. This analysis simulates the prices that would be bid by generators in a competitive generation market. In addition, expected emission reductions due to displacement of other generating facilities were evaluated.

1.3.3.1 Methodology

The results of this analysis, using the GE Market Assessment and Portfolio Strategies MWFLOW Model (MAPS), are presented below. The results indicate estimates of statewide electric energy cost savings (comprised principally of avoided fuel cost) and air pollution emission reductions from other generating facilities whose operation would be displaced by the Project. The results of these MAPS studies are presented in Table 1-1.

Table 1-1: MAPS Analysis of Project Operation – 2004

	Without Heritage Station	**With Heritage Station**	**Reduction Due to Heritage Station (year 2004)**
Total Emissions in New York (tons per year)			
SO_x	281,631	271,155	10,476
NO_x	565,594	562,546	3,048
CO_2	2,862,302,427	2,853,302,457	86,985
Total Combined Emissions in New York and Pennsylvania/New Jersey/Maryland (PJM) (tons per year)			
SO_X	1,093,508	1,077,829	15,679
NO_X	833,762	829,304	4,458
CO_2	3,007,140,285	3,006,333,380	806,905
New York Total Energy Costs ($ Millions)	**$4,518**	**$4,446**	**$72**
Area Spot Price ($/MWh)			
Statewide (load weighted average)	$28.1	$27.7	$0.4
West of Total East Constraint (load weighted average)	$25.7	$24.8	$0.9
East of Total East Constraint (load weighted average)	$29.5	$29.3	$0.2
Heritage Station (average across hours)	$25.4	$24.5	$0.9

MAPS is a planning model that commits, or "dispatches," units in a manner that provides a reasonable representation of how the NYISO will commit units in actual operation. Both MAPS and the NYISO will commit units based upon minimizing total bid costs while meeting all reliability requirements. As a planning model, MAPS models every hour of the year sequentially, capturing the impact of random forced outages and maintenance outages, as well as transmission constraints. The

MAPS analysis is based upon estimates of the operating costs (basically avoidable fuel and variable operations and maintenance costs) of the units and simulates entering bids based upon their avoidable operating costs consistent with the incentives provided by the NYISO coordinated energy market.

The model was recently used both for the 1998 SEP and by both Athens Generating Company, L.P. and the New York State Department of Public Service (DPS) in Case 97-F-1563. The database is the latest used by the state agencies in the state energy planning process. The database was provided to the Applicant by DPS Staff. According to DPS Staff, it was largely prepared "by the member agencies of the Energy Planning Board to simulate the New York electricity system for the energy planning process." The database substantially aligns with the 1998 SEP.

The analyses showed significant statewide energy savings from operating the Project. The analyses showed that the Project can be expected to produce approximately $72 million of energy savings for New York State in the year 2004, the first full year of plant operations, with savings of a similar magnitude expected in subsequent years.

1.3.3.2 Effect on Estimated Locational Based Marginal Prices

The MAPS analysis indicates that the dispatch of the Project will produce lower marginal prices at various locations throughout the state. The addition of the Project reduced LBMPs as shown in Table 1-1.

1.3.3.3 Air Pollution Reductions

The Project is also expected to significantly reduce statewide air pollution emissions because, as the MAPS analysis shows, the dispatch of the Project will mean that older, less efficient and higher emitting power plants will be run less, resulting in a reduction in total emissions. As a result of the expected Project operation, total NO_x emissions in the New York State and PJM areas are projected to be reduced by 4,458 tons in the year 2004. Additionally, sulfur dioxide (SO_2) emissions are expected to be reduced by 15,679 tons and carbon dioxide (CO_2) emissions by 806,905 tons. Annual reductions of this magnitude could be expected in subsequent years as well.

1.4 Article X Requirements

An Applicant for an Article X facility that has been selected pursuant to an approved procurement process is not required to file in its Application information on alternative sources of supply, estimated cost information, or a showing of capacity need. The regulations implementing these provisions are contained in 16 New York

Code of Rules and Regulations (NYCRR) §§ 1001.2, 1001.4, and 1001.5. Accordingly, this information is not provided in this Application.

The regulations issued by the Siting Board under Article X define a "private applicant" as one that does not have the power of eminent domain (16 NYCRR § 1000.2(o)). Pursuant to Section 1001.2(d)(1), consideration of demand-reducing measures by a private applicant is inappropriate. Furthermore, consideration of proposed sites by a private applicant may be limited to parcels owned by, or under option to, such applicant (16 NYCRR § 1001.2(d)(2)).

The Applicant does not possess the power of eminent domain and, therefore, is a private applicant. Heritage Power LLC does not own or have an option on any parcel of land suitable for the proposed Project, other than the proposed site. Accordingly, this Application does not address demand-reducing measures, and only evaluates the land parcels that make up the site for Certification.

In addition to the Article X requirements discussed above, the Applicant provides information requested by the Siting Board in another Article X proceeding. In its "Order Concerning Interlocutory Appeals" issued January 28, 1999, the Siting Board directed Athens Generating Company, L.P. to supplement the record on four specific topics:

- First, the applicant should explain why it selected the proposed site and how construction of its proposed facility at that site will be in the public interest. This filing need not be a quantitative submission describing the economics of alternatives, comparable to the analysis required under the former Article VIII. Neither must it delve into consideration of alternative sites.

- Second, the applicant should explain clearly why it proposes to burn natural gas for fuel, discussing this fuel's availability and environmental attributes as compared to alternatives.

- Third, as previously stated, a new SEP was recently issued. The applicant should establish the consistency of the proposed project with the most recent Plan.

- Fourth and finally, the applicant should explain the environmental impacts of its proposed facility in comparison to the alternative of "no action."[8]

The Applicant, in anticipation that the Siting Board will make the same request regarding the Project, provides the information below with respect to the Project.

---

[8] Order at 7. The information sought is comparable in quality and quantity to that supplied in environmental impact statements under the State Environmental Quality Review Act (SEQRA) by permit applicants in competitive industries.

1.4.1 *Selection of the Site and Public Interest Considerations*

To achieve its desired purpose and benefits, the Project must be sited in a manner that considers access to transmission, fuel and water while balancing impacts to the environment. The Project's location on the Independence Station site provides a unique opportunity to do just that.

Ready access to transmission is important in order for the Project to deliver its product to market. The reduced costs of power to the state could not be achieved if the Project were unable to easily connect its power to the electric transmission grid. The easy access to the Independence Substation obviates the adverse inconvenience, cost and environmental and community impacts that the construction of new, lengthy transmission lines would cause.

As explained in Section 1.3.3, the Project will benefit New York State because it will reduce energy production costs by approximately $72 million annually. In addition, the Project will provide the NYISO additional generation flexibility to address contingencies on the electric system; support voltage conditions in the region; reduce the likelihood of power shortages; and add to the generation reserve for New York State, making the state's electric grid more reliable. Given the Project's planned location on the grid, the Project can provide these benefits without the need for off-site transmission facilities.

Similarly, the Project has available access to an abundant source of water through existing intake and supply facilities owned by the city and town. For wastewater discharge, the Applicant will make use of existing infrastructure by connecting to the existing Independence Station discharge outfall.

Ready access to fuel is also required for the Project to produce its product efficiently. It requires a source of high volume and high-pressure natural gas. Again, there is easy access to the natural gas delivery infrastructure existing at Independence Station.

Furthermore, there is a skilled workforce in the region that successfully built Independence Station. Indeed, local and regional planning encourage the construction of power plants in the area. Construction and operation of the Project will provide $71.4 million in economic benefits to the Oswego County area, and additional economic benefits to Schenectady County, where the turbine design will occur.

Of equal importance are minimizing the potential environmental impacts caused by Project construction and operation and maximizing compatibility with existing land uses. The Applicant recognized early in the development process that New York's stringent environmental compliance and impact mitigation requirements presented significant challenges to successful project development. Given the Project's location in the vicinity of existing industrial uses, adjacent to an existing power plant, with major industry as neighbors, the Project minimizes the intrusion a power generation facility will have on residents in an area, both during construction and operation.

The Project will have fewer environmental impacts than existing fossil fuel-fired generating facilities and even some new generating facilities that would require significantly more accompanying infrastructure development. The Project has been designed to maximize fuel efficiency while minimizing the amount of emissions to the atmosphere and the amount of water that will be required. By using the latest generation technology (GE's 7H system), the Project will deploy a new state-of-the-art technology. In addition to the air quality benefits derived from displacement of older facilities, the Project will also more than offset its own NO_x emissions by purchasing certified emission offsets at a 1.15 to 1 ratio.

Construction of the Project will be in the public interest for many reasons. Fundamentally, the Project will be a state-of-the-art, low cost, efficient generating facility that will participate in the competitive power market, lowering costs for consumers and providing significant environmental benefits over existing generation facilities. Because the Project will be a merchant plant, New York ratepayers will not bear the costs or risks of construction. The Project, however, is different in a significant way from other merchant plants in that it will be testing a more efficient prototype turbine that will set a new standard of design for future plants to the benefit of consumers.

1.4.2 Availability and Environmental Attributes of Natural Gas Compared to Alternatives

The Applicant proposes to use natural gas as the Project's sole fuel for several reasons. First, there is a major natural gas pipeline that currently serves the site, adequate to serve the additional Project load. The short connection distance to the Project will be entirely on-site. Second, the existing gas line is connected to the greater regional gas transportation network, making gas supply and transportation readily accessible. Third, natural gas is the cleanest fossil fuel.

The Application describes the environmental impacts from the use of natural gas as a fuel, and the measures proposed to mitigate those impacts. Compared to other reasonable and commercially available fuel supply alternatives, combustion of natural gas has considerably fewer environmental impacts.

Natural gas currently offers the best balance between building large-scale power generators to provide electricity, preserving natural resources and protecting environmental quality. Modern natural gas fueled power plants are clean, energy-efficient facilities that can also offset generation from existing, higher emitting coal and oil burning plants, resulting in net air emission reductions and fewer water quality and aquatic resource impacts.

Although the development of new technologies based on renewable resources is important to meet energy needs in the future, the technologies are not yet developed to the point that they can compete on a large scale with traditional technologies. Wind and solar energy, for example, are not yet capable of providing significant amounts of energy at competitive cost. With today's technology, wind energy on a large scale would have significant impacts on land use and visual resources. For a given amount of generating capacity, wind machines require large amounts of land (often on ridge tops where wind is greatest), many times that used by natural gas-fueled power plants. Commercially available wind machines can generate up to about 1.5 MW, but must be spaced to avoid wake effects from adjacent wind machines and other obstacles. Accordingly, a wind project comparable in size to the Project would have excessive land requirements. Wind machines are also tall and highly visible, ranging in height up to approximately 300 feet. A large wind project would result in significant adverse visual impacts in most landscapes. Similarly, large-scale solar energy development is not economically viable and is not a reasonable alternative to the Project. In addition, given the public concern regarding nuclear generation and waste disposal, construction of a new nuclear plant was not considered a reasonable alternative.

Although modern coal or oil facilities can be developed with far less impacts than typically associated with older plants fueled by coal or oil, these facilities still have greater environmental impacts than natural gas-fueled combined-cycle power plants. Coal or oil power plants have much larger cooling requirements than gas-fired combined-cycle gas plants like the Project. Consequently, these plants have greater water demands and associated impacts. Additionally, coal facilities need several times more land than gas plants, mainly to accommodate coal unloading, storage, and handling. Oil plants require very large storage tanks. Combined-cycle gas plants also do not have the impacts related to coal handling (e.g., fugitive dust, transportation impacts) or coal ash disposal. NO_x emissions, even from today's cleanest coal or oil plants, are several times that of most combined-cycle gas facilities. In addition, SO_x emissions from gas plants are negligible compared to those from coal or oil. Even CO_2 emissions are substantially lower for natural gas as opposed to coal or oil generators. The 7H gas turbine combined-cycle efficiency is more than 50 percent higher than the best coal-steam plants so that emissions per MW are proportionately lower. For these reasons, the environmental impacts associated with coal or oil were not considered acceptable for a power plant in the region.

1.4.3 Consistency with the 1998 State Energy Plan

In Section 1.3, above, the Applicant has answered the Siting Board's third question as to why the Project is consistent with the 1998 SEP.

1.4.4 The No Action Alternative is Not Reasonable

The "no action" alternative assumes that the Applicant elects not to construct the Project. Such a choice would be inconsistent with the objective of the PSC as expressed in its Competitive Opportunities Order and in the SEP (discussed above) to allow market forces to create a competitive New York energy market, thereby lowering energy costs and providing choice for New York. Without the Project, the total electric energy cost savings described above (and amounting to an estimated $72 million per year) would not be realized. Furthermore, it would frustrate the exercise of market forces, given the Applicant's objective for the Project to compete in the New York market and produce electricity that can be sold on a competitive basis (refer to 6 NYCRR § 617.9(b)(5)(v)).

A 1998 SEP strategy is to:

Support market initiatives to develop new electric-generating facilities and encourage competitive procurement of energy supplies and services by regulated load-serving entities, mindful of short- and long-term economic and environmental considerations (1998 SEP at 1-16).

The SEP also found that:

This SEP promotes competition as a long-range energy planning objective and strategy. It emphasizes competition as a procurement strategy in the electric generation market to a much greater extent than did the 1994 SEP (1998 SEP at 2-52).

The PSC has also stated that regulators must give market forces greater latitude:

We also expect to see market-based solutions to public policy issues rather than regulatory mandates. Competitive providers (generators and energy service companies) would bear more of the risk of investment decisions, and customers less, than under regulation.[9]

Absent the Project, the stimulus to competition in New York State's electric power market, as well as the benefits it will give to the State's electric system, including expected 4 percent operation-related cost reductions for consumers resulting from increased competition, will be lost. Moreover, the positive economic impact to the region from construction and operation of the Project will not be realized.

Failure to build the Project will also have several key adverse environmental consequences. The NO_x offsets to be purchased by the Applicant will be lost along with the air quality benefits resulting therefrom. In addition, New York State will not

[9] Case 94-E-0952 – Opinion and Order Regarding Competitive Opportunities for Electric Service, Opinion No. 96-12 (May 1996) (Competitive Opportunities Order to Opinion No. 96-12) (Application, at 1-3).

enjoy the positive air quality benefits that will result from the Project's operation and its displacement of dirtier, less efficient electric generation.

In short, the "no action" alternative is inconsistent with the goals and objectives of the PSC, the 1998 SEP, and the Applicant relative to competition and consumer cost savings in New York State's electric markets, and could result in greater air quality impacts than if the Project is built and operated. Therefore, it is not a reasonable alternative to the Project (refer to Environmental Conservation Law (ECL) § 8-0109(1); 6 NYCRR § 617.9(b)(1)).

1.5 Preparation of the Application

To encourage public participation and to gain early input from regulatory agency personnel, the Applicant followed the pre-consultation process described in Section 163 of PSL. The procedure also complies with recent amendments to Section 163.

In April 1999, the Applicant filed a Pre-application Report for the proposed Heritage Station (then called Independence 2). Stipulations describing the scope of the studies to be performed (provided in Appendix A) were subsequently created, based on negotiations between the Applicant and interested parties. The studies conducted and documented in this Application reflect the comments received during this pre-application consultation process. In addition, several design features of the Project have been adjusted since submittal of the Pre-application Report (as described in Section 3.2.2.1) which reflect concerns expressed by interested parties. The resulting Project is described in this Application.

Each stipulation is addressed in a specific section of this Application to facilitate understanding of each respective issue. Table 1-2 (at the end of Section 1) provides specific information with regard to where each stipulation is addressed. Technical analyses are provided, as applicable, to respond to the study requirements defined in the stipulations. Where appropriate, technical materials are also appended to support the provided analyses. The Applicant believes that the Project represents a means to provide for power production within a setting that is uniquely suited to minimize the potential for environmental and community impact.

1.6 Permits or Approvals Required for the Project

This section addresses the requirements of Section 1001.7(a) of the Siting Board's regulations.

1.6.1 New York State Permits or Approvals

As authorized by §172 of Article X, a Certificate of Environmental Compatibility and Public Need for Heritage Station will include approval for the following consents, permits, certificates or other conditions:

- New York State Department of Environmental Conservation (NYSDEC) Part 231: Air Permit for a New Major Stationary Source;
- NYSDEC Operating Permit – Title IV (Acid Rain program);
- NYSDEC Operating Permit – Title V;
- New York State Office of Parks, Recreation and Historic Preservation (OPRHP) Section 106 Review;
- NYSDEC Regulatory Applicability Screening for Aboveground Storage Tank (AST) Management;
- NYSDEC Chemical Bulk Storage Certification;
- New York Department of State Coastal Zone Consistency Determination;
- NYS Department of Transportation (DOT) Crossing and Encroachment Permits;
- NYSDEC Threatened and Endangered Species Act Compliance;
- NYSDEC Article 15: Use and Protection of Waters Permit;
- NYSDEC Article 24: Wetland Protection ;
- NYSDEC Article 15: Section 401 Water Quality Certification; and
- NYSDEC Floodplain Development Permit.

The jurisdiction of these programs relative to the Project and its compliance with the substantive requirements of each program are described in the applicable technical sections of this Application. Provided with this Application are applications for the Prevention of Significant Deterioration (PSD) Permit and the SPDES Industrial Wastewater/Stormwater Discharge Permits (Appendix B and Appendix C, respectively).

The NYSDEC is authorized to issue the PSD permit in accordance with the federal PSD program for air quality (40 code of federal regulations (CFR) §52.21 and 124) delegated to NYSDEC and incorporated by reference into 6 NYCRR Part 200.9. This PSD application is included as Appendix B to the application.

The NYSDEC is also authorized to issue the SPDES permit in accordance with the SPDES Program, based on federal delegation of the National Pollutant Discharge

Elimination System (NPDES) Program (40 CFR §122 and 123) to the NYSDEC and incorporated by reference into 6 NYCRR Part 754. This SPDES application is provided in Appendix C.

1.6.2 Local Legal Requirements

A detailed review of the local legal provisions applicable to the Project was conducted, and the results discussed in Section 10.3. The Project represents a use specifically envisioned by the local community. The Project will be in compliance with all substantive provisions of the applicable local laws and comprehensive plans except the time limit for site restoration in the event of decommissioning. This provision is discussed further in Section 10.3 of the Application, and the Applicant requests that it not be applied to the Project.

1.6.3 Federal Permits or Approvals

The Federal Aviation Administration (FAA) Notification of Proposed Construction was submitted to the FAA on December 10, 1999. The application materials, as well as FAA's response requiring navigational lighting on the Project stacks, are provided in Appendix D.

With regard to wetland impacts, unavoidable intrusion will occur within wetlands that are designated as both state and federal wetlands. Therefore, a completed Joint Application for Permit has been submitted to the Army Corps of Engineers (ACOE). Based upon the small amount of wetland alteration proposed, it is anticipated that the work can be authorized under a Nationwide Permit.

In Section 17 of this Application, it is requested that the Siting Board issue a Water Quality Certification (6 NYCRR § 608.9). This Certification is required by the ACOE for the issuance of a Section 404 permit (Section 404 allows for cut and fill activities in areas designated as federally protected wetlands). The compliance of the Project with the substantive requirements of the federal Clean Water Act for the issuance of this Certificate is also discussed in Section 17. The Applicant hereby waives the 60-day deadline for issuance of the required Certification by the Siting Board. The Applicant will provide notice to the Siting Board that the Certification is required when the ACOE proceeds to the appropriate stage of review.

Stipulation	Clause	Stipulation	Reference
1 – Air		The Application to be submitted will include an examination of the impacts of criteria pollutants (Study) and non-criteria pollutants (Non-Criteria Study) from the Project on air quality. The components of the Study will include identification of climate and air quality conditions, an inventory of existing emission sources at Independence Station and proposed emission sources at Heritage Station, and an assessment of Project technology and design, emissions, impacts and cumulative impacts. The components of the Non-Criteria Study will include identification of emissions constituents and an assessment of Project impacts and cumulative impacts, assuming simultaneous operation of the existing Independence Station.	Section 6
1 – Air	1	To the extent consistent with the following paragraphs contained in this stipulation, the methodologies, standards, and definitions for assessing air quality will follow procedures outlined, and use data contained, in the following documents: For performing air quality dispersion modeling: • New York State Department of Environmental Conservation (NYSDEC), Air Guide-26, NYSDEC Guidelines on Modeling Procedures for Source Impact Analyses, (December 1996). • NYSDEC, Air Guide-36, Emission Inventory Development for Cumulative Air Quality Impacts Analysis, (June 1995). • Air Modeling Protocol to be established to the satisfaction of DEC, DPS and Department of Health Staff specifically for this case (hereinafter "Air Modeling Protocol"), and once approved, to be appended hereto as Attachment I. • U.S. EPA, Draft New Source Review Workshop Manual, (October 1990). • NYSDEC, Air Guide-12, Review of Major Sources. For determining stack height: • U.S. EPA, Guidelines for Determination of Good Engineering Practice, Stack Height (EPA Technical Support Document for the Stack Height Regulations), Document Number EPA-450/4-80-023R, (June 1995). For impacts on soils and vegetation: • U.S. EPA, A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soil, and Animals, Document Number EPA-450/2-81-078, (1981). For quantification and assessment of the Project's contribution to the New York State total deposition of sulfates and nitrates, in accordance with the State Acid Deposition Control Act: • Memorandum for Leon Sedefian to IAM Staff, (March 4, 1993). For performing visibility modeling: • U.S. EPA, Workbook for Plume Visual Impact Screening and Analysis. Document Number EPA-454/R-92-023, (October 1992).	Section 6; the Air Modeling Protocol in Appendix A

Table 1-2: Location of Response to Stipulations in the Application (Page 2 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	1 (Cont'd)	For non-criteria pollutant ambient air limitations and benchmarks. • NYSDEC, Complete & HAP Listing of AGCs, SGCs, and Air Quality Standards for the Air Guide 1 Software Program, (October 16, 1995). • U.S. EPA's On-Line Integrated Risk Information System (IRIS) Database. • U.S. EPA's Annual Health Effects Assessment Summary Tables (HEAST). • U.S. EPA's National Center for Environmental Assessment (NCEA). • U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR). • Risk-based ambient air criteria developed by the New York State Department of Health or other recognized organizations.	
1 – Air	2(a)	The air quality study will include: An assessment of existing climate data (average and extreme conditions) for the region surrounding the Project obtained from local climatological summaries, meteorological data sets from nearby stations, and/or other sources, as described in the Air Modeling Protocol, required to determine the normals and extremes of wind speed, temperature, and precipitation;	Sections 6.2 and 6.7.1.4
1 – Air	2(b)	An assessment of existing air quality levels and air quality trends for criteria pollutants in the region surrounding the Project including air quality levels and trends taken from regional air quality summaries and air quality trend reports, as described in the Air Modeling Protocol;	Section 6.2
1 – Air	2(c)	An existing major emission source inventory within the largest significant impact area plus 50 kilometers (if applicable), using data to be obtained from the NYSDEC and agencies from other relevant states or Canada, the inventory of all sources used in the analysis to be an appendix to the Application and verified by the source state or per Air Guide 36 requirements and the Air Modeling Protocol;	N/A, as discussed in Section 6.7.1.6
1 – Air	2(d)	An assessment of the impacts from quantifiable emissions, including those generated during construction of the Project;	Section 6.7 and 6.14

Table 1-2: Location of Response to Stipulations in the Application (Page 3 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	2(e)	A control technology assessment for pollutants subject to Prevention of Significant Deterioration (PSD) review and Nonattainment New Source Review promulgated under 40 CFR 52.21 and 6 NYCRR 231, respectively, to determine the best available control technology (BACT) and lowest achievable emission rate (LAER) for the applicable pollutants;	Section 6.3
1 – Air	2(f)	Pursuant to Air Guide 26, an assessment of an optimal stack height taking into consideration Good Engineering Practice (GEP) stack height for the Project, air quality related values, visual impacts, and other considerations;	Section 6.6
1 – Air	2(g)	An assessment of stack emissions of criteria and other regulated air pollutants, stack emissions being provided in hourly and annual estimates based on manufacturer's data, emission factors as published in EPA Publication AP-42 (compilation of Air Pollutant Emission Factors, design control efficiencies, and other data or specifications related to the design of the Project);	Section 6.4
1 – Air	2(h)	A calculation of the number of NO_x and volatile organic compounds (VOC) emission offsets to be obtained at the 1.15 to 1.0 ratio and how those offsets will be obtained in accordance with 6 NYCRR 231, and a discussion of the applicability and requirements of the "cap and trade" program pursuant to the proposed 6 NYCRR 227-3 and the federal Title IV acid rain program;	Section 6.5
1 – Air	2(i)	An assessment of the potential impacts to ambient air quality that may result from stationary combustion source emissions from the Project, the modeling to be done in accordance with the Air Modeling Protocol, a computer file output of dispersion modeling results to be provided to NYSDEC and DPS Staff;	Section 6.7; one copy of computer file transmitted to NYSDEC and DPS with the Application
1 – Air	2(j)	Using air dispersion modeling analyses, an assessment of the potential cumulative impacts to ambient air quality that may result from stationary combustion source emissions from the Project and the existing Independence Station, the modeling to be done in accordance with the Air Modeling Protocol, a computer file output of dispersion modeling results to be provided to NYSDEC and DPS Staff;	Sections 6.7.5 and 6.7.6
1 – Air	2(k)	An assessment of visibility impacts from stationary combustion emissions of NO_x and PM_{10} from the Project, as described in the Air Modeling Protocol;	Section 6.12.1
1 – Air	2(l)	An assessment of the cumulative impacts to soils and vegetation that may result from stationary combustion source emissions of the Project using EPA screening criteria (see also Stipulation 9 regarding air impacts on wildlife);	Section 6.12.3

Table 1-2: Location of Response to Stipulations in the Application (Page 4 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	2(m)	An assessment of the air quality impacts of any economic growth that may result from development of the Project in accordance with the Air Modeling Protocol;	Section 6.12.2
1 – Air	2(n)	An assessment of the predicted air quality impacts from the dispersion modeling analyses to the Prevention of Significant Deterioration (PSD) increments and air quality standards;	Section 6.7
1 – Air	2(o)	For those pollutants where the Project's impacts are estimated to exceed EPA's Significant Impact Levels, an assessment of the predicted cumulative air quality impacts from the dispersion modeling analyses to the PSD increments and air quality standards;	N/A, as discussed in Section 6.7.1.6
1 – Air	2(p)	In accordance with the State Acid Deposition Control Act, an assessment of the Project's contribution to the New York State total deposition of sulfates and nitrates at defined sensitive receptors as identified in the Air Modeling Protocol;	Section 6.9
1 – Air	2(q)	In accordance with the State Acid Deposition Control Act, an assessment of the cumulative contribution of the Project and the existing Independence Station to the New York State total deposition of sulfates and nitrates at defined sensitive receptors as identified in the Air Modeling Protocol;	Section 6.9
1 – Air	2(r)	If applicable, an offsite-consequence analysis for ammonia that will be stored on-site for use in the proposed selective catalytic reduction (SCR) system, including an analysis of an accidental release scenario for ammonia performed to meet the requirements of U.S. EPA's regulations implementing Section 112(r) of the Clean Air Act.	Section 6.10
1 – Air	2(s)	Submittal of the waiver approval for PSD pre-construction monitoring by EPA dated January 12, 2000.	Section 6.7.1.4; Appendix H.2
1 – Air	2(t)	Heritage Power will perform a cumulative source impact analysis for any air pollutant for which the Project has impacts above significance levels. The additional sources to be analyzed to determine whether the Project, in conjunction with existing and proposed major sources, will cause or contribute to exceedances of applicable National or State ambient air quality standards (NAAQS and NYAAQS) or PSD increments will include those identified as "nearby" existing sources, as defined in the EPA *Modeling Guidelines* and *NSR Workshop Manual*, and by the *Air Guide 26* procedures. The proposed inventory sources also will include all other proposed major electric generating facilities for which applications have been filed with the Siting Board and for which the determination to comply with Section 164 of the Public Service Law, pursuant to Section 165.1 of the Public Service Law has been issued. These additional existing and proposed sources will be limited to those located within a circular area defined by the significant impact area (SIA) of the proposed project, plus 50 kM, at the time of NYSDEC approval of the Project's cumulative source inventory per *Air Guide 36* requirements.	N/A, as discussed in Section 6.7.1.6

Table 1-2: Location of Response to Stipulations in the Application (Page 5 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	3(a)	The Air Study for Non-Criteria Pollutants will include: A review of pertinent available data on non-criteria pollutants that may be emitted by natural-gas fired combustion turbines, including formaldehyde, ammonia, and any other non-criteria pollutants with emission factors such as those published by U.S. EPA that may be identified after review of available emissions data;	Sections 6.8.1 and 6.8.2
1 – Air	3(b)	A review of pertinent available data on non-criteria pollutants that may be emitted from the cooling tower, considering both evaporative and drift emissions. Non-criteria pollutants to be considered are those detected in Lake Ontario water as delivered to the Project and the existing Independence Station cooling tower basin, (the list of constituents being sampled for will be specified in the Air Modeling Protocol), any constituent of cooling system anti-fouling treatment additives and pathogen growth control treatment additives that may be carried in the plume, or constituents that are likely to be present below detectable concentrations. These latter constituents will be identified by review of available data on water quality in the vicinity of the proposed intake, data on discharges near the intake, and other relevant available data. Potential concentrations of these constituents at the intake will be estimated using reasonable assumptions, which will be described in full in the Application.	Sections 6.8.1 and 6.8.2
1 – Air	3(c)	An assessment of the emission rates for non-criteria pollutants that may be emitted from the Project exhaust stacks and from the cooling system.	Sections 6.8.1 and 6.8.2
1 – Air	3(d)	An estimation of the potential ground level air concentrations (short-term and annual averages) of non-criteria pollutants due to 1) the Project, and 2) simultaneous operation of the Project and the existing Independence Station, quantified using the models and approach as discussed in the Air Modeling Protocol.	Section 6.8.2
1 – Air	3(e)	A comparison of the maximum predicted (ground-level) air concentrations to benchmark air concentrations for both short- and long-term exposures. These benchmark air concentrations will include: 1) NYSDEC Short-term and Annual Guideline Concentrations (SGCs and AGCs), and 2) Health risk-based criteria, to include Reference Concentrations (RfCs) for noncancer effects and air concentrations associated with an incremental lifetime cancer risk of one-in-one million for cancer, obtained or derived from U.S. EPA or other well-recognized organizations as summarized in Item 1 of this stipulation.	Section 6.8.2
1 – Air	3(f)	If the maximum predicted ground level air concentration of a non-criteria pollutant is estimated to be near or above the respective SGC, AGC or health risk-based benchmark air concentrations, the applicant will consult with NYSDEC, NYSDOH, and NYSDPS to develop a protocol for performing a cumulative air quality impact analysis.	N/A, as discussed in Section 6.8.2

Table 1-2: Location of Response to Stipulations in the Application (Page 6 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	3(g)	If the maximum modeled annual average ground level air concentration of a non-criteria pollutant exceeds 1 percent (persistent, bioaccumulative toxic chemicals) or 10 percent (other chemicals) of the corresponding health risk-based benchmark air concentration, the Application will include an evaluation of the need for a multipathway risk assessment. If the applicant can demonstrate with adequate documentation that the modeled plume will not impact beef or dairy farms, or areas that could support such farms, the 10 percent screening factor may be used for all non-criteria pollutants. The Application will include a multipathway risk assessment for those pollutants that exceed these criteria, are persistent in the environment, have the potential to accumulate in soil, water, fish, homegrown vegetables, or beef and dairy products, and, based on the information available in the documents listed in Item 1 of this stipulation, are of significant toxicological concern via ingestion relative to the inhalation pathway of exposure.	N/A, as discussed in Section 6.8.2
1 – Air	3(h)	The applicant will contact the Centers of Disease Control (CDC) and the Cooling Tower Institute to obtain recommended guidance regarding appropriate control measures to prevent the potential growth of pathogens, such as Legionella, in wet, evaporative cooling systems. This guidance will be summarized and evaluated in the Application. The Application will also include the cooling tower manufacturer's recommendations for the control of pathogen growth and a discussion of the methods the Applicant proposes to use to control pathogen growth in the cooling system.	Section 6.11.13
1 – Air	4	A stack plume visibility analysis and a cooling tower plume visibility analysis shall be provided to include an assessment of the predicted length and frequency of any visible water vapor plumes created by the Project in accordance with procedures set forth in the Air Modeling Protocol (the results of this analysis will be used for the visibility assessment discussed in Stipulation 11). Cooling tower modeling will also be conducted to determine the potential for impacts associated with fogging or icing on nearby roadways, and ice-shearing effects on nearby vegetation. This assessment will consider the cumulative effects of the Project with the existing Independence Station, and will also consider whether proximity of any other cooling towers would result in cumulative impacts on surrounding roadways. Such cooling towers will also be identified for use in the visual impact assessment outlined in Stipulation 11. Hybrid cooling towers as well as wet cooling towers will be addressed as part of the alternatives analysis.	Section 6.11
1 – Air	5	An assessment of the impacts of salt deposition due to cooling tower drift in accordance with the procedures set forth in the Air Modeling Protocol. This assessment will consider the cumulative effects of the Project with the existing Independence Station and will be used to assess the potential impacts of salt deposition on local vegetation.	Section 6.11.10

Table 1-2: Location of Response to Stipulations in the Application (Page 7 of 38)

Stipulation	Clause	Stipulation	Reference
1 – Air	6	The Application will include an assessment based on publicly available information of the global warming (global climate change) issue associated with the emission of carbon dioxide and other global warming gases. The assessment will include: 1) a summary of the emission reduction goals of the Kyoto Protocols, 2) an estimate of the proposed facility's annual and life cycle emissions of carbon dioxide and/or other significant global warming gases, 3) a comparison of projected facility emissions with New York State, National and/or global emissions, and 4) a conclusory statement as to the probable importance of the proposed facility's emissions relevant to Parts 1-3 above.	Section 6.13
2 – Cultural	1	The Application to be submitted will include a detailed summary of results of previous cultural resources studies (Phase 1A) for the Project Independence Station site.	Section 7.2
2 – Cultural	2(a)	The Application will include either: Written confirmation from the New York Office of Parks, Recreation and Historic Preservation (OPRHP) that further Phase 1 archaeological investigation of the site and any interconnects is not warranted or;	Section 7.2; Appendix I
2 – Cultural	2(b)	The results of studies performed to address recommendations made by OPRHP in response to the request for confirmation cited in (a) above. Said studies may be submitted after the Application is filed. It is agreed that said studies need not be completed for the Chairman of the Siting Board to determine that the Application complies with Section 164 of the Public Service Law.	N/A, as discussed in Section 7.2; Appendix I
2 – Cultural	3	The Application will include an Unanticipated Discovery Plan that will identify the actions to be taken in the unexpected event that resources of cultural, historical, or archaeological importance are encountered in the excavation process. This plan will include a provision for work stoppage upon the discovery of possible archaeological or human remains. In addition, the plan will specify that the methodology used to assess any discoveries will follow the most recent Standards for Cultural Resource Investigations and Curation of Archaeological Collections in New York State. Such an assessment, if warranted, will be conducted by a professional archaeologist, qualified according to the standards of the New York State Archaeological Council and the National Park Service 36 CFR 61.	Section 7.3; Appendix J
2 – Cultural	4	In the event that significant cultural resources are identified, the Applicant will identify potential measures to avoid or minimize adverse effects to those resources. The OPRHP Coordinator will be consulted throughout the investigation and DPS Staff will be informed of the status and results of the investigations.	N/A, as discussed in Section 7.2

Table 1-2: Location of Response to Stipulations in the Application (Page 8 of 38)

Stipulation	Clause	Stipulation	Reference
2 – Cultural	5(a)	The analysis of potential impacts to Historic Resources shall include: Field inspections to identify sites or structures listed or eligible for listing on the State or National Register of Historic Places within the Project Viewshed. The "Project Viewshed" shall be the area of potential visibility designated on the viewshed map prepared pursuant to Stipulation 11 (Visual Resources and Aesthetics);	Section 7.4; Appendix K
2 – Cultural	5(b)	Photographs taken of standing structures within the viewshed, which appear to be at least 50 years old and potentially eligible for listing in the State or National Register of Historic Places, based on an assessment by an architectural historian;	Section 7.4; Appendix K
2 – Cultural	5(c)	An OPRHP Building Structure Inventory Form will be completed for each potentially eligible (as described in (b)) or listed property and submitted to OPRHP and DPS Staff for review;	Section 7.4; Appendix K
2 – Cultural	5(d)	Potential visual impacts to significant historic structures within the Project viewshed that are listed, or, in the judgement of an architectural historian, are potentially eligible for listing on the State of National Register of Historic Places, will be characterized as part of the visual resources study, as described in Stipulation No. 11 (Visual Resources and Aesthetics). The Applicant will submit its documentation regarding listed and potentially eligible structures within the viewshed to OPRHP and DPS for review prior to completing the visual resources study; and	Sections 7.4 and 16.4
2 – Cultural	5(e)	A discussion of potential mitigation measures, and an assessment of effects of mitigation on reducing adverse impacts on listed or potentially eligible structures.	Section 7.4
3 – Electric Transmission Facilities		The Application to be submitted will describe the electrical interconnection proposed for the Heritage Station (sometimes referred herein to as "the Project"). It is anticipated that the interconnection will occur on the Project site, and that no new transmission facilities requiring an Article VII filing will be required.	Section 8
3 – Electric Transmission Facilities	1	The Application to be submitted will include a System Impact Study (Study) performed by Niagara Mohawk Power Corporation (NMPC). The Study will include the necessary technical analyses (Thermal, Voltage, Short Circuit and Stability) to evaluate the impact of the interconnection of the Project on the reliability of the NMPC system and the New York Power Pool (NYPP) system. Summer and winter peak load and light load conditions will be investigated, in accordance with the "NPCC Basic Criteria for the Design and Operation of Interconnected Power System" and the NYPP "Standards for Planning and Operating the New York Power Pool Bulk Power System". The NYPP analysis will be limited to the current availability of data and NMPC personnel knowledge and requirements of these systems.	Section 8

Stipulation	Clause	Stipulation	Reference
3 – Electric Transmission Facilities	2(a)	The Study will include the following: The Study will be conducted using the 2003 cases from the FERC-715 Filing, which include the PG&E Athens Energy Facility, NMPC Bethlehem Energy Center, Sithe Torne Valley Station, the FACTS capacitors at Oakdale substation, Middletown Tap and the OH-Michigan Phase Shifters.	Section 8
3 – Electric Transmission Facilities	2(b)	The Study will focus on the area of the bulk power system in proximity to and most likely to be affected by Heritage Station; that is, from Scriba east to New York City, and south into PJM. According to the standard practice used in the Operating Studies Task Force (OSTF) studies, phase angle regulators (PARs) will be modeled as regulating (holding scheduled flow at base case level) pre-contingency, and free-flowing post-contingency.	Section 8
3 – Electric Transmission Facilities	2(c)(1)	*Evaluation of Impact on Transfer Limits and Transfer Capability* Thermal, voltage, and stability analyses will be conducted to assess the performance of the bulk power system with and without Heritage Station in service. The analyses will determine the incremental impact of Heritage Station on the normal and emergency transfer limits of transmission interfaces within the study area. Those interfaces include • NYPP Central East, • Total-East, • UPNY-SENY, • NYPP-PJM, and • NYPP-NE interfaces. NYPP transfer limits will be evaluated in the west-to-east/north-to-south direction. NYPP-PJM, NYPP-OH and NYPP-NE transfer limits will be evaluated in both directions. In order to determine transfer limits, the analysis will simulate generation redispatches according to the standard proportions used in the Operating Studies Task Force (OSTF) operating studies. Thermal analyses will be performed for the summer peak, winter peak, and light load conditions. Voltage and stability analyses will be performed for the summer peak conditions. Transient stability analysis will be conducted to assess the impact of the Heritage Station dynamic control equipment (power system stabilizer and excitation systems) in accordance with the Guidelines for NPCC Area Transmission Reviews Section 5.1.5 Review of Dynamic Control Systems (DCS) and the Joint Working Group (JWG)-1 Report, "Technical Considerations and Suggested Methodology for the Performance Evaluation of Dynamic Control Systems". These studies will be shared with the PJM ISO, NE ISO and OH.	Section 8

Stipulation	Clause	Stipulation	Reference
3 – Electric Transmission Facilities	2(c)(2)	*Fault Duty Analysis* Short Circuit Analyses will be conducted to evaluate the impact of Heritage Station on adequacy of circuit breakers and related equipment at all NMPC and New York Power member equipment neighboring substations affected by the Project. The study will be coordinated through the NYPP/NY ISO SPAS, system protection advisor subcommittee.	Section 8
3 – Electric Transmission Facilities	2(c)(3)	*Extreme Contingency Assessment* Extreme Contingency Assessment (ECA) analysis will include significant load flow studies showing the base case and the post-fault conditions for the contingencies specified in Section 7.0 of the Basic Criteria, entitled "Extreme Contingency Assessment" and report on the most severe contingencies tested. ECA analysis will also include significant stability studies showing the effect on the system of contingencies as specified in Section 7.0 of the Basic Criteria and a report on the most severe contingencies tested.	Section 8
3 – Electric Transmission Facilities	2(c)(4)	*Relay-Coordination* A study will be done to evaluate any relay coordination changes that may be necessary. These changes will be identified and provided to the PJM ISO, NE ISO, OH and NYPP/NY ISO SPAS.	Section 8
3 – Electric Transmission Facilities	3	*Submittals* Based on the aforementioned Study, the Application to be submitted will include the information contained in sub-paragraphs 6 (a) – 6 (h) to the extent the analyses have been completed by NMPC. The signatories agree that all the analyses required by this Stipulation need not be filed in the Application for the Chairman of the Board to determine that Application is in compliance with Section 164 of the Public Service Law. To the extent NMPC has not completed portions of the Study by the time the Application is filed, the Applicant will file as a supplement those analyses that were not included in the Application within six weeks of filing the Application.	Section 8
3 – Electric Transmission Facilities	3(a)	An evaluation of the potential significant impacts of Heritage Station and its interconnection to the New York State transmission system reliability at a level of detail that reflects the magnitude of the impacts, this evaluation shall include transmission systems under the NYPP/NYISO control and transmission systems under the control of the local utility;	Section 8
3 – Electric Transmission Facilities	3(b)	An analysis of the impacts of Heritage Station and associated interconnection facilities on voltage stability, thermal limitations and transmission interface capabilities as prescribed in the NYPP or NYSRC and NPCC (as applicable) planning and operating standards;	Section 8

Table 1-2: Location of Response to Stipulations in the Application (Page 11 of 38)

Stipulation	Clause	Stipulation	Reference
3 – Electric Transmission Facilities	3(c)	A discussion of the benefits and detriments of Heritage Station on ancillary services and the electric transmission system;	Section 8.7
3 – Electric Transmission Facilities	3(d)	An estimate of the increase or decrease in the total transfer capability across each affected interface;	Section 8
3 – Electric Transmission Facilities	3(e)	An analysis of the impacts of the Project and associated interconnection facilities on short circuit capabilities as prescribed in the NYPP or NYSRC and NPCC (as applicable) planning and operating standards;	Section 8
3 – Electric Transmission Facilities	3(f)	If applicable a discussion of the impacts associated with reinforcements and new construction as a result of the Project;	Section 8
3 – Electric Transmission Facilities	3(g)	An analysis of any reasonable alternatives that would: mitigate adverse reliability impacts, if any, of the Project on the New York State transmission system; and: maintain voltage, stability, thermal limitations, and short circuit capability at levels consistent with standards promulgated by NERC, NPCC, and NYPP, or the NYSRC, as applicable; and	Section 8
3 – Electric Transmission Facilities	3(h)	An evaluation of reasonable corrective measures that could be employed to mitigate or eliminate any forecasted reduction in transfer capability across affected interfaces that violates reliability requirements.	Section 8
3 – Electric Transmission Facilities	4	The Scope of Study will be provided to Staff and the NYPP Transmission Planning Advisory Subcommittee (TPAS) (or NYISO, as applicable) for comments and review.	Section 8
3 – Electric Transmission Facilities	5	The Applicant or NMPC will keep Staff and TPAS (or NYISO, as applicable) advised of the Study as it progresses.	Section 8
3 – Electric Transmission Facilities	6	Staff may request technical conferences with NMPC and the Applicant, together, from time to time to discuss the Study as it progresses.	Section 8
3 – Electric Transmission Facilities	7	All updates and draft reports will be provided concurrently to Staff and TPAS (or NYISO, as applicable) including computer input data and output cases that are used in performing the analysis.	Section 8

Table 1-2: Location of Response to Stipulations in the Application (Page 12 of 38)

Stipulation	Clause	Stipulation	Reference
3 – Electric Transmission Facilities	8	Upon completion, the Study will be provided to Staff immediately and to TPAS (or NYISO, as applicable). Upon request of Staff, the Applicant will arrange a technical conference with NMPC and Staff to explain to Staff the scope, inputs, assumptions, change cases and other relevant parameters of the Study.	Section 8
3 – Electric Transmission Facilities	9	Upon receipt, the Applicant will immediately provide to Staff any TPAS (or NYISO, as applicable) response to the Study. It is agreed that the response need not be provided with the Application and that the Chairman of the Siting Board may determine that the Application complies with Section 164 of the Public Service Law without the response having yet been provided.	Section 8
3 – Electric Transmission Facilities	10	Upon receipt, the Applicant will immediately provide to Staff any study performed by NYPP (or NYISO, as applicable) regarding the Project.	Section 8
3 – Electric Transmission Facilities	11	If NYISO is established and it is determined that acceptance of the Study by NYISO is required, the Applicant will immediately inform Staff of the occurrence of acceptance of the Study by the NYISO.	Section 8
3 – Electric Transmission Facilities	12	The Applicant agrees to send the Study, or have NMPC send the Study, to the individual members of the NYPP, inviting them to comment.	Section 8
3 – Electric Transmission Facilities	13	The Applicant agrees to notify, or have NMPC notify, the PJM ISO, NE ISO, OH and other NPCC regions about the Project and work cooperatively on any joint studies with those entities that are required by their respective FERC-approved tariffs or NPCC procedures.	Section 8
3 – Electric Transmission Facilities	14	The Applicant agrees to provide to Staff concurrently copies of any draft or final studies submitted to PJM ISO, NE ISO, OH or any other NPCC regions as well as any computer input data and output data. Comments provided by those ISO's or NPCC regions will be provided to Staff as they are received by the Applicant.	Section 8
3 – Electric Transmission Facilities	15	Regarding information to be provided to Staff as required in this stipulation, nothing herein shall prejudice the Applicant's ability to formally invoke trade secret protection pursuant to 16 NYCRR § 6-1.3 and 6-1.4 by submitting the information to the presiding administrative law judge along with the Applicant's reasons why the information should not be disclosed to parties other than Staff. If trade secret protection is invoked, the Applicant will cooperate with Staff in obtaining a protective order so that Staff may have access to the information without delay; and	Section 8

Stipulation	Clause	Stipulation	Reference
3 – Electric Transmission Facilities	16	The Application to be submitted will include an analysis with all input and output data showing that operation under summer normal, winter normal, and short term emergency (STE) loading conditions of the proposed interconnection to the Heritage substation will comply (a) with the Public Service Commission's applicable electric field strength standards, as set forth in Opinion 78-13, and (b) with the applicable provisions of the Commission's Interim Policy Statement on Magnetic Fields, dated September 11, 1990.	Section 8.8; Appendix L
4 – Gas Transmission Facilities		The Application to be submitted will describe the natural gas pipeline interconnection proposed for the Project. It is anticipated that the interconnection will occur on the Project site, and that no significant upgrades of the existing pipeline will be required.	Section 9.1; Appendix M
4 – Gas Transmission Facilities	1(a)	The Application to be submitted will include a study of gas supply, capacity and system impact (study). The study will include: A detailed description of the proposed gas pipeline interconnection(s), including interconnection facilities, pipeline route, size, operating pressure, volume of gas required to serve the Project, nature and extent of transportation service as firm, interruptible, or both, the need for new on-site compression, and identifying who will construct, own and operate the pipeline facilities;	Section 9.1
4 – Gas Transmission Facilities	1(b)	An analysis demonstrating that there is sufficient gas supply and available gas pipeline capacity to support the requirements of the Project;	Sections 9.2.1 and 9.2.2
4 – Gas Transmission Facilities	1(c)	An evaluation of the potential impacts of the Project and its interconnection(s) on the gas distribution system of the Local Distribution Company (LDC); and	Section 9.3
4 – Gas Transmission Facilities	1(d)	A cumulative analysis of items (b) and (c) above assuming simultaneous operation of the Project and the existing Independence Station.	Sections 9.2 and 9.3
5 – Land Uses and Local Laws		The Application to be submitted will include a study of the land uses in the vicinity of the Project site (Study). The Study will include:	Section 10.2
5 – Land Uses and Local Laws	1(a)	A map of all existing land uses within a 2-mile radius of the Project site, expanded as necessary to include identification of major land uses outside that radius (such as the existing nearby nuclear power facilities, Scriba substation and nearby designated recreational land) and including representation on an aerial photograph;	Figures 10-1 and 10-2
5 – Land Uses and Local Laws	1(b)	A map of existing land use zones within a 2-mile radius of the Project site, including a description of the permitted uses within each zone;	Section 10.2.2; Figures 10-1 and 10-2

Table 1-2: Location of Response to Stipulations in the Application (Page 14 of 38)

Stipulation	Clause	Stipulation	Reference
5 – Land Uses and Local Laws	1(c)	A map of all publicly known proposed land uses within a 2-mile radius of the Project site, gleaned from interviews with State and local planning officials, from the Applicant's public involvement process, or from other sources;	Figures 10-1 and 10-2
5 – Land Uses and Local Laws	1(d)	A qualitative assessment of the compatibility of the Project with existing, potential and proposed land uses, and local and regional land use plans, within a 2-mile radius of the Project site; and	Section 10.4.1
5 – Land Uses and Local Laws	1(e)	A qualitative assessment of the compatibility of roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, with existing, potential and proposed land uses within a 1 mile radius of such improvements.	N/A
5 – Land Uses and Local Laws	2(a)	In accordance with Section 1001.7(b)(2) & (3) of the Rules of the Siting Board, the Application to be submitted will include a description of the financial resources available to restore any disturbed areas of the Project site in the event the Project is abandoned, cannot be completed, or is decommissioned. These Rules also require the Applicant to submit a plan for the decommissioning of the Project site. The Application to be submitted will include: A statement of the performance criteria proposed for site restoration and decommissioning;	Section 10.5
5 – Land Uses and Local Laws	2(b)	A discussion of why these performance criteria are appropriate;	Section 10.5
5 – Land Uses and Local Laws	2(c)	A demonstration that the financial resources available for restoration and decommissioning are adequate to restore the site to the condition specified in the performance criteria; and	Section 10.5
5 – Land Uses and Local Laws	2(d)	A description of any security fund or insurance in place or to be obtained, and the financial resources available to the Applicant in the event that either the Project cannot be completed, or that the Project must be decommissioned.	Section 10.6
5 – Land Uses and Local Laws	3	The Application will include a summary of the Applicant's ASTM Phase I Environmental Site Assessment for the Project site.	Section 10.2.1.2

Table 1-2: Location of Response to Stipulations in the Application (Page 15 of 38)

Stipulation	Clause	Stipulation	Reference
5 – Land Uses and Local Laws	4	After consultation with appropriate state and local agencies, the Application to be submitted shall include an identification and analysis of the recreational land uses, including Lake Ontario in the vicinity of the site, county parks, hiking trails and the Alcan Nature Reserve, that might be affected by the sight or sound of the construction or operation of the Project and any roadways to be constructed and all gas, electric, water, wastewater or other types of off-site interconnections or improvements required to serve the Project, indicating the number, usage by season, and uses of the park trails potentially affected.	Section 10.2.1.4
5 – Land Uses and Local Laws	5	The Application to be submitted will include an itemized description of the Project's consistency with each of the most recent federal and state Coastal Zone policies. Any additional coastal policies implemented at the local level will also be included. Any non-conformance will be detailed, and descriptions of alternative means of achieving consistency will be documented. A discussion will also be provided with regard to the NYSDEC's focus on preserving public access along the shoreline.	Section 10.4.2; Appendix N
5 – Land Uses and Local Laws	6(a)	The Application to be submitted will identify and analyze all substantive provisions of local law applicable to the Project. The Application will include: After consultation with the town of Scriba, the county of Oswego, and DPS Staff, an identification of all substantive local laws, ordinances, regulations and rules of the town of Scriba and the county of Oswego applicable to the construction or operation of the Project and the roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project. Prior to consultation, the local laws, ordinances and regulations shall be identified and circulated to the town of Scriba, the county of Oswego and DPS Staff;	Section 10.3
5 – Land Uses and Local Laws	6(b)	An identification of all substantive provisions identified above which the Applicant deems to be unreasonably restrictive in view of the existing technology;	Section 10.3
5 – Land Uses and Local Laws	6(c)	For any substantive provisions which the Applicant deems to be unreasonably restrictive in view of the existing technology, an explanation of the basis for asserting that the provision is unreasonably restrictive, including a review and analysis of reasonably related local precedent regarding the granting of variances or exceptions;	Section 10.3
5 – Land Uses and Local Laws	6(d)	For the substantive provisions which the Applicant does not deem to be unreasonably restrictive, a discussion or other showing demonstrating compliance with the substantive provisions identified above; and	Section 10.3

Stipulation	Clause	Stipulation	Reference
5 – Land Uses and Local Laws	6(e)	A summary comparison table in two columns listing the provisions in the first column and the degree of compliance in the second column.	Table 10-2
6 – Noise		The Application to be submitted will include a study of the noise impacts of the construction and operation of the Project. To the extent consistent with the following paragraphs contained in this stipulation, the methodology for assessing the potential impacts from noise will follow the procedures and use predictive data provided in the following documents: • Empire State Electric Energy Research Corporation, Power Plant Construction Noise Guide, Bolt, Beranek and Newman, Inc., Report No. 3321 (1977). • Edison Electric Institute, Electric Power Plant Environmental Noise Guide, Volume 1, 2nd Edition (1984). • United States Environmental Protection Agency, Model Community Noise Control Ordinance, U.S. EPA Report EPA 550/9-76-003, (September 1975). Noise source input data for the computer models referenced herein will be a combination of data acquired from the equipment suppliers, data based on actual measurements of similar equipment at other facilities, and computations from published empirical equipment noise equations. Regarding noise impacts, the Applicant will provide:	Section 11
6 – Noise	1	A map showing the location of the nearest noise receptors in relation to the Project site, including the nearest residential and other sensitive receptor locations;	Figure 11-2
6 – Noise	2	An evaluation of ambient pre-construction baseline noise conditions (long-term residual sound levels), including pure tones, at the nearest noise receptors, using actual measurement data recorded as a function of time and frequency using a Type 1 precision real time sound level meter (SLM) and octave band frequency spectrum analyzer. The pre-construction baseline measurements will be taken with the existing Independence Station operating;	Section 11.2
6 – Noise	3	A description of the noise design goals for the Project at the nearest noise receptors, including the nearest residential and other sensitive receptor locations;	Section 11.1

Table 1-2: Location of Response to Stipulations in the Application (Page 17 of 38)

Stipulation	Clause	Stipulation	Reference
6 – Noise	4	An estimate of noise levels at the nearest noise receptors during major construction phases using a hemispherical free field (HFF) noise prediction computer model that uses geometrical spreading, atmospheric and anomalous attenuation, on-site structural barrier effects, and effects of prominent terrain features to calculate the sound level decrease with increasing distance from the source. This analysis will incorporate existing sound levels from Independence Station in the baseline measurements, and the cumulative noise impacts of the Project with the existing Independence Station will be identified. The model will account for the noise emissions from each source in each octave band that propagates to each point on a specified receptor grid, identifying the source and value of all data inputs used;	Sections 11.3.2 and 11.4.2
6 – Noise	5	An identification and evaluation of reasonable noise abatement measures for construction activities for each major construction phase;	Section 11.5.1
6 – Noise	6	An estimate of noise levels at the nearest noise receptors during operation of the Project using a hemispherical free field (HFF) noise prediction computer model that uses geometrical spreading, atmospheric and anomalous attenuation, on-site structural barrier effects, and effects of prominent terrain features to calculate the sound level decrease with increasing distance from the source. This analysis will incorporate existing sound levels from Independence Station in the baseline measurements, and the cumulative noise impacts of the Project with the existing Independence Station will be identified. The model will account for the noise emissions from each source in each octave band that propagates to specified receptor points, identifying the source and value of all data inputs used;	Sections 11.3.1 and 11.4.1
6 – Noise	7	An identification and evaluation of reasonable noise abatement measures, including the use of alternative technologies, for the final design and operation of the Project during all operating scenarios;	Sections 5 and 11.5
6 – Noise	8	An evaluation of the following potential noise impacts: hearing damage (based on CNR & OSHA standards); sleep interference; indoor and outdoor speech interference; low frequency noise annoyance; community complaint potential; recreational quality; and the potential for structural damage due to vibration or infrasound.	Section 11.4.3
6 – Noise	9	A ranking for the construction and operation phases, using the Modified Composite Noise Rating (CNR) method, at the nearest residential and other sensitive receptor locations; and	Sections 11.4.2 and 11.4.1
6 – Noise	10	A description of post-construction noise evaluation studies that will be performed to establish conformance with design goals.	Section 11.6

Table 1-2: Location of Response to Stipulations in the Application (Page 18 of 38)

Stipulation	Clause	Stipulation	Reference
7 – Socioeconomics		The Application to be submitted will include a study of the socioeconomic impacts of the construction and operation of the Project. Where applicable, historical information associated with construction and operation of Independence Station will be referenced. Regarding socioeconomic impacts, the Applicant will provide:	Section 12
7 – Socioeconomics	1	An estimate of the number of temporary construction jobs that will be created, by discipline;	Section 12.2.1
7 – Socioeconomics	2	An estimate of the average construction work force, by discipline, for each quarter, during the period of construction, and an estimate of the peak construction employment level;	Section 12.2.2
7 – Socioeconomics	3	An estimate of the annual construction payroll, by trade, for each year of the project and an estimate of annual direct non-payroll expenditures likely to be made in the vicinity of the project (materials, services, rentals, etc.) during the period of construction;	Sections 12.2.3 and 12.2.4
7 – Socioeconomics	4	An estimate of the annual secondary employment and economic activity likely to be generated in the vicinity of the Project by the construction of the plant. This analysis should state the basis of any economic multiplier factor or other assumption used and should include an order of magnitude comparison of the employment and economic activity likely to be generated in the town of Scriba and Oswego County with recent levels of employment and economic activity;	Section 12.2.5
7 – Socioeconomics	5	An estimate of the number of jobs and the on-site payroll, by discipline, during a typical year once the plant is in operation, and an estimate of other expenditures likely to be made in the vicinity of the project during a typical year of operation;	Section 12.3
7 – Socioeconomics	6	An estimate of the annual secondary employment and economic activity likely to be generated in the vicinity of the Project by its operation;	Section 12.3
7 – Socioeconomics	7	A comparison of the anticipated construction work force, by trade, with the construction work force available within commuting distance, assuming a continuation of recent construction work force employment levels, with the exception that the labor force demands of any unusually large project which has been publicly announced for construction in the vicinity of the Project site during construction of the Project shall be addressed in the analysis;	Section 12.4
7 – Socioeconomics	8	An estimate of the extent and duration of temporary construction worker in-migration;	Section 12.4

Table 1-2: Location of Response to Stipulations in the Application (Page 19 of 38)

Stipulation	Clause	Stipulation	Reference
7 – Socioeconomics	9	An identification of the amount and location of temporary housing expected to be used by any in-migrating construction workers;	Section 12.5.1
7 – Socioeconomics	10	An estimate of incremental school operating and infrastructure costs that will be incurred by any affected school district during the construction phase of the Project, this estimate to be made after consultation with the affected school districts;	Section 12.5.2
7 – Socioeconomics	11	An estimate of incremental school operating and infrastructure costs that will be incurred by any affected school district due to the permanent operation of the Project, this estimate to be made after consultation with the affected school districts;	Section 12.6.1
7 – Socioeconomics	12	An estimate of incremental municipal or utility operating and infrastructure costs that will be incurred by the town of Scriba, the county of Oswego, and any other affected municipality or utility for police, fire, emergency, water, sewer, solid waste disposal and other municipal or utility services during the construction phase of the Project (this estimate to be made after consultation with the affected municipalities and utilities and to consider the potential effect of existing power plants in the region);	Section 12.5.3
7 – Socioeconomics	13	An estimate of incremental municipal or utility operating and infrastructure costs that will be incurred by the town of Scriba, the county of Oswego, and any other affected municipality or utility for police, fire, emergency, water, sewer, solid waste disposal and other municipal or utility services due to the permanent operation of the Project (this estimate to be made after consultation with the affected municipalities or utilities);	Section 12.6.2
7 – Socioeconomics	14	An identification of all jurisdictions (including benefit assessment districts) that levy real property taxes or benefit assessments upon the Project site, its improvements and appurtenances;	Section 12.7.1
7 – Socioeconomics	15	For each taxing jurisdiction, an identification of the most recent tax rate (or benefit assessment charge), and total tax levy for the jurisdiction;	Section 12.7.2
7 – Socioeconomics	16	For each taxing jurisdiction, an identification of the most recent assessed value (or benefit formula) assigned to the Project site, its improvements and appurtenances;	Section 12.7.3
7 – Socioeconomics	17	For each taxing jurisdiction, an identification of the amount of the most recent annual taxes (or benefit charges) levied against the Project site, its improvements and appurtenances;	Section 12.7.4
7 – Socioeconomics	18	A description of all on-site equipment and systems to be provided to prevent or handle fire emergencies and hazardous substance incidents;	Section 12.8

Table 1-2: Location of Response to Stipulations in the Application (Page 20 of 38)

Stipulation	Clause	Stipulation	Reference
7 – Socioeconomics	19	A description of all contingency plans to be implemented in response to the occurrence of a fire emergency or a hazardous substance incident; and	Section 12.8
7 – Socioeconomics	20	A discussion of the status of the economic development proposal associated with the existing Independence Station, including any impact the Project will have on such efforts.	Section 12.9
8 – Soils, Geology and Seismology		The Application to be submitted will include a summary of the data previously collected for Independence Station of the soils, geology and seismology impacts of the Project (Study) and an update to this data, when appropriate. The components of the Study will include identification and mapping of existing conditions, impact analysis, and proposed mitigation.	Section 13
8 – Soils, Geology and Seismology	1	To the extent consistent with the following paragraphs contained in this stipulation, the methodology for assessing potential impacts related to soils, geology and seismology will follow the appropriate procedures described, or will use data provided, in the following documents: • American Society for Testing and Materials (ASTM) testing methods and standards. • Isachsen, Y.W. et al, editors, Geology of New York: A Simplified Account, New York State Museum/Geological Survey (1991). • Jacob, Klaus, Seismic Vulnerability of New York State: Code Implications for Buildings, Bridges and Municipal Landfill Facilities, National Center for Earthquake Engineering Research (NCEER), Buffalo, New York (April, 1993). • National Earthquake Information Center. Preliminary Determination of Epicenters, Monthly Listing, USGS. • New York State Geological Survey, Damaging Earthquakes in New York State 1737-1989, (1989). • New York State Geological Survey and New York State Museum, New York State Geologic Highway Map, (1990). • Nottis, Gary N., editor, Epicenters of Northeastern United States and Southeastern Canada, Onshore and Offshore: Time Period 1534-1980, New York State Museum Map and Chart Series Number 38, (1983). • United States Department of Agriculture, Soil Conservation Service, Soil Survey of Oswego County, New York, (1981).	Section 13

Table 1-2: Location of Response to Stipulations in the Application (Page 21 of 38)

Stipulation	Clause	Stipulation	Reference
8 – Soils, Geology and Seismology	2(a)	Regarding soils, geology, and seismology, the Study will include: A map delineating soil types on the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Figure 13-1
8 – Soils, Geology and Seismology	2(b)	A description of the characteristics and suitability for construction purposes of each soil type identified above, including a description of the recharge/infiltration capacity of each soil type and a discussion of any dewatering that may be necessary during construction and whether the Project will contain any facilities below grade that would require continuous dewatering;	Section 13.2.2
8 – Soils, Geology and Seismology	2(c)	A map delineating depth to bedrock on the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Figure 13-2
8 – Soils, Geology and Seismology	2(d)	A map delineating existing topography showing contours at 2-foot intervals on the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Figure 13-3
8 – Soils, Geology and Seismology	2(e)	A map delineating underlying bedrock types on the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, including an evaluation for potential impacts due to Project blasting, construction and operation, based on information to be obtained from available published maps and scientific literature, review of technical studies conducted on and in the vicinity of the Project, and on-site field observations, test pits and/or borings;	Figures 13-2, 13-3 and 13-4; Sections 13.2.3, 13.3.1, 13.3.2 and 13.4
8 – Soils, Geology and Seismology	2(f)	A description of the characteristics and suitability for construction purposes of each bedrock type identified above;	Sections 13.3.1 and 13.3.2
8 – Soils, Geology and Seismology	2(g)	A map delineating existing slopes (0-3%, 3-8%, 8-15%, 15-25%, 25-35%, 35% and over) on the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Figure 13-3; Section 13.3.3

Table 1-2: Location of Response to Stipulations in the Application (Page 22 of 38)

Stipulation	Clause	Stipulation	Reference
8 – Soils, Geology and Seismology	2(h)	A proposed site plan showing existing and proposed contours at 2-foot intervals, for the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project at a scale sufficient to show all proposed buildings, structures, paved and vegetative areas, and construction areas;	Figure 13-3 and Figure 17-20
8 – Soils, Geology and Seismology	2(i)	A preliminary calculation of the quantity of cut and fill necessary to construct the Project, including separate calculations for topsoil, sub-soil and rock;	Section 13.3.4
8 – Soils, Geology and Seismology	2(j)	A description and preliminary calculation of the amount of fill material to be brought into the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Section 13.3.4
8 – Soils, Geology and Seismology	2(k)	A description and preliminary calculation of the amount of cut material or spoil to be removed from the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Section 13.3.4
8 – Soils, Geology and Seismology	2(l)	A description of excavation techniques to be employed;	Section 13.3.4
8 – Soils, Geology and Seismology	2(m)	A delineation of temporary cut or fill storage areas to be employed;	Section 13.3.4
8 – Soils, Geology and Seismology	2(n)	A preliminary plan describing all blasting operations including location, blasting contractor qualifications, charge sizes and limits, quantity of discrete blasts, hours of blasting operations, estimates of amounts of rock to be blasted, warning measures, measures to ensure safe transportation, storage and handling of explosives, use of blasting mats, a plan for a pre-blasting videotape condition survey of nearby buildings and improvements, and coordination with local safety officials;	Section 13.4
8 – Soils, Geology and Seismology	2(o)	An assessment of potential impacts of blasting to environmental features, above-ground structures, below-ground structures such as pipelines, wells, and nearby nuclear facilities;	Section 13.4

Table 1-2: Location of Response to Stipulations in the Application (Page 23 of 38)

Stipulation	Clause	Stipulation	Reference
8 – Soils, Geology and Seismology	2(p)	An identification and evaluation of reasonable mitigation measures regarding blasting impacts, including the use of alternative technologies and/or location of structures, and including a plan for securing compensation for damages that may occur due to blasting;	Section 13.4.6
8 – Soils, Geology and Seismology	2(q)	A description of the regional geology, tectonic setting and seismology of the Project vicinity;	Sections 13.3 and 13.5
8 – Soils, Geology and Seismology	2(r)	An analysis of the expected impacts of blasting, Project construction and operation of the Project with respect to regional geology, if such can be determined; and	Section 13.4
8 – Soils, Geology and Seismology	2(s)	An analysis of the impacts of typical seismic activity experienced in the Project area on the operation of the Project.	Section 13.5
9 – Terrestrial Resources		The Application to be submitted will address terrestrial resources on the Project site. Because a significant study effort was conducted for the Independence Station, the Application will rely upon the previous studies performed for the entire Sithe parcel, updated through a site walkover reconnaissance and review of available aerial photographs for the site. An analysis of changes to vegetation and wildlife since construction of Independence Station will be provided. Regarding terrestrial resource impacts, the Applicant will provide:	Section 14
9 – Terrestrial Resources	1	To the extent consistent with the following paragraphs contained in this stipulation, the ecological communities will be described according to Reschke, Ecological Communities of New York State (1990);	Section 14
9 – Terrestrial Resources	2	A characterization of the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, as to the type of plant communities present, the structure of these communities and the species composition of each community, based on previously conducted systematic surveys (and confirmed during on-site reconnaissance);	Section 14.2
9 – Terrestrial Resources	3	A list of the species of flowering plants, ferns, and fern relatives occurring on the Project site and areas to be disturbed, and the relative abundance of each;	Table 14-1; Section 14.2.2

Table 1-2: Location of Response to Stipulations in the Application (Page 24 of 38)

Stipulation	Clause	Stipulation	Reference
9 – Terrestrial Resources	4	A delineation of the vegetative communities-cover type present on the Project site and areas to be disturbed on the basis of recent aerial photography and field observations, mapped at a scale of not more than 100 feet per inch, including an identification and delineation of any unusual habitats or natural communities which could support listed threatened or endangered species or species of special concern (based on updated agency correspondence);	Figure 14-1; Appendix R; Sections 14.2 and 14.4
9 – Terrestrial Resources	5	Documentation of the structure of these communities (canopy, understory, and ground cover) by visual observations conducted during previous studies (and confirmed during on-site reconnaissance) identifying the structure and composition of the plant communities identified based on dominant species, but all species observed being recorded for the purpose of site inventory;	Section 14.2
9 – Terrestrial Resources	6	An estimate of the species and number of all trees 12 inches or greater in diameter at breast height within the Project site;	Section 14.2; Appendix S
9 – Terrestrial Resources	7	An analysis of the impact of the construction and operation of the Project and all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, on the vegetation identified, including a delineation of the vegetative areas to be removed or disturbed, mapped at a scale of not more than 100 feet per inch (Note: the results of the vegetation assessment will be used, in part, to support the visual impact studies for the Project), and including an assessment of potential impacts associated with cooling tower icing;	Sections 6.11.12, 14.6, 14.7 and 14.8.5.1; Figure 14-2; Appendix R
9 – Terrestrial Resources	8	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies, regarding vegetation impacts identified;	Sections 5 and 14.9
9 – Terrestrial Resources	9	A characterization of the Project site, and any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, as to the wildlife, including mammals, birds, amphibians, and reptiles, and wildlife habitats, that occur in, on, or in the vicinity of the Project site and areas to be disturbed, based on previous studies conducted at the Sithe property (and confirmed via on-site reconnaissance), including an identification and delineation of any unusual habitats or natural communities which could support listed species or species of special concern (based on updated agency correspondence), and including a discussion of terrestrial and water fowl migration bird flyways.	Sections 14.3 and 14.5
9 – Terrestrial Resources	10	A list of the species of mammals, birds, amphibians, and reptiles reasonably likely to occur in, on, or in the vicinity of the Project site and areas to be disturbed based on site observations and supplemented by publicly available sources;	Tables 14-3, 14-4 and 14-5

Table 1-2: Location of Response to Stipulations in the Application (Page 25 of 38)

Stipulation	Clause	Stipulation	Reference
9 – Terrestrial Resources	11	An analysis of the impact of the construction and operation, including air emissions, of the Project and all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, on the wildlife, wildlife habitats, and wildlife travel corridors identified pursuant to Paragraphs 9 and 10 above; and	Sections14.7 and 14.8
9 – Terrestrial Resources	12	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies, regarding wildlife impacts identified pursuant to Paragraph 11 above.	Sections 5 and 14.9
10 – Traffic and Transportation		The Application to be submitted will include a study of the traffic and transportation impacts of the construction and operation of the Project (Study). To the extent consistent with the following paragraphs contained in this stipulation, the methodology for assessing the potential traffic and transportation impacts from traffic generated by the construction and operation of the Project will follow the instructions provided in Transportation Research Board, National Research Council, Highway Capacity Manual, Special Report 209, Third Edition 1994. Where applicable, historical information associated with construction and operation of Independence Station will be referenced.	Section 15
10 – Traffic and Transportation	1(a)	The Study will include a description of the pre-construction characteristics of the roadways in the vicinity of the Project, to include County Routes 1 and 1A. The description will include: A review of existing data on vehicle traffic, use levels and accidents obtained from the New York State Department of Transportation;	Section 15.2
10 – Traffic and Transportation	1(b)	A review of existing data on vehicle traffic, use levels and accidents obtained from Oswego County, including information on traffic fluctuations associated with the operations of the nearby existing nuclear power plants;	Section 15.2.2
10 – Traffic and Transportation	1(c)	A review of existing data on vehicle traffic, use levels and accidents obtained from the town of Scriba;	Sections 15.2.2 and 15.2.3
10 – Traffic and Transportation	1(d)	A review of local school bus routes and schedules;	Section 15.2.4
10 – Traffic and Transportation	1(e)	An identification of approach and departure routes to and from the Project site for police, fire, ambulance and other emergency vehicles;	Section 15.2.6
10 – Traffic and Transportation	1(f)	A review of available load bearing and structural rating information for expected Project traffic routes;	Section 15.2.8

Stipulation	Clause	Stipulation	Reference
10 – Traffic and Transportation	1(g)	The results of peak turning movement counts for typical weekday morning and weekday afternoon, to be conducted by the Applicant at the following intersections: • Routes 104 and 63 • Routes 1 and 1A • Routes 63 and 1 • Routes 1 and 29 • Site Drive and Route 1A	Section 15.2.2
10 – Traffic and Transportation	1(h)	The results of twenty-four hour traffic volume counts to be conducted by the Applicant, including a calculation of average daily traffic (ADT) for each intersection listed above;	Section 15.2.2
10 – Traffic and Transportation	1(i)	For each intersection listed in Paragraph 1(g) above, documentation of the number of approach lanes, the lane widths, shoulder widths, traffic control devices by approaches, and sight distances;	Section 15.2.1
10 – Traffic and Transportation	1(j)	A calculation of the Level of Service (LOS) for each intersection listed above, giving detail for each turning movement; and	Section 15.2.5
10 – Traffic and Transportation	1(k)	An estimate of the annual rate of traffic growth in the vicinity of the Project incorporating general growth and growth from planned land use changes, but not including projected traffic for the Project, including the source and manner of calculation of the estimate.	Section 15.3.1
10 – Traffic and Transportation	2(a)	The Study will include an estimate of the trip generation characteristics of the Project during both construction and operation. The estimate will include: A description of each major phase of construction, including duration of construction, daily shift periods and project totals;	Section 15.3.2.1
10 – Traffic and Transportation	2(b)	For each major phase of construction, an estimate of the number and frequency of vehicle trips, including time of day and day of week arrival and departure distribution, by size and type of vehicle;	Section 15.3.2.2
10 – Traffic and Transportation	2(c)	An identification of approach and departure routes to and from the Project site for vehicles carrying dynamite, chemicals or hazardous materials for construction of the Project;	Section 15.2.7
10 – Traffic and Transportation	2(d)	For cut activity (rock and soil spoil removal from the Project site and affected interconnection areas), a separate estimate of the number and frequency of vehicle trips, including time of day and day of week arrival and departure distribution, and including a delineation of approach and departure routes, by size, weight and type of vehicle;	Section 15.3.2.2

Table 1-2: Location of Response to Stipulations in the Application (Page 27 of 38)

Stipulation	Clause	Stipulation	Reference
10 – Traffic and Transportation	2(e)	For fill activity (rock and soil deposition at the Project site and affected interconnection areas), a separate estimate of the number and frequency of vehicle trips, including time of day and day of week arrival and departure distribution, and including a delineation of approach and departure routes, by size, weight and type of vehicle;	Section 15.3.2.2
10 – Traffic and Transportation	2(f)	An estimate of the number of employees per shift for each major phase of construction;	Section 15.3.2.1
10 – Traffic and Transportation	2(g)	An identification of the location of housing expected to be utilized by construction workers temporarily relocating to the area, as identified in the studies regarding Socioeconomics, including a delineation of approach and departure routes from such housing to the Project site;	Sections 12.5.1 and 15.3.2.2
10 – Traffic and Transportation	2(h)	A description of the potential use of barge or rail shipments for construction deliveries, and if likely, the routes or railroad recertification required in order to reach the project site;	Section 15.3.2.2
10 – Traffic and Transportation	2(i)	A description of the operation of the Project, including the number of employees per shift, operating shift periods and seasonal and annual totals;	Section 15.4.2
10 – Traffic and Transportation	2(j)	An estimate of the number and frequency of vehicle trips generated during operation of the Project, including time of day and day of week arrival and departure distribution, by size and type of vehicle;	Section 15.4.2
10 – Traffic and Transportation	2(k)	An identification of approach and departure routes to and from the Project site for vehicles carrying chemicals or hazardous materials for operation of the Project; and	Section 15.2.7
10 – Traffic and Transportation	2(l)	A description of the proposed rerouting of access for cottages located along Lake Ontario in the vicinity of the site.	Section 15.3.2.2
10 – Traffic and Transportation	3	The Study will include a conceptual site plan, drawn at an appropriate scale, depicting all Project site driveway intersections, showing horizontal and vertical geometry, the number of approach lanes, the lane widths, shoulder widths, traffic control devices by approaches, and sight distances.	Figures 15-11 and 15-12
10 – Traffic and Transportation	4(a)	The Study will include an analysis and evaluation of the traffic and transportation impacts of the Project, including: A comparison of projected future traffic conditions with and without the proposed Project, including a calculation and comparison of the Level of Service (LOS) for each intersection listed above, giving detail for each turning movement, the analysis to be conducted separately for the peak construction impacts of the Project and for the typical operations of the completed Project. Note that cumulative impacts of the Project with operation of the existing Independence Station will be included in this analysis.	Section 15.4.3

Stipulation	Clause	Stipulation	Reference
10 – Traffic and Transportation	4(b)	An evaluation of the adequacy of the road system to accommodate the projected traffic, the analysis to be conducted separately for the peak construction impacts of the Project and for the typical operations of the completed Project; and	Sections 15.2.3 and 15.4.3
10 – Traffic and Transportation	4(c)	An identification and evaluation of reasonable mitigation measures regarding traffic and transportation impacts, including the use of alternative technologies, the construction of physical roadway improvements, and the installation of new traffic control devices.	Sections 15.3.5 and 15.4.5
11 – Visual Resources and Aesthetics		The Application to be submitted will include a visual impact assessment (VIA) to determine the extent and assess the significance of Project visibility. The components of the VIA will include identification of visually sensitive resources, viewshed mapping, confirmatory visual assessment fieldwork, visual simulations, visual impact analysis, cumulative visual impact analysis, and proposed visual impact mitigation. The original copy of the Application shall include a videotape of existing Independence Station cooling tower and exhaust stack plumes under typical conditions.	Section 16; original videotape transmitted to DPS
11 – Visual Resources and Aesthetics	1	To the extent consistent with the following paragraphs contained in this stipulation, the methodologies, standards, and definitions for assessing visual resources will follow procedures outlined in the following documents: For definitions for visibility analysis: • New York State Department of Environmental Conservation, D.E.C. Aesthetics Handbook, 1996. • U. S. Forest Service, Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701, 1995.	Section 16
11 – Visual Resources and Aesthetics	2(a)	The VIA will address the following issues: The character and visual quality of the existing landscape; including visibility of Project operational characteristics, such as visible plumes from stack and cooling towers and Project lighting.	Section 16.2
11 – Visual Resources and Aesthetics	2(b)	Visibility of the Project, including all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, within a study area as determined by the viewshed analysis described below;	Section 16.4; Figures 16-7 through 16-20

Table 1-2: Location of Response to Stipulations in the Application (Page 29 of 38)

Stipulation	Clause	Stipulation	Reference
11 – Visual Resources and Aesthetics	2(c)	Appearance of the Project upon completion, including facade colors and texture;	Section 16.3; Figure 3-5
11 – Visual Resources and Aesthetics	2(d)	Lighting (including lumens, location and direction of lights for facility area and/or task use and safety including stack requirements), and similar features;	Section 16.3; Figure 16-2
11 – Visual Resources and Aesthetics	2(e)	Representative views (photographic overlays) of the Project, including side and rear views, indicating approximate elevations;	Figures 3-5, 3-6, 16-1, 16-3, and 16-7 through 16-20
11 – Visual Resources and Aesthetics	2(f)	Nature and degree of visual change resulting from construction of the Project, including all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Sections 16.4 and 16.5; Figures 16-7 through 16-20
11 – Visual Resources and Aesthetics	2(g)	Nature and degree of visual change resulting from operation of the Project;	Sections 16.4 and 16.5
11 – Visual Resources and Aesthetics	2(h)	Nature and degree of cumulative visual change resulting from construction and operational characteristics of the Project and the existing Independence Station, including all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, as well as any other identified proposed land use changes in the vicinity of the Project; and	Sections 16.4 and 16.5
11 – Visual Resources and Aesthetics	2(i)	Proposed mitigation and mitigation alternatives, including alternative technologies, landscaping, lighting options for work areas and safety requirements, and lighting options for stack lighting as required by the FAA.	Section 16.6

Table 1-2: Location of Response to Stipulations in the Application (Page 30 of 38)

Stipulation	Clause	Stipulation	Reference
11 – Visual Resources and Aesthetics	3(a)	The viewshed analysis component of the VIA will be conducted as follows: A viewshed map of the Project study area will be prepared and presented on a 1:24,000 scale recent edition topographic base map. The viewshed study area is defined as the area within a 5-mile radius of the center of the Project site. The viewshed map(s) will provide an indication of areas of potential visibility based only on topography and the top of the structure with the highest peak elevation. The potential screening affects of vegetation will also be shown. The map(s) will be divided into foreground, midground and background areas based on visibility distinction and distance zone criteria as defined by the references cited above. Visually-sensitive sites, cultural and historical resources, representative viewpoints, photograph locations, and public vantage points within the viewshed study area will be included on the map(s) or an overlay. An overlay indicating landscape similarity zones will be included.	Section 16.4; Figures 16-4, 16-5 and 16-6
11 – Visual Resources and Aesthetics	3(b)	The VIA will include a detailed description of the methodology used to develop the viewshed maps, including software, baseline information, and sources of data.	Section 16.4.1
11 – Visual Resources and Aesthetics	3(c)	The viewshed mapping will be used to determine the sensitive viewing areas and locations of viewer groups in the Project vicinity. These will include recreational areas, residences, businesses, historic sites (listed or eligible), and travelers (interstate and other highway users), and will include viewing areas previously assessed for Independence Station as well as views from Lake Ontario.	Section 16.4
11 – Visual Resources and Aesthetics	3(d)	The Applicant will confer with its Cultural and Historic Resources experts, the DPS Staff, NYSDEC, and OPRHP in its selection of viewpoints. Viewpoint selection will be based upon the following criteria: • Representative or typical views from unobstructed or direct line-of-sight views; • Significance of viewpoints, especially historic sites, high public use areas, parks and scenic outlooks; • Level of viewer exposure, i.e., frequency of viewers or relative numbers, including residential areas, business centers, or high volume roadways; • Proposed land uses; and • Input from local public sources.	Section 16.4

Stipulation	Clause	Stipulation	Reference
11 – Visual Resources and Aesthetics	4	Leaf-off simulations (photographic overlays) of the Project, including all roadways to be constructed, if any, and all gas, electric, water, wastewater or other types of off-site interconnections or improvements required to serve the Project, will be prepared from the representative viewpoints established pursuant to paragraph 3(d) herein to demonstrate the post construction appearance of the Project. These simulations will include the cumulative visual effects resulting from the Project with the existing Independence Station. Representative viewpoints will be established in consultation with NYSDEC, DPS Staff and OPRHP for this assessment based on the information described in paragraph 3(d) herein. The visual simulations of the Project from each of the viewpoints selected pursuant to paragraph 3(d) herein will be limited to the Project as it would appear under typical operating conditions. In addition, three sets of simulations (representing typical, winter normal and maximum impact cases) will be prepared form a representative viewpoint showing a visible water vapor plume that could occur from the combustion turbine generator stacks and from the cooling towers. The depiction of the water vapor plumes may be based on visible water vapor plumes from other comparable plants operating under similar conditions or applicable engineering estimates. In addition, a discussion will be provided with regard to the Project's impacts in conjunction with the existing plumes currently visible in the Project vicinity.	Section 16.4; Figures 16-7 through 16-22
11 – Visual Resources and Aesthetics	5	Additional revised simulations illustrating mitigation will be prepared for those observation points for which mitigation is proposed in the Application.	N/A
11 – Visual Resources and Aesthetics	6	Each set of existing and simulated views of the Project will be compared and the change, if any, in visual character will be identified. Based upon the likely viewers, and their likely visual sensitivity, the potential impact will be discussed. Where visual impacts from the proposed facility expansion are identified, potential mitigation measures will be outlined, and the extent to which they effectively minimize such impact will be discussed.	Section 16.4; Figures 16-7 through 16-20
11 – Visual Resources and Aesthetics	7	An overlay of a USGS map showing the photographic view locations and the results of computer visibility potential modeling will be provided.	Section 16.4; Figure 16-4
12 – Water Resources		The Application to be submitted will include a study of the water resource impacts of the construction and operation of the Project. Regarding water resource impacts, the Applicant will provide:	Section 17

Table 1-2: Location of Response to Stipulations in the Application (Page 32 of 38)

Stipulation	Clause	Stipulation	Reference
12 – Water Resources	1	An estimate of the hourly and daily peak and the hourly and daily average water supply needs and consumptive water losses of the Project, in gallons, for each day of a typical year, broken down by power production, domestic, and fire protection uses, with daily, monthly and annual totals;	Section 17.1.2.1; Table 17-1
12 – Water Resources	2	An estimate of the daily peak, daily average, and fire suppression peak and average flow rate needs of the Project in gallons per minute;	Section 17.1.2.1; Table 17-1
12 – Water Resources	3	A description of the methodology used (i.e., estimate, comparison, data, calculation) to prepare the water supply needs and minimum and maximum flow rate estimates stating all factors used;	Section 17.1.2.2
12 – Water Resources	4	A description of the water chemistry requirements for water to be supplied to the Project, indicating any requirements that are more stringent than New York State standards for potable water, and describing any additional water treatment that will be necessary to obtain the desired chemistry;	Section 7.1.2.3
12 – Water Resources	5	An identification of the water supply source or sources to be used by the Project, including an analysis of the available capacity of the water supply source in terms of quantity, quality, and pressure and an analysis of the impacts of such water usage during both normal and drought periods on other users of the water supply source, and an identification of all infrastructure requirements or improvements necessary to serve the Project and the impact of the Project on excess infrastructure capacity, including distribution piping, mains, pumps, storage, or additional supply;	Sections 3.2.2.7, 17.1.3 and 17.4.3.1
12 – Water Resources	6	A cumulative analysis of the available capacity of the water supply source in terms of quantity, quality, and pressure and an analysis of the impacts of such water usage during both normal and drought periods on other users of the water supply source, and an identification of all infrastructure requirements necessary to serve the Project and the impact of the Project on excess infrastructure capacity, including distribution piping, mains, pumps, storage, or additional supply;	Sections 17.1.3 and 17.4.3.1; Table 17-2; Appendix F
12 – Water Resources	7	A description of the status of negotiations, or a copy of agreements that have been executed, with municipalities, companies or individuals for providing water to the Project;	Section 17.1.3.1
12 – Water Resources	8	An identification and evaluation of other reasonable mitigation measures, including the use of alternative technologies, potential alternative supply sources including on-site sub-surface wells, water storage, and offsetting water conservation, regarding water supply impact, and including a contingency plan for periods of drought or water emergency describing thresholds for water use curtailment;	Sections 5, 17.1.3.3, 17.1.4 and 17.4.4

Table 1-2: Location of Response to Stipulations in the Application (Page 33 of 38)

Stipulation	Clause	Stipulation	Reference
12 – Water Resources	9	A water balance diagram for average and maximum water use operating conditions for the Project facility that shows in detail all water sources, plant water uses, water treatment facilities, wastewater treatment facilities, and wastewater discharges;	Figures 3-7 and 3-8
12 – Water Resources	10	An identification and description of any process wastewater generation from the Project, including an estimate of the hourly and daily peak and average volumes and effluent characteristics;	Sections 3.2.2.8 and 17.2.2; Tables 17-3 and 17-4
12 – Water Resources	11	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies and subsurface disposal, regarding wastewater generation and disposal impacts;	Sections 5, 17.2.9 and 17.2.10
12 – Water Resources	12	An identification and description of all disposal methods for wastewater generated from the Project, including a review of all options explored for process wastewater disposal, including discharging to municipal sewer systems, Lake Ontario, aquifer recharge areas, inground discharges, including, as applicable, an analysis of the impacts on water quality and quantity in Lake Ontario and any other affected surface water or groundwater resource, and an analysis of the impacts of any out-of-basin transfers;	Sections 17.2.3, 17.2.7 and 17.2.10
12 – Water Resources	13	An identification and description, including conceptual plans and locations, for all wastewater sewer mains or other improvements, structures or means of interconnection with the Project site for the purposes of wastewater disposal, including a description of available capacity and any limitations on wastewater disposal capacity;	N/A
12 – Water Resources	14	A description of the status of negotiations, or a copy of agreements that have been executed, with municipalities, companies or individuals for receiving wastewater from the Project including any restrictions on Project wastewater disposal;	Section 17.2.4
12 – Water Resources	15	An identification and description of any water treatment that will be required prior to discharge as well as the effluent limitations that will need to be met;	Sections 17.2.5 and 17.2.6; Table 17-5
12 – Water Resources	16	An assessment of the potential thermal impacts of the proposed discharge, utilizing the CORMIX model;	Section 17.2.7
12 – Water Resources	17	An evaluation as to whether a SPDES Permit is required for any aspect of the Project;	Sections 17.2.1, 17.2.8 and 17.7.1

Table 1-2: Location of Response to Stipulations in the Application (Page 34 of 38)

Stipulation	Clause	Stipulation	Reference
12 – Water Resources	18	If a SPDES Permit is required for the Project, a completed SPDES Application for the Project, which would include a complete quantification of the proposed discharge from the Project, to include proposed chemical additives, expected end-of-pipe concentrations of all parameters expected to be discharged, as well as the delineation of mixing zone from the Project's proposed discharge; and delineation of the mixing zone assuming simultaneous operation of the Project with the existing Independence Station;	Appendix C; Section 17.2.7
12 – Water Resources	19	An evaluation of potential means for cooling, to include once-through cooling, air-cooled condensers, and hybrid wet-dry systems, to be provided in the alternatives analysis section of the Application;	Section 5
12 – Water Resources	20	A map of the Project site showing the depth to seasonal high groundwater table in the following increments: zero to 1 foot, 1 to 5 feet, 5 foot increments thereafter;	Figure 17-4; Section 17.3.2.1
12 – Water Resources	21	A map based on publicly available information showing all areas within a 1 mile radius of the Project site delineating all groundwater aquifers and groundwater recharge areas, and identifying groundwater flow direction, groundwater quality, and the location, depth, yield and use of all public and private groundwater wells or other points of extraction of groundwater, and including delineation of wellwater and aquifer protection zones;	Section 17.3.2.2; Figure 17-5
12 – Water Resources	22	An analysis and evaluation of all reasonably potential impacts created by the construction or operation of the Project on groundwater quality and quantity in the project area, including potential impacts on public and private water supplies and wellhead and aquifer protection zones;	Sections 17.3.3 and 17.3.4
12 – Water Resources	23	A description of the water quality, flow, locations at public water supply intakes and other characteristics of Lake Ontario and any other surface water feature based on observation and available secondary data, including intermittent streams, on or abutting the Project site or any area to be disturbed for roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Sections 17.4.2 and 17.6.2
12 – Water Resources	24	An identification of the extent of all Waters of the state of New York and the United States within the Project site;	Sections 17.4.2 and 17.6.2
12 – Water Resources	25	An identification of the extent of all Waters of the state of New York and the United States along or adjacent to all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	Sections 17.4.2 and 17.6.2

Table 1-2: **Location of Response to Stipulations in the Application (Page 35 of 38)**

Stipulation	Clause	Stipulation	Reference
12 – Water Resources	26	A description of the characteristics of all Waters of the state of New York and the United States, identified above;	Sections 17.4.2 and 17.6.2
12 – Water Resources	27	An analysis of the impact of the construction and operation of the Project and all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, on the surface waters identified above;	Sections 17.4.3 and 17.6.5
12 – Water Resources	28	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies, regarding impacts on Waters of the United States and the other surface waters identified above;	Sections 5, 17.4.4 and 17.6
12 – Water Resources	29	A description of the aquatic resource characteristics of the portion of Lake Ontario in the immediate vicinity of the site (e.g., within several miles, including the vicinity of the intake structure), based upon previously collected data for the existing Independence Station, Nine Mile Point, Fitzpatrick & Oswego Stations and updated through available secondary data as appropriate;	Section 17.5.2
12 – Water Resources	30	An analysis of the impact of the construction and operation of the Project and all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project, on the aquatic resources identified above;	Section 17.5.3
12 – Water Resources	31	Based upon the data reviewed pursuant to paragraph 29 above, an identification and evaluation of reasonable mitigation measures, including but not limited to a BTA evaluation of the intake structure, regarding aquatic resource impacts; once through, closed cycle (wet, hybrid), and dry cooling.	Sections 5 and 17.5.4
12 – Water Resources	32	A discussion regarding the potential cumulative impact on aquatic resources of the proposed Project in conjunction with Independence Station and all other nearby power plant facilities based upon available data;	Section 17.5.3

Table 1-2: Location of Response to Stipulations in the Application (Page 36 of 38)

Stipulation	Clause	Stipulation	Reference
12 – Water Resources		*Wetlands* To the extent consistent with the following paragraphs contained in this stipulation, the methodology for assessing the potential impacts to wetlands will follow the procedures and use predictive data provided in the following documents: • For identifying the appropriate vegetation, hydrology, and soils criteria which would define Federal-jurisdictional wetlands, the U.S. Army Corps of Engineers Wetlands Delineation Manual (1987); • For identifying the appropriate vegetation, hydrology, and soils criteria which would define State-jurisdictional wetlands, the NYSDEC Freshwater Wetlands Delineation Manual (July 1995). • For preparing functional assessments, the U.S. Army Corps of Engineers guide entitled "The Highway Methodology Workbook Supplement, Wetland Functions and Values, A Descriptive Approach" (November 1995).	Sections 17.6.2 and 17.6.4
12 – Water Resources	33	An identification of the extent of all federal and state regulated wetlands within the Project site;	Sections 17.6.2 and 17.6.3
12 – Water Resources	34	An identification of the extent of all federal and state regulated wetlands along all roadways to be constructed, if any, and all gas, electric, water, wastewater, or other types of off-site interconnections or improvements required to serve the Project;	N/A
12 – Water Resources	35	A description of the characteristics of all federal and state regulated wetlands identified above, including a description of the vegetation, soils, and hydrology data collected for each of wetland sites identified, based on actual on-site wetland observations;	Section 17.6.3
12 – Water Resources	36	An on-site identification and delineation of all federal and state regulated wetlands identified above;	Sections 17.6.2 and 17.6.3
12 – Water Resources	37	A survey or coordinate map of the location of all on-site federal regulated wetland boundaries identified above;	Figures 17-13 and 17-16
12 – Water Resources	38	A survey map of the location of all on-site state regulated wetland boundaries identified above;	Figures 17-13 and 17-16

Table 1-2: Location of Response to Stipulations in the Application (Page 37 of 38)

Stipulation	Clause	Stipulation	Reference
12 – Water Resources	39	A qualitative and descriptive wetland functional assessment, including seasonal variations, for all wetlands identified above for groundwater recharge/discharge, floodflow alteration, fish and shellfish habitat, sediment/toxicant retention, nutrient removal, sediment/shoreline stabilization, wildlife habitat, recreation, uniqueness/heritage, visual quality/aesthetics, and protected species habitat;	Section 17.6.4
12 – Water Resources	40	An analysis of all wetlands within 200 feet of the Project site and the wetlands identified above, observed in the field where accessible to determine their general characteristics and relationship, if any, to on-site, interconnection area or improvement area wetlands;	Section 17.6.3
12 – Water Resources	41	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies and control of potential phosphorus and nitrogen sources from the Project, regarding wetlands impacts;	Sections 17.6.5, 17.6.6, 17.7.4 and 17.7.5
12 – Water Resources	42	A description of all techniques that will be used to prevent stormwater contamination, and a conceptual site plan showing all intended structures and improvements to prevent stormwater contamination, including chemicals, fuel oil or other contaminants from storage facilities, product delivery, plant operation, plant maintenance, waste handling activities, and vehicles in parking lots or other areas;	Sections 17.7.3 through 17.7.5; Figure 17-20
12 – Water Resources	43	An identification and evaluation of reasonable mitigation measures, including the use of alternative technologies, regarding stormwater quality impacts; and	Sections 17.7.4 and 17.7.5
12 – Water Resources	44	A preliminary plan for the collection and treatment of stormwater runoff from the site during construction and operation, including delineation of watershed boundaries and subbasins, existing flowpaths and proposed flow path relocations, the location, type, and size of all existing and proposed storm drainage facilities, stormwater outfall and/or subsurface disposal locations and conditions, design flows and outfall velocities, proposed method of stabilizing outfall channels, the location, size and type of nearest upstream and downstream bridge or culvert affected by the Project, location, size and structural details of stormwater detention facilities, preliminary hydraulic calculations for the 2, 10 and 100 year storm frequencies for both existing and proposed conditions, delineation of affected floodways and flood hazard areas, a description of techniques that will be used to prevent or control stormwater-related soil erosion, runoff and subsequent sedimentation in areas that have been cleared and graded, both during construction and operation, an analysis of stormwater impacts, and an identification and evaluation of reasonable mitigation measures regarding stormwater impacts, including the use of alternative technologies and subsurface disposal.	Section 17.7; Figures 17-18 through 17-21

Table 1-2: Location of Response to Stipulations in the Application (Page 38 of 38)

Stipulation	Clause	Stipulation	Reference
13 – Reliability of Preferred Power Source and Alternative Control Technology Comparison	1	The Application will contain the following assessments: The Application will contain an assessment, with supporting details, of the reliability and feasibility of the preferred source(s) of power. As part of the supporting details, reliability data for the major generation components including the gas turbine, heat recovery steam generator, and steam turbine; and collectively for the entire power block will be provided. The reliability data, if publicly available, to be included, is as follows: capacity factor; availability; equivalent availability; forced outage rate; equivalent forced outage rate; and starting reliability. Data for the last 5 years, year by year and cumulative, will be provided, if available. If the equipment does not have an operating history, estimates of operating reliability with the rationale will be provided.	Section 3.2.2.4; Appendix E
13 – Reliability of Preferred Power Source and Alternative Control Technology Comparison	2	The Application will explain the basis for the selection of the power block. The Application will include an explanation of the environmental impacts and incremental costs of the preferred and reasonable alternatives for the cooling systems. The cooling systems to be evaluated are: once-through cooling, wet cooling tower, hybrid cooling tower, and air-cooled condenser. The hybrid cooling tower design alternative will include one design based on plume abatement down to 20F, *at a relative humidity of 85 percent*, as well as a second hybrid design based on plume abatement down to 40F, *at a relative humidity of 72 percent.* The signatories agree that the analyses for the 40F hybrid design alternative required by this Stipulation need not be filed in the Application for the Chairman of the Board to determine that Applications in compliance with Section 164 of the Public Service Law. To the extent that the Applicant has not completed the 40F hybrid design alternative analyses by the time the Application is filed, the Applicant will file as a supplement those analyses that were not included in the Application within 3 weeks of filing the Application. The Application will include an explanation of the basis of the chosen emission control systems, including the LAER (Lowest Achievable Emissions Rate) and BACT (Best Available Control Technology) analyses, as required by the PSD air permit application guidelines.	Sections 3.2.2.4, 5, 6.3 and 6.11; hybrid analysis to follow

2. PROJECT SUMMARY

2.1 Project Name and Article X Case Number

The Project name is Heritage Station, a proposed 800 MW natural gas-fired combined-cycle electric generating facility in Scriba, New York. Heritage Power LLC, a joint undertaking of affiliates of Sithe and GE, is the Project Applicant. The Article X case number for the Project is 98-F-0558.

2.2 Site Description and Present Development

The site is an approximately 190-acre parcel of land located in the town of Scriba, Oswego County, New York. The site is bounded by Lake Ontario and the Independence Park recreational property to the north, by Route 1A, residences and rural areas to the south and east and by the Alcan Rolled Products Company (Alcan) to the west.

The Project will be located on a leased parcel within the site of the existing Independence Station. Independence Station is a 1,042 MW electric generating facility, also fueled by natural gas. Primary structures associated with this facility consist of the generation building, cooling towers, a stormwater detention basin, a wastewater holding pond and outfall structure into Lake Ontario, an electrical switchyard (owned by NMPC) and other ancillary structures (including an office building, warehouses and tanks). A full analysis of the environmental impacts of this facility and the 190-acre site was undertaken in the early 1990s under the SEQRA process that confirmed that environmental impacts had been adequately defined and mitigated. One component of mitigation for activities on the site was designation of a 50-acre parcel of land, known as Independence Park, as a recreational facility that has been donated to Oswego County. A system of trails and an observation platform have been developed on this parcel to provide for near-shoreline recreational enjoyment by the public.

2.3 Project Description

The Project will be a natural gas-fired, combined-cycle generating plant with a nominal electric generating capacity of 800 MW. It will be located in the town of Scriba, Oswego County, New York. The Project is to be located on the site of Sithe's existing Independence Station, allowing integration of the Project on the site with a minimal impact to the environment and the surrounding community.

To achieve low air emissions, the Project will utilize only natural gas. BACT and LAER technology will be incorporated into the Project design, as appropriate, to ensure that air emissions are minimized to state-of-the-art levels. This will include the use of dry low NO_x (DLN) and SCR to achieve extremely low levels of NO_x

emissions. Dispersion modeling for all criteria pollutants indicates that Project ground-level impacts will not only be below the National Ambient Air Quality Standards (NAAQS) established to be protective of public health, but also below Significant Impact Levels (SILs) established as a small fraction of the NAAQS. In addition to the Project's minimal impact on air quality, it will be required to obtain NO_x offsets. By reducing NO_x emissions by an amount greater than the Project's low NO_x emissions, the Project will further reduce regional NO_x generation and provide for an overall improvement in air quality.

The Project is designed to incorporate the use of wet cooling towers, similar to those employed for cooling at the adjacent Independence Station. Lake Ontario water will be utilized, using intake, treatment, distribution, and pumping facilities owned and operated by the city of Oswego and the town of Scriba. Water supply from this source is abundant. Wastewater discharge will also be similar to Independence Station. Wastewater will be held within a separate holding pond prior to its release to the same outfall piping used by Independence Station, in a manner consistent with applicable regulatory requirements.

No off-site interconnections are anticipated for the Project. Interconnection with the electric transmission system and the natural gas supply pipeline will occur within the Project property. This Project is, therefore, able to significantly increase electric generating capacity while minimizing environmental impact and inconvenience off-site. In addition, the Project layout has been designed to minimize environmental impacts on-site as well, by situating Project components throughout the site in or adjacent to previously disturbed areas to the extent this could be accomplished consistently with other environmental mitigation objectives.

2.4 Summary of Project Environmental Effects and Mitigation

2.4.1 Air Quality and Meteorology

As discussed in Section 6 of this Application, in response to Stipulation No. 1, the Project will have an insignificant effect on local and regional air quality. Construction impacts on air quality will be controlled through best construction management measures, including the use of dust suppression measures as appropriate. Through the use of clean-burning natural gas as the fuel and advanced combustion and pollution control technologies, emissions will be significantly controlled. The Project will be designed to incorporate BACT and LAER technology, including the use of DLN and SCR. Modeling has shown that Project emissions will result in air quality impacts below SILs for all criteria pollutants and below all non-criteria pollutant thresholds. NO_x emissions offsets will be acquired to further mitigate the minimal air quality impact of the Project.

2.4.2 *Cultural Resources*

As discussed in Section 7 of the Application, in response to Stipulation No. 2, the Project site was investigated for potential historical and archaeological resources prior to construction of Independence Station. OPRHP has confirmed that no known cultural resources of concern exist on the Project site, and that the Project will have no effect on cultural resources. A survey of the viewshed area has been conducted in order to further assure that no impact will occur. Therefore, the focus has been to plan for unanticipated contingencies through preparation of an Unanticipated Discovery Plan for use during the construction period. No additional mitigation measures have been identified as appropriate for this issue.

2.4.3 *Electric Transmission Facilities*

The Project will connect to the transmission grid at the existing Independence Substation via a new double circuit 345 kV line entirely on-site. NMPC is currently conducting voltage, stability and thermal analyses to evaluate any effects on the transmission system of the interconnection. Pursuant to Stipulation No. 3, these studies will be submitted shortly. Preliminary analysis by the Applicant, discussed in Section 8 of the Application, shows no adverse impacts on system reliability.

In addition, an analysis has been completed that identifies existing EMF effects in the vicinity of the Project, and determines the likely EMF change due to the Project. The proposed interconnection will not significantly affect electric field levels off-site or along transmission line rights-of-way. All projected EMF levels are well within New York guidelines.

2.4.4 *Gas Transmission Facilities*

The Project's tie-in to the natural gas pipeline system is described in Section 9 in response to Stipulation No. 4. This section also confirms that the existing natural gas pipeline serving the site is adequate to supply fuel to the Project without interfering with other existing or potential users of the system.

2.4.5 *Land Uses and Local Laws*

Section 10 of the Application provides information about the Project site and its community setting, as required by Stipulation No. 5, in order to assess compatibility with surrounding land uses and community planning efforts. A specific review of potentially applicable local laws is also included. As discussed in that section, the

Project represents a unique opportunity to expand electric generating capacity and the community's economic industrial base in a manner that is consistent with existing land uses and community plans.

2.4.6 Noise

A noise study, consistent with the requirements of Stipulation No. 6, has been completed. As described in Section 11 of the Application, it compares existing noise levels to those anticipated to result from Project construction and operation. Near-field receptors were selected to represent maximum-impact cases, reflecting nearby residential uses as well as recreational uses associated with Independence Park. Using standard construction measures, noise impacts associated with the construction effort are anticipated to be acceptable. With noise-controlling design measures in place, the operational noise generated by the proposed Project will not result in increases above a modified Composite Noise Rating (CNR) of "B" at any of the selected noise receptors, indicating that no community reaction will result for off-site receptors. In addition, a design goal of "no perceptible increase" in operational noise levels off-site has been specified for the Project, reflective of local requirements.

During construction, the Project will take the following steps with regard to noise:

- Coordination with the local community to maintain communication links with regard to construction phasing and to respond to complaints;
- Use of construction equipment manufacturers' normal sound muffling devices; and
- Restricting noisy activities to daytime hours where practical.

With these measures in place, noise impacts associated with the construction effort are anticipated to be acceptable.

Facility components will be designed to incorporate, as appropriate, noise-attenuating features, such as enclosures, elimination of ventilation opening louvers, quiet supply and exhaust fans, turbine air intake silencing, stack silencing, quieted transformers or transformer barrier walls, and a special low-noise cooling tower. With these mitigation measures in place, Project operation will comply with the design goals identified above.

2.4.7 Socioeconomics

Section 12 of the Application provides an assessment of the socioeconomic impacts of the Project during construction and operation, as required by Stipulation No. 7. The Project will result in a significant need for workers during the construction phase. It has been confirmed that an adequate workforce is available in the region to serve the Project's needs without creating an undue demand on community services. In addition, the operational needs of the Project also will not significantly affect community services. In light of this, the Project represents a beneficial addition to the community. In addition to providing jobs and tax benefits to the region without stressing community services, the Project provides for expansion of the industrial base in a manner that meets community objectives and minimizes impact. Total construction and operational economic benefits, excluding taxes and payments in lieu of taxes, are estimated at approximately $423 million for the 30-year life of the Project.

2.4.8 Soils, Geology and Seismology

The analysis of soils, geology and seismology, presented in Section 13 of the Application to comply with Stipulation No. 8, does not identify any constraints that would require special design measures. This section additionally outlines procedures that would be implemented in the event blasting is required for the construction effort. The measures include community notification and a restriction on hours.

2.4.9 Terrestrial Ecology

A characterization of the ecology of the site is presented in Section 14, as required by Stipulation No. 9. As discussed in that section, the site includes wooded, open and developed areas. In defining the layout for the Project, care has been taken to utilize developed and already cleared areas on-site to the extent possible, and to minimize intrusion into wetland areas. In this way, impacts to terrestrial ecology have been minimized to the extent possible.

2.4.10 Traffic and Transportation

As discussed in Section 15 of the Application to comply with Stipulation No. 10, the Project will utilize the existing site driveway that currently serves Independence Station. Construction traffic, which will use both Riker's Beach Road and Ferguson Beach Road, will increase over existing traffic levels, resulting in a maximum of approximately 600 round trips to the site per day during the peak construction period. The length of this period will, however, be limited. During Project operation, traffic associated with employees, deliveries and other usage of the site will be insignificant. Approximately 25 round trip vehicles will enter and exit the site per day. This level of roadway usage during Project operation is not anticipated to affect traffic operations or safety along the surrounding roadway network.

Although traffic volumes will increase during Project construction, control measures will be used to minimize impacts on traffic operations at intersections through which construction traffic will travel during the 34-month construction period. The Project will coordinate shift times with other construction or major maintenance projects to minimize traffic overlap. No significant construction traffic issues resulted from the construction of Independence Station, a similar construction effort. Once the Project is operational, associated vehicle trips will be significantly reduced. Therefore, no mitigation measures associated with operational traffic have been proposed.

2.4.11 Visual Resources and Aesthetics

A detailed assessment of the potential visual effect of the Project is provided in Section 16 of the Application, as required by Stipulation No. 11. As discussed in that section, the Project is generally screened from view. Where the Project will be visible, its effect is generally limited by vegetation and distance. Although navigational lighting has been required by the FAA, a dual lighting system has been selected in order to minimize the obtrusiveness of the lights to the surrounding community.

As shown in Section 16, views of the Project from surrounding areas will be limited and generally distant. The impact of these views is minimized to the extent possible, as care has been taken to minimize stack heights consistent with good dispersion practices. In addition, to minimize visual intrusion, the buildings and stacks will match the color of the adjacent Independence Station. The Project will be located in an area with compatible visual elements.

2.4.12 Water Resources

Section 17 of this Application addresses a number of water-related topics, in accordance with the requirements of Stipulation No. 12: water supply; wastewater; groundwater; surface water; aquatic resources; wetlands; and stormwater/erosion control.

The Project will utilize Lake Ontario water from the city of Oswego municipal water system. Water from this source is abundant – Lake Ontario is one of the largest freshwater waterbodies in the world – and piping infrastructure is in place on-site to serve the Project. The city and town will require a modification to their respective water withdrawal permits to accommodate this use, and certain on-site modifications to the city's treatment station will be made. The Applicant expects to enter into a long-term water supply agreement. Use of the city's existing intake structure reduces the potential impact on surface water and aquatic community resources.

Wastewater from the Project will be discharged to the existing lake outfall pipe used by Independence Station. A separate wastewater holding pond and monitoring point will be established for individual point source discharge compliance. As discussed in Section 17, the wastewater discharge will not have a significant affect on water quality or aquatic ecology.

Because the Project does not intend to obtain water for facility use from a new groundwater source, impacts to groundwater are limited to potential indirect effects. The Project will be designed to ensure that existing resources in the vicinity of the site are protected from indirect effects potentially associated with accidental spills both during Project construction and operation.

Wetland resource areas were identified and delineated on the site prior to design of the facility in order to avoid or minimize impacts to the extent feasible. Several areas exist where impacts to NYSDEC and federal wetland areas were unavoidable. However, this wetland intrusion has been minimized to the greatest extent possible, and will be fully mitigated. This Application includes the details of a more than two-to-one replication plan to offset wetland disturbance in Section 17.6.6.2.

Pre- and post-development drainage conditions at the Project site have been assessed to ensure that stormwater flows will approximate existing conditions by mitigating peak runoff, providing features to attenuate pollutants, and approximating existing drainage patterns. It has been demonstrated that Project flows can be accommodated within the existing detention basin without the need for expansion.

3. PROJECT DESCRIPTION

Consistent with the requirements of 16 NYCRR §1001.1, this section provides a description of the proposed site and facility. The following sections address the type, size and proposed use of the Project; a description of the physical characteristics of the Project and surroundings; and the anticipated construction schedule and workforce.

3.1 Type, Size and Proposed Use of Project

The Project will be a combined-cycle power plant to be located on the same property as and adjacent to the existing Independence Station in the town of Scriba, New York (Figures 3-1 and 3-2). The Project will be a merchant facility, designed to sell electricity to the wholesale market. It will provide electrical power to the grid through the adjacent NMPC 345 kV switchyard.

The plant will be arranged in two power blocks of 400 MW each. Each power block incorporates a single shaft combined-cycle configuration with one GE Steam and Gas (STAG) 107H System, including one combustion turbine, one heat recovery steam generator (HRSG), one steam turbine, and one generator. This combination will produce a nominal plant output of approximately 800 MW.

The Project will be interconnected as a merchant plant through the NMPC utility power transmission system, utilizing open conductor transmission lines to interconnect with the NMPC switchyard already located at the site. The electrical interconnection will be at 345 kV, as more fully described in Section 8. The Project will utilize natural gas through an existing pipeline connection to the interstate gas transportation system, as more fully described in Section 9.

Water required for the facility will be delivered via an existing municipal water pipeline. Lake water for the facility will be filtered and treated at the existing city of Oswego water treatment plant. Wastewater from the facility will be discharged, after treatment, to a wastewater collection and holding pond and then to Lake Ontario via an existing outfall pipe currently in use by Independence Station.

A combined-cycle plant (Figure 3-3) utilizes waste heat from a combustion turbine (Brayton) thermodynamic cycle to serve as the heat input to a conventional steam turbine (Rankine) thermodynamic cycle. The combustion turbine cycle consists of compressor, combustor, and turbine sections. The fuel is fired in the combustor section with high-pressure air from the compressor section. The resulting exhaust gases created by the combustion process are expanded in the turbine section. The

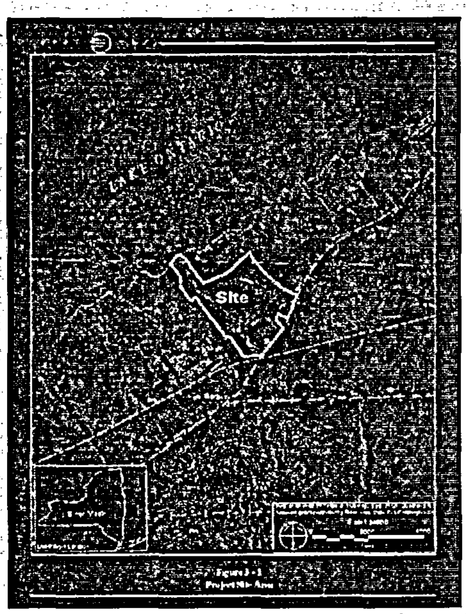


Figure 3 - 1
Project Site Area

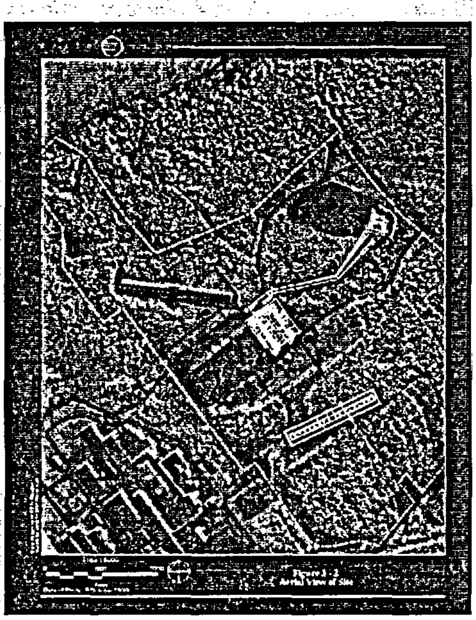
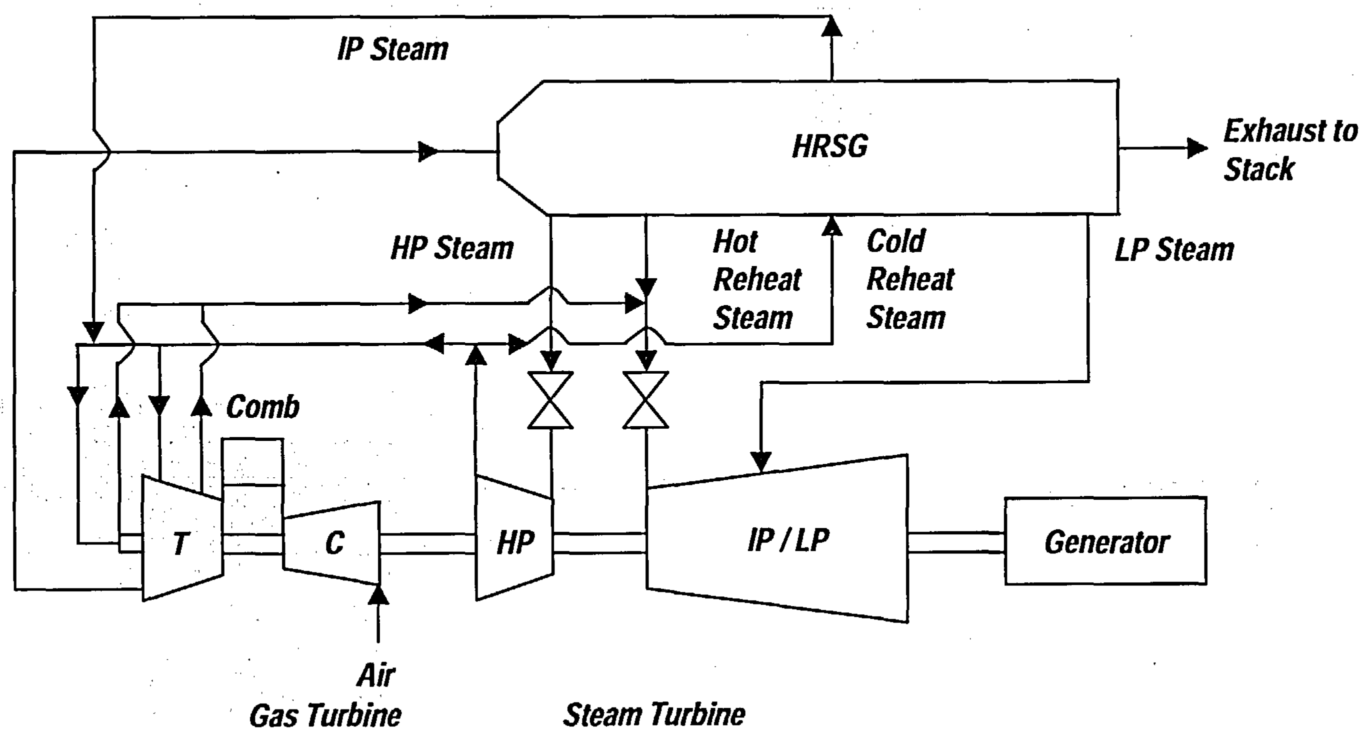


Figure 1-2
Aerial View of Site

H Combined Cycle - System Description



System Characteristics

- *Gas Turbine*
  —Scaled Aircraft Engine Compressor
  —DLN Combustor
  —4 Stage Steam Cooled Turbine
- *Steam Turbine*
  —Reheat 1800 psi/1050 F/1050 F
- *HRSG*
  —3 Pressure Reheat

expanded exhaust gas causes the turbine blades and shaft to rotate. An electrical generator is coupled to the turbine shaft to transfer rotational mechanical energy into electrical energy.

The hot combustion turbine exhaust gases are routed via ductwork to the HRSG. Steam is produced at three levels of pressure to maximize the efficiency of use of the thermal energy in the gas turbine exhaust. Heat from the exhaust gases is transferred to water/steam tubes that are immersed in the HRSG gas flow path, first to boil the water into steam and then to superheat the steam for use in the steam turbine. The expansion of steam in the steam turbine also rotates the generator. This combination of electricity generation through the use of combustion and steam turbines gives combined-cycle facilities their name. At Heritage Station each of the two combustion turbines will exhaust through its own HRSG. The steam generated in each of the two HRSGs will be expanded in steam turbines connected to the same shaft as their combustion turbine generator, hence the "single shaft" designation.

Each HRSG will have a stack for exhaust gases. Steam exhausting from each steam turbine will be sent into a water-cooled condenser where it will be converted back into water and pumped to the HRSGs.

3.2 Description of Physical Characteristics of the Project and Surroundings

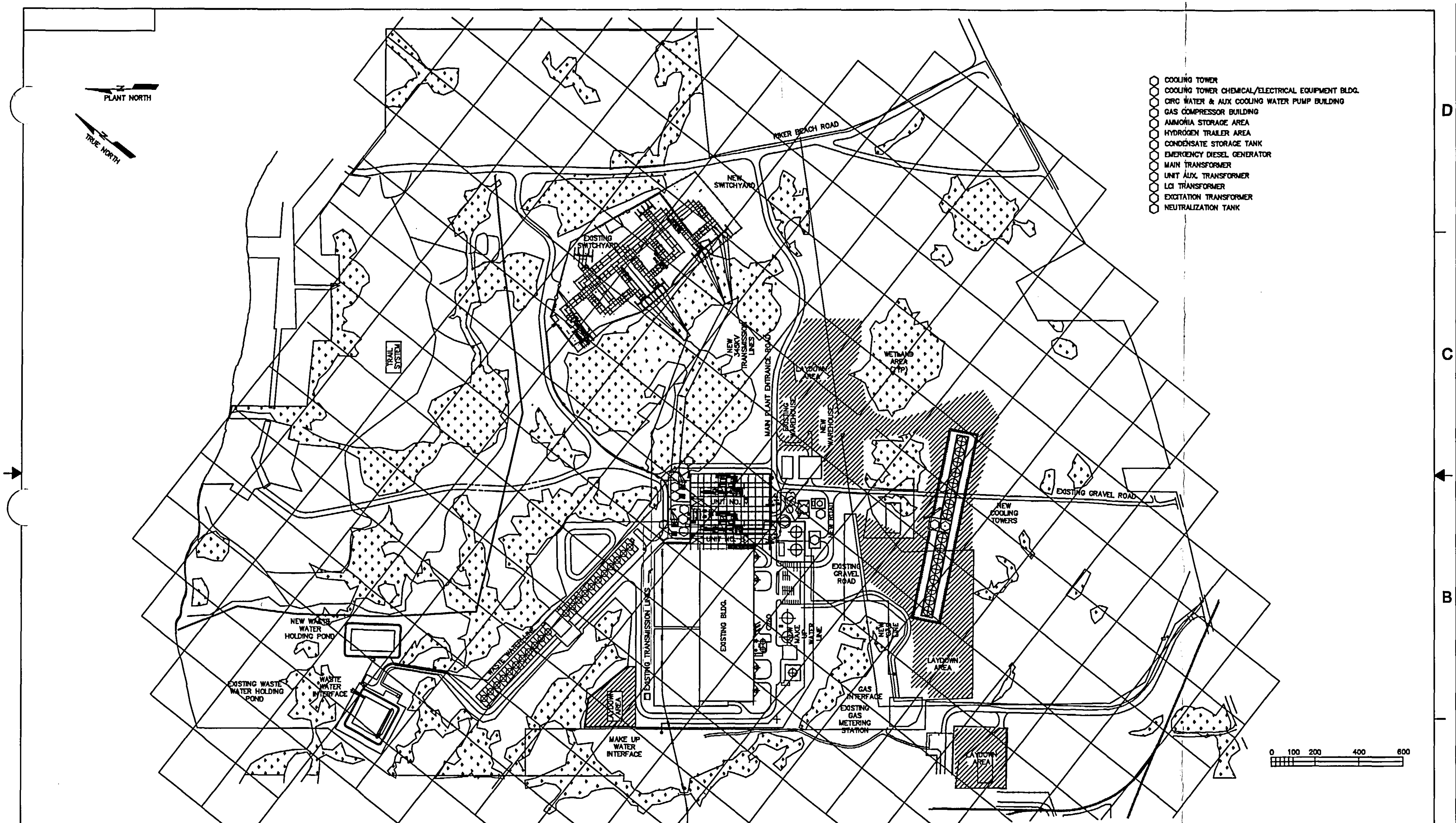
3.2.1 Site and Area Description

3.2.1.1 Site Location

The site of the proposed Project is in the town of Scriba, Oswego County, New York, east of the city of Oswego on County Route 1A (Figures 3-1 and 3-2). The Project will be located on portions of a site upon which the existing Independence Station electric generating facility is located (Figure 3-4). The Project powerhouse itself will be located on a generally rectangular area adjacent to the east side of the existing Independence Station powerhouse building; this area is currently vacant, and consists of cleared land. Additional elements of the Project (cooling towers, electrical switchyard, wastewater holding pond, and utility interconnections) are situated in various locations on the Independence Station property (as shown in Figure 3-4). The locations of these elements are also vacant, with some areas currently wooded in character and others currently cleared. The Project area is generally flat, with only minor variations in topography, which ranges from approximately 250 feet to 310 feet above mean sea level (msl). The average site elevation is approximately 273 feet msl (based on plant datum[1]).

---

[1] All drawings are based on plant datum elevation, which is 7.62 feet lower than the National Geodetic Vertical Datum of 1929.



DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY	P4			
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

Figure 3–4
SITE PLAN

SCALE: 1" = 200'

HERITAGE POWER LLC
H PROJECT

DWG. NO. 11-10-001

ORDER NO. 45000.845 REV P4

DRAWING RECORD: DESIGNER JEN 8/30/99; CADD FILE DATA: TYPE MS VIEW 95; PA: POWER/INDEP 7H/GA; FILE 1110001a.DGN; UPDATED: 11/02/99 BY: RKP

3.2.1.2 *Environmental Setting*

The Project will be located within an industrial parcel that has previously been disturbed for the development and operation of Independence Station, and is adjacent to the existing Alcan facility. As such, the Project will be located within an environmental setting that includes compatible land use elements, and provides for the required interconnections and services on-site.

The Project will be situated such that it will be interior to a 190-acre parcel that is located off of County Route 1A. The portions of the property that have not been developed as part of the existing Independence Station are either wooded or open areas, some of which were previously utilized for construction laydown. The Project layout focuses on minimizing the need for additional clearing, where possible. Similar elements of the Project have been placed in proximity to those that already exist.

The Alcan facility is located to the west of the Project site. A railroad line extends in an east-west direction across the Alcan property adjacent to the Project. Lake Ontario is located to the north. Along the shoreline, in addition to Project property, is a 50-acre parcel of land known as Independence Park that was donated to Oswego County for recreational usage as part of the Independence Station project (shown in Figure 3-4). Lakefront homes and seasonal cottages are situated between a portion of Independence Park and Lake Ontario. The remaining areas surrounding the Project site are generally rural and open in character, and single-family homes, mobile homes and mobile home parks exist only within narrow strips along county roads and in isolated hamlets.

3.2.2 *Project Description*

3.2.2.1 *Description of Changes Since the Pre-Application Report*

Since the Project's Pre-application Report was submitted in April 1999, environmental and engineering activities have continued to further refine design information for the Project.

The most significant change that has occurred since that document was filed is elimination of the then-proposed once-through cooling system. It has been determined that the use of conventional wet cooling towers would be more appropriate at this site, consistent with technologies employed at the existing Independence Station. This Application, therefore, provides descriptive information and environmental and community analysis based upon the water demand and wastewater discharge scenario as now proposed. Section 5.1 provides a more detailed discussion of alternative cooling technologies considered.

Another change that has occurred in the Project's design since the Pre-application Report was filed is the modest increase in height of the two stacks associated with

Heritage Station. Instead of the 195 feet originally envisioned and described in the Pre-application Report, the stacks are proposed to be 225 feet tall (still lower than Good Engineering Practice (GEP) height). This height increase was necessary based upon an increase in the building height associated with the H-technology that was not anticipated at the time the Pre-application Report was filed. By providing for this increase in height, optimal dispersion of the stack emissions will occur resulting in Project impacts below SILs (as described in Section 6). From a visual standpoint, as discussed in Section 16, the Project's stacks will still be consistent with those associated with the adjacent Independence Station.

3.2.2.2 Project Layout and Appearance

The Project's primary structures will occupy approximately 10 acres of the site. However, the elements will be interspersed throughout the 190-acre parcel to allow for appropriate blending of Project components with that of the existing Independence Station. As can be seen in Figure 3-4, the powerhouse (the largest visual element) will be located along the eastern side of the Independence Station powerhouse. The Project's building and stacks associated with the powerhouse will be generally consistent with those of Independence Station, as will the building's exterior treatments. In this way, the new Project can blend into the existing industrial setting to the greatest extent possible.

The other major visual element of the Project is the wet cooling tower. It has been located, as shown in Figure 3-4, to the southwest of the powerhouse location, utilizing as much previously cleared area as possible.

The remaining Project elements consist of tanks or other smaller outbuildings, an addition to the existing on-site switchyard, and a new wastewater holding basin. Each of these elements will be located, as shown in Figure 3-4, to fit within the existing elements located at the site in the least intrusive way possible. Figure 3-5 provides an artist's rendering of the Project, while Figure 3-6 provides an isometric view of the Project layout.

Although the facility is intended and designed to be separate from the existing Independence Station, in several cases the design of the Project will use common infrastructure and systems that will minimize environmental impacts. For example, gas, electric, and water services are shared. In other cases, the systems located at Independence Station will serve as backup for the Project (e.g., instrument air). In a few instances, for reasons of good engineering practice, the Project will solely use the Independence Station system (e.g., the Project's sanitary sewer will go to the existing Independence Station packaged sanitary treatment plant and holding tank).

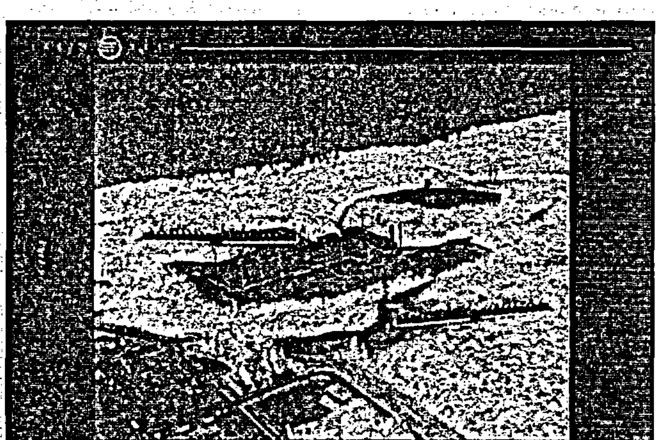


Figure [illegible]
Project Rendering

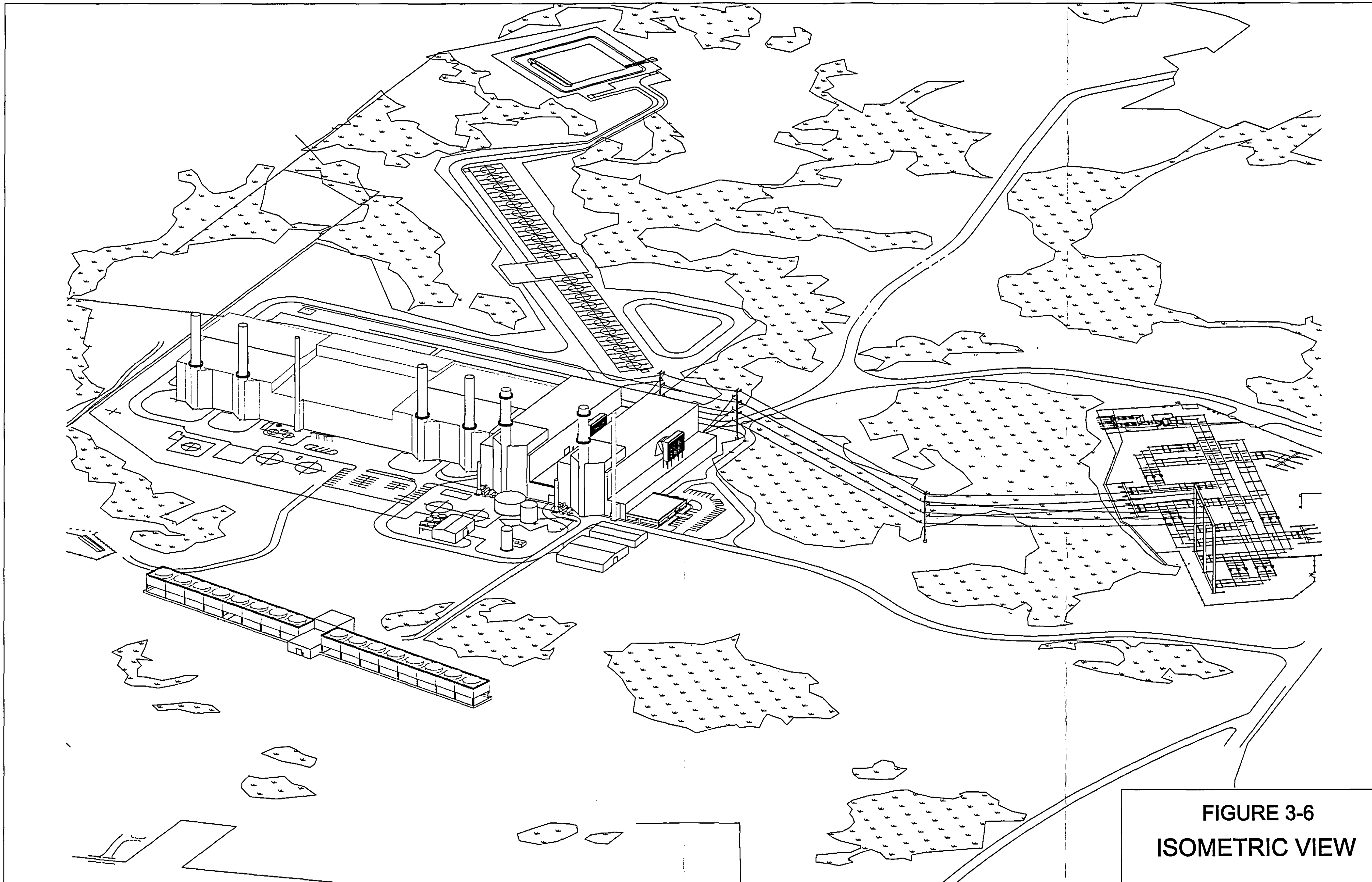


FIGURE 3-6
ISOMETRIC VIEW

All of the interfaces between the Project and Independence Station will be clearly stated and clarified within an interface agreement between Independence Station and the Project.

3.2.2.3 *Description of Primary Project Components*

The Project will include the following structures and buildings:

- The powerhouse building, which will be made of steel framework covered with painted metal panels to enclose the combustion turbines, HRSGs, steam turbines, mechanical equipment, electrical equipment, control room, administration area, workshops, and labs. The powerhouse will also contain all necessary mechanical and electrical equipment associated with the water treatment system.
- Two 225-foot tall emissions stacks, one for each unit.
- One auxiliary boiler, and its associated 195-foot stack.
- One emergency diesel generator and its 170-foot stack.
- One mechanical draft cooling tower for each unit.
- A gas metering facility, which will include the gas supplier's gas metering and pressure regulation.
- A gas compressor building.
- An electric transformer yard and substation.
- Miscellaneous ancillary buildings, such as a warehouse building for the storage of spare parts.
- Various storage tanks for raw water, demineralized clean water, water neutralization, low percent solution ammonia.
- An administration building.

Key Project elements are described below.

Powerhouse

The main turbine building, or powerhouse, will house the combustion turbine/steam turbine/generator STAG 107H units, the HRSGs, and all main plant equipment. The main turbine building will also house various maintenance areas for equipment laydown during plant outages. A portion of the main building along with miscellaneous outbuildings or annexes will house the plant control room, offices, chemistry lab, and electrical equipment.

The main building will be constructed of steel framing with a metal panel system to match the existing Independence Station exterior. Insulation will be added for energy conservation as well as for dampening noise.

To assist in equipment maintenance, the main building will include various monorail cranes and overhead bridge cranes. Other outbuildings will be provided for gas compressors, circulating water pumps, offices, and a maintenance warehouse.

Combustion Turbines

The gas turbine for the STAG 107H is a high capacity, 2,600°F class unit, which is integrated with a combined-cycle system. The turbine steam cooling system utilizes cooling concepts and features proven in GE air-cooled power generation and aircraft engine service. These, along with state-of-the-art analysis techniques and technology test programs, assure a highly reliable design.

Each combustion turbine will be located within an acoustical enclosure in the powerhouse. The enclosure provides thermal insulation, acoustical attenuation, and fire extinguishing media containment. The combustion turbine air inlets will be located outdoors on the sides of the powerhouse. The units will employ DLN combustors to assist in achieving the low NO_x emissions proposed for the Project. Steam cooling of the turbine Stage 1 nozzle also helps in reducing NO_x levels by reducing combustion reaction zone temperature for a given firing temperature.

Additional auxiliary systems provided with each STAG 107H turbine generator package include: static excitation system, static starting system, inlet silencer, electrical and control systems, vibration monitoring, compressor water wash skid, hydraulic oil systems, lube oil systems, cooling air systems, and steam cooling systems.

The major advantage of the H System is that it will be the most efficient power generation system in the world. With a high thermal efficiency, the H System is a revolutionary step change in the development of gas turbine technology compared to the most efficient technology commercially available today.

GE has the most extensive advanced F technology gas turbine operating experience in the world, now approaching 2 million fired hours (more than three times the fired hours of competitors' units combined). The H System incorporates all the lessons learned from this operating experience and from operating experience on GE aircraft engines. In addition, the H System is the first gas turbine designed by "Design for Six Sigma" methodology that maximizes reliability and availability throughout the entire design process. The H System gas turbines are anticipated to achieve the reliability levels of GE's F technology machines.

Proven features of previous gas turbine models incorporated into the H System include:

- GE aircraft engine compressor aerodynamics;
- DLN combustion system;
- Forward end thrust bearings;
- Steel wheels;
- Proven rotor wheel material (IN 718);
- Aft bearing;
- Front end drive;
- Through-bolt rotor construction; and
- Axial exhaust.

In addition to incorporating proven technology from existing gas turbines, GE made several significant technology advances in the development of the H System. Significant technology advances include:

- Increase in firing temperature that results in increased efficiency;
- Increased compressor airflow and higher pressure ratio;
- Thermal barrier coatings; and
- Advanced analysis tools.

Steam Turbines

The steam turbines will be 3,600 revolutions per minute (rpm), multistage, single reheat, tandem compound condensing turbines, each connected to the same shaft and driving the same generator as the respective combustion turbine. Each steam turbine includes a high pressure/intermediate pressure (HP/IP) casing and a double flow low pressure (LP) casing and will be housed in an enclosure for indoor installation within the powerhouse. Auxiliary systems for each steam turbine include instrumentation and controls, steam control and stop valves, turning gear, shaft sealing system, and emergency trip system.

Generators

Each generator is mechanically driven by its associated gas turbine and steam turbine, and electrically excited by a static excitation system. The generator for each STAG 107H combustion turbine/steam turbine unit will be 3,600 rpm, 3-phase, 60 hertz, 19-kV alternating current generators, constructed to meet applicable standards for turbine driven synchronous generators. The generators will be hydrogen cooled and will be sized to accept the maximum turbine output over the full range of plant operating conditions.

Heat Recovery Steam Generators

Each HRSG is a three-pressure level, reheat, unfired natural circulation type with horizontal gas turbine exhaust gas flow through vertical tube heat transfer sections. The heat transfer sections are configured in the direction of exhaust gas flow to obtain optimum exhaust gas energy utilization based on thermo-economic considerations.

Feedwater flows through the heat transfer sections counter to the exhaust gas flow and is progressively heated and evaporated in the economizer and the three evaporator sections, respectively. Saturated steam leaves the high pressure and low pressure steam drums and obtains final steam temperature in the superheater sections. The saturated steam leaving the intermediate pressure steam drum is first heated in the intermediate pressure superheater and passed through the gas turbine steam cooling circuit before being combined with the steam returning from the high pressure steam turbine exhaust. This combined steam flow obtains final steam temperature in the HRSG reheater section, and returns to the steam turbine IP section.

An SCR system will be provided to reduce NO_x emissions to 2 ppmvd at 15 percent oxygen (O_2). The SCR system consists of a catalyst bed over which the exhaust gases are passed, and an aqueous ammonia vaporization skid, distribution/injection piping and storage equipment that delivers ammonia required for the SCR reaction. The catalyst bed is installed in the HRSG at a location where the exhaust gas stream achieves the optimum temperature range for the catalyst performance.

Exhaust Stacks

After passing through the HRSG, the exhaust flow from each combustion turbine will pass through an approximately 225-foot tall stack for each unit. The stack height is intended to ensure adequate dispersion of the emissions while minimizing visual impact. The exhaust stacks will be equipped with a continuous emissions monitoring system (CEMS) and gas sampling ports for emission testing, all in accordance with U.S. Environmental Protection Agency (EPA) and NYSDEC requirements.

Heat Rejection System

The Project will employ a closed-loop feedwater/steam/condensing system for operation of the HRSGs, steam turbines, condensers, and associated pumps. High pressure steam exiting each HRSG will be routed to its individual steam turbine where it will expand and subsequently exit the turbine at low pressure. The low pressure steam will be exhausted from each of the two steam turbines to water-cooled condensers to be condensed and recirculated back to the HRSG feedwater system.

Cooling Water System

Mechanical draft cooling towers will provide cooling for the steam turbine condensers and the Project's auxiliary cooling water systems. The heat dissipation systems for the steam turbines use conventional surface condensers and mechanical draft cooling towers. Exhaust steam from each turbine is routed to its respective condenser, where it is condensed on tubes cooled by circulating cooling water. The resulting condensate is returned to the HRSG feedwater system by the facility's condensate system. The heat removed from the steam during condensation is absorbed by the circulating water, which is cooled in the cooling tower.

At the cooling tower, the now heated circulating water is routed to the top of the cooling tower where it is allowed to fall downward over the tower fill while ambient air is drawn upwards through the fill by induced draft fans. Heat will be transferred to the air primarily through the evaporation of a portion of the water. This evaporative effect allows the circulating cooling water to be cooled to a temperature approaching the ambient wet bulb temperature, typically significantly lower than the ambient dry bulb temperature. The evaporation process will result in a concentration of the chemical constituents in the remaining cooling water. To limit the concentration of chemical constituents in the cooling water, a small fraction of the cooling water is continuously removed and replaced with fresh cooling tower makeup water. This discharged effluent is called "blowdown." A very small fraction of the circulating water is entrained with the air leaving the tower and will be discharged to the atmosphere as small droplets called "drift." The Project will use high efficiency drift eliminators to minimize this discharge to the surrounding area.

The circulating water is collected in the cooling tower basin and pumped back to the condenser by the circulating water pumps. Makeup water will be added to the cooling tower basin to replace water loss due to evaporation, drift and blowdown. Makeup water will include boiler blowdown from the HRSG, fuel saturator blowdown, and ultrafiltration reject.

The water chemistry of the cooling water system must be maintained to control algal and bacterial growth, scale and corrosion. The treatment system planned for the Project is similar to that presently used at Independence Station. Sodium hypochlorite and sodium bromide will be added to control the growth of bacteria and algae in the system. A continuous chlorine residual level is maintained in the circulating water. Liquid sodium hypochlorite and sodium bromide are stored on-site in tanks, and are fed into the circulating water by metering pumps.

A scale inhibitor and a corrosion inhibitor will be used as necessary to control scale and the deposition of solids on the condenser tubes and in the cooling water system. The scale inhibitor chemicals will be stored on-site in tanks, and will be fed by metering pumps into the circulating water. Acid will be used to maintain the circulating water at an optimum pH.

3.2.2.4 Feasibility and Reliability of Preferred Power Source

Pursuant to 16 NYCRR §1000.1 and Stipulation No. 13 the reliability and feasibility of the power source proposed for the Project is described below. The Project will utilize the latest state-of-the-art technology of the STAG 107H combined-cycle system, which is setting new standards for the power generation industry.

In recent years, the reliability and availability of large gas turbine and combined-cycle plants has far surpassed that of other generating plant types. GE's new "H" Technology machines are being designed to achieve the same or higher levels of reliability as the industry currently expects from large combined-cycle plants. The new "H" Technology design is the latest development in the evolution toward more efficient, more reliable (and therefore more productive), electric power generation equipment offerings. The engineering advancement of the "H" Technology has been a joint effort between GE and the United States Department of Energy (USDOE) initiated over seven years ago. With the support of the USDOE, GE target levels of reliability and availability are consistent with the current industry expectations for large combined-cycle plants. Heritage Station is a key element of that technology development. This design is in its initial offering stage and no full plant operating data is yet available. The Heritage Station 107 H System (60 Hertz (Hz)) design will benefit from testing and operating experience of the similar 109 H System (50 Hz) installation in South Wales, United Kingdom (planned for first fire in October 2001, and following extensive characterization tests, scheduled for commercial operation in 2002).

As the technology has advanced to provide higher performance equipment, the engineering tools have also advanced to provide better analysis of the hardware component performance. Engineering design standards have also evolved to provide better and more comprehensive design guidance. The systematic approach utilized by the "H New Product Introduction Team" is a proven "best practice" from the aerospace and aircraft industry for introduction of complex, cutting-edge technology products. The first phase in the H System development process was a thorough assessment of product options and corresponding design concepts and system requirements. Also crucial in the first phase was careful selection of materials, components and sub systems. These were sorted into categories of existing capabilities or required technology advancements. The technical risk for each component and sub system was assessed and abatement analyses, testing and data were specified. The plans to abate risk and facilitate design were arranged, funded and executed.

The second development phase covered product conceptual and preliminary designs. This phase included the introduction of knowledge gained through experience, materials data and analytical codes from GE Power Systems and GE Aircraft Engines. The H System development program is currently in its third and final phase, technology readiness demonstration. This phase includes execution of detailed design and product validation through component and gas turbine testing. A high degree of confidence has been gained during Phase 3 through component and sub system testing and validation of analysis codes. Completion of the development program results in full-scale gas turbine testing at GE's factory test stand in Greenville, South Carolina followed by combined-cycle power plant testing at GE's Baglan Energy Park launch site in the United Kingdom.

With the introduction of the new MS6001FA gas turbines in the latter half of the 1990s, GE's design approach was able achieve a virtually immediate on-target performance and negligible new model introduction impact. GE's installed fleet of "F Class" gas turbine generators has now logged over 2,620,000 service hours of experience with the majority of units normally operated at full base load most of the time. In Appendix E, the latest available utility industry experience with combined-cycle power plants and with large (over 50 MW) MW gas turbine generating sets is reported by the North American Electric Reliability Council (NERC) for the period 1994 to 1998 (the most recent available NERC data). The data shows that GE gas turbine generating sets have out-performed the industry averages. A second independent source of industry data is Operational Reliability Analysis Program (ORAP) data from Strategic Power Systems, Inc. ORAP industry average data for "F" technology gas turbine generating sets for the period 1995 to 1999 is included in the Appendix E and again demonstrates that the GE North American "F" Technology gas turbine generating sets in combined-cycle applications have out-performed the industry averages. Finally, a comparison of seven GE "F-Class" gas turbine generator sets being operated at three different sites in the United States to industry reliability data is presented in Appendix E. Therefore, GE believes that the new "H" Class power generation equipment will meet its performance and reliability objectives, based on both the outstanding performance of the GE "F Class" technology, and on GE's successful experience developing the "F Class" technology.

For yet a deeper focus on reliability, it should first be recognized that the controls and accessories support systems typically account for 60 percent to 80 percent of a plant's unplanned outage events and 50 percent to 60 percent of the unplanned outage time. As the new "H" Technology machines go into production, the supporting controls and accessories systems are being assembled from the same class of components in the same proven system structures as currently serve the "E" Class and "F" Class product offerings. Much of the "H" Technology design is based on proven, established technologies. Even the major pieces of machinery – the bearing designs, the evaluation methods for rotor dynamics, the compressor and turbine blading designs, the generator field construction methods, etc. – are all either direct application of proven design technology or evolutionary refinements of existing designs. It is for these reasons that GE expects that the reliability of the new "H" Class generating system will be fully commensurate with the levels associated with today's "F" Class combined-cycle power plants. With maintenance and operations performed at "best practice" levels, the new "H" Class plant should reach its full reliability potential of 97 percent or better. GE's estimate of the individual component group reliability levels is outlined in Table 3-1.

Table 3-1: H Technology Component Group Reliability Levels

Major Component Group	**Unreliability (%)**
Gas Turbine (flange to flange)	0.60
Generator	0.20
GT Gen Accessories Systems	0.60
Heat Recovery Steam Generator	0.30
Steam Turbine	0.30
Steam Cycle Auxiliaries	0.40
Integrated Control System	0.20
Balance of Plant	0.10
Total Plant Unreliability	2.70
	Reliability (%)
Total Plant Reliability	**97.3**

The gas turbine industry essentially measures reliability in terms of the ratio of actual available time to the total period of time with an exclusion for scheduled outage time. More specifically, "reliability" is measured as one minus the unreliability, where the "unreliability" is the industry-recognized "Forced Outage Factor." Availability is a broader measure than "reliability" because it includes the effects of all outage categories including scheduled outages. In general, GE and the power generation industry expect availability levels of 90 percent and better for all gas turbine combined-cycle plants, no matter how complex. The measure of capacity factor is application-sensitive in that it is driven by the user's dispatch schedule. The Applicant anticipates the Project will operate close to base load and achieve annual capacity factors approaching and possibly exceeding 90 percent.

Starting Reliability is an important measure for peaking duty or daily start machines; and achievement of 95 percent or better Starting Reliability is expected for a single shaft combined-cycle unit started regularly. Starting Reliability is a less important measure for base loaded generating sets. The Applicant anticipates the Project will operate close to base load operation. It should also be noted that the majority of failure-to-start events are the result of minor, procedural errors that are remedied in less than 15 minutes without a bonafide "repair."

Based on the discussion herein and the supporting data in Appendix E, the Applicant is confident that the proposed gas turbine, steam turbine and HRSG are feasible and will perform reliably, with a 90 percent equivalent availability expectation by GE.

3.2.2.5 Gas Interconnection

Natural gas will be the Project's sole source of fuel. Natural gas will be delivered to a new on-site fuel gas metering facility via the existing NMPC gas pipeline installed for Independence Station. This pipeline has sufficient reserve capacity to accommodate the Project. A discussion of the gas delivery arrangements is provided in Section 9 of this Application.

A gas compressor building will be provided on-site. The building will be a pre-fabricated structure with metal factory insulated foam panel walls and standing seam factory insulated foam panel roof system. The building will house three natural gas compressors to boost natural gas supply pressure from 450 pounds per square inch at gauge (psig) to 650 psig. Individual compressors are rated at 50 percent of the total requirement. Two compressors will be running during normal plant operation with one compressor as a standby.

3.2.2.6 Electric Interconnection

Generator output at 19 kV from each of the two power blocks will be transmitted to an individual main generator step-up transformer through medium voltage isolated phase bus ducts and associated generator breaker.

The two turbine generator sets will utilize generator breakers in the 19 kV bus to synchronize the generator to the grid and provide for generator protection from electrical faults. Station auxiliary transformers will be fed off the 19 kV bus between the generator breaker and the generator step-up transformer to power the equipment required to operate the facility.

Within the transformer yard located directly adjacent to the powerhouse, the step-up transformers will raise the voltage to 345 kV for connection to the NMPC 345 kV substation located on-site.

Two circuit transmission lines, approximately 1,200 feet long, will provide connection through disconnect switches as required and new breakers to interface into the existing "A" and "B" busses. The existing NMPC substation will be expanded to accommodate additions and modifications. All equipment design and installation will be in accordance with applicable safety and reliability standards. Security fencing will be provided around all outside electric equipment in accordance with Occupational Safety and Health Administration (OSHA) and NMPC safety guidelines.

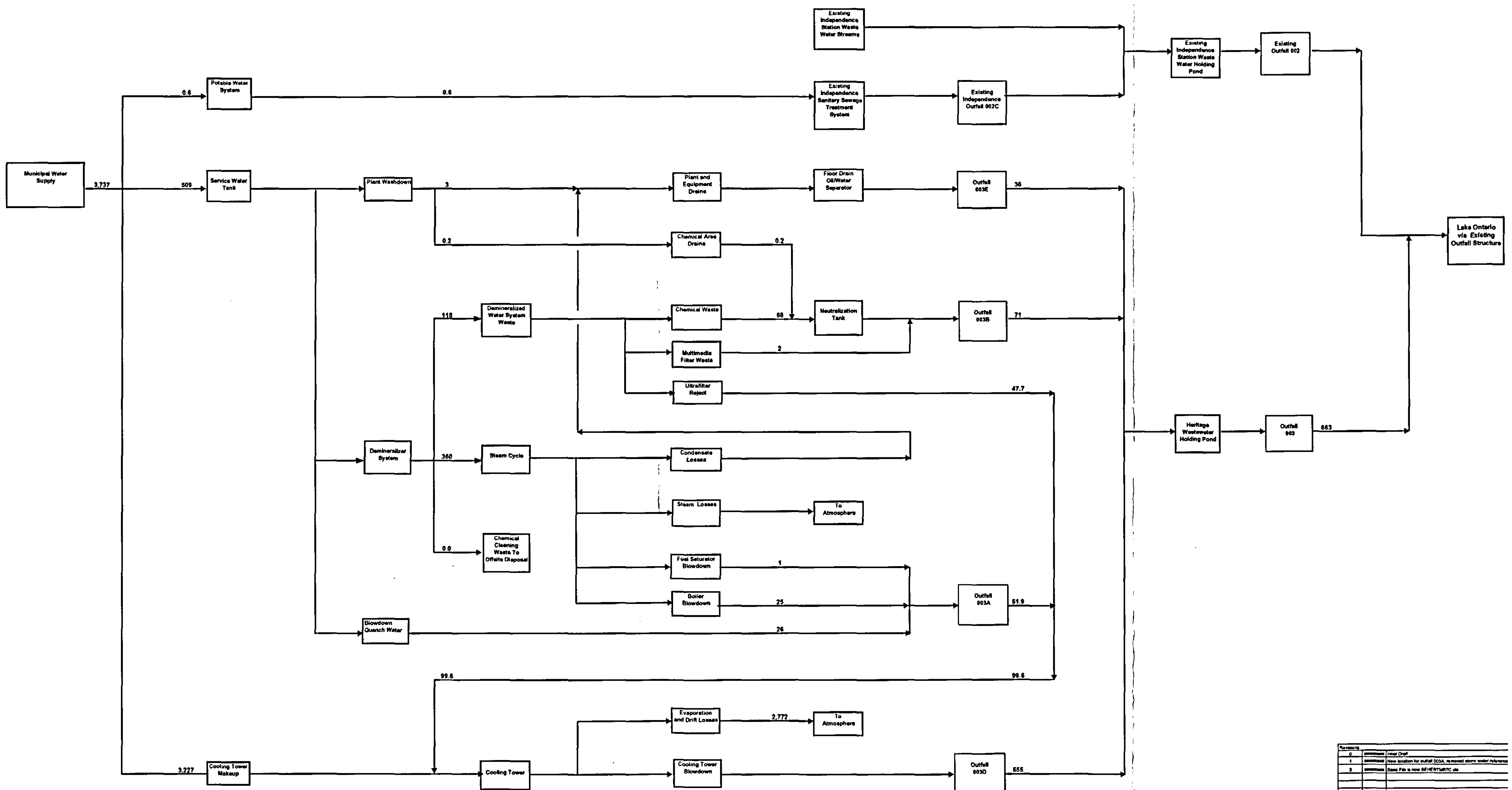
3.2.2.7 Project Water Supply: Source and Volume

The facility will use a maximum of 4.9 million gallons per day (mgd) of water for various plant uses including makeup to the plant cooling systems and steam cycle (as shown in Figures 3-7 and 3-8). Water will be delivered from the city of Oswego using the existing town of Scriba Consolidated Water Management District (SCWMD) water pipeline. Water is currently treated at the existing city water treatment plant and delivered via a city water line and SCWMD water line serving Independence Station. The present water pipeline is adequate to serve the increased demand of the Project, and with some required modifications within its fenceline, the existing city treatment plant will sufficiently accommodate the new water demand. The city's existing lake water intake structure has sufficient capacity to accommodate the Project's needs. Its capacity, configuration, and location in the lake result in the ability to obtain water from this source while minimizing impacts to Lake Ontario aquatic life.

Water Infrastructure

The adjacent Independence Station currently receives municipal water to meet its makeup requirements. This water is drawn by the city of Oswego from Lake Ontario, treated, chlorinated and pumped via a dedicated force main to the SCWMD. The SCWMD extends this force main to Independence Station.

The city of Oswego Water Treatment Plant currently holds a New York State Article 15, Part 15 Water Supply Permit to withdraw an annual daily average of 13.4 mgd from Lake Ontario, with the maximum daily average flow limited to 21.4 mgd. This water is drawn from a deepwater intake shared with the Onondoga County Metropolitan Water Board (OCMWB). Water usage by the OCMWB from this intake is estimated to be an average of 35 mgd and a peak of 50 mgd. OCMWB's draw from the intake is currently limited by its permits to 62.5 mgd. Based on hydraulic testing that has been done in the past, the current configuration of this intake can support a total draw of 125 mgd, well in excess of current usage. Under agreements between the city and OCMWB, 25 mgd of this capacity is currently allocated to the city, with a reserve of 6.5 mgd dedicated to the city and a further reserve of 18.5 mgd available to either party to serve uses within Oswego County.



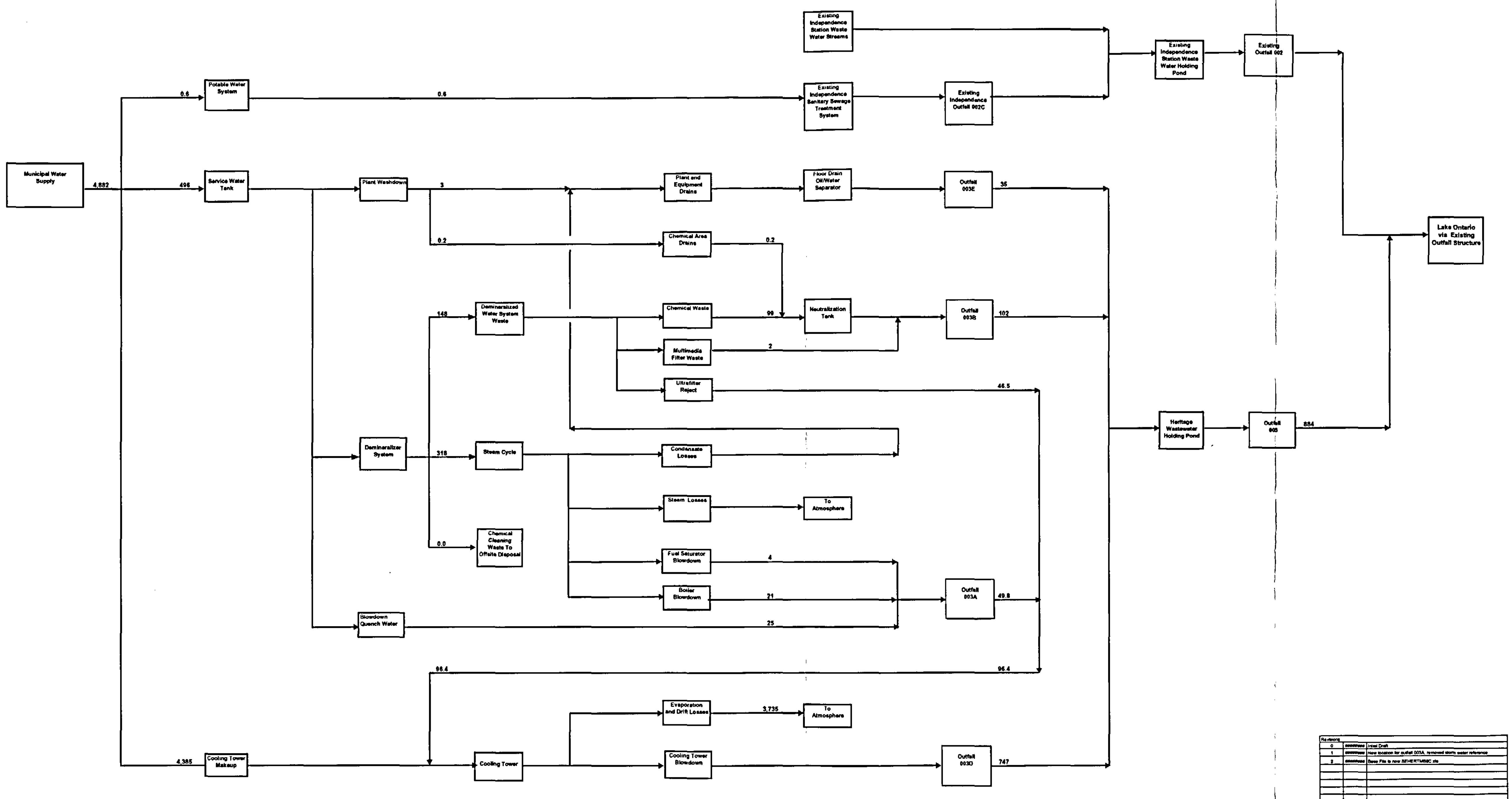
Revisions		
0	########	Initial Draft
1	########	New location for outfall 003A, removed storm water reference
2	########	Base File is now SEHERTMB7C.xls

Figure 3-7
Project Water Balance:
Average Conditions

File: SEHERTMB7C.xls

Water Volume Units are in kgpd

Operating Point [CCA-6518-NG Cycle Performance Map] : Case 5 - 100% CTG Load, NG Fuel, 47 °F Dry Bulb Temperature, 73 % Relative Humidity
Cooling Tower Cycles of Concentration = 6.0



Revisions		
0	[illegible]	Initial Draft
1	[illegible]	New location for outfall 003A, removed storm water reference
2	[illegible]	Base File is now SEHERTMB8C.xls

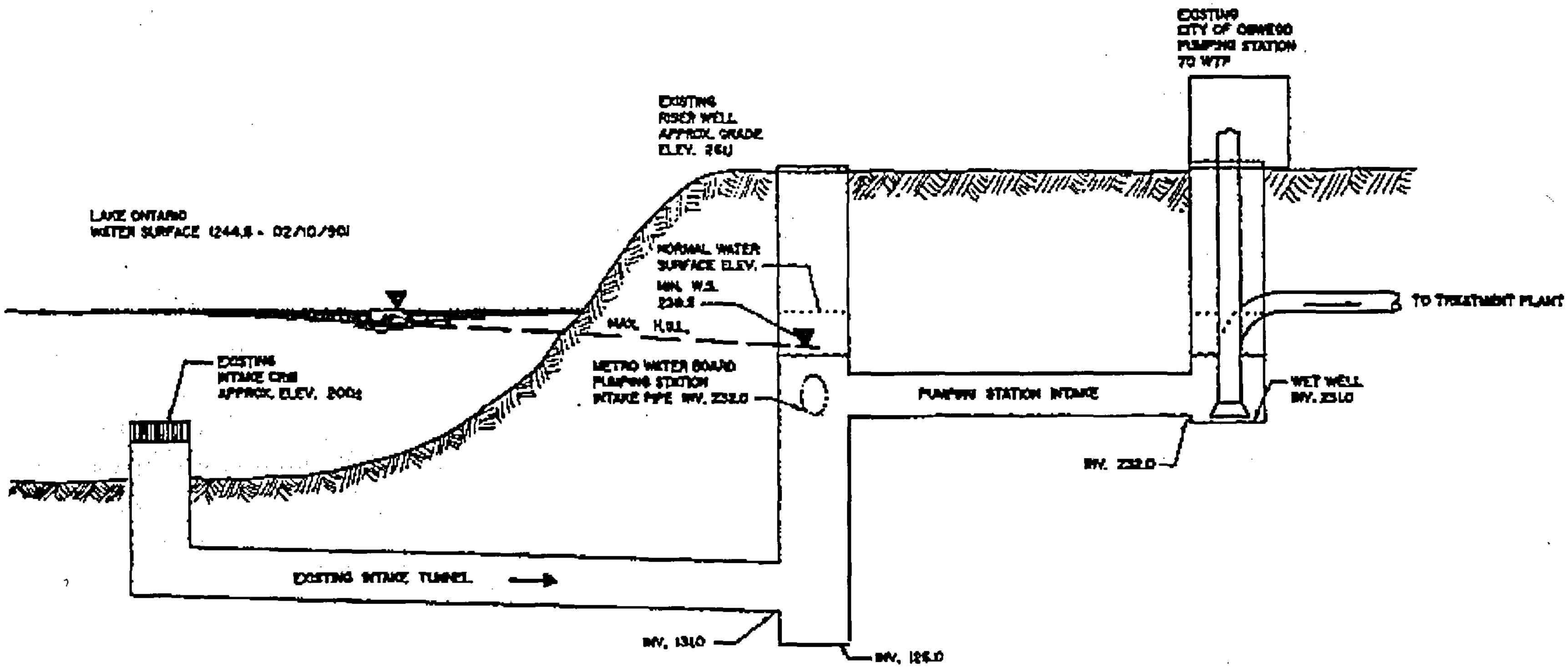
Figure 3-8
Project Water Balance:

MAXIMUM CASE

File: SEHERTMB8C.xls

Water Volume Units are in kgpd

Operating Point [Peak DBT with most probable WBT (Highest Water Usage)] : Case 7 - 100% CTG Load, NG Fuel, 92 °F Dry Bulb Temperature, 41.4 % Relative Humidity
Cooling Tower Cycles of Concentration = 6.0



**CITY OF OSWEGO AND MWB
RAW WATER INTAKE FACILITIES**

Figure 3 - 9
City Intake Structure

The water intake serving the city, constructed in 1958, is located at a depth of about 40 feet at a point 6,200 feet offshore, north of the city. The configuration of this intake is shown in Figure 3-9. The intake water is drawn though an intake crib, down a vertical shaft bored in the lake bedrock to an intake tunnel, also bored in the rock. This horseshoe shaped tunnel, measuring approximately 7 feet high by 7 feet wide, leads to the shore near the city's treatment plant. A vertical riser well, 135 feet in depth, leads from the tunnel to the surface. The city and the OCMWB each draw via separate intakes from this shaft to the wet wells for their respective lift stations

The design of the intake crib consists of an octagonal crib structure surrounded by boulder fill (see Figure 3-9). The crib measures 54 feet across and rises 14 feet from the lake floor. Water is drawn through a timber grill in the top surface of the crib. The grill is constructed of 3-inch by 12-inch timbers placed 8 inches on center. The grill comprises a gross area of approximately 1,000 square feet (sf) and a net flow area of about 620 sf. As the incremental demand of the Project represents only a 10 percent increase in the total intake flow, no improvements to the intake arrangement are necessary.

The city's lift station pumps unscreened water from the intake arrangement to the water treatment process, providing sufficient head to flow through the process by gravity to the treated water clear wells. The lift station is comprised of four vertical turbine pumps. The combined capacity of three of these pumps (leaving the fourth as a standby) is 17.5 mgd.

From the lift station, the water is subjected to processing as shown in Table 3-2. Capacities shown are as determined by Barton & Loguidice, P.C., consulting engineers for the SCWMD.

Table 3-2: Existing City of Oswego Water Treatment

Process Stage	Purpose	Current Unit Process Capacity, mgd
Rapid Mix	Injection and mixing of coagulants and carbon.	33.7
Flocculation	Detention to allow formation of floc.	20.0
Settling (Tube Settlers)	Clarification and removal of floc sediments.	20.3
Filtration	Multi-media filtration.	20.1
Disinfection	Chlorination to oxidize remaining biological contaminants.	24.0[(1)]

[(1)] Capacity of disinfection serving Independence Station force main only; assumes no future connections to the force main within the city.

After chlorination, treated water enters clear wells from which it is pumped via separate pumps and force mains to the SCWMD and to the city's distribution system. The pump station serving the SCWMD is comprised of three pumping units, which discharge to a 36-inch force main. Two of these units can support a demand on the SCWMD force main of 17 mgd, leaving the third pump in reserve.

The current maximum daily demand on the city of Oswego Water Treatment Plant is approximately 17.7 mgd, of which 7.8 mgd is delivered to Independence Station. An additional 0.9 mgd of treated water is required for internal process purposes (filter backwash). An additional 1.2 mgd of capacity is currently committed to customers but is currently unutilized. Adding the maximum 4.9 mgd required by the Project would raise the total treated water capacity requirement for the treatment plant to about 25 mgd. This flow falls within the city's current allocation of the capacity of the lake water intake. The total requirement of the SCWMD would rise to 15 mgd. This flow is well within the existing capacity of the dedicated clear well pump station and force main. However, meeting the additional requirement imposed by the Project requires some upgrades to the treatment plant, as shown in Table 3-3.

Table 3-3: Oswego Water Treatment Plant Upgrade Requirements

Item	Upgrade Required	Unit Process Capacity After Upgrade, mgd
Low Lift Pumps	Replacement of all four pumps in existing pump station with new 100 HP units with variable frequency drives	25.0
Flocculation	Add mechanical flocculators in existing basins	37.0
Settling	Add new tube settlers and troughs in the currently unutilized space in the existing basins	29.0
Filtration	Add one new filter similar to existing (34-foot × 40-foot basin, 930 sf filter area) in new 40-foot × 60-foot building.	27
Carbon Feed System	Add second feed system similar to existing	40
Flow Metering	Install new flow meter on SCWMD pipeline	15

Source: Barton & Loguidice (see Appendix F).

The total cost for these improvements has been estimated by Barton & Loguidice to be $3 to 4 million (Appendix F). It is anticipated that the Project would enter into a long-term water supply agreement with the city with regard to the required improvements. All of the identified improvements would be conducted within the existing water treatment plant site. It will be necessary for both the city of Oswego and the town of Scriba to apply for modifications to their respective Article 15, Part 15 Water Supply Permits to accommodate the Project's requirements.

Plant Water Demands

Under normal operating conditions, the water demand will remain relatively stable. The Project will require an average of 3.7 mgd and a maximum of 4.9 mgd of water. Figures 3-7 and 3-8 provide the estimated water balance under average and maximum conditions, respectively. The discussion below describes some of the major Project water uses.

- Circulating cooling water system makeup will be provided directly from the water line entering the site. The flow will be regulated by control valves maintaining the water level in each cooling tower basin. The cooling water system comprises the majority of the total Project demand. Although the flow will remain relatively steady during any day, it can vary based on plant operating output and weather conditions.

- Water is also required for the plant steam system. The water will be cleaned to ultra pure standards, referred to as demineralization. The demineralizer system removes impurities from the water so that the water can be used in the HRSGs and steam turbines without damaging the equipment. On a regular basis (one to four days), water must be used to flush and regenerate the demineralizer system. After flushing the demineralizer system, this water will be neutralized and directed to the wastewater holding pond.

- Two of the uses of water in the steam system include replacing HRSG blowdown and steam used for combustion turbine cooling. The HRSG blowdown is required to maintain proper chemistry levels in the steam cycle. It is recycled to the cooling tower. Steam is also used for cooling of the gas turbine internal components.

- Quenching water is used to cool the hot HRSG blowdown and fuel saturator blowdown. The quench cooling, required to protect Project personnel and plant equipment, is accomplished by mixing the hot water from the HRSG blowdown with the cooler makeup water. The mixture of the two water streams is routed to the cooling tower basin and, therefore, no water is consumed in the process.

- Plant water is used with the chemical feed systems and for equipment washdown water. Water is used to dilute the chemicals used in the circulating water system and to wash areas of the plant for safe and efficient operation.

- Water will be used as potable water for sanitary services and drinking water.

- Water will be available for fire protection.

3.2.2.8 *Wastewater*

Under normal baseload operating conditions, an average of approximately 660,000 gallons per day (gpd) is expected to be discharged from the Project's wastewater holding pond and collection system to Lake Ontario. Depending on operating conditions and weather conditions, the discharge from each individual plant system may vary, however, the wastewater pond acts to hold and buffer the variations in flow. Each wastewater stream is discussed briefly below.

Process Wastewater

The Project's wastewater system will collect and segregate wastewater from various plant systems. The system will include unit processes for oil/water separation, neutralization, and equalization prior to discharge. Project waste streams will be sent to the wastewater collection system and holding pond on-site. This pond will be located near the existing wastewater holding pond, and will buffer the Project's discharge flows to Lake Ontario. To maintain proper control and separation, the Project's wastewater pond will be separate from the Independence Station pond. Separate monitoring points will be available at the downstream side of each wastewater pond at locations allowing for adequate mixing and sampling. The Independence Station SPDES permit currently provides for sampling at the downstream side of its wastewater pond (prior to the outfall pipe to the lake and prior to the confluence with the Project discharge) and, therefore, needs no permit modification to accommodate the addition of wastewater from the Project. After wastewater has passed through the Project wastewater pond and monitoring point it will be discharged through the outfall pipe constructed for Independence Station to Lake Ontario thus avoiding any environmental impacts associated with construction of a new outfall pipe.

All wastewater discharges will be required to meet standards for discharge as required by the SPDES requirements and as defined in federal regulations (40 CFR 423.17). A SPDES permit application is included as Appendix C.

Sanitary Wastewater

Sanitary wastewater will be directed to and treated in the existing Independence Station packaged treatment plant prior to discharge.

Cooling Tower Blowdown

The cooling water system circulates 186,000 gallons of water each minute through the main steam condensers and auxiliary cooling heat exchangers. Circulation of this water through the plant cooling tower results in the evaporation of water, at an average rate of 1,925 gallons per minute (gpm) and by consequence, concentration of the natural constituents in the cooling water. To limit the concentration of solids and constituents in the cooling water, a small fraction of the water is continuously removed and replaced with fresh tower makeup water. The discharged effluent water is called "blowdown." This blowdown will be directed to the on-site wastewater pond.

Demineralized Regeneration Wastes

The water treatment demineralization system will be flushed and regenerated on-site. Demineralizer regeneration wastewater will be contained and neutralized before discharge to the Project's wastewater holding pond.

Combustion Turbine Water Washes

Off-line combustion turbine wash water will be collected and trucked off-site by a licensed contractor.

HRSG Blowdown

A majority of the HRSG blowdown will be recovered for reuse in the cooling towers. The remainder will be lost to the atmosphere as steam.

HRSG Cleaning Wastes

The HRSGs will be chemically cleaned during Project commissioning and startup. Depending on the chemicals employed during this activity and the results of analyses on samples of the effluent water, the wastewater may be trucked off-site by a licensed waste hauler; if quality is suitable, it may be discharged to the wastewater holding pond.

Saturator Blowdown

A small quantity of water from the fuel saturation system will be sent as makeup to the cooling tower.

Clean Area Floor Drains

Clean area floor and equipment drains will be collected and discharged to the Project's wastewater holding pond.

Potentially Oily Area Drains

Potentially oily area floor drains will be routed to the oil/water separator to remove oil prior to discharge to the Project's wastewater holding pond. Treated water from the oil/water separator will discharge to the Project's wastewater holding pond via the plant drainage system.

Transformer Containment Areas

The diked containment areas surrounding the oil-filled transformers will be sized to fully contain any oil spills that could occur in this area. During normal operation, rainwater will collect in the containment area. The collected stormwater will then be drained through an oil/water separator prior to discharging to the Independence Station's stormwater detention basin.

Chemical Storage and Unloading Areas

With the exception of the ammonia storage tanks, all chemical areas will be located indoors or in covered areas. Drains in chemical areas will normally be closed. If water accumulates in these areas, it will be inspected and drained through the neutralization tank and directed to the plant discharge system. If the water is not acceptable for the plant discharge system it will be trucked off-site by a licensed hauler.

Unloading areas for delivery of chemicals will be designed with spill containment features to prevent uncontrolled releases. Stormwater that collects in these areas will be drained to a sump, inspected and forwarded through a normally closed drain to the neutralization tank, and then to the plant discharge system. Stormwater contaminated with spilled material will be trucked off-site for treatment and/or disposal by a licensed hauler.

3.2.2.9 Stormwater

Stormwater runoff includes water from roofs, roads, parking lots, and general site areas. Stormwater will be collected and directed to the existing Independence Station detention pond. During construction, appropriate sediment and erosion control methods will be employed to prevent sediment-containing runoff from contaminating wetlands or waterways. Prior to Project construction, a comprehensive stormwater control and spill containment plan will be prepared and submitted in the Compliance Filing together with a comprehensive plan for use during operation. Additional details are provided in Section 17.7 of this Application.

3.2.2.10 Air Pollution Control Systems

The emissions control technology proposed for the Project includes DLN combustion in the combustion turbines and SCR systems in the HRSGs to control NO_x emissions. These pollution control technologies are discussed below. Combustion gases will be exhausted through two 225-foot stacks.

DLN Combustion

Each combustion turbine will be equipped with DLN combustors to minimize NO_x emissions from the combustion turbine. The combustors are designed to afford pre-mixed fuel-lean combustion to lower flame temperature and minimize NO_x formation.

The H combustion system is a can-annular, premix, DLN system, scaled up from the GE FA-turbine design. This proven can-annular design permits a 12-can configuration, with fuel nozzle staging for significant power turndown capability while retaining low emission characteristics.

Selective Catalytic Reduction

Selective catalytic reduction is a post-combustion flue gas control technology that will reduce the NO_x concentration in the exhaust gases discharged from the combustion turbine. The SCR system consists of a catalyst bed installed in the HRSG flue gas stream, as well as an aqueous ammonia vaporization skid, distribution/injection piping, and storage equipment.

As part of the SCR process, aqueous ammonia will be injected into the flue gas stream where it will mix with NO_x (predominantly NO at that point). The mixture will then pass through the catalyst bed to reduce NO to benign nitrogen gas (N_2) and water (H_2O). The SCR system will reduce the overall NO_x concentrations to 2 ppmvd, corrected to 15 percent O_2, and assuming a maximum of 10 ppmvd ammonia slip.

Because of its safer handling characteristics, aqueous ammonia will be used as the reagent in preference to anhydrous ammonia.

Control of Other Emissions

Natural gas contains only trace quantities of sulfur or sulfur containing compounds and very little ash. Thus, SO_2 and particulate matter (PM) emissions will be controlled through the exclusive use of natural gas. Control of CO and volatile organic compounds (VOC) will be achieved through proper combustion controls and practices.

3.2.2.11 Waste Generation and Disposal

The Project will implement a program to minimize solid waste and encourage recycling. Programs tailored toward solid waste minimization during construction will include such elements as:

- Segregating waste materials into stockpiles of metal and scrap wood made available for salvage on a regular basis;
- Utilizing excess excavation materials in the final grading plan to eliminate disposal, thus creating a balanced cut and fill for the Project;
- Minimizing spill impacts when transferring fluids or refueling vehicles through rigorous transfer control and containment structures;

- Including reuse and recycling in the evaluation criteria for purchasing construction materials and aids;

- Segregating excess reinforcing steel, lumber, pipe, conduit, structural steel, wire and other construction materials in centralized locations for reuse in ongoing installation; and

- Training on-site personnel on identifying, handling, storage and disposal of hazardous materials.

During Project construction and pre-operational cleaning, some waste solvents and flushing materials will be generated. They will be removed by the contractor for appropriate off-site management.

Solid waste and debris that cannot be recycled, reused or salvaged will be stored in on-site dumpsters or similar containers for disposal. Potentially hazardous wastes will be separated from normal waste including segregation of storage and proper labeling of containers. All waste will be removed from the site by licensed contractors in accordance with applicable regulatory requirements.

During operation, recycling will be encouraged and supported by placing appropriate containers labeled for the materials designated for recycling (i.e., metal, wood and cardboard). Office and other facility wastes will be recycled. Non-recyclable materials will be disposed of by a private contractor. Normal maintenance will generate small quantities of solid waste on a periodic basis. Depleted SCR catalysts will be sent to the manufacturer or a licensed recycler for recovery or disposal.

3.2.2.12 Chemical Storage and Handling

Major chemical requirements are for water and wastewater treatment, and operation of the SCR system. Project operation will require limited amounts of lubricating oils and certain other industrial chemicals, which will be stored in covered areas. The Project will also require chemicals for boiler feedwater treatment and SCR operation. Typical chemicals on-site during construction and operation are described in Tables 3-4 and 3-5, respectively. All chemical storage areas on-site will be provided with appropriate secondary containment which will, at a minimum, meet applicable safety codes.

During construction all chemical materials will be evaluated during the material receiving process. Materials that are determined to be hazardous will be stored in identified storage areas that will include containment measures. Personnel will be trained on the proper use, handling, protective equipment, storage and disposal of "hazardous" materials.

Table 3-4: On-site Chemical Storage during Project Construction

Product	Nominal Quantity	Storage Method
Medium WT Oil (New)	2,800 gallons	5-gallon containers on palettes in Conex box*
Waste Oil	200-500 gallons	55-gallon drums (bermed)
WD-40	110 gallons	1 gallon containers and spray cans
Thinners/Solvents/Xylene/MEK/Acetone	<110 gallons	1 gallon or less containers in Conex box*
Insecticides	30-55 gallons	Spray cans in tool room
Various Aerosol Cans (waste)	Potential for large quantities over the course of Project	Punctured empty containers become regular waste
Paint	50-1,000 gallons	55-gallon drums and 5-gallon containers in Conex box*
Gasoline	500 gallons	Aboveground portable storage tank with self-contained berm or fuel truck
Diesel Fuel	200-500 gallons	Aboveground storage tank with self-contained berm or fuel tank
Chemicals Utilized in Cleaning of HRSG & Piping: Citric Acid 50% (3% Wt Conc.) Caustic Soda 30% (pH to 9.0) OSI-1 Inhibitor (0.1 Vol. %) Sodium Nitrite (0.5% Wt) Pen-7 Surfactant (0.1% Vol.) Antifoam Agent	 40,000 pounds 875 gallons 63 gallons 2,750 pounds 63 gallons 63 gallons	Delivered by contractor at time of service
Cleaning Solvents	165 gallons	55-gallon drums in a Conex box*

*A Conex box is a steel cargo container per OSHA standards located inside a bermed area.

The SCR reagent, ammonia, will be provided as a 17.5 to 19.5 percent aqueous (water based) solution. For perspective, common household cleaning products can contain 1 to 5 percent ammonia while janitorial or industrial-strength cleaning products can contain up to 10 to 12 percent ammonia.

Two 30,000-gallon welded steel tanks will be provided for on-site storage of aqueous ammonia. The tanks will each be contained within a bermed area and will be designed in accordance with American Petroleum Institute (API) specifications. Each tank will be leak-tested before use and inspected periodically.

The tanks will be equipped with a level gauge, and monitored in the control room. In the event that the tank level were to fall at an abnormal rate, an alarm will sound in the control room, which will be staffed 24 hours a day, and emergency response procedures will be initiated. In the event of a small leak (at a valve or pipe joint), Project maintenance personnel, wearing appropriate protective gear, would initiate corrective measures (shut off control valves) or make repairs as quickly as possible. In the exceedingly unlikely event of a tank failure or rupture, Project personnel and an emergency response contractor would respond appropriately.

Table 3-5: On-site Chemical Storage during Project Operation

Product	Function	Volume (gallons)	Storage Method
Sulfuric Acid (93%)	Combustion Turbine pH Control	7,000	Bulk Storage Tank
Sulfuric Acid (93%)	Regenerate Demineralizer Resin, Neutralize Chemical Waste	8,000	Bulk Storage Tank
Sodium Hydroxide (50%)	Contingency Boiler Treatment	200	Portable Tote Vessels
Sodium Hydroxide (50%)	Ultrafilter Cleaning	200	Portable Tote Vessels
Sodium Hydroxide (50%)	Neutralize Chemical Waste, Regenerate Demineralizer Resin	8,000	Bulk Storage Tank
Sodium Hypochlorite (13%)	Cooling Tower Oxidizing Biocide	7,000	Bulk Storage Tank
Sodium Hypochlorite (13%)	Clean Ultrafilter Units	70	Portable Tote Vessels
Sodium Bisulfite	Cooling Tower Blowdown Dechlorination, Dechlorinate Ultrafilter Cleaning Solution and Demineralizer Inlet	675	Portable Tote Vessels
Sodium Bromide	Cooling Tower Oxidizing Biocide	2,300	Bulk Storage Tank
Hydrazine (35%)	Steam Cycle Condensate Oxygen Scavenger	160	Portable Tote Vessels
Ammonia Hydroxide (7.4%)	Steam Cycle Condensate pH Control	470	Portable Tote Vessels
Sodium Phosphate	Primary Boiler Treatment	2,700	Bulk Storage Tank
Sodium Phosphate	Contingency Boiler Treatment	200	Portable Tote Vessels
Acrylate Polymer	Cooling Tower Scale Inhibitor	2,800	Bulk Storage Tank
Sodium Nitrite	Closed Loop Cooling System Corrosion Inhibitor	440	Portable Tote Vessels
Sodium Chloride	Regenerate Organic Scavenger Anion Resin	1,500	Bulk Storage Tank
Ammonia Hydroxide (19%)	Injected into SCR for NO_x Suppression	60,000	2 × 30,000-gallon Bulk Storage Tanks

Under the Resource Conservation and Recovery Act (RCRA), the Project will be a conditionally exempt small quantity generator because it will generate less than 1,000 kilograms (kg) of hazardous waste. Accordingly, the Project is not required to obtain a permit, as provided in 6 NYCRR § 372.2(b)(iii). With respect to treatment, disposal and storage of hazardous waste, the Project will not treat or dispose of waste material, nor will it store waste material for more than 90 days. Accordingly, these provisions of RCRA are not applicable. Final disposal of waste materials will be at RCRA permitted facilities. Waste materials will be hauled off-site by transporters licensed under applicable RCRA and New York State law provisions.

3.2.2.13 Project Safety Features

Construction and operation of the Project will be designed and managed to ensure maximum safety for employees and the surrounding community. All design, construction and operation activities and equipment for the proposed Project will be in accordance with applicable federal and state regulations, and will comply with the latest editions of the regulations of all applicable governmental agencies and engineering associations. These organizations include OSHA, National Electrical Manufacturing Association (NEMA), the U.S. DOT, the American Society of Mechanical Engineers (ASME), American National Standards Institute (ANSI), and the National Fire Protection Association (NFPA).

During the construction phase, all contractors will be required to have programs in place to ensure compliance with all applicable federal and state safety and health standards. Provisions will be included in all construction contracts for auditing and for penalties or termination, in order to enforce environmental, safety and health performance obligations. Chemicals and other related substances used in construction will be managed in accordance with all relevant regulations. Chemical cleaning agents will be contained after use and hauled off-site by a licensed contractor for environmentally safe disposal or reuse.

All on-site contractors will be required to have safety meetings on a weekly basis and will be monitored by the Engineering, Procurement and Construction (EPC) contractor's Safety Manager. The EPC contractor will also perform periodic safety inspections to assure that all work is being performed in accordance with state, local and federal requirements. The EPC contractor will have the overall responsibility to observe, monitor, audit and direct, when necessary, the safety program for all vendors and contractors performing work on-site.

The Project safety program will require all contractors to provide training regarding the proper identification, use/handling, storage, safety equipment and disposal of hazardous materials.

3.2.2.14 Project Operation Staffing

The Project is intended to be operated continuously (24 hours per day, 7 days per week) to provide baseload power, subject to dispatch. The operational labor force will consist of approximately 20 full-time employees, with about half working the normal day shift (8:00 a.m. to 4:30 p.m.). The remaining employees will perform shift work to maintain a 24-hour operation.

3.3 Timetable and Project Construction

The Project will be one of the first of the new class of merchant generating facilities that will compete in the new, deregulated, competitive marketplace and will provide power at a low cost with a minimum impact on the environment. Project construction is expected to begin in the first quarter of 2001, with Project start-up and commissioning beginning in the spring of 2002 and Project completion expected by the summer of 2003, a total construction duration of approximately 34 months. The construction workforce is expected to peak at about 600 personnel per day, with an average of 300 workers over the construction period.

4. PUBLIC INVOLVEMENT PROGRAM

This section demonstrates the Applicant's compliance with the requirements of 16 NYCRR Part 1000.3, Public Involvement Program (PIP). The Applicant has actively encouraged the involvement of interested agencies and stakeholders in the Article X process. This has been done to ensure that they understand and have the opportunity to provide comments on the Project. Public participation has been actively sought during the planning, pre-application and application preparation phases of the Project. Agencies, municipal representatives, stakeholders and interested citizens have been informed about the Project and consulted for their comments and ideas. The PIP will continue during the certification, compliance and implementation phases of the Project. The following sections describe the PIP activities that have occurred to date, and the Applicant's plans for continuing community involvement.

4.1 Pre-Application Phase

The Project is uniquely able to take advantage of the on-going public relationship between the existing Independence Station and the host community. Because the Project will be similar in nature, and will be located within the same site, a level of awareness exists with regard to community issues that cannot always be the case for new development projects.

Throughout the development process for Independence Station, proposed and licensed in the early 1990s, local officials and the public provided comment via the SEQRA process. This community outreach expanded even more as Independence Station was constructed. During this period, relationships with business and labor organizations were established, and interaction with neighbors occurred in response to construction-related issues. Independence Station is now operational, and an active business within the community. Many of the facility's employees are lifelong members of the Oswego community, and significant outreach into the community occurs on a variety of levels.

During the pre-application phase of the Article X Process, the Applicant undertook extensive efforts to inform residents of Oswego County and neighboring communities about the proposed Project. Equally important, Project representatives revisited the experience Sithe had in developing and constructing Independence Station to consider any community issues that had arisen out of that effort. This knowledge base, both in terms of issues and in terms of the people behind the issues, will continue to be a key component to the success of the Project.

Sithe has been a part of the Oswego community since 1989. The relationships that have been built over the last decade will allow a continued commitment to bring new jobs and economic growth to the Oswego area.

As the Project concept was being developed, a number of agency representatives and local officials were contacted about the feasibility of locating the Project at the Independence Station site. During this period (fall and winter 1998), the following agencies, municipal offices and local residents were contacted:

- NYSDEC – Region 7 in Syracuse:
  - Division of Regulatory Services;
  - Division of Water;
  - Division of Air; and
  - Habitat Specialist.
- NYSDEC – Central Office in Albany:
  - Division of Water; and
  - Division of Regulatory Services.
- Oswego County Department of Health;
- Town of Scriba;
- Federal Emergency Management Agency (flood hazard areas);
- Scriba Town Supervisor;
- DPS Staff;
- Oswego County Building and Construction Trades Council;
- Operation Oswego County;
- Oswego County Industrial Development Agency (IDA);
- Mayor of Oswego;
- Oswego County Administrator;
- Assemblywoman, 117th District;
- Senator, 46th District;
- Congressman, 24th District;
- Alcan Plant Manager;
- Executive Director, Metropolitan Development Association; and
- Publisher, Palladium Times.

During these preliminary meetings, issues were discussed that have helped to shape the Project.

The information gathered during the planning phase was incorporated into a Pre-application Report, filed in April 1999. The Pre-application Report was intended to serve as the basis for ongoing discussions with agency and municipal representatives, stakeholders and interested citizens as agreements are reached regarding the scope and content of the Application for this Project.

Based upon the review of the Pre-application Report, it was determined that the Project should modify its proposal for cooling systems. Instead of the once-through cooling system identified in the Pre-application Report, it was determined that the Project should utilize a conventional wet cooling tower system similar to the one in use at Independence Station. Other than this major shift in cooling technology, the basic Project characteristics remain similar to those outlined in the Pre-application Report.

4.2 Study and Application Preparation Phase

As the Project moved into its application preparation phase, in addition to continued communication with governmental officials and members of the community, a Citizens Advisory Group was formed to provide for regular consultation. Meetings that have been held with this Advisory Group, and with others, are described in the following paragraphs. Not included are the numerous informal telephone conversations that have been on-going since April 1999.

In May 1999, Sithe Northeast's President and Chief Operating Officer, Jeffrey Tranen, spoke at Operation Oswego County's annual meeting.

On September 10, 1999, Project representatives met with DPS Staff to review proposed draft Stipulations. These Stipulations were intended to specify clearly the contents of the Project's Article X Application, and define major issues of concern. Staff representing the DPS were in attendance for the majority of the 12 topics included in the draft Stipulations. A number of comments were received at that meeting, both general and specific in nature, and a subsequent draft was prepared and distributed to DPS for further comment.

A press conference was held on September 16, 1999 to increase public awareness of the Project. A press release was sent to numerous media and radio contacts throughout the region. The press conference was attended by approximately 75 people, and had coverage by both television and radio stations, as well as newspapers. Channel 5 News from Syracuse aired a clip regarding the conference at noon on September 17, 1999, and WRVO, the local National Public Radio affiliate, aired the entire conference. Handout materials provided at the conference included a Sithe corporate brochure, a Heritage Station Project Overview sheet and a GE H-System Technology fact sheet. The speakers for the press conference were

Barry Sullivan, Vice Chairman, Sithe; Del Williamson, President, GE Power Systems; Bill Shannon, President, Oswego County Building and Construction Trades Council; and Senator James Wright, Chairman, New York State Senate Energy and Telecommunications Committee.

Based in part on encouragement by DPS staff, a Public Information Meeting/Open House, sponsored by the Applicant, was held on September 28, 1999, for residents of Oswego County. The Applicant issued a press release to all local media and radio inviting participation. In addition, a paid advertisement was placed in local area newspapers to ensure visibility of the notice. About 500 letters were sent to stakeholders, community leaders, organizations, individuals and interested parties. Again, Channel 5 News attended and aired a clip on the 11:00 p.m. news on September 28, 1999 and also on the noon news on September 29, 1999. Coverage from local media was excellent and comments were very positive. The format of the open house utilized information stations in various locations around the room. Representatives from the DPS, Sithe, GE and Project consultants were available at each of the information stations to answer questions about the Project, including the draft Stipulations, and to provide general Project information. This allowed attendees to focus their attention on particular issues, and spend time talking one-on-one with Project or DPS representatives.

A Pre-application meeting was held in Albany on October 6, 1999 with representatives from the NYSDEC and the DPS responsible for the review of air quality issues. During this meeting, the applicable proposed draft Stipulations were reviewed. The contents of the air quality modeling protocol document were discussed, as were issues associated with preparation of the PSD Permit Application and the documentation for the Article X process.

On October 12, 1999 Dave Turner, Manager of Community and Government Relations for Sithe, participated in a panel discussion on the evolution of the energy industry. The discussion was hosted by the Greater Fulton Chamber of Commerce. Other participants included: NMPC, NYPA, the PSC, Agway Energy and Arcadia Energy.

On October 13, 1999 the first formal Citizen Advisory Group meeting was held. The Advisory Group is made up of nine individuals with various interests in the Project. The members of the group include:

- Mr. Gary Buehler, Ph.D., Superintendent of Oswego City Schools;
- Mr. Phil Gaines, Chairman, Department of Technology at State University of New York (SUNY) Oswego;
- Ms. Susan Carey, property owner, town of Scriba;

- Mr. John DeHollander, Director of Oswego County Soil and Water Conservation District and member of the Oswego County Environmental Management Council;
- Mr. Frank Hale, Executive Director of the Greater Oswego Chamber of Commerce;
- Mr. Chuck Rinoldo, Treasurer of the Oswego County Building and Trades Council and member of the Scriba Town Board;
- Ms. Carolyn Rush, Executive Director, Center for Business and Community Programs; Chairman, IDA; County Legislator for New Haven and Scriba;
- Mr. Dee Heckethorn, Member, Adirondack North Country Association Board; and
- Mr. Morris Sorbello, Chairman, Economic Development Committee; Oswego County Legislature.

Their task is to assist the Project team in identifying any opportunities to better inform the public about the Project. This group will be involved throughout the certification, compliance and implementation process. The Citizens Advisory Group members had several suggestions of groups with which to speak, such as the Economic Development Committee of the County Legislature and the Workforce Development Board.

A presentation was made before the Oswego County Building and Construction Trades Council on October 15, 1999. At this meeting representatives of the Applicant presented an overview of the Project. In addition, general discussions occurred with regard to the Article X process. Questions focused primarily on the timing of the construction effort. Trade Council members were involved in the construction of Independence Station, and have an ongoing involvement in maintenance outages that occur at that facility. In general, members of this group look forward to the Project, and to participating in the construction and operational efforts associated with it.

Several Project personnel met with officials from the city of Oswego and town of Scriba on October 20, 1999 regarding the physical and technical capabilities of the city water system. The Project team members gave an update on the Project schedule along with an overview of its general characteristics. Shortly after this meeting, the Mayor of Oswego gave the Applicant permission to have an engineering firm to study the physical and technical capabilities of the city's water system relative to the Project's requirements.

On October 25, 1999 a meeting was held with Oswego County officials and local governmental officials. In attendance were The Honorable James Wright, New York State Senator; The Honorable Frances Sullivan, Assemblywoman; County Administrator Jack Tierney; The Honorable Frank Church, Scriba Legislator; The Honorable Morris Sorbello, Chairman of the Economic Development Committee of the County Legislature; The Honorable Floyd Boyton, Chairman of the Oswego County Legislature; Ed Marx, Director of the County Department of Planning and Community Development; Mike Treadwell, Executive Director of the Oswego County IDA; and Bruce Clark, County Attorney.

A meeting was held with town of Scriba officials on October 26, 1999. Attending were Kevin Caraccioli, Counsel to the Planning Board; Brian Kocher, Town Board member; Norma Canale, Town Board member; Jim Wellington, Chairman of the Planning Board; George Stooks, Planning Board member; Gary Holthouse, Planning Board member; Sue Gosselin, Secretary to the Planning Board; Beth Canale, Planning Board member; and Jim Basile, Planning Board member.

For both the Oswego County and town of Scriba meetings noted above, the Article X process was discussed and a Project overview presented. The Applicant answered technical questions about the Project, and addressed site layout issues. At these meetings, the Applicant agreed that local feedback was important to the success of the Project and that they would work with Oswego County and the town of Scriba throughout the Project and meet regularly to keep an open flow of communication between all parties.

At the request of the DPS, on October 26, 1999 the Applicant also sent the proposed stipulations to those on the pre-application service list.

A meeting was held on November 3, 1999 at the NYSDEC regional office in Syracuse. Attending were NYSDEC Staff members, representing the range of technical disciplines to be reviewed for the Project, DPS Staff, and Project representatives. The purpose of this meeting was three-fold. It intended to serve as a formal re-introduction of the Project, as modified subsequent to the filing of the Pre-application Report, in order to appropriately focus on permit-related issues. Second, it provided an opportunity to review each of the 12 draft Stipulations and to solicit comment from the NYSDEC. Third, it allowed for a face-to-face meeting of the specific task leaders for each environmental topic with Project team members to facilitate future topic-specific discussions. During this meeting, the NYSDEC provided comments on the proposed draft Stipulations, and committed to resolving any additional comments soon thereafter. The comments received generally served to clarify issues already scoped for inclusion in the Application.

On November 3, 1999 the DPS held a public meeting to afford the public another opportunity to comment upon the draft Stipulations for the Project that were previously sent to the public. Project representatives were also on hand to answer Project-specific questions. Approximately 550 meeting notices were sent to organizations, stakeholders, individuals and interested parties. In addition, the Applicant placed a paid advertisement in the major local area newspapers and issued a press release to regional print media and radio stations. The meeting was well attended, with approximately 50 people present. The public meeting focused largely on a presentation by DPS Staff with regard to the Article X process, stressing the mechanisms available for public participation. Following this presentation, the DPS invited comments on the draft Stipulations and questions with regard to the Article X process. Copies of the draft Stipulations were available for distribution at the meeting. In addition, copies of the draft Stipulations were circulated to those who participated in the Pre-application consultation process, members of the Citizens Advisory Group and a town of Scriba Planning Board representative. The DPS invited attendees to review the draft Stipulations further, and provide any additional comments either in writing or via e-mail so appropriate local issues could be included in the finalized Stipulation language.

On November 9, 1999, based upon discussions with DPS, the Applicant sent another notice to the Pre-application Report service list inviting comments on the draft stipulations. None were received.

On November 17, 1999, the Citizen Advisory Group met for the second time. This group will meet again in mid-January, after the holiday season.

At the bi-monthly city of Oswego School Board meeting on November 17, 1999, Project representatives addressed the Board of Education.

On November 18, 1999, Project team members met with members of the Scriba Town Planning Board and Scriba Town Board to discuss proposed language on local land use laws, regulations and policies. The group consisted of Beth Canale, Planning Board member; Jim Wellington, Chairman of the Planning Board; Sue Gosselin, Secretary to the Planning Board; Chuck Rinoldo, Planning Board member; Gary Holthouse, Planning Board member; Steve Baxter, Town Supervisor; Donna Scanlon, County Planning; Kevin Caraccioli, Counsel to the Planning Board; and two representatives of the Hiscock and Barclay law firm. Andrew Davis of the DPS Staff participated in the meeting via telephone.

On December 7, 1999, Phil Mooney and Dave Turner of Sithe met with the Oswego County Highway Engineer, Chris Baldwin, and the county's engineering firm (Barton & Loguidice), Alcan representatives and a representative from Metal Transportation Company to discuss proposed improvements to County Routes 1 and 1A. The county has federal money to improve the section from Alcan's western entrance east to Riker's Beach Road. The purpose of the meeting was to discuss the scope of the roadway improvement project and the tentative schedule with the primary users and landowners along the route. To the extent possible, Project planning will be coordinated with the county so as to minimize impacts.

Also on December 7, 1999, Dave Turner and Robin Rando of Sithe met with the Economic Development Committee of the Oswego County Legislature, as recommended at the most recent Citizen Advisory Group meeting. A booklet of materials on Sithe and the Project was given to each member.

Phil Mooney, Dave Turner and Robin Rando met on December 9, 1999, with the full Oswego County Legislature to provide a Project overview.

On December 15, 1999, Dave Turner made a presentation to the Oswego County Workforce Development Board in response to a suggestion from the Applicant's Citizen Advisory Group. Company and Project information was distributed.

On January 6, 2000, Phil Mooney and Dave Turner met with New York State Senator Jim Wright; Operation Oswego County Executive Director Mike Treadwell; and Empire State Development representative Tony Kolinski. The status of the Project was discussed, in an attempt to keep key stakeholders fully apprised.

Based upon comments solicited from the public, local and regional officials, the NYSDEC, the New York State Department of Health (NYSDOH), and the DPS, a final version of the Stipulations was prepared and executed on February 8, 2000. Copies are included in the Application for distribution to the service list for the Project. This executed Stipulation document (provided in Appendix A) formally establishes the scope of the studies for the Article X application in 13 general areas. This Application, as previously discussed in Section 1.5, responds to each of the specific issues outlined in those Stipulations.

Issues of concern to the public have been consistent throughout the pre-application phase. A brief summary of issues is provided below.

The question of whether or not new transmission lines will be needed has been asked at several public outreach meetings. The Applicant reported that all studies to date show that no off-site improvements to transmission lines will be required.

Another question frequently asked pertains to the operation of the Oswego Steam Station. The Project is a merchant facility that can be operated during all hours based upon market conditions, while the Oswego Steam Station is a peaking facility that only runs during peak times. The two facilities, therefore, serve in two different markets. All studies to date show that the Project facility will have no effect on the operation of the Oswego Steam Station.

One of the most frequent issues raised in meetings with public officials is the tax revenues that the various government entities will receive as part of a payment in lieu of taxes (PILOT) Agreement. The Applicant's plan has been to work with the Oswego County IDA to enter into an agreement that will be fair and equitable to all parties. The Applicant has begun discussions with the IDA and plans to begin negotiations over the next several months as the Project moves through the Application phase.

One issue raised by the Town of Scriba Planning Board is an interest in having Siting Board hearings at a location in the town of Scriba. Frank Church, County Legislator for the town of Scriba, at a recent meeting with the Oswego County Economic Development Committee of the Oswego County Legislature, also requested holding the public hearings, when they begin, in the town of Scriba. Both groups expressed their belief that residents from Scriba will feel much more comfortable voicing opinions about the Project if meetings are held locally. The Applicant is willing to work with the parties to schedule hearings in the town of Scriba rather than the city of Oswego.

Another concern raised during meetings with the local community is potential noise from the Project. The Applicant has addressed those concerns by focusing engineering efforts on low noise design measures. The Project engineers have incorporated significant mitigation measures in order to meet the stringent local noise standard of no new perceptible noise off-site.

4.3 Application Review Phase

The formal Application review process begins with the filing of this Article X Application and service on interested parties. The review process will include formal notification, opportunities for parties to formally exchange information, as well as public hearing sessions to receive comments, statements and testimony about the Project. The Applicant will ensure that all notice and filing requirements are met.

A press release will be distributed to the local media announcing the filing of the Article X Application. Residents living within 1,000 feet of the Project site will be notified by mail with a copy of the press release. Notice of the Application will be published in local and regional newspapers pursuant to the requirement set forth in 16 NYCRR §1000.6.

The Project will provide an application fee, to be allocated by the Presiding Examiner designated by the Siting Board to municipal and local parties. This will ensure that effective public involvement continues throughout the Application review and certification process.

During the Application phase, the Applicant will continue to consult with agency representatives and others through correspondence, meetings and other methods that facilitate consultation, including field visits and telephone conferences. The Project team will continue to hold public informational meetings and presentations and will continue to respond to inquiries from local government officials, stakeholders and other interested parties and citizens. DPS will be updated regularly on the schedule for these events and the discussions that are held.

A Website (http://www.heritage-station.com) has been established as another public information tool. An e-mail address (info@heritage-station.com) with 24-hour access is included as part of the website. This will allow anyone with questions and/or comments the convenience to inquire about the Project as their schedule allows. The Applicant has used press releases and paid advertisements to publicize and encourage the public to utilize these tools. The web page will be updated periodically as the Project progresses. The full application will be posted on the Website when it is filed with the Siting Board.

4.4 Compliance and Implementation Phase

During the construction, commissioning and operation of the Project, the Applicant will continue to maintain relationships established with regulatory agency staffs, local government officials, stakeholders, and interested parties and citizens. Agency consultations and updates will continue throughout the life of the Project. During construction and commissioning, there will be meetings and filings with agencies to document compliance, the completion of mitigation efforts and certification of equipment. Agency visits and inspections will be welcome.

During construction and commissioning, Project representatives will be available to attend meetings, give presentations, and answer questions whenever requested. Ongoing relationships will be established with local emergency service organizations to ensure familiarity with the facility. Public information meetings will be scheduled, as necessary. The Applicant will continue to participate in the local community and maintain the appropriate standards of any good corporate citizen.

4.5 Notices and Filings

The service list for this Application is provided in Appendix G.

5. ALTERNATIVE COOLING TECHNOLOGY EVALUATION

Pursuant to Section 1001.2, and Stipulation 13, Clause 2, this section provides a discussion of alternative cooling technologies that were reviewed as the Project's conceptual design developed.

A number of stipulations require assessment of alternative cooling technologies in terms of mitigating impacts. The selection of Project cooling technology affects several disciplines. Therefore, this section addresses portions of Stipulation 6, Clause 7 (Noise Mitigation); Stipulation 9, Clause 8 (Terrestrial Ecology); Stipulation No. 11, Clause 2(i) (Visible Plume Impacts); and Stipulation 12, Clauses 8 (Water Use), 28 (Surface Water Impacts), 31 (Aquatic Ecology), and 41 (Wetlands).

As discussed in Section 3.2.2.6 of this Application, the Project will require a main circulating water cooling system to provide cooling for each of the two main steam turbine condensers and other ancillary systems. The majority of the cooling load results from the condensing of turbine exhaust steam in the steam turbine condensers. Several types of cooling systems are available to transfer this heat either directly to the atmosphere or through large bodies of water. Which technology is most appropriate for a given project is dependent on a site-specific balancing of a number of technical, economic and environmental factors.

As discussed in this section, the use of a mechanical wet cooling tower system has been determined to be the most appropriate technology for the Project. The wet cooling tower option best balances the range of technical, environmental and cost criteria examined. While the once-through cooling option offers maximum efficiency, these advantages are outweighed by significantly greater environmental impacts and a higher capital cost. Wet cooling towers were found to be superior to either the air-cooled condenser or hybrid options in terms of efficiency and economics, while avoiding the environmental impacts and higher capital costs associated with once-through cooling. The air-cooled and hybrid options would use less water than the wet cooling tower option. However, the availability of an abundant water supply, Lake Ontario, through an existing intake structure with adequate excess capacity, makes this advantage far less important at the Project site than in locations where water supply is more limited. In addition, the wet cooling tower option offers the environmental advantages of lower emissions on a per MW-hour basis, a smaller footprint at the Project site, and less wetland encroachment than the air-cooled condenser option. The basis for selection of the wet-cooled system for the Project is described in more detail in the following sections.

5.1 Description of Cooling Technology Alternatives

Four cooling technology alternatives were identified and evaluated:

- Evaporative or wet cooling tower;
- Once-through cooling system;
- Air-cooled (dry) condenser; and
- Hybrid (wet/dry) cooling system.

This section presents a description of each of these technologies.

5.1.1 Evaporative or Wet Cooling Tower System

In an evaporative or wet cooling tower system, water is circulated in a loop through the steam surface condensers and the cooling tower. The circulating water serves as the intermediary heat transfer medium between the steam surface condenser and ambient air. Cooling is achieved through evaporation of approximately 2 percent of the water circulating through the system and through direct contact with the air as the water cascades down through the cooling tower fill. Air is moved through the cooling tower through use of fans. A supply of water is required to make up for evaporation losses. In addition, a smaller quantity of water, known as blowdown, is discharged from the system in order to limit the build-up of dissolved solids that are concentrated in the remaining circulating water during the evaporation process. The blowdown water must also be replaced with makeup water.

5.1.2 Once-through Cooling System

Once-through cooling systems circulate water from a nearby surface waterbody through the steam surface condensers. Heat from the steam condensers is transferred to the cooler circulating water. The same quantity of water is then returned directly to the surface waterbody after exiting the condensers, although at an increased temperature. The higher temperature is the result of the water having absorbed the latent heat of vaporization associated with condensing turbine exhaust steam back to a liquid state. The name of this system is derived from the fact that cooling water is passed through the condenser just one time before being returned to the water source.

5.1.3 Air-cooled Condenser

An air-cooled condenser would rely only on ambient air as a direct steam-cycle heat sink, without the use of any water or other intermediary heat transfer medium. Steam is routed from the turbine exhaust through ducts to a series of finned tube heat exchangers. The steam flows through, and condenses inside the tubes while air flows over the outer, finned tube surface. Condensate is discharged from the air-cooled condenser and supplied back to the HRSGs after the latent heat of vaporization is transferred from the turbine steam directly to the air stream. Air is moved through the air-cooled condensers by a series of fans, with warmer air discharged from the top of the condenser.

5.1.4 Hybrid or Wet/Dry Cooling System

A hybrid, or wet/dry cooling system, is similar to a wet cooling system, except that the cooling tower includes both dry, finned tube heat exchanger sections and wet evaporative cooling sections. Warm water from the condenser flows first through the tubes of the dry heat exchangers located on top of the evaporative cooling sections and then cascades down through the fill of the evaporative sections. Hybrid cooling towers are designed to provide plume abatement down to a specific ambient temperature and relative humidity. The hybrid design evaluated in this section is based on a design reflecting plume abatement down to 20°F, at a relative humidity of 85 percent. As required by Stipulation 13, Clause 2, the Applicant will submit a supplementary filing discussing a hybrid tower designed to abate plumes at ambient conditions above 40°F, at a relative humidity of 72 percent. Like the wet cooling system, the hybrid system would require a makeup supply of water from Lake Ontario.

5.2 Cooling Technology Evaluation Criteria

Each candidate cooling technology was evaluated with respect to the following technical, environmental and economic criteria.

5.2.1 Technical Criteria

Technical criteria focused on compatibility with the GE H System design objectives. The H System will be the most efficient combustion turbine system yet developed, and the Project will mark its introduction into the U.S. market. This objective makes optimizing equipment efficiency a key technical criterion in selecting the cooling technology for the Project. Therefore, each cooling technology alternative was evaluated with respect to cooling efficiency, fuel efficiency, and net electrical output.

5.2.2 Environmental Criteria

A key objective of the Project is to minimize environmental impact. Important elements in meeting this objective include the selection of Project technologies and design configurations that represent a minimal impact on the environment and on the community. Consistent with the Stipulations cited above, each cooling alternative was evaluated with respect to the following environmental factors:

- Ease of noise mitigation;
- Land use requirements and associated terrestrial ecology and wetlands impact potential;

- Visible plume potential;
- Water supply and wastewater discharge requirements; and
- Impacts to aquatic ecology.

5.2.3 Economic Criteria

Selection of least-environmental-impact technologies that fall within reasonable cost profiles is an important factor for facility design. Each cooling technology was evaluated with respect to capital cost, operating and maintenance (O&M) cost, and net electrical output.

5.3 Cooling Technology Evaluation

Table 5-1 summarizes the results of the alternative cooling technology analysis. The results are discussed in the following sections.

5.3.1 Evaporative (Wet) Cooling

As described earlier, evaporative, or wet cooling circulates water in a closed loop through the steam surface condensers, where heat is transferred to the circulating water. The water is then routed to a cooling tower where evaporation of a portion of the heated water and direct contact with the air cool the remaining water. As discussed in this section, the use of a wet cooling system for the Project is considered the most appropriate since it is best suited for the unique characteristics of the Project design and site.

5.3.1.1 Technical Criteria

Because water is a more effective cooling medium than air, wet cooling towers are more efficient than air-cooled condensers. Because of the higher temperature and corresponding steam pressure in an air-cooled condenser system, net plant output for a hypothetical peak summer demand day would be over 30 MW higher with a wet cooling tower. Similarly, for this peak demand condition, the wet cooled option would be 4.7 percent more fuel efficient (287 British thermal units per kilowatt-hour [Btu/kWh]) than the air-cooled option. Conversely, the once-through cooling system would have a peak summer demand day output 15 MW higher than the wet cooling tower option and would be 2.2 percent more fuel efficient.

Table 5-1: Summary of Alternative Cooling Technology Analysis

Performance	Once-through Cooling	Wet Tower Cooling	Hybrid Cooling	ACC
Ambient Temperature (°F)	87	87	87	87
Relative Humidity (%)	60	60	60	60
Cooling Water Temperature (°F)	75	N/A	N/A	N/A
Each Power Block				
Gross Block Generator Output (kW)	354,000	349,650	349,650	334,730
Block Auxiliary Power (kW)	8,437	11,747	12,126	12,083
Net Block Output (kW)	345,564	337,903	337,524	322,647
Total Plant Output (kW)	691,127	675,806	675,048	645,294
Difference in Output (kW)	15,321	Base	(758)	(30,512)
Percent Output Difference	2.3%	Base	(0.1%)	(4.5%)
Heat Consumption (MBtu/hr, lhv)	4,097	4,097	4,097	4,097
Heat Rate (Btu/kWh, lhv)	5,928	6,062	6,069	6,349
Difference in Heat Rate (Btu/kWh-lhv)	(135)	Base	7	287
Percent Heat Rate Difference	(2.2%)	Base	0.1%	4.7%
Capital Cost ($000s)				
Total Installed Cost	$21,336	$12,733	$19,875	$51,400
Difference from Base	$8,604	Base	$7,143	$38,668
Percent Difference	68%	Base	56%	304%
Land Use (acres)				
Equipment area only		1.10	1.22	2.29
Cleared Wetland Area*		–	–	2.21
Difference	N/A	Base	–	2.21
Cleared Forested Area*		0.83	1.05	3.51
Difference	N/A	Base	0.22	2.68
Water Use & Discharge (mgd)				
Water for Cooling	340.00	3.23	2.91	–
Plant Water	0.51	0.51	0.51	0.51
Total Water Use	340.51	3.74	3.42	0.51
Wastewater	340.11	0.66	0.60	0.11

*Area includes equipment space and maintenance access space. Some forested area is in wetland areas.

ACC = air-cooled condenser
kW = kilowatt
lhv = lower heating value
MBtu/hr = million British thermal units per hour
Btu = British thermal units
KWh = kilowatt-hour

5.3.1.2 Environmental Criteria

Noise

Because evaporative cooling systems use water as a cooling medium, as opposed to air, they are inherently quieter than air-cooled or hybrid systems which must rely on more and larger fans. Because wet cooled towers have smaller fans and are shorter than air-cooled condensers or hybrid towers, noise impacts may be more readily mitigated.

Land Use

Except for the once-through cooling option, the evaporative cooling tower option would result in the smallest footprint at the Project site. The proposed wet cooling towers will occupy approximately 1 acre of land at the Project site, much of which has previously been cleared, and all of which avoids wetland encroachment. The hybrid option would be slightly larger, but twice as tall. The air-cooled condenser option would be twice as large and three times as tall as the evaporative towers. Because of the orientation of wetlands at the Project site, the wet cooling tower option would have the least impact on wetlands of all options considered.

Visible Plume Potential

The wet cooling towers will dissipate heat by evaporating water and discharging the water vapor into the atmosphere. If the ambient air is cold and/or moist, a portion of the emitted vapor will condense to form water droplets. This condition results in a visible water vapor plume emanating from the cooling towers. Section 6 discusses the potential for visible plumes and the expected frequency of occurrence. As discussed in more detail in Section 16, the visual impact of the cooling tower vapor plumes is lessened considerably for this site due to visual buffer afforded by the large wooded site as well as the presence of existing plumes in the area, which will exist regardless of the Project's choice of technologies. Visible plumes from the Project will be similar to plumes from the existing Independence Station; existing plumes from the natural draft cooling tower associated with the nearby Nine Mile Point nuclear power facility are much larger than those anticipated from the Project. Therefore, the visual impacts of the Project plume are not adverse when compared to the existing visual setting.

Unlike air-cooled systems, wet cooling towers have the potential to cause ground level fogging and icing. As discussed in greater detail in Section 6, however, the potential fogging and icing impacts associated with the proposed cooling towers are expected to be negligible.

Water Supply/Wastewater

At 3.7 mgd, total plant water use under the wet cooling tower option would require approximately 1 percent of the water circulated by the once-through cooling option. However, because it uses evaporation for cooling, the wet cooling tower returns only about 20 percent of the wet tower makeup water in the form of cooling tower blowdown. The air-cooled condenser option would reduce total plant water use to approximately 0.5 mgd. However, because the Project is located next to an abundant water supply, Lake Ontario, it will use an existing intake structure that meets Best Technology Available (BTA) requirements, and will discharge wastewater through an existing discharge diffuser, environmental impacts associated with water use have been effectively mitigated.

Aquatic Ecology

As discussed in Section 17, impacts of the wet cooling tower option on aquatic ecology are expected to be negligible. The Project proposes to use an existing intake structure maintained by the city of Oswego and the Metropolitan Water Board. Because the existing intake structure has adequate capacity to support the Project, dredging and shoreline impacts associated with a new once-through cooling system can be avoided. As discussed in greater detail in Section 17, this intake structure meets BTA requirements. The low intake velocity associated with the intake structure, its vertical shaft design, and its location 6,200 feet offshore in relatively deep water serve to minimize aquatic impacts compared to those associated with once-through cooling, that would withdraw and circulate over 90 times more water than the wet cooling tower option. Characterization of baseline ecological conditions and an assessment of Project impacts to aquatic ecology as discussed in Section 17, were based on ecological studies at the Nine Mile Point, James A. Fitzpatrick and Oswego power stations. Because of the relatively close proximity and similar lake conditions at the city of Oswego intake, estimates of aquatic organisms lost due to entrainment were based on analyses completed for the nearby Nine Mile Point power station over the period April through August 1997. As detailed in Section 17, for the proposed evaporative cooling tower system approximately 245,000 aquatic organisms would be entrained over this period, translating to an equivalent loss of 164-219 adult Alewives. This compares to an equivalent loss of approximately 15,000-20,000 adult Alewives for the once-through cooling system, 23-31 adult Alewives for the air-cooled system and 150-200 adult Alewives for the hybrid option. As discussed in Section 17, because of the design of the city of Oswego's intake structure, its very low intake velocity, and its location 7,200 feet offshore in relatively deep water, outside of depths and locations where high frequencies of fish impingement occur, no significant impingement impacts would be expected to occur for the proposed evaporative cooling system, the air-cooled system or the hybrid system. The once-through cooling option would, however, be expected to necessitate a shoreline intake, which would be more likely to result in impingement impacts.

5.3.1.3 Economic Criteria

The use of a wet cooling tower for the Project results in the lowest capital cost for the Project. Capital costs for the wet cooling option are estimated to be $7 million less than for the hybrid tower, $9 million less than for the once-through cooling option, and $39 million less than for the air-cooled condenser option.

5.3.1.4 Conclusion

On balance, the wet cooling tower option was determined to best maximize performance, while minimizing environmental impact. Therefore, the wet cooling tower option was determined to be the most appropriate cooling technology for the Project.

5.3.2 Once-through Cooling

As described earlier, once-through cooling circulates water from a large surface waterbody directly through the steam condenser, where heat is transferred to the cooling water. The heated effluent is then discharged back to the surface waterbody. Given the Project site's proximity to Lake Ontario, once-through cooling is considered a potentially viable option. The once-through cooling option would entail construction of new surface water intake and discharge structures in the lake. Approximately 340 million gallons of water per day would be drawn from the lake, circulated through the steam condenser system, and discharged back to the lake approximately 12°F warmer.

5.3.2.1 Technical Criteria

Use of once-though cooling maximizes plant power output and efficiency. During peak summer demand days the net plant output would be over 15 MW greater than with a wet cooling tower system, and approximately 46 MW greater than with an air-cooled condenser. Plant fuel efficiency would also be maximized with once-through cooling. The Project's heat rate (amount of fuel required to produce a kilowatt-hour of electricity) would be approximately 135 Btu/kWh less than that for a wet cooling system and approximately 422 Btu/kWh less than the Project with an air-cooled condenser.

5.3.2.2 *Environmental Criteria*

Noise

Noise impacts potential would be reduced with the use of once-through cooling, as there would be no cooling tower, a major source of noise. However, noise would not be totally eliminated, since the main intake pump house, a source of noise, would occur at the lakefront, closer to lakefront residences to the northeast of the Project site.

Land Use

Since once-through cooling technology avoids the need for cooling towers, land use requirements would be minimized, as would associated impacts to terrestrial ecology. However, the need for intake and discharge structures would entail work along the shoreline of Lake Ontario, and result in associated wetland impacts. In addition, to accommodate the large volumes of water required, new 48-inch intake and discharge pipes would need to be installed from the lakefront structures to the Project steam turbine condensers. The pipes would require clearing an approximately 50-foot corridor. The water line routes would be routed to minimize wetland crossings, however, some temporary wetland impacts would occur.

Visible Plume Potential

Since there is no cooling tower associated with this technology, the use of once-through cooling provides the lowest off-site visual impact. It avoids the vapor plumes associated with either the wet or hybrid cooling towers and avoids the tall structures associated with the hybrid cooling tower and air-cooled condenser options. Nevertheless, visual impact would not be eliminated, since the cooling design would require the construction of rather large intake and discharge structures which could be visible by boaters on the lake, as well as users of the Independence Park trail system.

Water Supply/Wastewater

The once-through cooling system would have the largest water demand and wastewater discharge requirements. The use of once-through cooling would require approximately 340 mgd of water to be drawn from and subsequently discharged back to the lake. As discussed below, the circulation of these large volumes of water would have the greatest surface water and aquatic ecology impacts of the cooling technologies evaluated.

Aquatic Ecology

To draw the large volumes of water necessary from the lake, a lakefront water intake structure and screen house would need to be constructed. To address BTA requirements, the intake structure would be designed to minimize intake water flow velocity so as to minimize impingement and entrainment of aquatic organisms. Because of the magnitude of the water demand, installation of a deep-water intake would likely be cost-prohibitive. A shoreline surface intake would result in substantially greater aquatic impact than that associated with any of the other cooling technologies. As previously discussed, entrainment of aquatic organisms under the once-through cooling option would result in 90 times the expected losses of organisms associated with the proposed evaporative cooling option. In addition, the location of the intake structure in shallower water, along with the higher water demand would be expected to result in significantly higher impingement rates than for the proposed evaporative cooling system. Based on impingement data from the nearby Nine Mile Point power station, a once-through cooling system would be expected to result in an impingement rate of approximately 4,000 fish per day.

To minimize thermal discharge impacts, a subsurface diffuser would be constructed. However, because of the large volume of water and the intake/discharge temperature differential, this option would have a substantially larger thermal mixing zone than the wet or hybrid cooling tower options. In addition, considerable dredging would be required to create the intake and discharge structures. Depending on the depth to bedrock, some blasting might also be required.

5.3.2.3 Economic Criteria

Because of the requirement for large intake and discharge structures and larger and longer water piping, capital costs for the once-through cooling system would be approximately $9 million higher than for a wet cooling tower system.

5.3.2.4 Conclusion

Despite its efficiency advantages, the once-through cooling option was not selected for the Project due to its potential for significant aquatic ecology impacts and incremental cost.

5.3.3 Air-cooled Condenser

The air-cooled condenser, or dry cooling, option would utilize ambient air drawn across a series of finned tube heat exchangers to cool the steam turbine exhaust. Air would be moved through the condensers by a series of fans with the warmer air discharged from the top of the condenser.

5.3.3.1 Technical Criteria

Air-cooled condensers would be up to 4.7 percent less fuel efficient (on a Btu/kWh basis) than a wet cooling system on a hypothetical peak demand summer day. As a result of the efficiency penalty, net plant output would be up to 30.5 MW less on a hypothetical peak demand day.

5.3.3.2 Environmental Criteria

Noise

Since air is a less effective cooling medium than water, air-cooled condensers require more and larger fans to move air across the steam condensers. Because of the size, height and elevated noise levels associated with air-cooled condensers, it is more difficult to mitigate noise impacts from air-cooled condensers than from wet cooling tower systems.

Land Use

Air-cooled condensers for the Project would need to be twice as large as the proposed wet cooling towers plus additional area required for equipment maintenance. On the Project site, this would result in greater impact to terrestrial ecology, as an additional 116,400 square feet of forested area would need to be cleared to accommodate the larger air-cooled condensers. In addition, 20,800 square feet of wetland encroachment would be necessary for the air-cooled condenser, while none is impacted by the wet-cooled design.

Visible Plume Potential

Because air-cooled condensers do not evaporate water, they would not have a visible water vapor plume and there would be no occurrences of ground level fogging or icing.

Water Supply/Wastewater

Because air-cooled condensers use air as opposed to water for cooling, impacts associated with water use would be less. With an air-cooled condenser, total plant water demand would be 0.5 mgd, compared to an average of 3.7 mgd with wet cooling towers and 340 mgd with once-through cooling.

Aquatic Ecology

Because less water would be drawn from and subsequently discharged to the lake, impacts to aquatic ecology would be less with an air-cooled condenser than with any of the other cooling technologies. As previously discussed, under the air-cooled option, losses of aquatic organisms through entrainment would be approximately 14 percent of the losses expected for the proposed evaporative cooling option.

5.3.3.3 Cost Criteria

Of the four cooling technology options evaluated, dry cooling has the highest capital cost, estimated to be approximately $39 million more than the proposed wet cooling towers.

5.3.3.4 Conclusion

For the Project, the advantages of dry cooling, in terms of lower water use, plume visibility and aquatic impacts would come at the expense of greater land disturbance, wetland encroachment, performance penalties, and cost. Because the water quality, plume visibility, and aquatic impacts associated with the proposed wet cooling towers have been demonstrated to be insignificant at the Project site, the advantages of dry cooling were determined to be outweighed by the disadvantages. Therefore, dry cooling was not selected for the Project.

5.3.4 Hybrid Wet/Dry Cooling System

A hybrid cooling system is similar to a wet cooling tower, except that hybrid towers include both dry, finned tube heat exchanger sections as well as evaporative cooling sections. Hybrid towers are frequently used to lessen water vapor plumes without the performance penalties associated with completely dry systems.

5.3.4.1 Technical Criteria

On a peak summer high demand day, the efficiency penalties associated with the hybrid tower are much lower than would be experienced with a dry cooling system. Plant fuel efficiency (on a Btu/kWh basis) would be comparable to the wet cooling option, only 0.1 percent less efficient. Similarly, net plant output would only be about 760 kilowatts less than with a wet cooling tower, as opposed to a 30 MW penalty for dry cooling.

5.3.4.2 Environmental Criteria

Noise

The hybrid tower would be 29 feet taller and have more fans than the wet tower and would, therefore, have greater noise impact potential. As a result, for the Project site, noise mitigation would be more difficult and costly than for the wet cooling tower option.

Land Use

The hybrid cooling towers would be approximately 10 percent larger than the wet tower system. Although it appears that the hybrid tower could be sited to avoid wetland encroachment, it would result in approximately 5,300 more square feet of tree clearing.

Visible Plume Potential

Use of a hybrid tower would reduce the frequency and size of visible water vapor plumes associated with the wet cooling tower option, with less economic and efficiency penalty than a dry cooling system. For the Project site, however, this advantage would be less noticeable due to the presence of a similar cooling tower plume at Independence Station and larger plumes from the natural-draft cooling tower at the nearby Nine Mile Point nuclear power plant.

Water Supply/Wastewater

Because it includes dry cooling sections, the hybrid tower will use less water than the wet cooling tower option. However, the water use advantage of approximately 9 percent is relatively modest.

Aquatic Ecology

Because it will withdraw less water, the hybrid tower would be expected to have slightly less associated aquatic ecological impacts than the wet cooling tower option. As previously discussed, losses of aquatic organisms through entrainment would be approximately 9 percent less than for the proposed evaporative cooling option.

5.3.4.3 Cost Criteria

The hybrid system would have a $7 million higher capital cost than the wet cooling tower system.

5.3.4.4 Conclusion

Because the environmental impacts associated with proposed wet cooling tower system's water use and visible water vapor plumes have been determined to be insignificant, the added capital cost, noise impacts and performance penalties associated with the hybrid cooling tower are not warranted. Therefore, the hybrid cooling system option was not selected for the Project.

6. AIR QUALITY AND METEOROLOGY

This section addresses Stipulation No. 1, Clauses 1 through 6. Included are the findings of the air quality and meteorology studies including the air pollution control technology assessment, studies of the Project and cumulative impacts of criteria and non-criteria air pollutants, calculation of emission offsets, visibility impacts, impacts to soils and vegetation, as well as the Project's contribution to deposition of sulfates and nitrates, and other studies. The PSD Application for the Project is provided in Appendix B.

6.1 Applicable Regulatory Requirements

The NYSDEC and the EPA have promulgated air quality regulations that establish ambient air quality standards and emission limits. These regulations include: (1) NAAQS; (2) New York Air Quality Standards (NYAQS); (3) New Source Review (NSR) requirements for major sources and modifications, including PSD review and Non-attainment New Source Review (NNSR); and (4) New Source Performance Standards (NSPS). These programs are administered through delegation or under regulations promulgated under Title 6 of the NYCRR. These standards and requirements impose design constraints on new and modified facilities and provide the basis for an evaluation of the potential impacts of proposed projects on ambient air quality. This section briefly summarizes these regulations, explains their relevance to the Project, and presents the anticipated Project impacts. Detailed discussions are presented in subsequent sections of the Application. These detailed discussions demonstrate that the Project will comply with all applicable air quality regulatory requirements.

6.1.1 National Ambient Air Quality Standards and Policies

The NYSDEC and EPA have established NAAQS and NYAQS for six air contaminants, known as criteria pollutants, for the protection of public health and welfare. These criteria pollutants are SO_2, particulate matter having a diameter of 10 microns or less (PM_{10}), nitrogen dioxide (NO_2), CO, ozone (O_3), and lead (Pb). There are both primary and secondary NAAQS. Primary standards protect human health, while secondary standards protect public welfare from known or anticipated adverse effects associated with the presence of air pollutants, such as damage to property or vegetation. The NYSDEC also has limits (the NYAQS) to regulate Total Suspended Particulate (TSP) for 24-hour (250 micrograms per cubic meter ($\mu g/m^3$)) and annual (45 $\mu g/m^3$) averaging periods. The state and federal ambient air quality standards, listed in Table 6-1, include both short- and long-term standards.

Table 6-1: National and State Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS and NYAQS (µg/m³) Primary	Secondary	SILs[6] (µg/m³)
NO_2	Annual [1]	100	Same	1
SO_2	Annual [1] 24-hour [2] 3-hour [2]	80 365 –	– – 1,300	1 5 25
PM_{10}[3]	Annual [4] 24-hour [5]	50 150	-- --	1 5
CO	8-hour [2] 1-hour [2]	10,000 40,000	Same Same	500 2,000
O_3	1-hour [3]	235	Same	–
Pb	3-month [1]	1.5	–	–

[1] Not to be exceeded.

[2] Not to be exceeded more than once per year.

[3] NYSDEC also has TSP limits for 24-hour (250 µg/m³) and annual (45 µg/m³) averaging periods.

[4] Not to be exceeded by the arithmetic average of the annual arithmetic averages from 3 successive years.

[5] Not to be exceeded more than an average of 1 day per year over 3 years.

[6] SILs – *Significant Impact Levels.*

Source: 40 CFR 50 and 6 NYCRR Part 257

EPA also promulgated a new Fine Particle ($PM_{2.5}$) NAAQS on July 18, 1997 and established a transition program from PM_{10} to $PM_{2.5}$. However, a federal district court remanded the $PM_{2.5}$ rulemaking back to EPA for reconsideration. Therefore, the current regulated particulate matter pollutant remains as PM_{10}.

One of the basic goals of state and federal air regulations is to ensure that ambient air quality, including the impact of existing sources and new sources, complies with the ambient standards (i.e., NYAQS and NAAQS). Towards this end, the EPA has classified all areas of the country as either "attainment," "nonattainment," or "unclassified" with respect to the ambient standards. If an area is "attainment" or "unclassified" for a particular pollutant, then new major sources or major modifications of existing sources would require permitting under the PSD program, including application of BACT and a NAAQS compliance demonstration. If an area is designated "nonattainment" for a given pollutant, then major sources, or major modifications of existing sources, of the nonattainment pollutant would be subject to NNSR. The NNSR regulations have more stringent requirements for source emission rates and require the source to obtain emission reduction credits (ERCs) to "offset" the potential emissions of the Project. ERCs are enforceable commitments by an existing source to permanently reduce emissions (on a ton per year basis) for the specific nonattainment pollutant. The NNSR regulations also require the use of Lowest Achievable Emission Rate (LAER), as discussed in Section 6.1.2 below.

The Oswego area in the New York Central Air Quality Control Region (NYSDEC Region 7) is either attainment or unclassified for SO_2, NO_2, CO, Pb, and is projected to be attainment for PM_{10}; it is therefore, treated as in attainment for PM_{10}. Although the area is attainment for ozone, Oswego, along with the entire state of New York, is located in the Northeast Ozone Transport Region (NOTR), and is treated as moderate non-attainment for ozone.

In order to identify those new sources with the potential to impact ambient air quality, the NYSDEC and the EPA have adopted SILs for NO_2, SO_2, CO and PM_{10} (see Table 6-1). New or modified sources, that have maximum predicted air quality impacts that exceed the SILs, require a more detailed assessment of compliance with the ambient air quality standards. This more detailed assessment requires consideration of the combined impacts of the new source, existing sources, and measured background levels. According to the NYSDEC and the EPA, sources with impacts below SILs do not warrant such an assessment.

In order to compare predicted concentrations associated with Project operation to SILs, dispersion modeling was performed to predict ambient pollutant concentrations for receptors within a 20-kilometer (km) radius of the Project site. These results, as documented in Section 6.7 of this Application, demonstrate that the predicted concentrations from the Project are less than the SILs in all cases.

6.1.2 Nonattainment New Source Review

The Clean Air Act Amendments of 1990 (CAAA) define several nonattainment classifications for ozone based on the frequency of exceedances and concentration of ozone monitored in a region. The NYSDEC and EPA consider ozone a secondary pollutant formed by the interaction of VOC and NO_x in the atmosphere. The NYSDEC and EPA regulate VOC and NO_x as nonattainment pollutants under the ozone standard since they are precursors of ozone. Because the entire state of New York is part of the NOTR, Oswego County is treated as a "moderate" nonattainment area.

New York's NNSR program promulgated under 6 NYCRR Part 231 requires that new major sources in the Oswego area perform the following:

- Install LAER controls for subject pollutants (NO_x and/or VOC); and
- Obtain ERCs to offset potential emissions for each applicable nonattainment pollutant (NO_x and/or VOC). As delineated under Subpart 231-2.15, projects located in the NOTR must secure ERCs at a ratio of 1.15:1.

6 NYCRR Part 231-1.3 also requires that an applicant certify that all major sources located in New York State and under the applicant's ownership or control (or under the ownership or control of any entity which controls, is controlled by, or has common control with the applicant) are:

1. In compliance with all applicable air pollution control regulations; or
2. Are meeting the terms of any administrative order or court decree.

NNSR review thresholds depend on whether the Project qualifies as the same source or as a separate source with respect to the existing Independence Station. The Project and Independence Station are owned and controlled by separate entities. Therefore, for air regulatory purposes, the Project is considered a separate source at the time of this Application. However, the future operation of the two facilities may be integrated. Therefore, the Project proposes to be evaluated under the more stringent of either new source or major modification criteria. The major modification criteria are generally more stringent. This issue is discussed in more detail in Section 6.1.4 of this Application.

The existing Independence Station is a major source of both NO_x and VOC, with potential emissions of NO_x exceeding 100 tons per year (tpy) and VOC exceeding 50 tpy. The NO_x emissions from the Project will meet the threshold criteria as a major modification of NO_x, with potential emissions exceeding 40 tpy. The Project will not meet the threshold criteria as a major modification for VOC, since potential emissions of VOC will be less than 40 tpy.

The NNSR regulations (6 NYCRR Part 231) are in the process of being revised to incorporate changes made necessary by implementation of the Title V program and other requirements of the CAAA. The final draft is now with the Governor's Office of Regulatory Reform for final review, public notice and subsequent approval. Promulgation of the modified Part 231 regulations is expected to be in 2000.

6.1.3 Prevention of Significant Deterioration Review

PSD review is a federally mandated program for new major sources of regulated pollutants and major modifications to existing major sources. The existing Independence Station is a major PSD source. The thresholds that trigger PSD depend on whether the Project qualifies as the same source or as a separate source with respect to the existing Independence Station. As discussed in Section 6.1.4, the Project is being treated as a major modification to Independence Station. Therefore, the proposed Project is a major modification at an existing major source on a pollutant-specific basis if emissions increase by greater than the following significant PSD pollutant emission rates: 100 tpy for CO; 40 tpy for NO_x or SO_2; 25 tpy for particulate matter (PM); 15 tpy for PM_{10}; 0.6 tpy for Pb; or 7 tpy for sulfuric acid mist (H_2SO_4). Federal regulations stipulate that major modifications must apply BACT for control of PSD-applicable pollutants.

6.1.4 Potential Emissions and PSD/NNSR Applicability Summary

This section discusses the Project as related to applicability thresholds for PSD and nonattainment new source review.

6.1.4.1 Source Classification

In order to determine the Project's applicability status, it is necessary to determine whether the proposed Project and the existing Independence Station qualify as part of the same source for air regulatory purposes. There are three basic criteria that determine whether two different activities qualify as the same source for air permitting and regulatory purposes. These criteria are: 1) the activities are part of the same industrial grouping; 2) the activities are located on contiguous properties; and 3) the activities are under common control. The activities must satisfy all three criteria in order to be considered as part of the same source.

The Project and Independence Station will satisfy the first two criteria, in that they are both part of the same industrial grouping (power generation) and are located on contiguous properties. Industrial grouping is determined by the first two digits of the Standard Industrial Classification (SIC) code. The existing Independence Station is a cogeneration qualifying facility (QF) under FERC regulations, in that it generates electricity as well as supplies steam to an industrial operation. Heritage Station will not be a QF, but will strictly be a "merchant" electric power generating facility. However, both cogeneration facilities and electric generating facilities fall under the two-digit SIC code "49" for power generation.

With respect to the third criterion (common control), Heritage Power LLC is a separate entity from Sithe Independence Power Partners, L.L.P. Therefore, under the regulatory definition of "source," the Project and Independence Station are currently separate sources. However, in order to not place constraints on the future ownership and management structure of the Project, the Applicant is proposing to use the more stringent of the separate source or single source modification criteria for air regulatory applicability evaluations. In general, the single source modification criteria are more stringent and are used as the basis of the applicability evaluations below.

6.1.4.2 PSD/NNSR Applicability

Table 6-2 summarizes the potential annual emissions from the Project in comparison to PSD/NNSR applicability criteria (see the detailed discussion of BACT in Section 6.3). Heritage Station may in the future be equipped with an evaporative cooler that may be used during periods of warmer weather to chill the inlet air. Use of this cooler would tend to lower the effective annual average temperature of the inlet air to the turbine. In order to allow for this potential effect, the turbine heat input rates at 100 percent load have been increased by 5 percent. This value is a reasonable conservative estimate to account for the effect of decreasing the effective annual average temperature condition. For comparison, the final heat input rate at 100 percent load increases approximately 4 percent between 47°F, based on vendor performance data.

The potential emissions for the auxiliary boiler and emergency diesel generator are based on a maximum proposed operation for these units of no more than 500 hours and 300 hours, respectively, per rolling 12-month period.

Table 6-2: Project PSD/NNSR Applicability Determination

Pollutant	Potential Maximum Annual Emissions from Heritage Station[(1)] (tpy)	PSD Significant Emission Rate (tpy)	NNSR Significant Emission Rate (tpy)
NO_x	202	40	40
VOC	37	40	40
CO	372	100	N/A
TSP/PM_{10}	211[2]	25/15	N/A
SO_2	55	40	N/A
H_2SO_4	8.4	7	N/A
Other PSD pollutants[(3)]	None expected	Varies	N/A

(1) Includes potential emissions from turbines, auxiliary boilers and emergency diesel generator.

(2) Includes 8.5 tpy from cooling tower drift.

(3) Includes lead, vinyl chloride, asbestos, fluorides, hydrogen sulfide, total reduced sulfur and reduced sulfur compounds.

N/A – not applicable

The existing Independence Station is a major source of both NO_x and VOC, with potential emissions of NO_x exceeding 100 tpy and VOC exceeding 50 tpy. The Project will meet the threshold criterion as a major modification of NO_x, with potential emissions exceeding 40 tpy. The Project will not meet the threshold criterion as a major modification for VOC, since potential emissions of VOC will be less than 40 tpy.

Since the existing Independence Station is a major PSD source, and the proposed Project will exceed the PSD Significant Emission Rate for NO_x, SO_2, PM, PM_{10}, CO, and H_2SO_4, it will, therefore, be categorized as a major modification of an existing major source for these pollutants. Federal regulations stipulate that major modifications must apply BACT for control of PSD-applicable pollutants. The Project will, therefore, be subject to PSD review of NO_x, SO_2, PM/PM_{10}, CO, and H_2SO_4.

6.1.5 New Source Performance Standards

The NSPS regulate pollutant emissions from given processes. For combustion sources, emission standards are typically expressed in terms of mass pollutant emissions per unit of fuel combusted, fuel quality, or exhaust gas concentration. The EPA has established NSPS for various categories of new sources. 40 CFR 60 Subpart GG "Standards of Performance for Stationary Gas Turbines" and Subpart Db "Standards for Industrial/Commercial/Institution Steam Generating Units" apply to the Project.

The Project will easily comply with the NSPS Subpart GG emission limit requirements. Project NO_x emissions of 2.0 ppmvd at 15 percent O_2 will be well below the NSPS limit, which is a nominal 75 parts per million (ppm). The NSPS Subpart GG also limits SO_2 emissions by limiting fuel sulfur content to less than 0.8 percent by weight. The Project will meet this limit through the exclusive use of natural gas which has a sulfur content well below 0.8 percent by weight.

Under the NSPS Subpart GG requirements, compliance emission testing for each unit is required within 60 days of achieving maximum production rate, but no later than 180 days after initial startup. The Project will be the first commercial installation of GE's H-system turbine. The initial testing and commissioning of the H-system turbine will therefore be significantly more extensive than is typically required for a combustion turbine combined-cycle facility. For this reason, the Applicant is requesting that an initial commissioning and testing period of 1 year be granted for the Project prior to the requirement for compliance stack tests. After the compliance stack tests, the routine compliance mechanisms of the permit will take effect.

The auxiliary boiler (163 million British thermal units per hour [MMBtu/hr]) is in the size range of boilers subject to the NSPS for Industrial/Institutional Boilers under 40 CFR 60 Subpart Db. However, for a natural gas-fired unit, with a restriction on the annual capacity factor of less than or equal to 10 percent, there are no applicable limits under Subpart Db. The Applicant proposes to restrict operation of the Project's auxiliary boiler to no more than 500 hours per year operation (annual capacity factor of less than 6%). Therefore, the auxiliary boiler will not be subject to any emission limits under Subpart Db. The new auxiliary boiler will be equipped with a low NO_x burner unit with flue gas recirculation, which will have a maximum emission rate of 0.036 pounds per million British thermal units (lb/MMBtu). This rate is only 18 percent of the limit that applies to units of this type and size under Subpart Db.

There are no NSPS requirements for internal combustion engines applicable to the emergency diesel generators.

6.1.6 *Acid Rain Program (40 CFR 72 and 75)*

According to 40 CFR 72, the Project will be a Phase II Acid Rain "New Affected Unit" 90 days after commencement of commercial activities. An application for the Project's acid rain permit will be submitted, as required. As one feature of the Acid Rain Program, EPA established a program to reduce SO_2 emissions from existing power plants by allocating a limited number of marketable allowances primarily to existing power plants, and by requiring all plants, including new plants that were not allocated allowances, to hold or obtain allowances to offset their actual annual SO_2 emissions. Allowances are available through the Chicago Board of Trade and other sources, and will be secured by the Project in the amount required.

In accordance with 40 CFR 72, the Project will have a Designated Representative (DR) and install a CEMS. The DR will be responsible for submitting required permits, compliance plans and emission monitoring reports, offset plans, and compliance certifications; and will be the responsible official with regard to all matters under the Acid Rain program. The CEMS will meet the requirements specified in 40 CFR 75 for monitoring SO_2 and NO_x emissions. As an option, natural gas-fired facilities may conduct fuel sampling analysis and fuel flow monitoring in place of SO_2 continuous emissions monitoring and flue gas flow monitoring. CO_2 emissions may be calculated with EPA-specified factors.

6.1.7 *New York State Air Regulations*

6.1.7.1 *Fuel Sulfur Content – 6 NYCRR Subpart 225-1.2*

Natural gas will be the sole source of fuel for the main facility components (the combustion turbines and auxiliary boiler) at the Project. Therefore, the NYSDEC fuel sulfur limits in oil and solid fuels do not apply to these units. The emergency diesel generator will fire No. 2 diesel fuel oil and meet the fuel sulfur limits specified in 6 NYCRR Subpart 225-1.

6.1.7.2 *Particulate Matter Emissions – 6 NYCRR Subpart 227-1.2*

6 NYCRR Subpart 227-1.2 limits particulate matter emissions from stationary combustion projects that fire oil or solid fuels. Since the turbines and auxiliary boiler will operate exclusively on natural gas, the particulate emission-rate limitations of this subpart do not apply to these units. The emergency diesel generator is underneath the size threshold of 227-1.2. Particulate matter emissions from the Project will be limited based upon the results of the BACT analysis required under the PSD program.

6.1.7.3 Opacity - 6 NYCRR Subpart 227-1.3

Under this subpart, stationary combustion installations shall not have opacity emissions that exceed 20 percent opacity (6 minute average) except for one 6 minute period per hour that may not exceed 27 percent opacity. The Project will comply with these opacity limits by firing natural gas as the only fuel in the turbines and auxiliary boiler and by using good combustion practices.

6.1.7.4 NO_x RACT (Reasonably Available Control Technology) – 6 NYCRR Subpart 227-2

Under this subpart, NO_x emissions from natural gas-fired combined-cycle combustion turbines are limited to 42 ppmvd at 15 percent O_2. Additionally, NO_x emissions must be continuously monitored with an approved CEMs. The Project is subject to LAER controls for NO_x emissions because it will have potential emissions greater than 100 tpy and is located in an ozone nonattainment area. The anticipated LAER NO_x emission rate for the turbines is 2.0 ppmvd at 15 percent O_2 which is well below the NYSDEC NO_x RACT limit. The Project will install and operate a NO_x CEMs that complies with 6 NYCRR Subpart 227-2.6.

6.1.7.5 NO_x Budget Program – 6 NYCRR Subpart 227-3

The Project will be subject to the NYSDEC NO_x Budget Rule. This is a NO_x allowance program designed to limit state-wide NO_x emissions during the 5 month ozone season (from May through September). As a new budget source that begins operation after May 1, 1999, the Project will receive each year a quantity of NO_x allowances from the state's New Budget Source Holding Account equal to the previous ozone season's actual NO_x emissions. In the event that there are not sufficient allowances in the New Budget Source Holding Account to cover the source's actual emissions, then sufficient allowances will be secured in each unit's account to cover actual emissions.

6.1.7.6 Title V Operating Permits – 6 NYCRR Subpart 201-6

The NYSDEC has promulgated permit regulations in accordance with the requirements of the Title V Operating Permit program of the CAAA of 1990. The Operating Permit program has been promulgated under 6 NYCRR Part 201 and requires a Title V Facility Permit. This Title V Facility Permit serves as both the pre-construction and operating permit in the NSR and PSD programs for major sources.

The Project will be subject to New York State's Title V Operating Permit Program. As a new stationary source, the Project will be required to submit a Title V permit application within 1 year after the commencement of operation. The requirements for a complete application are included in 6 NYCRR Parts 200 and 201 as well as 6 NYCRR Part 621 (Uniform Procedures).

The NYSDEC Air Permit Application forms are provided in Appendix H.1.

6.1.7.7 Nonattainment NSR – 6 NYCRR Subpart 231

The NNSR regulations are in the process of being revised to incorporate changes made necessary by implementation of the Title V program and other requirements of the CAAA. Promulgation of the modified Part 231 regulations is expected to be promulgated later in 2000. The Project will be subject to, and comply with, the final New York NNSR regulations.

6.1.7.8 New York Air Toxics Program

The NYSDEC has developed a policy (Air Guide 1) that provides guidelines for the control of toxic ambient air contaminants. Air Guide 1 requires each project to provide an assessment of the ambient air quality impacts for air toxics that may be emitted. The predicted short- and long-term impacts are then compared to the short- and long-term guideline concentrations (SGC and AGC) identified in Air Guide 1.

In addition, pursuant to Stipulation No. 1, Clauses 3(e) and 3(f), the NYSDOH has requested assessment of health based impacts for emissions of air toxics. Specifically, the NYSDOH has requested that an annual average emissions concentration be developed which correlates to a one-in-a-million increased lifetime cancer risk for carcinogens and a reference concentration for non-carcinogens. For each air toxic contaminant expected to be emitted from the Project, the health based annual emissions concentration have been developed utilizing the following resources:

- EPA's Integrated Risk Assessment System (IRIS);
- EPA's Annual Health Effects Summary Tables (HEAST);
- EPA's National Center for Environmental Assessment (NCEA); and
- U.S. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR).

6.1.7.9 New York Acid Deposition Control Act (ECL 19-1901)

The Project will be subject to the state's Acid Deposition Control Act. The Act requires that a proposed facility quantify the facility's contribution to the New York State total deposition of sulfates and nitrates. This assessment will be performed according to the guidelines specified in a March 4, 1993 memorandum from Leon Sedefian to Impact Assessment Meteorology (IAM) Staff.

In general, pursuant to Stipulation No. 1, Clauses 2(p) and 2(q), the assessment approach is based upon previous model results performed by the NYSDEC. The approach uses source (emission rate) receptor (deposition rate) matrices to scale the proposed source's potential impacts. Modeled sources that are spatially appropriate are first identified. The ratio of Project emissions to model source emissions are then multiplied by the depositions predicted for the modeled source at each receptor location to assess the impacts.

6.2 Baseline Ambient Air Quality, Meteorology, and Climatology

This section provides information about climate, pursuant to Stipulation No. 1, Clauses 2(a) and 2(b). The Project site is located on the south shore of Lake Ontario approximately 2 miles east-northeast of the city of Oswego. The area in and around the Project site and Oswego is relatively flat.

The Project area is located in the path of the "prevailing westerlies" and can be classified as northern continental. The area, however, also experiences the influence of Lake Ontario. Thus, winters are usually cold and feature the presence of "lake-effect" snows. Summers generally include warm afternoons and cool evenings. Precipitation is distributed relatively evenly throughout the year.

Climatological data for the Oswego area are summarized below. These data were taken from the National Climatic Data Center's (NCDC) document "*Climate of New York*" (NCDC 1982).

The PSD regulations may involve the collection of preconstruction monitoring data for meteorology and/or air quality on a project-specific basis. A preconstruction monitoring waiver request was submitted for approval, and a waiver was received dated January 12, 2000. This waiver request and waiver approval may be found in Appendix H.2.

6.2.1 Precipitation

Average annual precipitation in the Project area is 37.54 inches. As noted above, precipitation amounts are relatively consistent from month to month, ranging from 2.36 inches in July to 4.02 inches in November. Table 6-3 presents monthly average, monthly maximum and greatest daily precipitation amounts based on years of record 1953-1973 at Oswego East, New York.

The primary snow season extends from November through March, with February typically the month of both maximum snowfall and depth of snowpack. The greatest maximum monthly snowfall was 94.1 inches in February 1972 and the greatest snow depth was reported as 78 inches in 1966.

Table 6-3: Precipitation – Averages and Extremes (inches)

Month	Mean Monthly	Maximum Monthly	Greatest Daily
January	2.84	4.95	1.10
February	3.17	5.82	2.15
March	2.64	5.75	3.69
April	3.27	5.74	1.45
May	3.17	5.19	1.60
June	2.90	4.42	2.07
July	2.36	4.89	2.54
August	2.89	4.97	2.14
September	3.16	5.19	2.55
October	3.39	10.10	2.70
November	4.02	9.03	3.25
December	3.73	6.68	2.30

6.2.2 Temperature

The average annual temperature for the Oswego area is 47.4°F. The coldest months are December through February, with an average temperature of 26.1°F during this period. The average temperature for the warmest 3-month period, June through August, is 67.8°F. Table 6-4 provides monthly averages of maximum, mean, and minimum temperatures.

Table 6-4: Monthly Average Temperatures and Extremes

Month	Daily Maximum (°F)	Daily Minimum (°F)	Daily Mean (°F)
January	30.5	17.2	23.9
February	31.7	18.6	25.2
March	38.8	26.5	32.7
April	51.5	36.6	44.1
May	62.7	45.7	54.2
June	72.9	55.7	64.3
July	78.2	62.0	70.1
August	76.9	61.0	69.0
September	70.8	54.7	62.8
October	60.4	45.1	52.7
November	46.8	35.2	41.0
December	35.0	23.5	29.3

6.2.3 Winds

Figure 6-1 shows the frequency distribution of wind speed and direction for the Project area for the period of 1985 through 1989. The data show a strong persistence of winds from the west, west/southwest, and south.

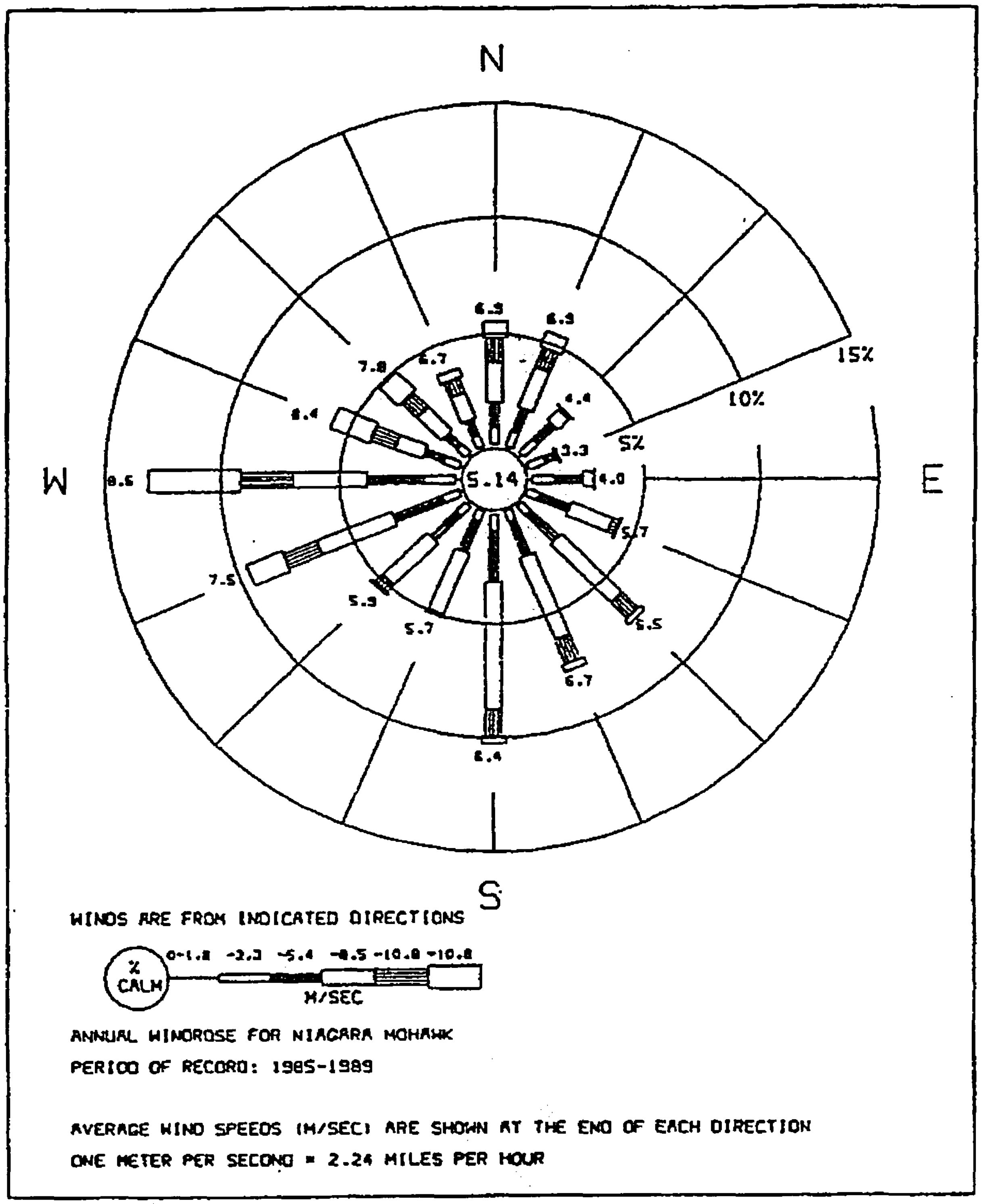


Figure 6-1: Annual Windrose Diagram for Nine Mile Point Station (1985-1989)

6.2.4 *Background Air Quality*

The NYSDEC collects air quality data (ambient pollutant concentrations) at numerous monitoring stations throughout the state.

Pursuant to Stipulation No. 1, Clauses 2(a) and 2(b) and consistent with the Air Modeling Protocol (provided in Appendix A), air quality data collected from NYSDEC monitoring stations closest to the Project site were used to characterize existing air quality conditions in the study area. Most data used were from the Syracuse area, approximately 38 miles south of the Project site. For cases where data were not collected in Region 7, data from either the Rochester area or Albany area are presented. The monitoring stations used for each pollutant are summarized in Table 6-5. The latest three years of data available from the NYSDEC's Air Quality Reports (1996 through 1998), for each of these sites, are presented in Table 6-6. Based on these monitoring data, Table 6-6 also presents proposed background air quality levels for the Project.

6.2.5 *Air Quality Trends*

The 1997 Air Quality Report issued by NYSDEC Air Resources describes recent trends in air quality. The O_3 concentrations (design values) have steadily declined since the 1980s. Ambient SO_2 levels remain well below the annual standard and all sites are in compliance with the short-term (3-hour and 24-hour) standards. One-hour and 8-hour CO concentrations have generally declined during the past few years. PM_{10} levels have remained relatively stable over the past few years, well below the NAAQS.

Table 6-5: Regional NYSDEC Air Quality Monitoring Stations

Pollutant	Monitoring Station	Approximate Distance from Project
O_3	East Syracuse (3353-09N)	38 miles
SO_2	East Syracuse (3353-09N)	38 miles
NO_2	Loudonville/Albany (0101-33)	160 miles
CO	Syracuse (3301-22)	36 miles
PM_{10}	Maximum from Syracuse Area Sites	36 miles
TSP	Rochester (2701-04)	65 miles
Pb	Rochester (2701-18N)	65 miles

Table 6-6: Summary of NYSDEC Regional Air Quality Monitoring Data

Pollutant	Averaging Period	1996	1997	1998	Background (ppm)	NAAQS ($\mu g/m^3$)
Ozone (ppm)	1-hour	0.088	0.102	0.092	0.102 (200 $\mu g/m^3$)	235
SO_2 (ppm)	3-hour	0.020	0.026	0.018	0.026 (67.8 $\mu g/m^3$)	1,300
	24-hour	0.012	0.014	0.009	0.014 (36.5 $\mu g/m^3$)	365
	Annual	0.003	0.002	0.002	0.003(7.8 $\mu g/m^3$)	80
NO_2 (ppm)	Annual	0.015	0.014	0.015	0.015 (28.3 $\mu g/m^3$)	100
CO (ppm)	1-hour	7.8	7.9	6.0	7.9 (9,029 $\mu g/m^3$)	40,000
	8-hour	3.9	4.0	3.0	4.0 (4,582 $\mu g/m^3$)	10,000
PM_{10} ($\mu g/m^3$)	24-hour	61	55	62	62 $\mu g/m^3$	130
	Annual	26	25	27	27 $\mu g/m^3$	50
TSP ($\mu g/m^3$)	24-hour	53	NA	NA	53 $\mu g/m^3$	250
	Annual	34	NA	NA	34 $\mu g/m^3$	75
Pb ($\mu g/m^3$)	Quarterly	0.03	NA	NA	0.03 $\mu g/m^3$	1.5

Source: NYSDEC's Air Quality Reports (1996 through 1998).

Note: Concentrations for short-term averaging periods (24-hour and less) are based on highest second-highest measured concentrations.

6.3 Control Technology Evaluation – BACT/LAER

This section presents an analysis of Project emissions and controls, pursuant to Stipulation No. 1, Clause 2(e), including BACT and LAER analyses for applicable pollutants. As was discussed in Section 6.1.4.2, LAER is required for emissions of NO_x and BACT is required for emissions of NO_x, CO, PM/PM_{10}, SO_2, and H_2SO_4. The evaluation of LAER for NO_x under NNSR regulations is also included in this section, since it is integral to the central technology evaluation for NO_x.

6.3.1 Regulatory Definitions

6.3.1.1 LAER

LAER is defined by 40 CFR 52 and 6 NYCRR Part 231 as either:

A. *The most stringent emission limitation which is contained in the Implementation Plan of any state for that class or category of source, unless the owner or operator of the proposed source demonstrates that those limitations are not achievable; or*

B. *The most stringent emission limitation that is achieved in practice by that class or category of source, whichever is more stringent. In no event may LAER result in emission of any pollutant in excess of those standards and limitations* *promulgated pursuant to Section 111 or 112 of the United States Clean Air Act as amended, or any emission standard promulgated by the Department.*

The LAER analysis follows a "top-down" approach similar to the BACT approach with identification of the most efficient technology. In the case of LAER, however, more effective control technologies cannot be eliminated on the basis of economics.

6.3.1.2 BACT

40 CFR 52 defines BACT as "an emission limitation based on the maximum degree of reduction for each air pollutant subject to regulation that would be emitted from any proposed major stationary source or major modification, taking into account energy, environmental and economic impacts, and other costs. The BACT shall be verified on a case-by-case basis by the Regional Administrator of EPA and may include reductions achieved through the application of processes, systems, and techniques for the control of each air pollutant."

The Applicant conducted a "top-down" approach to determine BACT. First, control technology alternatives were identified for each pollutant. Technically infeasible technologies were eliminated and remaining technologies ranked by control efficiency. These technologies were then evaluated based on economic, energy and environmental impacts. If an alternative, starting with the most stringent, was eliminated based on these criteria, the next most stringent technology was evaluated until BACT was selected.

BACT is an emission rate that may be achieved from one or the combination of: (1) a change in the raw material processes; (2) a process modification; and (3) add-on controls.

Change in Raw Materials

This emissions-limiting technique typically applies to industrial processes that use chemicals, such as solvents, where substitution with a lower emitting chemical may be technically feasible. In the case of the proposed Project, the "raw material" is a fuel to be combusted for the generation of electricity. The only fuel proposed for this Project is natural gas, which is a cleaner burning fuel than coal or oil.

Process Modifications

Process modifications may be considered if a change in the process methods or conditions can result in lower emissions. In the case of the Project, the "process" is a combustion turbine firing natural gas, exclusively. The Project consists of two power blocks. Each power block incorporates a single shaft combined-cycle configuration with one GE STAG 107H system, including one combustion turbine, one HRSG, and one GE steam turbine generator. The proposed combined-cycle configuration is among the most efficient fossil fuel power plant designs available, therefore, process modifications were not considered.

Add-on Controls

For many processes add-on control equipment is available that can reduce pollutant emissions. Common examples of add-on controls for fossil fuel fired power plants include acid gas scrubbers, reduction catalysts, oxidization catalysts, flue gas recirculation, and reagents. The BACT analysis for each individual pollutant considers add-on controls where available and necessary to achieve BACT.

6.3.2 BACT/LAER Approach

In determining BACT or LAER, EPA's recommended sources of information for BACT were evaluated:

- Preconstruction permits recently issued in Northeastern United States for other similar sources;
- Emission limits proposed in state or federal regulations; and
- Levels "demonstrated in practice" at other facilities as determined by other agencies, including review of the EPA's RACT/BACT/LAER Clearinghouse (RBLC).

A "top-down" approach was implemented to determine BACT. All alternative raw materials, process modifications and add-on control techniques were reviewed for each pollutant. Technically unfeasible alternatives were eliminated and remaining alternatives were ranked by control efficiency. These technologies were then evaluated based on economic, energy and environmental impacts. If an alternative, starting with the most stringent, was eliminated based on these criteria, then the next most stringent technology was evaluated until BACT was selected. A formal BACT analysis was not performed on those pollutants where Project emissions will be less than recently permitted levels for other, similar projects.

The following sections present the results of the evaluation to determine BACT and LAER, focusing on the recently issued permits for similar facilities, and levels "demonstrated in practice" at other facilities, including review of the EPA's RBLC.

Table 6-7 provides a summary of the available emission information for representative projects in Northeastern United States. All of the projects in Table 6-7 were subject to NO_x LAER or BACT.

Table 6-7: Recent LAER/BACT Emission Limits for Natural Gas-Fired Combined-Cycle Power Plants – Northeastern United States

				Emission Limits[1],[2]					
Facility	Location	Permit Date	Nominal Capacity (MW)	NO_x (ppm)	CO (ppm)	VOC (ppm)	PM (lb/MMBtu)	SO_2 (lb/MMBtu)	Controls
Brooklyn Navy Yard Cogen.	New York City, NY	8/23/93	286	3.5 LAER	4 LAER	1.6	0.004	NA	SCR, CO catalyst
Berkshire Power	Agawam, MA	9/22/97	272	3.5 LAER	4 (100%) 10 (75%) 20 (50%)	4 (100%) 6 (75%) 6 (50%)	0.0105	0.0023	SCR, CO catalyst
Dighton Power	Dighton, MA	10/6/97	170	3.5 LAER	2 (100%) 6 (75%)	3 (100%) 6 (75%)	0.0105	0.0023	SCR, CO catalyst
Millennium Power	Charlton, MA	1/29/98	360	3.5 LAER	4 (100%) 4 (75%) 30 (50%)	1 (100%) 1 (75%) 3 (50%)	0.005	0.0023	SCR, CO catalyst
Tiverton Power	Tiverton, RI	2/13/98	265	3.5 LAER	12	2	0.009	0.006	SCR catalyst
Gorham Energy	Gorham, ME	12/4/98	870	2.5 LAER	5	1.3	0.009	0.0023	SCR, CO catalyst
Milford Power	Milford, CT	4/16/99	544	2.0 LAER	3.0 (100%) 20 (75%)	1.2	0.011	0.0022	SCR, CO catalyst
Lake Road Generating	Killingly, CT	6/22/99	792	2.0 LAER	3.0 (100%) 4.0 (75%) 20.0 (50%)	1.1	0.01	0.0022	SCR, CO catalyst
ANP Blackstone	Blackstone, MA	4/16/99	580	2.0 3.5 (SI)[3] 2.3 (rolling 12 mo.) LAER	3.0 (100%) 4.0 (75%) 20.0 (50%)	1.4 (100-75%) 2.5 (50%) 3.5 (SI)[3]	0.012	0.0023	SCR, CO catalyst
ANP Bellingham	Bellingham, MA	7/30/99	580	2.0 3.5 (SI)[3] 2.3 (rolling 12 mo.) LAER	3.0 (100%) 4.0 (75%) 20.0 (50%)	1.4 (100-75%) 2.5 (50%) 3.5 (SI)[3]	0.012	0.0023	SCR, CO catalyst
AES Londonderry	Londonderry, NH	4/26/99	720	2.5 LAER	15.0	1	0.004	0.0023	SCR
Newington Energy	Newington, NH	4/26/99	525	2.5 LAER	15.0	1.5	0.015	0.0036	SCR
Casco Bay Energy	Veazie, ME	4/19/99	340	3.5 LAER	20	1	NA	0.006	SCR
Westbrook Power	Westbrook, ME	12/4/98	528	2.5 LAER	15.0	1.2	0.011	0.006	SCR
Sithe Mystic	Everett, MA	1/25/00	1,550	2.0 BACT	2.0	1.0 unfired 1.7 (duct fired)	0.011	0.0029	SCR, CO catalyst
Athens Generating Co.	Athens, NY	1/25/00	1,080	2.5 (interim) 2.0 (final)	15.0 (100%) 30.0 (75%)	Not a PSD Condition	0.011	0.007	SCR

[1] Concentration in ppm is parts per million by volume, dry, at 15 percent O_2.

[2] Concentration in lb/MMBtu is pounds per million Btu heat input (HHV).

[3] SI refers to steam injection for power augmentation.

6.3.3 NO_x LAER

This section presents a LAER determination for NO_x by reviewing existing permit limits and alternative add-on controls for NO_x emissions as well as NSPS.

6.3.3.1 Combustion Turbines

Existing Permit Limits

This section evaluates NO_x emission levels reported to be "demonstrated in practice" at gas turbine combined-cycle generating facilities. This evaluation has focused on reported NO_x emission levels less than 3.5 ppm firing natural gas, since it is clear that NO_x emission levels of 3.5 ppm have been demonstrated in practice and are established by precedent for other recently permitted facilities in the Northeast. This evaluation has focused on projects greater than 100 MW in capacity. Such projects are identified in Table 6-7.

The Brooklyn Navy Yard Cogeneration Project was the first large gas turbine combined-cycle unit in the Northeastern United States subject to NO_x LAER, and has been operating for several years at 3.5 ppm of NO_x.

Since mid-1997, there have been 15 combined-cycle facilities (6 in Massachusetts, 2 in Connecticut, 2 in New Hampshire, 1 in Rhode Island, 1 in New York and 3 in Maine) that have been issued NO_x LAER approvals. A final PSD approval was also issued recently in Massachusetts for a facility subject to state BACT for NO_x. One of these recently permitted facilities has also begun operation.

Dighton Power Associates has completed construction of a 170 MW combustion turbine combined-cycle facility in Dighton, Massachusetts that was issued an approval dated October 6, 1997. Dighton Power is fired with natural gas as the sole fuel. The Dighton Power approval has a NO_x limit of 3.5 ppm. Stack testing was completed in early July 1999, and compliance with the 3.5-ppm limit was demonstrated.

The Berkshire Power Project, currently in testing and startup at a site in Agawam, Massachusetts, is a nominal 272 MW combustion turbine combined-cycle facility based on a single ABB Model GT24 gas turbine. The Berkshire Power Project will use natural gas as the primary fuel. The Berkshire Power Project Approval has NO_x limits of 3.5 ppm during natural gas firing. The Berkshire Power Project Approval was issued on September 22, 1997. The facility has not completed compliance testing so these limits have not been demonstrated in practice.

The Millennium Power Project, currently in the final stages of construction on a site in Charlton, Massachusetts, will consist of a nominal 360 MW combustion turbine combined-cycle facility based on a single Westinghouse Model 501G gas turbine. The Millennium Power Project will use natural gas as the primary fuel. The Millennium Power Project Approval, issued on January 29, 1998, has a NO_x limit of 3.5 ppm during natural gas firing. The facility has not completed compliance testing so these limits have not been demonstrated in practice.

The Tiverton Power Associates facility is a proposed 265 MW combustion turbine, combined-cycle facility to be located in Tiverton, Rhode Island. Tiverton Power Associates was issued an Approval on February 13, 1998. Tiverton Power will be fired with natural gas as the sole fuel. The Tiverton Power Approval also has a NO_x limit of 3.5 ppm. The facility has not completed compliance testing so these limits have not been demonstrated in practice.

Since December 1998, there have been a number of PSD approvals for combined-cycle units in the Northeast with limits of 2.5 and 2.0 ppm of NO_x. These approvals include the ANP Gorham (Maine) Energy Project, Westbrook (Maine) Power, the Newington Energy (New Hampshire) Project, and the AES Londonderry (New Hampshire) Project, all approved at 2.5 ppm for gas firing. The Milford Power (Connecticut) project and the Lake Road Project in Killingly (Connecticut) were both recently approved at 2.0 ppm (gas firing). The Massachusetts Department of Environmental Protection recently approved both the ANP Blackstone Energy Project and the ANP Bellingham Energy Project at NO_x limits of 2.0 ppm (gas firing) without steam injection for power augmentation, and 3.5 ppm (gas firing) with steam injection for power augmentation. The annual average NO_x emissions approved for both ANP Blackstone and ANP Bellingham correspond to 2.3 ppm. The Mystic Station Redevelopment Project in Massachusetts was also recently issued an Approval with a state-level BACT limit for NO_x of 2 ppm. None of these units are operating and the emission rates have not yet been demonstrated in practice.

The only recent NO_x LAER approval for a combined-cycle facility in New York is for the Athens Project. The NO_x limits for Athens include an interim limit for the first 12 months of operation of 2.5 ppm, with a final limit of 2.0 ppm.

Process Changes

Since the Project will fire natural gas exclusively in advanced DLN combustors, no changes in raw materials or process modifications were considered.

Add-on Control Technologies

Following is a discussion of add-on NO_x control technologies that have been applied to combustion turbines.

Selective Catalytic Reduction

In addition to DLN combustors, the Project proposes to add-on SCR in the HRSG. NO_x emissions from the combustion turbines will be controlled by the SCR system to 2.0 ppm over a 3-hour averaging period, which is lower than any emission rate actually demonstrated in practice at any unit of this size; therefore, it clearly satisfies LAER. This is equivalent to the final NO_x limit approved for the Athens Project and lower or equal to the limits approved for all recently permitted natural gas-fired combined-cycle plants in the Northeast. SCR is the most advanced control technology currently available that has been demonstrated in practice to control NO_x emissions from combined-cycle gas turbines greater than 100 MW in capacity.

$SCONO_x$™ Review

There is an experimental new NO_x control technology known as "$SCONO_x$". $SCONO_x$ is a trade name for a proprietary NO_x control technology being marketed by Goal Line Technologies. EPA Region IX issued a letter (dated March 23, 1998) indicating that emissions data from Sunlaw's 32 MW Federal Cogeneration facility in Vernon, California (a 22 MW LM2500 plus steam turbine) has "demonstrated in practice" NO_x emissions at or below 2.0 ppm (3-hour average) for the period from June 28, 1997 to December 28, 1997 using $SCONO_x$. Although this letter is not a "Federal LAER determination," the letter does state that future projects subject to LAER should evaluate this experimental technology for feasibility of application. The South Coast Air Quality Management District of California also recently adopted (effective June 12, 1998) a new "BACT" guideline for gas turbines in its district equal to 2.5 ppm NO_x (1-hour average) at 15 percent O_2 based on $SCONO_x$ technology.

The Environmental Systems division of ABB Alsthom Power (ABB) is the licensee for $SCONO_x$ systems on combustion turbine units over 100 MW. On December 1, 1999, ABB issued a press release announcing the commercial offering of the $SCONO_x$ process for large combustion turbines. In spite of this recent announcement of the availability of a commercial offering for "any size" combustion turbine combined-cycle system, it is important to recognize that the largest unit on which $SCONO_x$ has operated is the 22 MW LM2500 at the Federal facility. The 32 MW combined-cycle federal facility is less than 10 percent of the size of one of the Project's combined-cycle units. The federal facility is also owned by one of the partners of Goal Line Technologies. The ABB Environmental Systems press release indicates that $SCONO_x$ will also be offered at a NO_x emission rate of 2 ppmvd (corrected to 15% O_2). Therefore, since $SCONO_x$ has not been demonstrated in practice at a unit larger than 22 MW and offers no advantage in the proposed NO_x emission rate for the Project, $SCONO_x$ is not considered further for this Project. It is significant to note that two permit approvals for large combined-cycle projects (Sithe Mystic in Massachusetts and Athens in New York) have been issued based on the use of SCR subsequent to the ABB announcement.

XONON™ Review

Another new NO_x control technology is being developed by Catalytica Combustion Systems, with the trade name of "XONON". This combustion catalyst technology includes a pre-burner, a fuel injection and mixing system, a flameless catalyst module and a flameless burnout zone. The pre-burner starts the turbine and a fuel injection system provides a uniform fuel and air mixture to the catalyst, where a portion of the fuel is combusted at reduced temperature to reduce thermal NO_x emissions. The remainder of the fuel is combusted in the burnout zone with minimal NO_x emissions. Catalytica has reported NO_x emissions from test units at less than 3 ppm at 15 percent O_2. However, the XONON system is not commercially available at this time for turbines of the size proposed, and it is, therefore, not considered further in this analysis.

NSPS

The Project will be subject to NSPS Subpart GG "Standards of Performance for Stationary Gas Turbines." Project NO_x emissions of 2.0 ppmvd at 15 percent O_2 will be below the NSPS limit, which is a nominal 75 ppmvd.

NO_x emissions from natural gas-fired combined-cycle combustion turbines are limited to 42 ppmvd at 15 percent O_2 under 6 NYCRR Subpart 227-2 (NO_x RACT). Additionally, NO_x emissions must be continuously monitored with an approved CEMS. The Project is subject to LAER controls for NO_x emissions as it will have potential emissions greater than 100 tpy and is located in the NOTR. The anticipated LAER NO_x emission rate for the Project is 2.0 ppmvd at 15 percent O_2 which is well below the NYSDEC NO_x RACT limit. The Project will install and operate a NO_x CEMS that complies with 6 NYCRR Subpart 227-2.6.

NO_x Emissions Rate

The Applicant proposes SCR in combination with DLN combustors to achieve the LAER limits for the Project shown in Table 6-8. The 2.0 ppm emission rate (3-hour average) proposed for the Project is equivalent or less than any emission rate permitted for this size turbine; therefore, further analysis should not be required.

Table 6-8: Proposed NO_x LAER Limits for Heritage Station

Load	ppmvd @ 15% O_2	lb/MMBtu	lb/hr[1]	Tons/yr[2]	Compliance Mechanism
50-100%	2.0	0.0075	44.0	184.2	3-hour CEMS Block Average for ppmvd @ 15% O_2

[1] Worst case hourly emissions represent combined emissions for the two turbines at 100 percent load at -19°F ambient temperature, firing natural gas.

[2] Annual emissions for gas firing based upon 47°F ambient temperature for 8,760 hours at 100 percent load, plus a 5 percent firing rate margin.

6.3.3.2 Start-up and Outage Auxiliary Boiler

The Project will have a natural gas-fired auxiliary boiler rated at 163 MMBtu/hr heat input. This boiler will be used very infrequently, only during startup of the combustion turbine or during facility outages. The Applicant will limit the annual operation of this boiler to less than 500 hours per year (<6% annual capacity factor).

This boiler will be equipped with a low NO_x burner and flue gas recirculation, and will have a maximum emission rate of 0.036 lb/MMBtu. This is only 18 percent of the NSPS limit that applies to boilers in this size range with capacity factors of 10 percent. The NO_x emissions from the auxiliary boiler represent the lowest practical level of emissions for a unit of this type since the boilers will exclusively use natural gas, the cleanest available fuel.

6.3.3.3 Emergency Diesel Generator

The Project will have a nominal 3 MW emergency diesel generator for the sole purpose of providing emergency electrical power to safely shut down the facility in the event that power is not available from the utility grid. This emergency diesel generator will be limited to no more than 300 hours per year of operation, and will likely operate less than 25 hours per year. Add-on NO_x controls are not practical or advisable for an emergency diesel generator. The emergency diesel generator will have NO_x emissions of 12.34 grams/brake horsepower-hour (g/bhp-hr).

6.3.4 CO BACT

6.3.4.1 Combustion Turbines

A review of other recently permitted gas turbine combined-cycle facilities in the Northeast indicates that 2 ppm is the most stringent CO emission limit for any permitted facility (see Table 6-7). Several of the facilities have CO oxidation catalysts and permit limits of 5 ppm or less at 75 percent to 100 percent load for natural gas firing. However, the Berkshire (20 ppm), Millennium (30 ppm), and

Milford (20 ppm) facilities are permitted for unrestricted operation at 50 percent load and have elevated CO emission limits for 50 percent load operation. In addition, a number of other recent projects identified in Table 6-7 were permitted without a CO catalyst. These projects include Tiverton, Rhode Island (12 ppm); Londonderry, New Hampshire (15 ppm); Casco, Maine (20 ppm); Westbrook, Maine (15 ppm); and most notably Athens (15 ppm on natural gas at 100% load and 30 ppm at 75% load). The Tiverton, Londonderry, Cosco, Westbrook and Athens projects established recent precedents supporting combustion controls for CO as PSD BACT.

The most stringent control available is an oxidation catalyst. The oxidation catalyst system is a passive reactor that consists of a honeycomb grid of metal panels coated with a platinum catalyst. Such systems typically oxidize 80 to 90 percent of the inlet CO concentration.

An economic analysis was conducted for a catalytic oxidation system to control CO from the turbines. The analysis was conducted for a nominal 85 percent efficiency CO oxidation catalyst. The costs for an appropriate CO control system for this Project were based on vendor budgetary cost estimates. These costs include both the capital cost of the oxidation system and the costs of operating the system. Operating costs include a power output penalty (loss of energy produced by the Project) due to pressure loss through the catalyst bed, and costs associated with replacement of the catalyst.

Calculations supporting the analyses at 100 percent load are presented in Appendix H.3. Based on these analyses, use of an oxidation catalyst would cost greater than $3,100 per ton of CO removed. This cost of control is considered excessive and does not warrant a CO oxidation catalyst as BACT. The cost of control for a CO oxidation catalyst calculated for the Project is similar in magnitude to the cost range presented for the Athens project ($3,500 to $3,900) and was determined to not be cost-effective.

In addition to cost considerations, there are environmental impacts associated with the use of a catalytic oxidation system because of the potential oxidation of SO_2 to sulfur trioxide (SO_3). It is estimated that, by optimizing the location of the CO catalyst in the heat recovery steam generator, the conversion of SO_2 to SO_3 can be limited to an additional 20 percent. The additional SO_3 can react with moisture to form H_2SO_4 and/or ammonia to form ammonium sulfate salts ($(NH_4)_2SO_4$), a form of PM_{10}.

The generation of additional PM_{10} and H_2SO_4 are negative environmental impacts of a CO oxidation catalyst. Since the predicted, uncontrolled ambient CO impacts from the Project are well below the SILs, the benefits of the oxidation catalyst are outweighed by its cost and environmental impacts.

The Applicant proposes clean burning natural gas and high efficiency combustion turbines to achieve the BACT limits shown in Table 6-9. The proposed CO limit of 7.2 ppmvd at 15 percent O_2 from 50 to 100 percent load is less than half of the CO limit recently approved for the Athens Project.

Table 6-9: Proposed CO BACT Limits for Heritage Station

Load (%)	ppmvd @ 15% O_2	lb/MMBtu	lb/hr[1]	Tons/yr[2]	Compliance Mechanism
50-100%	7.2 (maximum)	0.0162	90.2	367.9	1-hour CEMS Block Average for ppmvd @ 15% O_2

[1] Worst case hourly emissions represent combined emissions for the two turbines at 100 percent load at -19°F ambient temperature, firing natural gas.

[2] Annual emissions for gas firing based upon 47°F ambient temperature for 8,760 hours at 100 percent load, plus a 5 percent firing rate margin.

6.3.4.2 Startup and Outage Auxiliary Boiler

The low-utilization auxiliary boiler will have a low NO_x burner designed for a maximum CO emission rate of 100 ppmvd at 3 percent O_2 (0.08 lb/MMBtu). This is reflective of modern low NO_x burner designs and is considered BACT.

6.3.4.3 Emergency Diesel Generator

Add-on control technology is not practical for control of CO emissions from an emergency diesel generator that will operate no more than 300 hours per year. Good combustion control practices, therefore, represent BACT for CO for the Project's emergency diesel generator. The emergency diesel generator will have maximum CO emissions $\leq$ 0.50 g/bhp-hr.

6.3.5 SO_2 and H_2SO_4 BACT

6.3.5.1 Combustion Turbines

Changes in raw materials or process modifications were deemed inappropriate to achieve BACT since the "raw material," natural gas, is the fossil fuel with the lowest sulfur content. SO_2 emissions form by oxidation of sulfur in fuel. H_2SO_4 forms when a portion of fuel sulfur that may further be oxidized to SO_3 reacts with moisture. The NSPS limit (40 CFR 60, Subpart GG) is 0.8 percent sulfur, by weight, in fuel. The Project proposes to limit the sulfur in gas to 0.8 grains/100 standard cubic feet (scf) (<0.003 percent by weight) based upon expected pipeline gas quality to the Project.

The Applicant proposes to achieve a Project SO_2 emission rate of less than or equal to 0.0022 lb/MMBtu and a Project H_2SO_4 emission rate of 0.0003 lb/MMBtu. The exclusive use of natural gas for fuel represents BACT for SO_2 and H_2SO_4. Table 6-10 summarizes SO_2 and H_2SO_4 BACT. These proposed SO_2 and H_2SO_4 emission limits are also less than levels recently approved for the Athens project.

H_2SO_4 emissions, in addition to being a function of fuel sulfur content, are also related to the amount of oxidation of fuel sulfur to SO_3. In a gas turbine combustion system with SCR for NO_x control, the expected oxidation of fuel sulfur to SO_3 is conservatively estimated at 10 percent (mole basis). However, as discussed under the CO BACT analysis, a CO catalyst adds an additional 20 percent (even with optimal placement of this catalyst to minimize SO_2 to SO_3 oxidation), so the overall conversion of SO_2 to SO_3 is expected to be approximately 30 percent. Therefore, BACT for H_2SO_4 is proposed to be firing natural gas exclusively and minimizing SO_2 to SO_3 oxidation.

Table 6-10: Proposed SO_2 and H_2SO_4 BACT for Heritage Station

Pollutant	Load	lb/MMBtu	Tons/year[1]	Compliance Mechanism
SO_2	50-100%	0.0022	55.0	Periodic Fuel Test
H_2SO_4	50-100%	0.0003	8.4	Periodic Fuel Test

(1) Annual emissions for natural gas firing based upon 47°F ambient temperature for 8,760 hours at 100 percent load, plus a 5 percent firing rate margin.

6.3.5.2 Startup and Outage Auxiliary Boiler

The Project's low utilization auxiliary boiler will also use natural gas as the only fuel, and the emission rates of 0.0022 lb/MMBtu of SO_2 and 0.00017 lb/MMBtu of H_2SO_4 are considered to be BACT.

6.3.5.3 Emergency Diesel Generator

The only practical control technique available for an emergency diesel engine that will operate no more than 300 hours per year is the use of low sulfur fuel. The use of low sulfur transportation diesel (0.05% by weight sulfur) represents BACT for SO_2 for the Project's emergency diesel generator.

6.3.6 PM BACT

6.3.6.1 Combustion Turbines

Since natural gas is the fossil fuel that produces the least amount of PM emissions, a change in raw materials was not considered. PM may be formed from non-combustible constituents in fuel or combustion air, from products of incomplete combustion, or from post-combustion formation of ammonium sulfates. It is expected that all the PM from the Project will be in the form of PM_{10}.

Add-on controls are not technically and economically feasible due to the high exhaust gas flows and very low concentrations of PM associated with combined-cycle facilities such as the Project. Consistent with the most recent BACT determinations for combined-cycle projects, the use of clean burning natural gas is proposed as BACT for PM. The Project will attain a PM emission rate of no more than 0.010 lb/MMBtu, correlating to an emission rate of 49.0 lb/hr. This is less than the PM/PM_{10} emission limit of 0.011 lb/MMBtu recently approved for the Athens project. Table 6-11 summarizes PM BACT.

Table 6-11: Proposed PM BACT for Heritage Station

Load	lb/MMBtu[1]	lb/hr[(1)]	Tons/year[(2)]	Compliance Mechanism
50-100%	0.010	49	202	Stack Test

[(1)] Worst case hourly emissions represent combined emissions for the two turbines at 100 percent load at -19°F ambient temperature firing natural gas.

[(2)] Annual emissions for gas firing based upon the proposed emission limit of 23.0 lb/hr/unit at 47°F ambient temperature for 8,760 hours.

6.3.6.2 Startup and Outage Auxiliary Boiler

The Project's low utilization natural gas-fired auxiliary boiler will have a very low particulate emission rate of 0.007 lb/MMBtu, which represents BACT.

6.3.6.3 Emergency Diesel Generator

The Applicant proposes the use of transportation grade diesel fuel in emergency conditions, and good combustion practices as BACT for particulate matter. The PM emission rate from the emergency diesel generator will be $\leq$ 0.5 g/bhp-hr.

6.3.6.4 Cooling Tower

The Project will include wet mechanical draft cooling towers for condenser cooling. In a wet mechanical draft cooling tower system, warm water is circulated to the tower cells and distributed over fill material where it is cooled by evaporation. A fan in each tower cell provides the air flow to draw ambient air past the circulating water for the evaporative heat transfer to occur. The air flow is warmed somewhat by contact with the circulating water. The tower discharge consists primarily of warm moist air. The cooled circulating water is directed back through the plant to equipment heat exchangers and steam condensers (non-contact).

A very small fraction of the circulating water is entrained in the air flow, and exits the tower. This very small fraction of the circulating water that exits the tower is known as "drift." The circulating water contains dissolved solids that concentrate in the tower as cooling water evaporates. Makeup water must be supplied to the tower to replace water lost through the evaporation. Since the makeup contains dissolved solids and the water that is evaporated from the tower does not include dissolved solids, these solids tend to concentrate in the circulating water. A portion of the circulating water is discharged (known as "blowdown") in order to remove solids from the system. The circulating water will remain at a relatively steady-state condition of dissolved solids depending on the ratio of makeup, evaporation and blowdown. The Project's cooling tower circulating water is being designed to operate with dissolved solids at or below 2,000 milligrams per liter (mg/l). The circulating water system for each tower is designed for nine cycles of concentration, based on the maximum design (total dissolved solids (TDS) of 2,000 ppm and the maximum total suspended solids (TSS) of 25 ppm). During periods of high TDS in the city water supply, the system would be operated at six cycles of concentration, resulting in a maximum TDS of 3,200 ppm and a maximum TSS of 25 ppm.

State-of-the-art high efficiency drift eliminators will be used to minimize the very small fraction of the circulating water that may exit the tower as drift. These high efficiency drift eliminators are typically chevron type baffles that remove small droplets of water by impaction. Use of high efficiency drift eliminators is considered to represent BACT for PM emissions from the cooling tower.

The maximum dissolved solids concentration in the Project circulating water is 3,200 mg/l. The maximum "drift" rate from the Project cooling towers will be 1.17 gpm (0.0005% of the circulating water flow) per tower. This is considered to represent "state-of-the-art" for drift elimination which is also equivalent to the drift rate approved for the Athens project. This results in maximum potential PM emissions from the cooling towers of 8.2 tpy.

It should be noted that the standard method for measuring the drift rate in the cooling tower industry actually involves measuring the total rate of solid emissions in the tower exhaust. All solids are included in the emission characterization whether as part of drift droplet (as most of the solids are emitted) or as dry particulate. Then, a "drift rate" is calculated corresponding to all the emitted solids as if they were all in the form of drift. Thus, solids emissions as calculated from the "drift rate" do in fact account for all tower particulate emissions.

6.3.7 BACT Summary

Table 6-12 presents a summary of the proposed emission limits for the Project (turbine and cooling tower).

Table 6-12: Summary of Proposed BACT/LAER for the Turbines and Cooling Towers

Pollutant	Limit	BACT
NO_x	2.0 ppmvd @ 15% O_2	DLN Combustors/SCR
CO	7.2 ppmvd @ 15% O_2	Good combustion practices
SO_2	0.8 grains/100 scf sulfur content	Use of natural gas only
PM/PM_{10}	0.010 lb/MMBtu (turbines)	Use of natural gas only
PM/PM_{10}	0.0005% drift rate (cooling tower)	Use of high efficiency drift eliminators

6.4 Project Emissions

Appendix H.4 includes spreadsheets that present detailed information on emissions and operating data for the Project for the range of possible load conditions and ambient temperatures pursuant to Stipulation No. 1, Clause 2(g).

6.4.1 Emission Control Summary

A summary of the emission controls and performance for various stack emission parameters are as follows:

- NO_x will be controlled using DLN combustors and SCR to an emission level of no more than 2.0 ppmvd corrected to 15 percent O_2.
- CO and VOC will be controlled by the high efficiency turbine combustors to an emission level of no more than 7.2 ppmvd corrected to 15 percent O_2 for CO, and no more than 1.2 ppmvd at 15 percent O_2 for VOC.
- PM/PM_{10} will be controlled by use of clean burning natural gas as the sole fuel, and the high efficiency combustors to an emission rate of no more than 24.5 pounds per hour per unit.
- SO_2 will be controlled by use of natural gas as the sole fuel. The maximum sulfur content for natural gas will be 0.8 grains/100 scf of natural gas, corresponding to a maximum emission rate of 0.0022 lbs. of SO_2/MMBtu.

- Ammonia (NH_3) may be emitted as a result of unreacted NH_3 from the SCR system. NH_3 is used as a reagent in the SCR system. NH_3 emissions will be controlled by SCR design and operation to an emission rate of no more than 10 ppmvd corrected 15 percent O_2.

- H_2SO_4 will be controlled by use of natural gas as the sole fuel. Due to the low sulfur content of natural gas, maximum H_2SO_4 emissions will be 0.0003 lb/MMBtu.

- Formaldehyde may be emitted in minute quantities as a product of incomplete combustion from natural gas. Maximum formaldehyde emissions are expected to be 0.0004 lb/MMBtu. Emissions of formaldehyde from natural gas combustion in the proposed facility are expected to be extremely small due to the high efficiency combustors to be used.

6.4.2 Emission Summary – Criteria Pollutants

Tables 6-13, 6-14 and 6-15 provide criteria pollutant emission rates and stack parameters for the full range of normal operating loads for the combustion turbines, auxiliary boiler, and emergency diesel generator, respectively.

Annual operation of the auxiliary boiler will be limited to no more than 500 hours per year of operation. Annual operation for the emergency diesel generator will be limited to no more than 300 hours per year.

Annual emission from the combination of both combustion turbine/HRSG stacks, which are used for regulatory applicability purposes, are shown on Table 6-16. This estimate is based on 100 percent load condition at the annual average ambient air temperature for Oswego (47°F).

Heritage Station may in the future be equipped with an evaporative cooler that may be used during periods of warmer weather to chill the inlet air. Use of the cooler would tend to lower the effective annual average temperature of the inlet air to the turbine. In order to allow for this potential, the turbine heat input rates at 100 percent load have been increased by 5 percent.

Table 6-13: Stack Criteria Pollutant Emissions and Parameters for Each Combustion Turbine

Case #	1	2	3	4	5	6	7	8	9
CTG Load, %	Base	Base	Base	75	75	75	50	50	50
Ambient Temperature, °F	-19	47	100	-19	47	100	-19	47	100
Stack Exhaust Velocity, m/s	24.5	22.4	18.5	18.9	17.1	14.2	15.0	13.1	12.1
Stack Exhaust Temperature, K	357.1	346.3	350.5	354.4	341.8	344.9	351.6	339.5	346.0
NO_x, lbs/hr	22.0	21.0	17.1	16.3	15.5	12.8	12.9	11.5	10.0
NO_x, g/s	2.77	2.65	2.15	2.05	1.95	1.62	1.62	1.44	1.26
CO, lbs/hr	45.1	42.0	32.5	33.0	31.0	24.0	27.0	24.0	21.0
CO, g/s	5.69	5.294	4.10	4.16	3.91	3.02	3.40	3.02	2.65
SO_2, lbs/hr	6.6	6.3	5.1	4.9	4.6	3.8	3.9	3.4	3.0
SO_2, g/s	0.83	0.79	0.64	0.61	0.58	0.48	0.49	0.43	0.38
PM, lbs/hr	24.5	23.0	18.4	19.0	17.8	14.4	15.2	13.7	12.3
PM, g/s	3.08	2.90	2.32	2.39	2.24	1.81	1.92	1.73	1.55
VOC, lbs/hr	4.4	4.1	3.3	3.2	3.0	2.5	2.6	2.3	2.1

Table 6-14: Criteria Pollutant Emissions and Stack Parameters for the Auxiliary Boiler

Case #	A1	A2	A3	A4
Load, %	100	75	50	25
Stack Exhaust Velocity, m/s	17.90	12.81	8.55	4.49
Stack Exhaust Temperature, K	397.59	383.15	370.37	358.71
NO_x, g/s	0.737	0.548	0.363	0.183
NO_x, lbs/hr	5.849	4.349	2.881	1.452
CO, g/s	1.638	1.217	0.808	0.406
CO, lbs/hr	13.000	9.659	6.413	3.222
SO_2, g/s	0.045	0.033	0.022	0.011
SO_2, lbs/hr	0.357	0.262	0.175	0.087
PM, g/s	0.143	0.106	0.071	0.036
PM, lbs/hr	1.135	0.841	0.564	0.206

Table 6-15: Criteria Pollutant Emissions and Stack Parameters for the Emergency Diesel Generator

Case #	D1	D2	D3	D4	D5
Load, %	110	100	75	50	25
Stack Exhaust Velocity, m/s	19.0	17.5	12.6	11.2	7.2
Stack Exhaust Temperature, K	630	600	547	492	437
NO_x, g/s	13.799	13.711	8.800	5.517	2.692
NO_x, lbs/hr	109.52	108.82	69.84	43.79	21.37
CO, g/s	0.550	0.311	0.167	0.139	0.136
CO, lbs/hr	4.365	2.468	1.325	1.103	1.079
SO_2, g/s	0.187	0.170	0.129	0.091	0.056
SO_2, lbs/hr	1.484	1.349	1.024	0.722	0.444
PM, g/s	0.550	0.311	0.167	0.139	0.136
PM, lbs/hr	4.365	2.468	1.325	1.103	1.079

Table 6-16: Annual Criteria Pollutant Emissions for Heritage Station Combustion Sources

Pollutant	Turbines Annual Emissions (tons/year)	Auxiliary Boiler Annual Emissions (tons/year)	Emergency Generator Annual Emissions (tons/year)	Total Annual Emissions (tons/year)
NO_x	184.2	1.5	16.4	202
CO	367.9	3.3	0.7	372
SO_2	55.0	0.1	0.2	55
PM/PM_{10}	201.5	0.3	0.7	211[1]
VOC	35.9	0.3	0.3	37
NH_3	334	None expected	None expected	334

[1]Includes 8.5 tpy from cooling tower drift.

6.5 NO_x Emission Reduction Credits

This section provides a discussion of the emission reduction credits required for the Project, pursuant to Stipulation No. 1, Clause 2(h).

The location of the Project is within an attainment area for ozone; however, since the area is included in the ozone transport region, the area is treated as if it were moderate nonattainment. Since ozone is a secondary pollutant, it is not emitted directly but forms as a result of atmospheric chemical reactions involving VOC and

NO_x. Under federal and state regulations, both VOC and NO_x are considered nonattainment pollutants. As was shown in Table 6-2, the maximum annual potential NO_x emissions from the Project subjects it to regulation under 6 NYCRR Part 231, *New Source Review in Nonattainment Areas and Ozone Transport Regions*, with respect to NO_x emissions. VOC emissions are below the 40-tpy threshold; therefore, VOC emissions are not subject to Part 231.

Part 231 requires the source to obtain ERCs to offset the Project emission potential (PEP) of the nonattainment pollutant by a ratio of 1.15:1.0. The PEP is calculated based on continuous operation at design capacity and after considering emissions reductions on the application of control equipment at the maximum enforceable permissible emission rate.

The PEP for NO_x is 202 tpy; therefore, the Project must obtain ERCs equal to:

- 202 tpy × 1.15 = 232.3 tpy, or 233 ERCs.

The NYSDEC has developed a mechanism to track generation and use of ERCs for offsets for new sources, in conjunction with 6 NYCRR Part 227-3, *Pre-2003 Nitrogen Oxides Emission Budget and Allowance Program.* Part 227 is designed in conformance with the NOTC NO_x Memorandum of Understanding (MOU) and Sections 172 and 173 of the Clean Air Act. Any creditable reductions in emissions, documented in accordance with 6 NYCRR Part 227-3 and Part 231, are posted in an ERC Registry. Sources may transfer available credits from the ERC Registry in accordance with 6 NYCRR Part 227-3.8.

With respect to ozone nonattainment areas, Part 231 requires that the ERC must be obtained from within the same ozone nonattainment area or from a location in another nonattainment area of equal or higher classification (but only if the emissions in that area would contribute to the nonattainment in the area of the proposed source). A review of the ERC Registry (Table 6-17) indicates that over 5,000 tons of NO_x ERCs were available for this Project as of February 9, 2000.

Table 6-17: Total Available NO_x ERCs by Nonattainment Area Classification

Nonattainment Area	NO_x ERCs
Attainment (NOTR)	982.66
Marginal	451.13
Moderate	58.08
Severe	3,720.86
Total	**5,212.73**

Part 231 requires the applicant to identify each emission source to be used to provide the necessary ERC prior to the date of issuance of the permit. A complete listing of available credits from the ERC Registry is presented in Appendix H.5.

6.6 Stack Height Optimization/GEP Analysis

Selection of the optimum stack height for the Project, addressed pursuant to Stipulation No. 1, Clause 2(f), consisted of weighing the increased dispersion potential associated with increasing the stack height against minimizing the visual impact associated with the stack as a building structure. The air quality assessment consisted of examination of multiple options and selection of a stack height, which resulted in impacts of all Project emissions below the concentration defined by the SILs. The visual assessment is presented in Section 16 of this Application.

The GEP Guidelines provide a method for determining a calculated GEP formula height for a stack based on the dimensions of the "controlling" structure. For the Project's stacks and cooling tower, the tallest "nearby" buildings are the penthouse tiers around the HRSG section of the Project buildings (one for each turbine train). A structure is considered "nearby" if it is within "five times the lesser of the height or the projected width dimension of the structure" according to the GEP Guidelines.

The height of the HRSG penthouse tier of the new buildings (110.5 feet) is the lesser dimension of each; therefore, the calculated GEP formula stack height for the Project stacks is equal to 2.5 times the building's height, as these are squat structures. Thus, the calculated GEP height is 276.25 feet (2.5 * 110.5 feet).

The Project's two stacks for the combustion turbines are proposed at 225 feet in height, which is below GEP. The stack height was selected to balance aesthetics and potential air impacts. Modeling results indicate that, at 225 feet, the combustion turbine impacts are predicted to be "insignificant" relative to the National Ambient Air Quality Standards. The stack heights for the auxiliary boiler (195 feet), the emergency diesel generator (170 feet), and the cooling tower cells (37 feet) are also less than GEP. Therefore, the Building Profile Input Program (BPIP, version dated 95086) was used to define the height and projected width of the "controlling" structures (as a function of flow vector) for the turbine stacks and cooling tower cells. Figure 6-2 illustrates the facility stacks and potentially influencing building structures. The BPIP results are presented in Appendix C of the Air Quality Modeling Protocol (Protocol), which is contained in Appendix A of this Application. Additional plot plans showing facility buildings, emission sources, property lines, and fences are also provided in Appendix C of the Protocol, along with a table that describes facility buildings and dimensions.

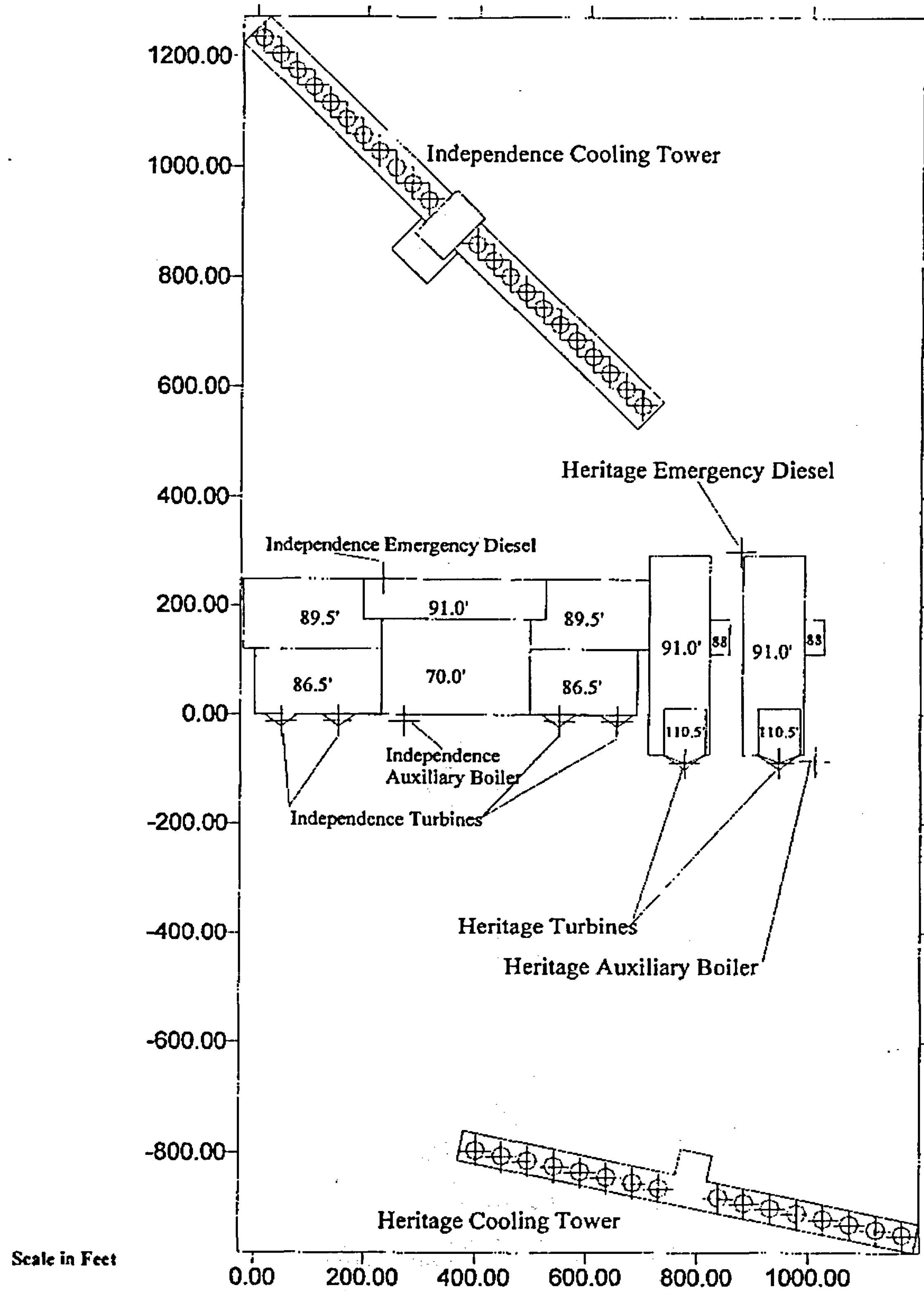


Figure 6-2: Schematic Facility Diagram for BPIP Analysis

The new Project buildings also have the potential to influence stack emissions at the adjacent Independence Station. As shown in the BPIP results, the penthouse tiers of the Project building are the controlling tier for some of the directions for the two easternmost Independence Station turbine stacks and the existing Independence Station auxiliary boiler stack. Since the Project has the potential to change the dispersion characteristics of these stacks, an evaluation of this change has been conducted, as described in Section 6.7.5. This evaluation indicates that the Heritage Station structure will not change any of the conclusions of the original Independence dispersion analysis.

6.7 Air Quality Impact Assessment

This section addresses Stipulation No. 1, Clauses 2(c), 2(d), 2(i), 2(j), 2(n), 2(o), 3(c), 3(d), and 3(e).

6.7.1 Refined Modeling for Simple and Intermediate Terrain

An assessment of air quality impacts was conducted to evaluate the range of operating conditions presented in Tables 6-13 through 6-14. The refined modeling analysis was conducted using 5 years of meteorological data and refined terrain elevations. Refined modeling provides an evaluation of pollutant concentrations from the source's emissions by examining terrain elevations in all directions and actual recorded hourly meteorology over the 5-year period evaluated. The EPA Industrial Source Complex Short-term Model (ISCST3) analysis considered receptors representative of both simple terrain (terrain below stack top elevation) and intermediate terrain (terrain between stack top elevation and plume height elevation). Intermediate terrain (as well as complex terrain) was also considered with SCREEN3 in the VALLEY mode (see Section 6.7.2) and maximum impacts predicted with either ISCST3 or SCREEN3 were used for the compliance demonstration. Complex terrain refers to terrain above stack top elevation including above plume height elevation.

6.7.1.1 Model Selection

Pursuant to the Air Modeling Protocol (provided in Appendix A), refined modeling was conducted using the ISCST3 model (Version dated 99155). In accordance with the EPA's Guideline on Air Quality Models (revised) (Appendix W of 40 CFR 51), this model is the most appropriate to address potential pollutant impacts from the proposed Project. The ISCST3 model was used to evaluate the Project for the range of operating loads and ambient conditions presented in Tables 6-14 through 6-16.

The ISCST3 dispersion model was used to evaluate simple terrain. In simple terrain mode, ISCST3 sets all elevations above stack top to the stack top elevation. The regulatory default option and the rural mode option were selected. Note that the ISCST3 model was also used to evaluate impacts in intermediate terrain, as well as the complex terrain model (see Section 6.7.2). Maximum predicted impacts for either model were then used for the compliance assessment.

6.7.1.2 Source Parameters – Criteria Pollutants

Table 6-18 summarizes stack characteristics for all of the proposed combustion sources (combustion turbines, auxiliary boiler, and emergency diesel). Criteria pollutant emission rates and stack parameters for the full range of normal operating loads for the combustion turbines, auxiliary boiler, and emergency diesel generator, respectively, were provided in Section 6.4. The non-criteria pollutants potentially emitted from the combustion turbines, auxiliary boilers, and emergency diesel generator, respectively, were also presented in Section 6.4.

Source parameters and building dimensions for the proposed cooling tower are provided in Table 6-19.

Table 6-18: Stack Characteristics for the Proposed Combustion Sources

Parameter	Combustion Turbines	Auxiliary Boiler	Emergency Diesel Engine
Base Elevation, msl (feet/meters)	280.5/85.5	280.5/85.5	280.5/85.5
Stack Height (feet/meters)	225/68.58	195/59.44	170/51.82
Inside Stack Diameter (feet/meters)	19.5/5.94	4/1.22	3/0.91
Number of Stacks	2	1	1
Predominant Land Use Type	Rural	Rural	Rural
Stack No. 1 Location:			
UTM-E (m)	382,819.4	382,874.8	382,773.0
UTM-N (m)	4,816,652.8	4,816,668.5	4,816,764.5
Stack No. 2 Location:			
UTM-E (m)	382,860.8	NA	NA
UTM-N (m)	4,816,684.0		

Table 6-19: Heritage Station Cooling Tower Stack Data for ISCST3/SCREEN3 Modeling

Base Elevation, msl (feet/meters)	298/90.83
Cell Height (feet/meters) - above ground	37/11.28
Cell Inside Stack Diameter (feet/meters)	33/10.06
Cell Exit Temperature (°F/K)	73.2/296.0
Cell Exit Velocity (meters/second)	7.48
Number of Towers	2
Number of Cells	8 per tower (16 total)
Cooling Tower Deck Height (feet/meters)	31/9.45
Cooling Tower Length (feet/meters)	837/255
Cooling Tower Width (feet/meters)	48/14.6
PM/PM_{10} Emission Rate (grams/sec/cell)	0.015

6.7.1.3 *Receptors*

A refined polar receptor grid centered on a location near the center of the Project's two main stacks was developed. Receptors were located every 10 degrees at the following distances:

- At 100-meter intervals from 100 to 1,000 meters;
- At 200-meter intervals from 1,000 to 2,000 meters;
- At 500-meter intervals from 2,000 to 5,000 meters; and
- At 1,000-meter intervals from 5,000 to 20,000 meters.

Figures that describe the main polar grid receptors are provided in Appendix D of the Protocol (contained in Appendix A). An explanation of the proposed treatment of property lines and fence lines is also included in Appendix D of the Protocol. Terrain elevations at receptors has been obtained using Earth Tech's TERREL program and United States Geological Survey (USGS) 30-meter digital terrain data. TERREL is a preprocessing program that extracts and reformats USGS Digital Elevation Model (DEM) data, ARM3 digital terrain data and Canadian DEM terrain data according to user options of domain and resolution. TERREL produces gridded fields of terrain elevations for air quality model input or for plot files that can be read directly by a contouring software package. For USGS quadrangles where 30-meter data are not available, 90-meter digital terrain data has been used. For the close-in grid, out to 600 meters, receptor elevations have also been selected manually using USGS maps. The highest elevation around each receptor has been selected (i.e., the highest elevations in the area around each receptor is assigned to the closest receptor).

A set of discrete receptors, located at terrain peaks in the Project area, were manually identified and added to the receptor grid to ensure the highest terrain in the area is accurately represented. Discrete receptors were also placed just outside the building cavity (at a distance of 3L, where L is the lesser dimension of the building height or projected width) in each of the 36 compass directions for each of the combustion unit stacks .

6.7.1.4 *Meteorological Data*

Pursuant to Stipulation No. 1, Clause 2(a), and the Air Modeling Protocol, the meteorological data used in the refined modeling analysis consisted of 5 years of surface observations (1985-1989) collected at the Nine Mile Point Power Station, along with mixing heights derived from upper air soundings at Buffalo, New York. The Nine Mile Point data are very representative of the Project site as Nine Mile Point is approximately 2 miles east of the Project site and is also located on the southern shore of Lake Ontario. Meteorological data from the Nine Mile Point

Power Station were also used for the prior modeling study for Independence Station. These data were provided by the NYSDEC, and represent the most recent meteorological data that have been made available by the Nine Mile Point Station. This data set includes wind measurements made at the 200-foot level of the tower.

Relative humidity (RH) data were required for plume visibility, fogging and icing analysis. RH data collected at the Syracuse, New York National Weather Service (NWS) Station were used. Syracuse is the closest NWS station and is located approximately along the same longitude. As such, passing fronts will affect the sites similarly, and comparable RH conditions are expected.

A preconstruction monitor waiver request was submitted for approval by NYSDEC and the EPA. This waiver was received from EPA Region II in a letter dated January 12, 2000. Both the preconstruction monitoring waiver request and approval letters are provided in Appendix H.2.

6.7.1.5 ISCST3 Analysis Methodology

The basic modeling scenario to be considered for the Project for the evaluation of criteria and non-criteria pollutants is the operation of both new combustion turbine combined-cycle units. The auxiliary boiler is intended to operate when both turbines are off-line, or for a short period during turbine startup of one or both turbines. The emergency diesel generator is intended to operate as an emergency source of electric power for the facility. During normal facility operation, neither the auxiliary boiler nor the emergency diesel generator will operate simultaneously with the combustion turbines. However, since testing of either the auxiliary boiler or the emergency diesel generator may occur (individually) for up to 3 hours during operation of the combustion turbines, the combined impacts of these units was considered.

Short-term concentrations (24 hours or less) of both criteria and non-criteria pollutants were evaluated by summing maximum predicted impacts of either the auxiliary boiler or emergency diesel generator with the combustion turbine. For averaging periods greater than 3 hours, auxiliary boiler and emergency diesel generator concentrations were scaled by the amount of potential simultaneous operating hours (3) to the operating hours of the averaging period (8 or 24). For the annual average concentrations of criteria and non-criteria pollutants the maximum predicted concentrations from the combined-cycle units, the auxiliary boiler and the emergency diesel generator were summed for comparison with the applicable criteria.

Refined pollutant concentrations were initially compared to the SILs for criteria pollutants. The SILs are included in Table 6-20. For this analysis, the conservative NO_x to NO_2 conversion of 100 percent is proposed for predicting annual NO_2 concentrations. The NAAQS and PSD Class II Increments are also provided in Table 6-20 for the criteria pollutants.

Table 6-20: SILs, NAAQS, and PSD Increments ($\mu g/m^3$)[1]

Pollutant	Averaging Time	SILs	NAAQS	Class II PSD Increment[2]
SO_2	3-hour	25	1,300	512
	24-hour	5	365	91
	Annual	1	80	20
PM_{10}	24-hour	5	150	30
	Annual	1	50	17
TSP	24-hour	5	250	NA
	Annual	1	45	NA
NO_2	Annual	1	100	25
CO	1-hour	2,000	40,000	N/A
	8-hour	500	10,000	N/A
O_3 (ppm)	1-hour	N/A	235[3]	N/A
Pb	Quarterly	N/A	1.5	N/A
Beryllium (Be)	1-month	N/A	0.01	N/A

[1] – Compliance with PM_{10} 24-hour AAQS is based on the 99 percentile that equates to the fourth highest concentration.
– All other standards, except annuals, not to be exceeded more than once per year.
– Annual standard never to be exceeded.

[2] PSD increments are provided in 40 CFR 51.166. New York limits increment consumption to 25 percent of available annual increment and 75 percent of available short-term increment.

[3] Area must still meet NOTR requirements.

6.7.1.6 ISCST3 Model Results for Criteria Pollutants

The ISCST3 model results for simple and intermediate terrain demonstrate that predicted impacts for criteria pollutants are less than SILs for all pollutants and averaging periods. Table 6-21 presents maximum predicted impact concentrations for the combustion turbines considering all loads and ambient temperature conditions.

Tables 6-22 and 6-23 present the maximum predicted Project impacts for criteria pollutants for the auxiliary boiler and emergency diesel generator, respectively, considering all load conditions. Maximum predicted impact concentrations are less than corresponding SILs for all pollutants and averaging periods. Because results are below SILs, no interactive modeling is required pursuant to Stipulation No. 1, clauses 2(c), 2(o) and 2(t). Detailed model results are provided in Appendix H.6.

Table 6-21 **Maximum ISCST3 Predicted Criteria Pollutant Impacts for the Heritage Station Combustion Turbines**

Pollutant	Averaging Period	Maximum Concentration (µg/m^3)	SILs (µg/m^3)	Load Case Scenario for Maximum
NO_2	Annual	0.13	1	100%, 100°F
SO_2	3-hour	2.23	25	100%, 47°F
	24-hour	1.11	5	52%, 47°F
	Annual	0.04	1	100%, 100°F
PM_{10}	24-hour	4.44	5	52%, 47°F
	Annual	0.15	1	52%, 47°F
CO	1-hour	16.52	2,000	100%, 47°F
	8-hour	13.35	500	100%, 47°F

Table 6-22: **Maximum ISCST3 Predicted Criteria Pollutant Impacts for the Heritage Station Auxiliary Boiler**

Pollutant	Averaging Period	Maximum Concentration (µg/m^3)	SILs (µg/m^3)	Load Case Scenario for Maximum
NO_2	Annual*	0.014	1	75%
SO_2	3-hour	0.45	25	100%
	24-hour	0.17	5	25%
	Annual*	0.0008	1	100%
PM_{10}	24-hour	0.55	5	25%
	Annual*	0.003	1	75%
CO	1-hour	27.26	2,000	50%
	8-hour	9.54	500	100%

*Weighted based on 500-hour annual operating limit.

Table 6-23: **Maximum ISCST3 Predicted Criteria Pollutant Impacts for the Heritage Station Emergency Diesel Generator**

Pollutant	Averaging Period	Maximum Concentration (µg/m^3)	SILs (µg/m^3)	Load Case Scenario for Maximum
NO_2	Annual*	0.12	1	100%
SO_2	3-hour	1.84	25	110%
	24-hour	0.73	5	110%
	Annual*	0.0017	1	75%
PM_{10}	24-hour	0.98	5	110%
	Annual*	0.002	1	110%
CO	1-hour	12.67	2,000	110%
	8-hour	3.34	500	110%

*Weighted based on 500-hour annual operating limit.

Table 6-24 presents the maximum predicted combined impacts for all of the Heritage Station emissions sources (combustion turbines, auxiliary boiler, emergency diesel generator, and cooling towers [PM_{10} only]). The auxiliary boiler and emergency diesel generator will not operate simultaneously with the combustion turbine, except during test periods for up to 3 hours in length. Therefore, for short-term averaging periods longer than 3 hours, maximum predicted concentrations for the auxiliary boiler or emergency diesel generator were scaled by the amount of potential simultaneous operating hours (3) by the operating hours of the averaging period (8 or 24). The maximum short-term impact of either the auxiliary boiler or emergency diesel generator is summed with the short-term predicted impact from the turbines and cooling towers. For the annual average, concentrations from each of the emission sources are summed for comparison with applicable criteria. Total impact concentrations are less than corresponding SILs for all pollutants and averaging periods. Therefore, compliance with the NAAQS and NYAQS is demonstrated.

Table 6-24: Maximum ISCST3 Predicted Impacts for All Heritage Station Emission Sources (Turbines, Auxiliary Boiler, Emergency Diesel Generator and Cooling Towers) (μg/m³)

Pollutant	Averaging Period	Auxiliary Boiler	Emergency Diesel	Heritage Station Combustion Turbines and Cooling Tower	Combined Total of Project Units	SILs (μg/m³)
NO_2	Annual	0.014	0.12	0.13	0.26	1
SO_2	3-hour	0.45	1.84	2.23	4.07	25
	24-hour	0.06	0.23	1.11	1.34	5
	Annual	0.0008	0.0017	0.04	0.04	1
PM_{10}	24-hour	0.18	0.31	4.50	4.65*	5
	Annual	0.003	0.002	0.30	0.36*	1
CO	1-hour	27.26	12.67	16.52	43.78	2,000
	8-hour	9.54	3.34	13.35	22.89	500

Note: Short-term total facility impacts include simultaneous operation of either the Project auxiliary boiler or Project emergency diesel generator for the maximum of 3 hours concurrent with the Project combustion turbine/cooling tower in any day.

*Combined total PM_{10} impacts based on ISCST3 model results which included all Project PM_{10} emission sources.

6.7.2 Complex Terrain Modeling

6.7.2.1 SCREEN3 Modeling

Pursuant to the Modeling Protocol (provided in Appendix A), the SCREEN3 model (version dated 96043) was used to evaluate the Project's impact at complex terrain, with complex terrain defined as terrain above stack top. Intermediate terrain (terrain between stack top and plume height) was evaluated with both SCREEN3 and ISCST3 (see Section 6.7.1). The maximum predicted impact with either model was used for demonstration of compliance at intermediate terrain receptors.

Receptors for the SCREEN3 complex terrain analysis were selected by reviewing the topographic maps for area surrounding the Project and selecting the nearest terrain at stack top elevation and above, up to plume centerline height. The nearest stack top elevation for the main Project turbine stacks (505.5 feet = 154.1 meter [m]) is located approximately 5,100 m from the main turbine stacks. Since terrain corresponding to plume height elevation is beyond 25 km for each of the combustion units and load case scenarios, except the emergency diesel generator 25 percent load, hypothetical receptors were placed at a distance of 25,000 meters and an elevation corresponding to plume height for the various load case scenarios. The receptor elevations and distances proposed for the SCREEN3 complex terrain modeling of the combustion turbine, auxiliary boiler, and emergency diesel generator, as well as the cooling towers, are presented in Table 6-25.

The SCREEN3 modeling was only conducted to evaluate the "VALLEY" equivalent results, as the ISCST3 modeling provides more refined results for simple terrain. The "VALLEY" complex terrain calculations are done for a hypothetical "worst-case" meteorological condition. The condition required by EPA procedures and used by SCREEN3 is a stable atmosphere (F stability) and a, 6-hour wind persistence over a 24 hour period at a wind speed of 2.5 meters per second. Rural dispersion coefficients, ground level receptors, and an ambient temperature equivalent to each combustion turbine operating case will be used. For the auxiliary boiler, emergency diesel generator, and cooling tower, a default average ambient temperature of 293°K (68°F) was modeled.

Since "VALLEY" equivalent results of SCREEN3 provide only 24-hour values, concentrations for other averaging periods were calculated by multiplying the 24-hour concentrations by the following time scaling factors:

- 1-hour: 4
- 3-hour: 3.6 (4 × 0.9)
- 8-hour: 2.8 (4 × 0.7)
- Annual: 0.32 (4 × 0.08)

Maximum concentrations from the SCREEN3 "VALLEY" equivalent modeling were compared to the SILs, the NYSDEC short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs), and the health-based reference concentrations (RfCs), and the health-based air concentrations (HBACs).

Table 6-25: SCREEN3 Complex Terrain Receptor Data

Combustion Cases	Receptor Data		
Receptor	Distance[1] (meters)	Elevation (meters)	Height Above Stack Base (meters)
Stack Top (Emergency Diesel Generator)	3,696	137.3	51.8
Stack Top (Auxiliary Boiler)	4,049	144.9	59.4
Stack Top (Turbine)	5,104	154.1	68.6
Intermediate (C)	14,243	164.6	79.1
Intermediate (D)	16,896	167.6	82.1
Plume Height (Emergency Diesel Generator, 25%)	17,004	168.0	82.5
Plume Height (Emergency Diesel Generator, 50%)	25,000	175.0	89.9
Plume Height (Emergency Diesel Generator, 75%)	25,000	178.8	93.3
Plume Height (Emergency Diesel Generator, 100%)	25,000	185.1	99.6
Plume Height (Emergency Diesel Generator, 110%)	25,000	187.2	101.7
Plume Height (Auxiliary Boiler, 25%)	25,000	171.2	85.7
Plume Height (Auxiliary Boiler, 50%)	25,000	178.9	93.4
Plume Height (Auxiliary Boiler, 75%)	25,000	185.4	99.9
Plume Height (Auxiliary Boiler, 100%)	25,000	191.8	106.3
Plume Height (Turbines Case #1)	25,000	303.6	218.1
Plume Height (Turbines Case #2)	25,000	281.9	196.4
Plume Height (Turbines Case #3)	25,000	258.9	173.4
Plume Height (Turbines Case #4)	25,000	290.4	204.9
Plume Height (Turbines Case #5)	25,000	268.7	183.2
Plume Height (Turbines Case #6)	25,000	245.8	160.3
Plume Height (Turbines Case #7)	25,000	279.6	194.1
Plume Height (Turbines Case #8)	25,000	257.8	172.3
Plume Height (Turbines Case #9)	25,000	241.9	156.4
Cooling Tower Cases			
Independence Cooling Tower Stack Top	1,485.9	96.5	13.1
Intermediate	2,286.0	112.8	29.4
Intermediate	3,429.0	128.0	44.6
Intermediate	3,639.0	134.4	51
Independence Cooling Tower Plume Height	3,771.9	144.8	61.4
Heritage Cooling Tower Stack Top	1,371.6	102.1	11.3
Intermediate	2,076.5	118.9	28.1
Intermediate	3,048.0	134.1	43.3
Intermediate	3,448.0	140.8	50.0
Heritage Cooling Tower Plume Height	4,629.2	150.4	59.6

1 All receptors at 25,000 meters downwind represent a hypothetical hill placed at the plume height for each load case. The actual distance to a plume height receptor would be greater than 25,000 meters.

6.7.2.2 *SCREEN3 Model Results for Criteria Pollutants*

The SCREEN3 model results for complex and intermediate terrain demonstrate that predicted impacts for criteria pollutants are less than SILs for all pollutants and averaging periods. Table 6-26 presents maximum predicted impact concentrations for the combustion turbines considering all loads and ambient temperature conditions.

Tables 6-27 and 6-28 present the maximum predicted Project impacts for criteria pollutants for the auxiliary boiler and emergency diesel generator, respectively, considering all load conditions. Maximum predicted impact concentrations are less than corresponding SILs for all pollutants and averaging periods. Detailed model results are provided in Appendix H.6.

Table 6-26: Maximum SCREEN3 (VALLEY Mode) Predicted Criteria Pollutant Impacts for the Heritage Station Combustion Turbines

Pollutant	Averaging Period	Maximum Concentration (μg/m³)	SILs (μg/m³)	Load Case Scenario for Maximum
NO_2	Annual	0.17	1	100%, -19°F
SO_2	3-hour	0.59	25	100%, -19°F
	24-hour	0.16	5	100%, -19°F
	Annual	0.05	1	100%, -19°F
PM	24-hour	0.64	5	100%, -19°F
	Annual	0.20	1	100%, -19°F
CO	1-hour	4.50	2,000	100%, -19°F
	8-hour	3.15	500	100%, -19°F

Table 6-27: Maximum SCREEN3 (VALLEY Mode) Predicted Criteria Pollutant Impacts for the Heritage Station Auxiliary Boiler

Pollutant	Averaging Period	Maximum Concentration (μg/m³)	SILs (μg/m³)	Load Case Scenario for Maximum
NO_2	Annual	0.01	1	100%
SO_2	3-hour	0.11	25	100%
	24-hour	0.03	5	100%
	Annual	0.001	1	100%
PM	24-hour	0.10	5	100%
	Annual	0.002	1	100%
CO	1-hour	4.43	2,000	100%
	8-hour	3.10	500	100%

*Weighted based on 500-hour annual operating limit.

Table 6-28: Maximum SCREEN3 (VALLEY Mode) Predicted Criteria Pollutant Impacts for the Heritage Station Emergency Diesel Generator

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	SILs ($\mu g/m^3$)	Load Case Scenario for Maximum
NO_2	Annual	0.12	1	110%
SO_2	3-hour	0.52	25	110%
	24-hour	0.14	5	110%
	Annual	0.002	1	110%
PM	24-hour	0.19	5	110%
	Annual	0.002	1	110%
CO	1-hour	1.70	2,000	110%
	8-hour	1.19	500	110%

*Weighted based on 300-hour annual operating limit.

Table 6-29 presents the maximum predicted combined impacts for all of the Heritage Station emission sources (combustion turbines, auxiliary boiler, emergency diesel generator, and cooling towers [PM_{10} only]). The auxiliary boiler and emergency diesel generator will not operate simultaneously with the combustion turbine, except during test periods for up to 3 hours in length. Therefore, for short-term averaging periods longer than 3 hours, maximum predicted concentrations for the auxiliary boiler or emergency diesel generator were scaled by the amount of potential simultaneous operating hours (3) by the operating hours of the averaging period (8 or 24). The maximum short-term impact of either the auxiliary boiler or emergency diesel generator is summed with the short-term predicted impact from the turbines and cooling towers. For the annual average, concentrations from each of the emission sources are summed for comparison with applicable criteria. Total impact concentrations are less than corresponding SILs for all pollutants and averaging periods. Therefore, compliance with NAAQS is demonstrated.

Table 6-29: Maximum SCREEN3 (VALLEY Mode) Predicted Impacts for All Heritage Station Emission Sources (Turbines, Auxiliary Boiler, Emergency Diesel Generator and Cooling Tower ($\mu g/m^3$) (Page 1 of 2)

Pollutant	Averaging Period	Auxiliary Boiler	Emergency Diesel Generator	Heritage Station Combustion Turbines and Cooling Tower	Total of Heritage Units	SILs
NO_2	Annual	0.01	0.12	0.17	0.30	1
SO_2	3-hour	0.11	0.52	0.59	1.22	25
	24-hour	0.01	0.14	0.16	0.31	5
	Annual	0.01	0.002	0.05	0.05	1

Table 6-29: Maximum SCREEN3 (VALLEY Mode) Predicted Impacts for All Heritage Station Emission Sources (Turbines, Auxiliary Boiler, Emergency Diesel Generator and Cooling Tower (μg/m³) (Page 2 of 2)

Pollutant	Averaging Period	Auxiliary Boiler	Emergency Diesel Generator	Heritage Station Combustion Turbines and Cooling Tower	Total of Heritage Units	SILs
PM	24-hour	0.04	0.09	1.10*	1.23	5
	Annual	0.002	0.002	0.35*	0.35	1
CO	1-hour	4.43	1.70	4.50	10.63	2,000
	8-hour	3.10	1.19	3.15	7.44	500

Note: Short-term total facility impacts include simultaneous operation of either the Project auxiliary boiler or Project emergency diesel generator for the maximum of 3 hours concurrent with the Heritage combustion turbine/cooling tower in any day.

6.7.3 Cavity Zone Analysis

Since emissions from the combustion units and the cooling towers will be released from source points that are less than GEP height, the potential for emissions being entrained into the recirculation zone (cavity) was considered. Pursuant to the Air Modeling Protocol (provided in Appendix A), the cavity analysis was conducted using the SCREEN3 model that provides the length of the cavity and recirculation zone concentrations for non-GEP stacks. The structures that were evaluated are based on those identified by the BPIP results as "controlling" (by flow vector).

The controlling building tiers for the Project's main turbine stacks and auxiliary boiler stack are the 110.5-foot penthouse tiers located above the boilers on each Project turbine building. The potential for plume entrainment in the cavity due to the penthouse tiers was evaluated for two cases: the case where the penthouse tiers were assumed to "combine" for purposes of downwash effects and the uncombined case. SCREEN3 model results indicate that the stack exhaust plume for each of these stacks (two main turbine and auxiliary boiler stacks) will not be entrained in any of building cavities produced. The emergency diesel generator is located on the northwest side of the turbine building. While BPIP results indicate that the penthouse tier cavity may influence the emergency diesel generator stack in a few directions, potential building cavity effects on this side of the building will be dominated by the 91-foot main turbine buildings. The potential for plume entrainment in the cavity due to the main turbine buildings was also evaluated for two cases: the case where the turbine buildings were assumed to "combine" with the Independence Station building and the "uncombined" case. SCREEN3 model results indicate that the stack exhaust plume for the emergency diesel generator will not be entrained in the building cavity produced for either case. The SCREEN3 model cavity analysis results are provided in Appendix H.5.

The cavity region for the Project cooling tower will extend approximately 90.4 meters (m) out from the long side of the tower and 19.3 m out from the short side of the tower. This entire cavity region will be fenced in, and predicted concentrations within this area were not considered in the compliance evaluation.

6.7.4 Shoreline Fumigation Analysis

The new stacks will be approximately 2,500 feet from the shoreline of Lake Ontario. For onshore flow during the daytime, a thermal internal boundary layer (TIBL) increases in depth with inland distance. The TIBL is formed as the stabley stratified air originating from over the lake is heated from below by the warmer land. The greatest difference in temperatures between a cool lake and warm land surface would occur in spring or early summer. Plumes emitted into the stable lake air undergo more rapid vertical mixing as they intercept the rising TIBL.

The SCREEN3 model was used to make an initial conservative estimate of the impact of shoreline fumigation. The following methodology for estimating 3-, 8-, and 24-hour averaged concentrations was followed, as contained in Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised (EPA-454/R-92-019, October 1992). This involves combining the estimated shoreline fumigation concentration with the maximum 1-hour non-fumigation concentration from SCREEN3 as follows:

Averaging Time	*Concentration*
3 hours	$0.9(X_1 + X_f)/2$
8 hours	$0.7(13X_1 + 3X_f)/16$
24 hours	$0.4(15X_1 + X_f)/16$

Where:

X_1 is the maximum 1-hour concentration and X_f is the estimated shoreline fumigation concentration.

The procedure was applied to every source and load/temperature case except for the -19°F cases, which were deemed too cold for TIBL growth. The maximum predicted concentrations were less than the corresponding SILs for all pollutants and averaging periods except for the following combustion turbine cases: 100 percent load at 100°F, 75 percent load at 47°F and 50 percent load at 47°F. No shoreline fumigation was predicted for the auxiliary boiler and emergency diesel generator because the plume rise for these sources is lower than for the combustion turbines and these plumes stay below the TIBL.

A more refined variation of this methodology was then applied which estimated X_1 as the maximum 1-hour concentration over the receptor grid, at the range of distances (700-1,400 meters) where maximum fumigation impacts were predicted to occur, for the 5-year modeling period using ISCST3 instead of the SCREEN3 1-hour maximum. The same estimate of X_f for shoreline fumigation from SCREEN3 was used. The maximum predicted criteria pollutant concentrations resulting from shoreline fumigation are provided in Table 6-30. These concentrations include contribution from either the auxiliary boiler or the emergency diesel generator (the maximum of the two sources is used) assuming one of the units may operate simultaneously with the combustion turbine for up to 3 hours. For PM_{10}, the maximum 1-hour predicted concentrations for all emissions sources (turbines, cooling tower, auxiliary boiler and emergency diesel generator) was used as X_1 and the concentration for the 24-hour averaging period was scaled as shown above. Maximum predicted concentrations are less than SILs for all pollutants and averaging periods. SCREEN3 Model results for shoreline fumigation are provided in Appendix H.5.

Table 6-30: Maximum SCREEN3 Predicted Fumigation Impacts for Heritage Station

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	SILs ($\mu g/m^3$)	Load Case Scenario for Maximum
CO	1-hour	110.77	2,000	100%, 100°F
	8-hour	28.82	500	100%, 100°F
PM_{10}	24-hour	4.09	5	100%, 100°F
SO_2	3-hour	8.77	25	100%, 100°F
	24-hour	1.42	5	100%, 100°F

Note: Annual averaging periods were not considered since fumigation is a short-term phenomenon.

6.7.5 Dispersion Change at Independence Station

This section addresses the requirements of Stipulation No. 1, Clause 2(j).

As described in Section 6.6, the two main turbine buildings proposed for the Project include 110.5-foot tiers (penthouse tiers). These penthouse tiers are taller than any of the existing structures at the adjacent Independence Station site. A BPIP analysis was conducted (see Section 6.6 and Appendix C of the Protocol (provided in Appendix A)) which indicates that these penthouse tiers have the potential to influence dispersion at the two easternmost turbine stacks and the auxiliary boiler stack for Independence Station. Therefore, an analysis of these potential downwash effects was conducted.

To evaluate the change to ground level impact concentrations from the Independence Station stacks potentially caused by the construction of the Project, a dispersion modeling analysis was conducted to predict the percent change (increase) of maximum predicted ground level concentrations for each of the source scenarios affected. This percent change has been applied to the values predicted and presented in the compliance demonstration conducted for Independence Station in 1992 (see Appendix E of the Protocol (provided in Appendix A)). The Independence Station compliance demonstration showed that maximum predicted concentrations were less than SILs for all pollutants. This analysis shows that, with consideration of the Project-induced dispersion influence, maximum impact concentrations for Independence Station will remain below SILs. Thus, the conclusions of the original Independence Station compliance demonstration remain unchanged.

The affected Independence Station emission sources (turbine stacks three and four and the auxiliary boiler stack) were modeled with ISCST3 in the refined mode in accordance with the methodology described in Section 6.7. The modeling was conducted for each of the load case scenarios previously evaluated for Independence Station. The emission and stack parameters for the load cases are provided in Appendix H.7. Since SCREEN3 ("VALLEY" mode) predictions do not account for downwash, it was not necessary to conduct this analysis.

Table 6-31 presents the results of the ISCST3 modeling analysis. Results are presented for each averaging period in terms of a ratio of maximum predicted impacts for Independence Station sources including the influence of Project structures to maximum predicted impacts for Independence Station sources under existing conditions (no Project influence). These results indicate that maximum predicted concentrations for the auxiliary boilers (for 1, 2, and 3 boiler cases) do not change. Maximum predicted impacts for the combustion turbines increase from 8 to 40 percent. Table 6-32 presents the results of the Independence Station compliance demonstration. This table shows that maximum predicted impacts including adjustment of concentrations to account for Project-induced dispersion change remain below SILs and, therefore, compliance with NAAQS is demonstrated. Detailed results of the Independence Station modeling analysis are provided in Appendix H.7.

Table 6-31: ISCST3 Model Results for Independence Station Before and After Construction of Heritage Station

	Maximum Impact Concentration Ratio (with Project/Existing Conditions)			
Average Period	Turbines 1-4	One Auxiliary Boiler	Two Auxiliary Boilers	Three Auxiliary Boilers
Annual	1.08	1.00	1.00	1.00
1-hour	1.18	1.00	1.00	1.00
3-hour	1.13	1.00	1.00	1.00
8-hour	1.30	1.00	1.00	1.00
24-hour	1.40	1.00	1.00	1.00

Note: Emergency diesel generator stack is unaffected by Heritage Station (see BPIP results in Appendix H.6).

Table 6-32: Updated Independence Station Compliance Demonstration

		Impact Concentrations (μg/m³)		
		Four Combustion Turbines		
Pollutant	Averaging Period	Existing	With Heritage	SILs (μg/m³)
NO_2	Annual	0.20	0.22	1
SO_2	Annual	0.01	0.011	1
	24-hour	0.12	0.17	5
	3-hour	0.37	0.42	25
CO	8-hour	17.05	22.17	500
	1-hour	33.30	39.29	2,500
PM/PM_{10}	Annual	0.13	0.14	1
	24-hour	2.07	2.90	5

Note: Maximum predicted impacts for auxiliary boiler, do not change. The emergency diesel generator stack is beyond the influence of Heritage Station.

6.7.6 Cumulative Impact Assessment

An assessment of the cumulative impacts of Heritage Station and Independence Station was conducted. This assessment was based on the sum total of maximum predicted impacts for the two facilities. For criteria pollutants, the sum of the maximum predicted impacts of Heritage Station and those of Independence Station (from the previous compliance demonstration adjusted to reflect the influence of the Heritage Station buildings (see Section 6.7.5)) were added to ambient background concentrations and the total concentrations are compared with the NAAQS in Table 6-33. Total cumulative criteria pollutant impacts are well below NAAQS for all pollutants and averaging periods.

Table 6-33: Cumulative Criteria Pollutant Impact Assessment for Heritage Station and Independence Station

		Maximum Predicted Concentration				
Pollutant	Averaging Period	Heritage Station (μg/m³)	Independence Station (μg/m³)	Ambient Background (μg/m³)	Total Concentration (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	0.30	0.99	28.3	29.6	100
SO_2	Annual	0.05	0.18	7.8	8.0	80
	24-hour	1.42	2.75	36.5	40.7	365
	3-hour	8.77	18.7	67.8	95.3	1,300
CO	8-hour	28.82	112.0	4,582	4,722.8	10,000
	1-hour	110.77	290.0	9,029	9,429.8	40,000
PM/PM_{10}	Annual	0.36	0.18	27	27.5	50
	24-hour	4.65	2.75	62	69.4	150

6.7.7 Class I Analysis

The nearest Class I area to the Project is the Lye Brook Wilderness to the east in Vermont. The distance of the Project to this location is approximately 270 km. Consistent with the Air Modeling Protocol (provided in Appendix A), dispersion modeling for Class I Areas is not required because of this great distance.

6.8 Non-Criteria Pollutant Impact Analysis

Pursuant to Stipulation 3 and the Air Quality Modeling Protocol (provided in Appendix A), the Project is required to assess the impact of non-criteria pollutants from the combustion turbines, auxiliary boilers, emergency diesel generator, and cooling towers. This evaluation was completed in two steps. First, the Project determined the non-criteria pollutants emitted and the benchmark air concentrations, and then the Project emissions and the total cumulative emissions including Independence Station were compared to these benchmark concentrations. This evaluation was done for both the 1-hour and annual averaging periods for comparison to the applicable SGC the AGC the RfC and the HBAC.

6.8.1 Non-Criteria Pollutants Benchmark Air Concentrations

Table 6-34 provides the non-criteria pollutants potentially emitted from the combustion turbines, auxiliary boilers, emergency diesel generator, and cooling tower. Table 6-34 also presents the threshold inhalable exposure concentration for these pollutants. These criteria have been reviewed as part of the approval of the Air Modeling Protocol and include all of the revisions recommended by NYSDOH.

Table 6-34: Benchmark Air Concentrations [All values in micrograms per cubic meter (µg/m³)] (Page 1 of 3)

Pollutant	CAS Number	SGC[a] (1-hour Average)	AGC[b] (Annual Average)	RfCs[c, d]	HBAC[c, e]
acenaphthene	83-32-9			2.2E+2[(1)]	
acenaphthylene	208-96-8			2.2E+2[f]	
acetaldehyde	75-07-0	4.5E+3	1.1E+2	9.0E+0[(2)]	4.5E-1[(2)]
acrolein	107-02-8	2.3E+1	2.0E-2	2.0E-2[(2)]	
aldrin	309-00-2	6.0E+1	6.0E-1	1.0E-1[(2) g]	2.0E-4[(2)]
aluminum	7429-90-5	3.8E+2	2.4E+1	3.7E+0[(1)]	
ammonia	7446-41-7	4.0E+3	1.0E+2	1.0E+2[(2)]	
anthracene	120-12-7		2.0E-2	1.1E+3[(1)]	
antimony	7440-36-0	1.2E+2	1.2E+0	1.5E+0[(1)]	
arsenic	7440-38-2	2.0E-1	2.3E-4	1.0E+0[(2)g]	2.0E-4[(2)]
barium	7440-39-3	1.2E+2	5.0E-1	5.0E-1[(3)]	
benzene	71-43-2	3.2E+1	1.2E-1	6.0E+0[(1)]	1.3E-1[(2)]
benz(a)anthracene	56-55-3		2.0E-2	1.0E+2[h]	2.0E-2[i]
benzo(a)pyrene	50-32-8		2.0E-3	1.0E+2[h]	2.0E-3[(4)]
benzo(b)fluoranthene	205-99-2			1.0E+2[h]	2.0E-2[i]
benzo(g,h,i)perylene	191-24-2			1.0E+2[h]	
benzo(k)fluoranthene	207-08-9			1.0E+2[h]	2.0E-1[i]
beryllium	7440-41-7	5.0E-2	4.0E-4	2.0E-2[(2)]	4.0E-4[(2)]
boron	7440-42-8	3.8E+2[j]	2.4E+1[j]	2.0E+1[(3)]	
butane	106-97-8	4.5E+5	4.5E+4		
cadmium	7440-43-9	2.0E-1	5.0E-4	2.0E-2[(5)]	5.0E-4[(5)]
chloroethane	75-00-3	6.3E+4	1.3E+4	1.0E+4[(2)]	2.2E+0[(1)]
chloroform	67-66-3	9.8E+2	4.0E-2	3.0E-1[(1)]	4.0E-2[(2)]
chromium	7440-47-3	1.0E-1	2.0E-5	1.0E-1[(6)]	2.0E-5[(6)]
chromium (III)	16065-83-1	1.2E+2	1.0E-1	1.0E-1[(6)]	
chromium (VI)	18540-29-9	---[k]	---[k]	1.0E-1[(6)]	2.0E-5[(6)]
chrysene	218-01-9		2.0E-2	1.0E+2[h]	2.0E-1[i]
cobalt	7440-48-4	4.8E+0	4.8E-2	2.2E+2[(1)]	
copper	7440-50-8	4.8E+1	4.8E-1	1.5E+2[(1)]	
cyanide	57-12-5	5.0E+2	1.2E+1	7.3E+1[(1)]	
cyclohexylamine	108-91-8	9.8E+3	9.8E+1		
diazinon	333-41-5	2.4E+1	2.4E-1	3.3E+0[(1)]	
dibenz(a,h)anthracene	53-70-3		7.1E-5	1.0E+2[h]	2.0E-3[i]
dichlorobenzene	25321-22-6	1.4E+4	7.0E+2	8.0E+2[(2) l]	2.8E-1[(1) l]
1,2-dichloroethane	107-06-2	9.5E+2	3.9E-2	5.0E+0[(1)]	4.0E-2[(2)]

Table 6-34: Benchmark Air Concentrations [All values in micrograms per cubic meter ($\mu g/m^3$)] (Page 2 of 3)

Pollutant	CAS Number	SGC[a] (1-hour Average)	AGC[b] (Annual Average)	RfCs[c, d]	HBAC[c, e]
di(2-ethylhexl)phthalate	117-81-7	1.2E+3	1.2E+1	7.0E+1[(2) g]	4.5E-1[(1)]
dimethylbenz(a)anthracene	57-97-6			1.0E+2[h]	
di-*n*-butylphalate	84-74-2	1.2E+3	1.2E+1	3.7E+2[(1)]	
ethane	74-84-0				
fluoranthene	206-44-0			1.5E+2[(1)]	
fluorene	86-73-7			1.5E+2[(1)]	
fluoride	16984-48-8	7.1E+0	4.0E-1	8.0E-1[(7)]	
formaldehyde	50-00-0	3.0E+1	6.0E-2	3.0E+1[(8)]	6.0E-2[(8)]
hexane	110-54-3	4.2E+4	2.4E+2	2.0E+2[(2)]	
indeno(1,2,3-cd)pyrene	193-39-5			1.0E+2[h]	2.0E-2-[i]
iron	7439-89-6	2.4E+2	2.4E+0	1.1E+3[(1)]	
isopropyl alcohol	67-63-0	2.3E+5	2.3E+3		
lead	7439-92-1	1.2E+1	7.5E-1	1.5E+0[(9)]	
lindane	58-89-9	1.2E+2	6.0E-4	1.2E+0[(10) g]	5.0E-3[(10) m]
lithium	7439-93-2			7.3E+1[(1)]	
magnesium	7439-95-4				
manganese	7439-96-5	4.8E+1	5.0E-2	5.0E-2[(2)]	
mercury	7439-97-6	6.0E+0	3.0E-1	3.0E-1[(2)]	
methane	74-82-8				
2-methyl naphthalene	91-57-6			3.0E+0[n]	
3-methylcholanthrene	56-49-5			1.0E+2[h]	
methylene chloride	75-09-2	4.1E+4	2.7E+1	6.0E+1[(11)]	2.1E+0[(2)]
molybdenum	7439-98-7	3.8E+2	1.2E+1	1.8E+1[(1)]	
morpholine	110-91-8	1.7E+4	1.7E+2		
naphthalene	91-20-3	1.2E+4	1.2E+2	3.0E+0[(2)]	
nickel	7440-02-0	5.0E+0	4.0E-3	2.0E-1[(12)]	4.2E-3[(2)]
nitrous oxide		1.1E+4	1.1E+2		
PCB	1336-36-3	1.0E-1	4.5E-4	7.0E-2[g, o]	1.0E-2[(2)]
n-pentane	109-66-0	8.3E+4	8.3E+2		
phenanthrene	85-01-8		2.0E-2	1.0E+2[h]	
phosphoric acid	7664-38-2	2.4E+2	1.0E+1	1.0E+1[(2)]	
potassium	7440-09-7				
propane	74-98-6				
propylene	115-07-1				
pyrene	129-00-0		2.0E-2	1.1E+2[(1)]	
selenium	7782-49-2	4.8E+1	4.8E-1	1.8E+1[(1)]	
silver	7440-22-4	2.4E+0	2.4E-2	1.8E+1[(1)]	
sodium cyanate	917-61-3	5.0E+3	5.0E+1		
sodium nitrate	7631-99-4		1.2E+1		
sodium nitrite	7632-00-0		4.1E+0		
sulfuric acid	7664-93-9	2.4E+2	2.4E+0		
strontium	7440-24-6			2.2E+3[(1)]	
titanium	7440-32-6			3.1E+1[(1)]	

Table 6-34: Benchmark Air Concentrations [All values in micrograms per cubic meter (μg/m³)] (Page 3 of 3)

Pollutant	CAS Number	SGC[a] (1-hour Average)	AGC[b] (Annual Average)	RfCs[c, d]	HBAC[c, e]
toluene	108-88-3	4.5E+4	4.0E+2	4.0E+2[(2)]	
1,1,1-trichloroethane	71-55-6	4.5E+5	1.0E+3	1.0E+3[(1)]	
vanadium	7440-62-2	1.0E+2	2.0E-1	2.0E-1[(13)]	
xylene (total)	1330-20-7	1.0E+5	3.0E+2	3.0E+2[(14)]	
zinc	7440-66-6		5.0E+1	5.0E+1[(15)]	

Footnotes

[a] NYSDEC short-term guideline concentrations.

[b] NYSDEC annual guideline concentrations.

[c] Comparison values determined for a 70 kg adult who inhales 20 m³ of air per day.

[d] Health Based Reference Concentrations (RfCs) to evaluate non-carcinogenic effects as presented in EPA's Integrated Risks Information (IRIS) database.

[e] Health Based Air Concentrations associated with a lifetime cancer risk of one-in-a-million for carcinogenic effects as presented in EPA's IRIS database.

[f] Based on acenaphthene.

[g] In the absence of an inhalation reference concentration, the oral reference dose may be used as a surrogate to evaluate inhalation noncancer risks for systemic toxicants, assuming a 70 kg individual inhales 20 m³ of air per day.

[h] Based on pyrene.

[i] The risk-based concentration was based on the cancer potency of benzo(a)pyrene and the application of the following relative potency factors: 0.1 for benz(a)anthracene, 0.1 for benzo(b)fluoranthene, 0.01 for benzo(k)fluoranthene, 0.01 for chrysene, 1.0 or dibenz(a,h)anthracene, and 0.1 for indeno(c,d-1,2,3)pyrene.

[j] For boron oxide.

[k] See chromium.

[l] Based on 1,4-dichlorobenzene.

[m] In the absence of an inhalation unit risk, the oral cancer potency factor may be used a surrogate to evaluate inhalation cancer risk for systemic carcinogens, assuming a 70 kg individual inhales 20 m³ of air per day.

[n] Based on naphthalene.

[o] Based on Aroclor 1254 reference dose.

References

(1) EPA 1999a
(2) EPA 1999b
(3) EPA 1997
(4) NYSDOH 1989
(5) NYSDOH 1990a
(6) NYSDOH 1990b
(7) NYSDEC 1972
(8) NYSDOH 1990c
(9 NAAQS
(10) NYSDEC 1997
(11) NYSDOH 1988a
(12) USDH&HS 1997
(13) NYSDOH 1990d
(14) EPA 1991
(15) SDOH 1988b

6.8.2 *Impact Results for Non-Criteria Pollutants – Heritage Station and Independence Station*

Cumulative impacts of the Project and Independence Station have been determined as follows:

- Table 6-35 provides the maximum 1-hour average impacts for the Project in combination with the maximum impacts from Independence Station for various operation scenarios. As shown, all predicted concentrations are below applicable 1-hour thresholds.

- Table 6-36 provides the maximum predicted annual impacts for the Project and Independence Station cooling towers in combination with Independence Station for various scenarios. As shown, all predicted concentrations are below applicable annual thresholds.

Only one pollutant (formaldehyde) has a predicted annual impact greater than 10 percent of any applicable criteria. In accordance with Stipulation No. 1, Clause 3(g), an evaluation of the need for a multipathway risk assessment for formaldehyde was conducted. Upon discussion with the NYSDOH, it was considered that formaldehyde is primarily toxic through the inhalation pathway and a multipathway risk assessment for formaldehyde was not warranted. Pursuant to Stipulation No. 1, Clause 3(f), it was determined that a cumulative assessment for formaldehyde also was not warranted because the predicted ground level air concentration is not estimated to be near or above the RfC.

Supporting calculations for non-criteria pollutant emission rates and impacts are provided in Appendix H.8.

Table 6-35: Maximum Predicted 1-Hour Non-criteria Pollutant Impacts for the Combined Sources at Heritage Station and Independence Station

(George to supply Excel Table)

Table 6-36: Maximum Predicted Annual Average Non-criteria Pollutant Impacts for the Combined Sources at Heritage Station and Independence Station

(George to provide)

6.9 Acid Deposition

Pursuant to Stipulation No. 1, Clauses 2(p) and 2(q), an acid deposition impact analysis was performed for the Project that quantifies both the Project's contribution, and the Project's contribution in combination with Independence Station to the New York State total deposition of sulfates and nitrates in accordance with the New York State Acid Deposition Control Act (ECL 19-1901). This assessment was performed according to guidelines specified in a March 4, 1993 memorandum from Leon Sedefian to IAM Staff.

The NYSDEC has performed modeling to simulate the NO_x/nitrate emission-deposition relationship and the SO_2/sulfate emission-deposition relationship. The modeling provides estimates of acid deposition rates at designated sensitive receptors both within and outside New York State. Total deposition rates at each designated sensitive receptor location were determined as the cumulative impact due to a statewide set of point sources and area sources. Facilities expected to make a significant contribution to designated receptor locations were included as individual point sources. Other sources were aggregated and treated as countywide area sources. The output of the modeling predicts deposition rates of SO_2 and NO_2 at each of the designated sensitive receptor locations due to emissions at each of the sources. Designated sensitive receptor locations are shown in the figure provided in Appendix H.9.

In general, the assessment approach is based on these previous model results. The approach used source-receptor impact matrices to scale the proposed source's potential impacts. Previously modeled county and/or point sources that are spatially representative of the proposed source were used. The nitrate and sulfate deposition impact entries in the matrices were then used to scale the Project's potential acid deposition impacts.

The Oswego County area source (Oswego-CO) and the Oswego Steam Station point source (Oswego-PP) were used to develop scaling factors for the Project. The modeled deposition impact rate for these sources are presented in Table H.9-1 provided in Appendix H.9. Annual deposition factors (deposition rate per 1,000 tons of pollutant emissions) for the selected source-receptor combinations calculated by dividing the deposition rates by the source emission rates are presented in Table H.9-2 provided in Appendix H.9. For each source and each pollutant, the potential deposition contributions from the Project is quantified by multiplying the ratio of Project emissions to the source emissions by the depositions predicted for the source at each receptor location.

Table 6-37 shows the results of the estimated deposition rates at each sensitive receptor for the project and for the Project and Independence Station combined. Also

Table 6-37: Acid Deposition Estimates for Heritage Station and Independence Station (Kg/Ha-yr)

presented are the total deposition rates due to all New York sources, all point sources, and all county sources in the NYSDEC inventory at each receptor location. As shown, the highest cumulative Project and Independence Station sulfate deposition impact is less than 0.25 percent of the total New York State point source and county source impacts. The highest cumulative Project and Independence Station nitrate deposition impact is less than 0.25 percent of the total New York State point source and county source impacts. These rates are insignificant.

6.10 Accidental Release Program

This section addresses Stipulation No. 1, Clause 2(r).

Aqueous ammonia will be used as the reducing agent in the Project's SCR system for controlling NO_x emissions from the turbines. The NO_x reduction achieved by the SCR system is affected by the ratio of NH_3 to NO_x. Aqueous ammonia (a mixture containing less than 19.5 percent by weight ammonia in water) will be stored on-site in two 30,000-gallon storage tanks. The tanks will be designed in accordance with API specifications. They will be leak-tested before use and inspected periodically; they will also be equipped with a leak detection and ammonia vapor treatment system. The vapor treatment system will consist of a continuous water quench designed to absorb all ammonia vapor generated from the tank's operation. The system will have a ventilation pipe less than 4 inches in diameter.

The tanks are located approximately 250 feet south of the turbines and some 1,000 feet northwest of the nearest property boundary. The tanks are each designed as a double walled steel tank with an impervious, secondary containment dike sufficient to hold 110 percent of the tank volume. The use of concrete in the construction of the containment dikes will also prevent accidental contact with the tanks by vehicles or other equipment.

Each tank will be equipped with a level gauge, and monitored in the continuously-staffed control room. In the event that the tank level were to fall at an abnormal rate, an alarm would sound and emergency response procedures would be initiated. In the event of a small leak (at a valve or pipe joint), plant maintenance personnel, wearing appropriate protective gear, would initiate corrective measures (shut off control valves) or make repairs as quickly as possible. In the exceedingly unlikely event of a tank failure or rupture, plant personnel and an emergency response contractor would respond appropriately.

The aqueous ammonia will be delivered to the Project site in standard tanker trucks. These trucks typically have a capacity of 5,500 gallons. Upon arriving at the Project site, the driver will register at the guardhouse and then proceed to the ammonia unloading area. A suitably trained and qualified member of the plant operating staff will meet the delivery truck at the unloading area to ensure that proper unloading procedures are implemented.

After the truck is properly positioned in the bermed unloading area, the driver will chock the truck tires. The auxiliary plant operator will check the storage tank level to verify that the full tanker load can be delivered and then will notify the control room that the driver is ready to begin unloading; a phone or intercom in the tank area will be provided for this purpose.

Unloading will be accomplished via heavy-duty rubber hoses similar to those used by gasoline tankers at retail gas stations. The hose will be connected to a permanent pump/pipe system, which transfers the ammonia solution to the adjoining storage tank. The delivery trucks will be equipped with fast-action shut-off valves in the event that a leak or other problem should arise. A hose from off the top of the tank will be connected back to the truck to contain fumes displaced by filling. The auxiliary plant operator and the delivery truck driver will stay with the truck for the entire unloading process and the auxiliary plant operator will notify the control room when unloading is finished and the hose and pump are properly secured.

The aqueous ammonia vendor will be advised in writing of Project requirements. Prior to the commencement of operations, the delivery drivers will be trained in filling and emergency procedures, and the requirements will be clearly posted in the unloading area.

An unplanned release from the ammonia tank would be fully contained within the tank outer wall. The tank vapor treatment system will continue to function even if the aqueous ammonia accumulates within the outer tank wall.

In order to assess the potential for off-site impacts resulting from a worst-case release scenario (i.e., a rupture of both the primary (internal) tank wall and the secondary (outer) tank wall), an evaluation of this unlikely event was performed using the protocol established in EPA's Risk Management Program regulations (40 CFR Part 68). While the Project's use of 19.5 percent aqueous ammonia is not subject to these regulations due to its dilute concentration, the protocol provides a conservative approach to estimating the potential for off-site impacts from releases of hazardous substances.

The referenced EPA protocol requires that a worst-case release of the entire tank volume (30,000 gallons) of one of the storage tanks be reviewed. It should be pointed out that, in the highly unlikely event an accidental spill from a storage tank does occur, the liquid will be fully contained within the impervious diked area.

A determination of the potential for an off-site impact from an accidental worst-case ammonia release scenario was conducted using EPA's reference tables and calculation methods. The tables and methods are discussed in detail in EPA's *Risk Management Program Guidance for Offsite Consequence Analysis* (EPA, April 1999) developed by EPA as part of the 1990 CAAA Title III Risk Management Program. The first step in this analysis is determining a release rate (QR) in pounds per minute.

Section 3.3 of the referenced guidance specifies a method for analyzing releases of common water solutions such as aqueous ammonia. In this analysis, the use of passive mitigation factors (i.e., containment dike) is allowed and used in calculating QR.

The guidance treats water solutions, such as aqueous ammonia, at ambient temperatures, as a liquid release (Section 3.2.3 for liquids) and first requires the calculation of the maximum pool area without the benefit of passive mitigation:

$$A = QS \times DF$$

Where:

A = Area (square feet)

QS = Quantity Released (pounds)

DF = Density Factor (Exhibit B-3 of the guidance, 20 percent ammonia).

QS is calculated using the data in Table 6-38. DF is 0.53 per Exhibit B-3 of the guidance document. The maximum area of the pool without mitigation, assuming a depth of 1 centimeter per the guidance, is 122,382 square feet (sf).

The evaporative surface area of the dike is calculated to be 644 sf. The smaller of the two areas is used in determining QR. Therefore, the available evaporative surface area of the dike is smaller than the pool area, and is used to determine QR. The release rate is calculated as follows:

$$QR = 1.4 \times LFA \times A$$

Where:

1.4 = Wind speed factor = $1.5^{0.78}$, where 1.5 m/s is wind speed for the worst-case

LFA = Liquid Factor Ambient (Exhibit B-3, 20 percent ammonia)

A = Diked area (sf)

LFA is 0.015 from Exhibit B-3 of the guidance. Thus, the calculated release rate QR is 13.52 pounds per minute.

Table 6-38: Off-site Consequence Analysis for Aqueous Ammonia

Parameters	Values	Reference
Volume (gallons)	30,000	Heritage Station design
Release (pounds)(1)	230,910	Calculated
Percent Ammonia in Solution	19.5	Heritage Station design
Area of Dike (square feet)	1024	Calculated
Evaporative Surface Area (square feet) (2)	644	Calculated
Pooled Area (square feet)(3)	122,382	Calculated
Density Factor	0.53	Exhibit B-3
Liquid Factor Ambient (LFA)	0.015	Exhibit B-3
Topography	Forested	USGS
Vapor Density	Buoyant	Exhibit B-3
Release Duration	10-minute	Guideline
Toxic Endpoint (milligrams per liter)	0.14	Exhibit B-3
Stability	F	Reference Table 1
Wind Speed (m/s)	1.5	Reference Table 1

(1) Release in pounds derived assuming density of 0.9229 g/cm^3 (20 percent ammonia solutions) and 8.34 pounds per gallon of water.

(2) The dike area is derived as the open area around the tank. The area of the dike is 1,024 square feet based on a dike with dimensions of 32 feet by 32 feet. The area of the tank is 380 square feet based on an outer tank diameter of 22 feet. The open area around the tank is the difference between 1,024 – 380 = 644 square feet.

(3) Pooled area is equal to release in pounds multiplied by the density factor.

Finally, the determination of the potential worst-case release impact distance is calculated. The guidance provides worst-case distances for neutrally buoyant gases and vapors and for dense gases and vapors for both rural/open and urban/forested areas (Section 4.0). The tables were developed assuming a wind speed of 1.5 meters per second (m/s) and F stability. Ammonia is considered neutrally buoyant with a prescribed toxic endpoint level of 0.14 mg/l, which is approximately equivalent to 200 ppm. The toxic endpoint value is based on the existing short-term exposure value derived from the American Industrial Hygiene Association Emergency Response Planning Guidelines Level 2 (EPRG-2).

Using reference Table 10 in the guidance for neutrally buoyant aqueous ammonia vapors, and assuming a 10-minute release duration and urban/forested conditions, the resulting potential worst-case impact distance corresponds to 0.1 miles (528 feet). The closest fenceline and property boundary distances are approximately 1,025 feet and 1,000 feet to the west and south-southwest, respectively. Therefore, using the EPA protocol as outlined in EPA's *Risk Management Program Guidance for Offsite*

Consequence Analysis, the defined worst-case accidental release scenario (30,000 gallons consisting of 19.5 percent aqueous ammonia solution in an impervious, diked area) will not result in an exceedance of the ERPG-2 guideline for ammonia beyond the fenceline and property boundary.

6.11 Cooling Tower and Plume Visibility Analyses

The Project will include two 8-cell Linear Mechanical Draft Cooling Towers (LMDCT) and two combustion turbine stacks for which visibility has been assessed. In the cooling towers, water falls downward over the tower fill in each cell, while ambient air is drawn upward through the fill by induced draft fans. Heat will be rejected to the atmosphere by sensible heat transfer to the air, as well as by evaporation of a portion of the circulating cooling water. A very small fraction of the circulating water is also discharged to the atmosphere as tiny droplets, known as "drift." Use of high efficiency drift eliminators will minimize drift. The cooled water will be collected in the basin of the LMDCT and will be circulated back to the condenser. Makeup water will be added into the basin to replace water lost due to evaporation, drift and blowdown.

The cooling tower will dissipate heat by evaporating water and discharging the water vapor into the atmosphere. If the ambient air is cold and/or moist, a portion of the emitted water vapor will condense to form water droplets. This condition results in a visible, white plume emanating from the cooling system. The plume evaporates downwind because of mixing with unsaturated air. Similarly, moisture emitted from the Project's stack may also condense at times, resulting in a visible plume. Ground level fogging or icing may occur if the plume comes in contact with the ground.

The frequency and persistence of a visible plume depends on the type of cooling system or stack conditions, as well as the local climate. Visible plume formation occurs more frequently during the cooler seasons when ambient conditions are less conducive to evaporation of the condensed water droplets.

Pursuant to Stipulation No. 1, Clause 4 and the Air Quality Protocol (provided in Appendix A), analyses were conducted to assess the visible plume lengths and heights from the Project, and the cumulative effects of the Project and Independence Station associated with fogging or icing on nearby roadways and the deposition of salts from cooling tower drift.

6.11.1 Dispersion Model

Water vapor dispersion for the cooling tower and stack were predicted using the CALPUFF (5.0) dispersion model. CALPUFF is a demonstrated transport and dispersion model that is being proposed by EPA as a Guideline model at the upcoming 7th Modeling Conference. The model has undergone extensive review and evaluation for passive pollutants, including evaluations with tracer data sets. CALPUFF has been subject to an EPA-sponsored peer review by an independent group of scientists. When driven by standard meteorological data used with the EPA-approved ISCST model, CALPUFF is able to reproduce near-field concentrations predicted by ISCST for releases from point sources, including building downwash effects and elevated terrain. The CALPUFF model was recently approved for application to the Alcoa Massena, New York facility by the NYSDEC. Documentation on the CALPUFF model is available on the Earth Tech Atmospheric Studies Group web site, www.src.com/calpuff/calpuff1.htm.

For this Application, CALPUFF estimates the dispersion and transport of a passive pollutant (water vapor), accounting for multiple-source interactions and building downwash effects. The hourly emissions of water vapor and the temperature of the cooling tower exhaust are calculated with the pre-processor, CTEMISS, which considers the ambient temperature and humidity and the heat rejection, as well as the operating characteristics of the cooling tower. This provides the hourly source term for CALPUFF. The concentrations of water vapor predicted by CALPUFF at the model receptors are then evaluated by post-processors, POSTPM and POSTRM, to determine if, when added to the ambient water vapor concentration, the plume will have concentrations exceeding the saturation value and, therefore, be visible or cause icing or fogging.

The treatment of fogging and icing in CALPUFF is designed to be conservative. The presence of liquid water (defined as any water concentration above the saturation value) triggers the classification of the hour as a fogging/icing hour. Therefore, even marginal hours with small liquid water contents that may not result in a significant visible plume will be conservatively flagged as fogging or icing hours.

With these added pre- and post-processors for water vapor plumes from mechanically forced cooling towers and stacks, CALPUFF will:

- Define the release conditions for a saturated plume (exit temperature and water vapor release rate) consistent with the heat released to the atmosphere and the ambient temperature and relative humidity for each hour;

- Model the diffusion of temperature excess (above ambient) as well as water vapor concentration, including effects of plume rise, building downwash, ambient turbulence, and elevated terrain; and

- Predict the relative humidity at specified receptor locations from the modeled temperature excess and water vapor concentration, and the ambient water vapor concentration.

CALPUFF is a multi-source model that can simultaneously model the water vapor emissions from two separate and different cooling towers, as well as from the combustion turbine stacks. Water vapor concentrations for all sources are summed at each model receptor so that the mass of water from all sources is simulated.

For example, each cooling tower cell is separately assigned a heat rejection rate, stack height, exit velocity and building downwash structure dimensions. This was done in the fogging and icing analyses, which considered the simultaneous water vapor plumes from both the Independence Station and Project cooling systems.

The pre-processor algorithm, CTEMISS, which calculates the hourly emission rate and temperature of the water vapor plumes from each cell, is capable of modeling both wet and hybrid cooling towers. The percent of the Btus that are rejected by the dry section, as well as the percent of the airflow in the dry section are inputs to the pre-processor. These data are used to calculate the hourly exhaust temperature and water vapor emissions of the cooling tower plume from each cell. As described above, CALPUFF is used for the transport and dispersion calculations for the water vapor plume. The dry/wet operation of a hybrid cooling tower can be changed monthly or by temperature ranges in CTEMISS. Hour-by-hour modeling is conducted using actual ambient conditions and any proposed tower operations.

The CALPUFF water vapor dispersion methodology has been applied for various regulatory plume length and fogging/icing analyses. Earlier applications have included projects in Milford, Connecticut (under construction); Meriden, Connecticut (application deemed complete); Londonderry, New Hampshire (application approved); Covert, Michigan (application submitted); Kenosha, Wisconsin (application submitted); and Westfield, Massachusetts (application withdrawn).

This modeling approach provides the benefit of using current air modeling practice in predicting ground-level concentration fields resulting from complex, downwashing sources such as mechanically forced cooling towers. It remains "conservative," however, by ignoring plume rise enhancement that can occur when individual, nearby plumes merge as they rise.

6.11.2 Source Parameters

The cooling tower source parameters used in the CTEMISS pre-processor and the CALPUFF input file are shown in Table 6-39.

During cold weather and including reduced plant operating loads, the fans in individual cells may be shut down in order to prevent the circulating water from becoming too cold. Under these conditions, the individual cells may still have circulating water flow, resulting in reduced air flow and heat rejection from these cells. While less water is evaporated from a cell under these conditions, the lower exhaust airflow will also result in lower plume rise. Appendix H.10 provides a spreadsheet that summarizes tower operation under these cold weather conditions. These cold weather and part-load conditions were also examined with the CALPUFF model to assess the potential for fogging and icing due to reduced plume rise.

Table 6-39: Cooling Tower Data for Water Vapor Analyses

Base Elevation, msl (feet/meters)	274./83.4
Number of Cells	8 per tower (16 total)
Cell Height (feet/meters) - aboveground	37/11.28
Cell Inside Stack Diameter (feet/meters)	33/10.06
Cooling Tower Deck Height (feet/meters)	31/9.45
Cooling Tower Length (feet/meters)	837/255
Cooling Tower Width (feet/meters)	48/14.6
Cell Exit Velocity (m/s)	7.48
Heat Rejection per cell (Btu/hr)	1.024×10^8
Cell Exit Temperature	Varies hourly with ambient temperature and RH
Circulating Water Flow Rate (gallons/minutes)	117,000 gallons per minute per tower
Cell Water Vapor Emission Rate	Varies hourly with ambient temperature and RH

6.11.3 Receptors

For the fogging/icing analyses, receptors were placed on all roadways surrounding the Independence Station and Project facilities. A map of the receptor locations is provided in Appendix H.10.

6.11.4 Meteorological Data

The same 5 years of hourly meteorological data discussed above for the air quality dispersion modeling, supplemented by the humidity data needed for cooling tower water vapor impact assessment modeling, has been used as input to the CALPUFF model.

The parameters in the Nine Mile Point data provided by NYSDEC for the air dispersion modeling included wind speed and direction at 200 feet; dry bulb temperature; stability classification; and mixing height. The wind speed at 200 feet is scaled in CALPUFF to the source heights using power law profiles, so that the wind speed can be approximated at cooling tower height. The dry bulb temperature and relative humidity from the closest representative station were incorporated into the 200-foot Nine Mile Point tower data. Because only absolute and not relative humidity would be conserved, the temperature and relative humidity from the same (off-site) location were used to calculate the hourly ambient background absolute water vapor content.

The Syracuse NWS station was selected as more appropriate than Rochester NWS for humidity because Syracuse is closer to the Heritage Station (50 km vs. 105 km) and is located approximately along the same longitude. Therefore, the timing of frontal passages, and hence air masses, is more likely to be coincident with the Syracuse station rather than the Rochester station. Although the Rochester airport is closer to the lake than Syracuse, it is still located about 15 km away from the shoreline. The lake shoreline is also oriented differently at the Heritage Station site (NE-SW) than at Rochester (NW-SE).

6.11.5 Plume Visibility Modeling

The proposed cooling towers will emit moisture into the atmosphere in the form of water vapor and water droplets, which under certain meteorological conditions may cause a visible plume. In some of these cases, ground level fogging or icing may occur if the plume comes in contact with the ground.

The 100 percent load condition is expected to be the worst case for visible plume length since the maximum load condition corresponds to the greatest water vapor emission rates (grams/second (g/s)) from the cooling tower. However, 50 percent and 75 percent part load scenarios were examined to compare visible plume lengths to the 100 percent load case. Part load tower operation involves turning off the fans in some of the cells as a function of temperature. The operating parameters for the full and part load scenarios for the Project and Independence Station cooling towers are provided in Table H.10-1 and H.10-2 in Appendix H. The CALPUFF preprocessor, CTEMISS, is able to simulate different air flow and heat rejection rates individually by cooling tower cell, which can then be modeled as variable emission point sources in CALPUFF.

CALPUFF is an hour-by-hour model. Seasonal effects are simply averages of the individually modeled hours. For the visible plume depiction from the stacks and cooling tower, Stipulation No. 11, Clause 4 specifies simulations representing (1) typical, (2) winter-normal, and (3) maximum impact cases. As a typical depiction of the visible plume, the weather conditions from 7:00 p.m. on March 30, 1987 has been used as a surrogate. The temperature was 52°F with a relative humidity of 72 percent. These conditions are near the annual average values. For winter normal, noon on January 28, 1988 was selected. The temperature was 20°F with a relative humidity of 65 percent. Again, these are near the average winter conditions. The maximum impact case will be represented by the conditions at 9:00 a.m. on February 8, 1985. The temperature was 5°F with a relative humidity of 88 percent. This combines a below normal temperature with a high humidity, which would lead to a maximum, daytime, clear-sky event.

The CALPUFF model was run for the meteorological database discussed in Section 6.11.4. Plume length is generally meaningful for a single source only. This is straightforward for the two Project stacks. The stack plume visibility modeling was performed for the 100 percent, 75 percent and 50 percent load cases with both units operating. The two stacks were considered merged at a single point, with the emissions modeled based on the combined water vapor flux, and an equivalent (effective) stack diameter. The POSTPM post-processor was used to predicted concentrations of water vapor for each hour to calculate the distance where the plume is visible (the plume plus ambient water vapor concentration exceed the saturation water vapor concentration). The frequency of visible plume lengths and plume heights for daylight hours (6 a.m. through 10 p.m.) was calculated, as well as for all hours of the day. Hours with saturated ambient conditions (relative humidity of 100%) and calm conditions were eliminated from the statistics.

Because the cooling tower length is 255 meters, it is unrealistic to represent the water vapor plume as a single point source. Instead, each of the sixteen cells was modeled as a separate point source in CALPUFF using a 3-dimensional grid of 960 receptors. The grid included eight wind directions (parallel, perpendicular and at 45 degree angles to the cooling tower), 12 heights from the ground to 500 meters, and ten distances from 100 meters to 10 kilometers. The cooling tower was modeled at 100 percent, 75 percent and 50 percent load. For each hour, a post-processor, POSTPRM, calculated the height with the maximum water vapor concentration at the furthest distance where the concentrations are above the saturation concentration.

The estimate of visible plume length is designed to be conservative. The presence of any liquid water (defined as any water concentration above the saturation value) is deemed to make the plume visible. Therefore, no distinction is made in the plume opacity between dense visible plumes with large liquid water contents close to the source and plumes at distances where there is only a small liquid water content and opacity may be much smaller.

6.11.6 Plume Visibility Modeling Results

The length, height and frequency that visible plumes are expected to extend downwind from either the cooling towers or combustion turbine stacks of the proposed Project have been analyzed. The plume lengths and heights were calculated for the combined water vapor emissions of the 16-cell cooling tower and for the combined water vapor emissions of the two combustion turbine stacks that will be added by the Project. Tables 6-40 and 6-41 compare length and height statistics at full and partial loads. Meteorological data from 1985 is used for this comparison. As expected, full load resulted in longer and higher plumes and so length and height statistics for subsequent years are presented only for the full load case. Table 6-42 presents the average length and height statistics during 6 a.m. to 10 p.m. for the 5-year period. Hours with saturated ambient conditions that would already be foggy and hours with calm winds where dispersion analyses are not reliable have been removed from the analyses. For a year-by-year breakdown of both 6 a.m. to 10 p.m. and all-hour statistics, see Appendix H.10.

Statistics for the cooling tower plumes are presented in Tables 6-43 through 6-45. Because the plant-operating load also affects the cooling tower plumes, Tables 6-43 and 6-44 present statistics for full and partial loads, again using 1985 weather data. Table 6-45 presents the 5-year average statistics during 6 a.m. to 10 p.m. for full-load operation. As with the stacks, hours with saturated ambient conditions or calm winds have been removed. In addition, a small number of hours (about 5%) could not be resolved with sufficient accuracy by the receptor grid and were also removed. For a year-by-year breakdown of both 6 a.m. to 10 p.m. and all-hour statistics, see Tables H.10-3 through H.10-18 in Appendix H.10.

Averaged over the 5-year period for the hours between 6 a.m. to 10 p.m., nearly 56 percent of the combustion stack plumes are less than 20 m in length and 83 percent are less than 300 m long. For the cooling towers, 50 percent of the plume lengths are less than 100 m and 76 percent are less than 300 m. Many of the longer visible plumes occur at night when the relative humidity of the ambient air is higher or during the colder winter months.

Table 6-40: Length and Frequency of Stack Visible Plume: All Loads

Load Visible Length (m)	100% Hours	75% Hours	50% Hours	100% %Year	75% %Year	50% %Year	100% Cumulative %	75% Cumulative %	50% Cumulative %
0-20	4,261	3,870	3,980	48.6	44.2	45.4	48.6	44.2	45.4
21-100	463	672	821	5.3	7.7	9.4	53.9	51.8	54.8
101-150	435	516	628	5.0	5.9	7.2	58.9	57.7	62.0
151-200	745	933	993	8.5	10.7	11.3	67.4	68.4	73.3
201-250	355	405	362	4.1	4.6	4.1	71.4	73.0	77.4
251-300	529	504	469	6.0	5.8	5.4	77.5	78.8	82.8
301-400	541	522	406	6.2	6.0	4.6	83.7	84.7	87.4
401-750	606	565	443	6.9	6.4	5.1	90.6	91.2	92.5
751-2,000	309	277	194	3.5	3.2	2.2	94.1	94.3	94.7
2,001-5,000	74	60	35	0.8	0.7	0.4	95.0	95.0	95.1
5,001-10,000	16	11	4	0.2	0.1	0	95.1	95.1	95.1
> 10,000	1	0	0	0.0	0	0	95.1	95.1	95.1
Total	8,335	8,335	8,335						

Note: Based on 1985 meteorological data.

Table 6-41: Height and Frequency of Stack Visible Plume: All Loads

Load Plume Height (m)	100% Hours	75% Hours	50% Hours	100% %Year	75% %Year	50% %Year	100% Cumulative %	75% Cumulative %	50% Cumulative %
0-100	0	0	0	0	0	0	0	0	0
101-200	536	1,472	2,572	6.1	16.8	29.4	6.1	16.8	29.4
201-300	3,402	3,524	3,200	38.8	40.2	36.5	45.0	57.0	65.9
301-400	1,791	1,373	1,042	20.4	15.7	11.9	65.4	72.7	77.8
401-500	846	560	430	9.7	6.4	4.9	75.1	79.1	82.7
501-600	381	333	169	4.3	3.8	1.9	79.4	82.9	84.6
601-800	422	281	208	4.8	3.2	2.4	84.2	86.1	87.0
801-1,000	199	116	42	2.3	1.3	0.5	86.5	87.4	87.5
1,001-2,000	370	659	672	4.2	7.5	7.7	90.7	95.0	95.1
2,001-3,000	388	17	0	4.4	0.2	0	95.1	95.1	95.1
3,001-4,000	0	0	0	0	0	0	95.1	95.1	95.1
>4,000	0	0	0	0	0	0	95.1	95.1	95.1
Total	8,335	8,335	8,335						

Note: Based on 1985 meteorological data.

Table 6-42: Length and Height Frequencies of Stack Visible Plume (5-Year Average, 6 a.m. to 10 p.m.): 100 Percent Load

Visible Length (m)	Hours	% Year	Cumulative %	Plume Height (m)	Hours	%Year	Cumulative %
0-20	3,451	55.6	55.6	0-100	0	0	0
21-100	335	5.4	61.0	101-200	209	3.4	3.4
101-150	310	5.0	66.0	201-300	1,909	30.7	34.1
151-200	511	8.2	74.2	301-400	1,503	24.2	58.3
201-250	241	3.9	78.1	401-500	819	13.2	71.5
251-300	303	4.9	83.0	501-600	413	6.6	78.2
301-400	312	5.0	88.0	601-800	499	8.0	86.2
401-750	416	6.7	94.7	801-1,000	247	4.0	90.2
751-2,000	156	2.5	97.2	1,001-2,000	302	4.9	95.1
2,001-5,000	34	0.5	97.7	2,001-3,000	173	2.8	97.9
5,001-10,000	7	0.1	97.9	3,001-4,000	0	0	97.9
> 10,000	1	0	97.9	>4,000	0	0	97.9
Total	6,076	97.9			6,076	97.9	

Table 6-43: Length and Frequency of Cooling Tower Visible Plume: All Loads

Load	100%	75%	50%	100%	75%	50%	100%	75%	50%
Visible Length (m)	Hours	Hours	Hours	%Year	%Year	%Year	Cumulative %	Cumulative %	Cumulative %
0-100	3,808	4,201	5,284	43.5	48.0	60.3	43.5	48.0	60.3
101-200	1,502	1,627	1,181	17.1	18.6	13.5	60.6	66.5	73.8
201-300	637	541	623	7.3	6.2	7.1	67.9	72.7	80.9
301-500	483	473	351	5.5	5.4	4.0	73.4	78.1	84.9
501-750	428	356	174	4.9	4.1	2.0	78.3	82.2	86.9
750-1,000	238	173	73	2.7	2.0	0.8	81.0	84.1	87.7
1,001-2,000	497	330	135	5.7	3.8	1.5	86.7	87.9	89.3
2,001-3,000	190	134	51	2.2	1.5	0.6	88.8	89.4	89.9
3,001-5,000	169	107	52	1.9	1.2	0.6	90.8	90.7	90.5
Total	7,952	7,942	7,924						

Note: Based on 1985 meteorological data.

Table 6-44: Height and Frequency of Cooling Tower Visible Plume: All Loads

Load	100%	75%	50%	100%	75%	50%	100%	75%	50%
Plume Height (m)	Hours	Hours	Hours	%Year	%Year	%Year	Cumulative %	Cumulative %	Cumulative %
0-25	5,287	5,886	6,717	60.4	67.2	76.7	60.4	67.2	76.7
26-50	840	677	480	9.6	7.7	5.5	69.9	74.9	82.2
51-75	375	282	225	4.3	3.2	2.6	74.2	78.1	84.7
76-100	940	710	356	10.7	8.1	4.1	85.0	86.2	88.8
101-150	358	283	94	4.1	3.2	1.1	89.0	89.5	89.9
151-200	121	75	13	1.4	0.9	0.1	90.4	90.3	90.0
201-250	16	9	2	0.2	0.1	0	90.6	90.4	90.0
251-300	14	4	5	0.2	0	0.1	90.8	90.5	90.1
Total	7,951	7,926	7,892						

Note: Based on 1985 meteorological data.

Table 6-45: Length and Height Frequencies of Cooling Tower Visible Plume (5-Year Average, 6 a.m. to 10 p.m.): 100 Percent Load

Visible Length (m)	Hours	% Year	Cumulative %	Plume Height (m)	Hours	%Year	Cumulative %
0-100	3,109	50.1	50.1	0-25	4,211	67.8	67.8
101-200	1,082	17.4	67.5	26-50	595	9.6	77.4
201-300	506	8.2	75.7	51-75	251	4.0	81.5
301-500	355	5.7	81.4	76-100	395	6.4	87.8
501-750	296	4.8	86.1	101-150	221	3.6	91.4
750-1000	140	2.3	88.4	151-200	99	1.6	92.9
1,001-2,000	228	3.7	92.1	201-250	33	0.6	93.5
2,001-3,000	60	1.0	93.0	251-300	17	0.3	93.8
3,001-5,000	65	1.0	94.1				
Total	5,841	94.1			5,822	93.8	

6.11.7 Cooling Tower Fog/Ice Analysis

The potential for fogging and icing at surrounding roadways were addressed using the CALPUFF model with the 5 years of meteorological data, receptors, and individual cell emission characteristics presented above. These fogging and icing calculations consider both the Project and Independence Station cooling towers and combustion turbine stacks. Modeling was performed at 100 percent, 75 percent, and 50 percent load to assess how changes in plume characteristics such as temperature, exhaust speed and water vapor emission rates affects the impacts. Results at each receptor for each hour were written to a file, each of which was processed by POSTRM to tabulate information for each hour where saturation is predicted at a receptor. POSTRM does not include hours where natural fog is present. This occurs when the ambient relative humidity is 100 percent. Further screening included those hours of predicted icing/fogging where the weather reported at the Syracuse NWS station was fog, rain, snow, or blowing snow. A list of the hours and location of predicted events are presented in Table 6-47.

6.11.8 Cooling Tower Fog/Ice Results

The proposed cooling towers will emit moisture into the atmosphere in the form of water vapor and water droplets which, under certain meteorological conditions, may cause a visible plume. In some of these cases, ground level fogging or icing may occur if the plume comes in contact with the ground.

The potential for icing or fogging on nearby roadways was analyzed using the combined effects of the Project's 16-cooling tower cells with the existing 22 cells from Independence Station, along with the water vapor emissions from the six turbine stacks from both Stations.

The model was used to predict the occurrences of fogging and icing at 68 locations near the Project. These receptors were spaced along the roads adjacent to the Project:

North Road, Lake Road, Middle Road, Creamery Road, and Shoreline Road. Receptors were also placed at School #16, the Lakeview development just north of the school, and the trailer park on Lake Road. The model receptors range in distance from about 100 m to 3,000 m from the cooling towers. A figure showing the location of these receptors may be found in Appendix H.

The result counts the number of hours during which fogging or icing is predicted at one or more receptors. The hours are tabulated in two different ways. First, each individual receptor is examined for the number of hours with predicted fogging or icing at that location. Second, the number of hours is counted during which fogging or icing is predicted for the facility as a whole. Every unique hour is counted, and duplicate hours are not counted. For example, suppose fog is predicted at Receptor 24 at 10:00 p.m. on January 30, 1986. If fog is predicted for this hour at both 75 percent and 50 percent loads, the hour is counted only once toward the total for Receptor 24. If fog is predicted for this hour at Receptor 24 and Receptor 25, it is counted once for each receptor's total fog hours, but counts as only 1 hour toward the total number of hours during which the facility produced a fog impact.

Of the 43,824 hours in the 5 years analyzed, there were 39 hours with predicted fogging and 294 hours with predicted icing at the receptors. However, a more detailed analysis of the hours with predicted fogging and icing show that nearly all the hours are associated with adverse weather. Observed weather at the Syracuse Airport was coupled with the hours of predicted icing and fogging for the 5-year period. Most of the hours had snow and blowing snow reported at the airport. Some hours had rain, and a few had fog reported. If these hours are removed, only 64 hours over the 5 years had predicted icing or fogging without concurrent adverse weather reported at the Syracuse Airport, or an average of only 13 hours per year.

Table 6-46 shows the number of hours of icing or fogging for each receptor as an annual average over the 5-year period. The left-hand side shows all the predicted hours without regard to the observed weather. The right-hand side shows only those hours of icing or fogging for which no snow, rain or fog was reported. A number less than one indicates that fewer than 5 hours of icing or fog were predicted during the 5-year period.

Fogging and icing tends mostly to occur along a NW-SE line perpendicular to the shore of Lake Ontario and passing over the Project cooling towers. The vast majority of icing and fogging occurrences are along the short stretch of Lake Road immediately adjacent to the plant site, with some occurrences on the portions of North Road and Creamery Road lying directly inland from the plant site.

Table 6-47 shows the locations of the 64 hours of predicted fogging and icing over the 5-year period for which no concurrent adverse weather was reported. It also shows which of the three modeled operating loads were predicted to have an impact. When adverse weather is removed, the majority of the remaining occurrences lie immediately along the lake shore, with the rest along the short sections of road directly inland from the plant. Most of the icing and fogging occurs late in the evening or very early in the morning, during late autumn and early winter.

Roughly twice as many occurrences are predicted at 75 percent load as at 100 percent load. This is likely due to a smaller cooling tower plume rise at 75 percent, increasing the chance that the plume will contact the ground. Even though the plume rise is even smaller at 50 percent load, this is offset by the reduced water vapor emissions.

Table 6-46: 5-Year Average Plume-Induced Fogging and Icing Occurrences at Receptors (Number of Hours) (Page 1 of 2)

	All Hours			With Snow, Rain and Fog Events Removed		
Receptor No.	Fog	Ice	Total	Fog	Ice	Total
1	0	0.2	0.2	0	0	0
2	0.2	0	0.2	0.2	0	0.2
3	0.2	0.4	0.6	0.2	0.2	0.4
4	0	0.2	0.2	0	0	0
5	0	0.2	0.2	0	0	0
6	0	0.2	0.2	0	0	0
7	0	0.2	0.2	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	0.6	0.6	0	0.4	0.4
14	0	4.4	4.4	0	0.8	0.8
15	0.4	6.6	7	0	0.2	0.2
16	0	6	6	0	0.2	0.2
17	0.4	5.8	6.2	0	0.2	0.2
18	1.4	6.6	8	0.4	0.6	1
19	0.8	6.6	7.4	0	0.4	0.4
20	0	0	0	0	0	0
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	3.8	3.8	0	0.2	0.2
24	1	26.2	27.2	0	1.6	1.6
25	1.2	10.6	11.8	0	0	0
26	0.6	3.2	3.8	0.2	0	0.2
27	0	0.2	0.2	0	0	0
28	0.2	1	1.2	0	0	0
29	0	0.8	0.8	0	0	0
30	0	0.4	0.4	0	0	0
31	0	0.2	0.2	0	0	0
32	0	0.2	0.2	0	0	0
33	0	0.4	0.4	0	0	0

Table 6-46: 5-Year Average Plume-Induced Fogging and Icing Occurrences at Receptors (Number of Hours) (Page 2 of 2)

	All Hours			With Snow, Rain and Fog Events Removed		
Receptor No.	Fog	Ice	Total	Fog	Ice	Total
34	0	0.2	0.2	0	0	0
35	0	0.2	0.2	0	0	0
36	0	0.2	0.2	0	0	0
37	0	0.2	0.2	0	0	0
38	1	0.2	0.2	0.2	0	0.2
39	0	0	0	0	0	0
40	0.2	0.6	0.8	0.2	0	0.2
41	0.6	3.4	5	0.2	1	1.2
42	0.4	6	6.4	0	0.4	0.4
43	0.2	3.4	3.6	0	0.4	0.4
44	0	0.2	0.2	0	0	0
45	0	0	0	0	0	0
46	0	0.2	0.2	0	0	0
47	0.8	2	2.8	0	0.8	0.8
48	0	0.6	0.6	0	0.2	0.2
49	0	0	0	0	0	0
50	0	0	0	0	0	0
51	0	0	0	0	0	0
52	0	0.4	0.4	0	0.2	0.2
53	0	0	0	0	0	0
54	0	0	0	0	0	0
55	0	0	0	0	0	0
56	0	0	0	0	0	0
57	0	0	0	0	0	0
58	0	1.2	1.2	0	1	1
59	0.2	1.4	1.6	0	1	1
60	0.6	2.2	2.8	0	1.2	1.2
61	0.4	3	3.4	0.2	2	2.2
62	0	1	1	0	0.8	0.8
63	0	0.6	0.6	0	0.6	0.6
64	0	0.2	0.2	0	0	0
65	0	0	0	0	0	0
66	0	0	0	0	0	0
67	0.2	0	0.2	0	0	0
68	0	0	0	0	0	0

Table 6-47: Fogging and Icing Predictions with Snow/Rain/Fog Hours Removed (Page 1 of 2)

Year	Day	Hour	Receptor Locations	100%	75%	50%	Predicted Fog or Ice?
85	9	8	North Road, Lake Road		Y		ICE
85	9	9	North Road, Lake Road		Y	Y	ICE
85	9	21	North Road, Lake Road		Y		ICE
85	9	22	North Road, Lake Road		Y		ICE
85	10	23	Shoreline		Y		ICE
85	31	1	Shoreline	Y	Y	Y	ICE
85	31	4	Shoreline	Y	Y		ICE
85	34	8	Shoreline		Y		ICE
85	336	9	Lake Road	Y			FOG
85	359	18	North Road		Y	Y	ICE
86	7	6	North Road, Creamery Road	Y			ICE
86	7	7	North Road, Creamery Road	Y			ICE
86	23	23	Shoreline		Y		ICE
86	23	24	Shoreline	Y	Y	Y	ICE
86	24	6	Shoreline		Y		ICE
86	29	23	Shoreline		Y	Y	ICE
86	30	2	Shoreline		Y		ICE
86	30	3	Shoreline		Y		ICE
86	30	4	Shoreline	Y	Y	Y	ICE
86	32	6	Shoreline		Y		ICE
86	32	7	Shoreline		Y		ICE
83	52	19	Plant Service Road	Y			ICE
86	52	20	Plant Service Road	Y			ICE
86	53	3	Plant Service Road	Y	Y		ICE
86	58	1	Creamery Road	Y	Y	Y	ICE
86	76	2	North Road		Y		FOG
86	76	5	Creamery Road	Y	Y		FOG
86	79	23	Creamery Road	Y	Y		ICE
86	93	2	Middle Road		Y		FOG
87	3	24	Shoreline	Y	Y	Y	ICE
87	4	3	Shoreline		Y	Y	ICE
87	4	4	Shoreline	Y	Y	Y	ICE
87	4	5	Shoreline	Y	Y	Y	ICE
87	4	6	Shoreline	Y	Y	Y	ICE
87	4	19	North Rd	Y	Y	Y	ICE
87	5	6	Lakeview	Y	Y		ICE
87	6	7	Shoreline	Y	Y	Y	ICE
87	28	6	Shoreline		Y		ICE
87	36	7	Creamery Road		Y		ICE
87	49	24	Plant Service Road		Y		ICE
87	53	6	Shoreline		Y		ICE
87	289	3	School #16, Lakeview	Y			FOG
87	295	4	Middle Road	Y			FOG
87	364	18	North Road	Y	Y		ICE
88	41	22	North Road		Y	Y	ICE

Table 6-47: Fogging and Icing Predictions with Snow/Rain/Fog Hours Removed (Page 2 of 2)

88	62	2	Shoreline		Y		ICE
88	160	4	North Road		Y		FOG
88	352	21	Creamery Road		Y		ICE
89	5	19	Shoreline		Y		ICE
89	5	22	Shoreline		Y		ICE
89	107	5	Shoreline	Y			ICE
89	268	6	Shoreline	Y			FOG
89	327	6	Shoreline		Y	Y	ICE
89	335	23	Shoreline		Y		ICE
89	338	7	Lake Road		Y	Y	ICE
89	338	8	Lake Road		Y	Y	ICE
89	342	22	Shoreline		Y		ICE
89	342	23	Shoreline		Y		ICE
89	342	24	Shoreline		Y		ICE
89	343	4	Shoreline		Y		ICE
89	343	10	Shoreline		Y	Y	ICE
89	346	20	Shoreline		Y	Y	ICE
89	356	9	North Road		Y		ICE
89	361	10	Shoreline		Y		ICE

6.11.9 Discussion of Fogging and Icing Experience for Independence Station Cooling Towers

This section provides an evaluation of the pre-construction predictions of ground level fogging and icing for the Independence Station cooling tower with actual reported operating experience. In the pre-construction Independence Station impact assessment, the local roads that were predicted to experience project-induced fogging include Lake Road (4 hours fogging per year), North Road (13 hours fogging per year), and the Riker's Beach Access Road (14 hours fogging and 14 hours icing per year). Based on information reported by operators of the Independence Station, there have been no reported project-induced fogging or icing incidents on any of these local roads. Therefore, the pre-construction impact assessments are considered to have been conservative (overestimating potential impacts) based on plant operating experience.

6.11.10 Cooling Tower Salt Deposition

Salt deposition from the Project and Independence Station have been predicted using the EPRI-sponsored Seasonal/Annual Cooling Tower Plume Impact model (SACTI 1987). This computer code is an outgrowth of earlier model evaluation studies carried out by A.J. Policastro of the Argonne National Laboratory (ANL). An improved plume routine in the code has been calibrated with existing field and laboratory data and then subsequently verified with new data not included in the calibration process.

The SACTI model is used to identify a series of combinations of meteorological variables that represent the full range of atmospheric conditions affecting the plume. Modeling was conducted with 5 years (1985 through 1989) of meteorological data from the Nine Mile Point Power Station with relative humidity from the Syracuse NWS Station. The emissions from the Project's cooling towers and Independence Station's cooling towers were modeled separately. SACTI provides salt deposition values for various distances at each of the 16 compass directions. The results for each Station were then added to determine a total salt deposition value in each direction sector and downwind distance. Consistent with SACTI, salt depositions are provided in units of kilograms per square kilometer-month (kg/[km^2-mo]).

The SACTI model requires site-specific and cooling tower-specific data. The source of the cooling tower makeup water is potable water from the city of Oswego. The potable water will be cycled at least five times through the cooling water system for a total salt concentration of approximately 2,000 mg/l. Key SACTI input data is summarized and provided in Table H.10-19 in Appendix H.10.

In order to assess predicted salt deposition levels with respect to potential vegetative impacts, a criterion that has been previously used as a planning level to avoid vegetation damage due to cooling tower drift in the Northeastern United States is 200 kilograms/km^2-month (2 Kg/hectare-month). This value is used for the deposition study for Heritage Station. This value was sited by Dr. Charles Mulchi, Ph.D., University of Maryland, for the assessment of cooling tower salt deposition impacts for another Northeast power plant. Dr. Mulchi has published studies on the effects of saline aerosal drift from cooling towers on agriculture.

6.11.11 Cooling Tower Salt Deposition Results

SACTI model-predicted salt deposition rates are provided in Table H.10-20 in Appendix H.10. The results indicate that the maximum predicted salt deposition rates are located close to the tower, and drop off rapidly with increasing distance from the tower. The maximum predicted 5-year average salt deposition rate is 113 kg/km^2-month located at 225 meters to the ENE of the tower.

To assess the cumulative effects of salt deposition from the Project and Independence Station cooling towers, maximum predicted deposition rates were summed. The SACTI model-predicted salt deposition rates for Independence Station were presented in the Sithe/Independence Environmental Impact Statement report. These were reviewed to determine the salt deposition contribution from the Independence Station cooling towers at the location of maximum salt deposition from the Project cooling towers. The maximum combined salt deposition rate is 117 kg/km^2-month. On the basis of these predictions, no adverse impacts to vegetation due to cooling tower drift are expected.

6.11.12 Ice Shearing Assessment

Pursuant to Stipulation No. 1, Clause 4, the potential for ice shearing effects on vegetation near the proposed Heritage Station cooling tower has been evaluated. Ice shearing refers to the buildup of ice from the cooling tower plume on tree branches in proximity to the tower, causing breakage to these branches and associated vegetation damage.

There is not a good analytical method presently available to predict potential ice shearing impacts. Experience with the existing Independence Station tower has been very localized, with affected vegetation being limited to trees within approximately 150 feet, primarily to the south of the tower. On this basis, any ice shearing impacts from the Heritage Station tower are expected to be similarly limited.

Any vegetation potentially impacted by ice shearing from the Project's cooling tower is expected to be contained within the fenced area around the tower, as shown in Appendix D of the Air Protocol (provided in Appendix A).

6.11.13 Cooling Tower Biological Control

6.11.13.1 Existing Guidance

Per Air Quality Stipulation No. 1, Clause 3(h), this section includes a summary of guidance regarding appropriate control measures to prevent the potential growth of pathogens, such as *Legionella*, in wet, evaporative cooling systems. Consistent with the stipulation, the Applicant contacted the Center for Disease Control and Prevention (CDC), Respiratory Division. The CDC does not have its own recommended water treatment protocol for cooling towers, and generally recommends following the guidelines of the Cooling Tower Institute.

The Cooling Tower Institute (now known as the Cooling Technology Institute (CTI)) has a position statement with respect to control of Legionella (CTI 1996). The key principles of avoiding *Legionella pneumophila* proliferation are minimizing stagnation and maintaining effective biological control; using high-efficiency drift eliminators; maintaining cleanliness; and minimizing process leaks in the cooling system. Among the suggested treatment methods is the application of oxidizing biocides (specifically chlorine or bromine) to maintain a free halogen residual. Chlorine and/or bromine delivery may be through various types of halogen-release chemicals. The free halogen residual should be measured and maintained in the warm water return at the cooling tower. CTI prefers a "continuous feed" of an oxidizing biocide over "periodic slug feeding." They further recommend that cooling towers should be located away from fresh air intakes, be designed to avoid the presence of stagnant-water segments and give special consideration to control of biological growth during extended shutdown periods. With respect to testing, the position statement recommends testing specifically for *Legionella pneumophila* only when an outbreak is suspected. Otherwise, such testing is not recommended for several reasons, including difficulties with the interpretation of results and the potential for rapid changes in the biological profile of the cooling water.

CTI is expected to release further cooling tower guidelines shortly (Puckorias 2000). It is expected that these will include "good housekeeping" measures: visual inspections; cleaning out buildup of dirt and debris; regular inspection of drift eliminators and tower fill; and suggested recordkeeping practices. Algae or other visible biomass should be monitored in the condenser, at drift eliminators, and in the cooling tower basin. Preference is expected to be given to oxidizing biocides over non-oxidizing biocides. It is also anticipated that continuous chlorination will be cited as an appropriate control measure. (Earlier industry guidance had generally assumed periodic slug treatment as preferable.)

A manufacturer for the Project's cooling tower has not been selected. However, one possible cooling tower manufacturer endorses CTI guidance (Mirsky 2000).

In addition, there are comprehensive guidelines currently being drafted under the auspices of the American Society of Heating, Refrigerating, and Air-conditioning Engineers (ASHRAE). This document, ASHRAE Guideline 12, is entitled *Minimizing the Risk of Legionellosis Associated with Building Water Systems,* and addresses smaller closed-circuit cooling towers associated with air conditioning systems, as well as other various small systems. The development of these guidelines is in its latter stages and publication of the final version is expected soon. It is anticipated that the final guideline will not contain major substantive deviations from the public review draft circulated in spring of 1999 (Beary 2000). The recommended treatment in this document includes many of the same recommendations as the CTI position statement. A specific recommendation found in Guideline 12 is that, when shutting down a cooling tower system for more than 3 days, particular attention should be given to controlling biological growth during the shut down and prior to restarting the system.

Additional guidance is available from companies specializing in water treatment. Nalco Chemical Company's brochure on cooling water chlorination advises that "continuous chlorination of cooling water is considered to be the best method and is effective at both high and low pH... *Contact time* is extremely important. By increasing the contact time, effective chlorination can be achieved at lower free chlorine residuals (Nako 1986)."

6.11.13.2 Evaluation and Pathogen Control Plan

Per Stipulation No. 1, Clause 3(h), this section includes an evaluation of the available guidance and a discussion of the methods the Applicant proposes to use to control pathogen growth in the cooling system. Legionellosis has been found to occur at smaller, poorly maintained cooling towers associated with air conditioning units. The Project is consistent with the approaches endorsed by CTI. First, in terms of siting and design, the cooling towers are not proposed to be located near fresh air intakes or windows and are far from both plant buildings and off-site buildings. The system will have no areas where water will stagnate. Oxidizing biocides will be used, as detailed in Section 17.2.5.1. The Applicant is proposing continuous low level biocide treatment as opposed to periodic batch doses, consistent with the preferred approach of CTI and other industry guidance. High-efficiency drift eliminators (0.0005% of circulating water flow) will be used. In terms of routine testing, the Applicant agrees with the 1996 CTI position statement that testing specifically for *Legionella* need not be conducted on a routine basis. However, continuous free chlorine residual testing will be performed, and periodic biological assays of the cooling tower water will be conducted. To avoid impacts from the cooling tower blowdown containing free residual chlorine, the blowdown will continuously be dechlorinated with sodium bisulfite. With respect to shutdown and startup, when the plant is not operating water will continue to circulate and the system will continue to be chlorinated, thus assuring that there will be no special chlorination effort necessary prior to restarting.

6.12 Additional Impact Analyses – Visibility, Growth, Soils and Vegetation

The PSD regulations require that additional impact analyses be conducted to consider the affects on visibility, on soils and vegetation, and the potential for and air quality impact of secondary economic growth. The following sections address these issues, consistent with Stipulation No. 1, Clauses 2(k), 2(l) and 2(m), and with the Air Modeling Protocol (provided in Appendix A).

6.12.1 Visibility

A quantitative visibility analysis of the Project's plume was conducted using the EPA VISCREEN program (Version 1.01 dated 88341) for the nearest Class I Area and the Adirondack State Park. A Level-1 analysis was conducted. The nearest Class I Area to the Project is the Lye Brook National Wilderness Area in Vermont (approximately 270 km to the east of the Project). The Adirondack Park is approximately 98 km to the east of the Project. Background information and a description of the model is detailed in the EPA Visibility Workbook (EPA 1992). The VISCREEN model provides the capability of assessing plume contrast (Cp) and plume perceptibility (Delta E) against two backgrounds, sky and terrain.

The VISCREEN modeling was based on maximum particulate and NO_x emissions from the Project. Model inputs are presented in Table 6-48.

The results of the Level 1 VISCREEN screening analysis are provided in Appendix H.11. The results indicate that the plumes from the Project combustion turbines are well below the plume perceptibility thresholds at both the Lye Brook Wilderness Area and the Adirondack Park.

Table 6-48: Model Inputs for Visibility Analysis

	Lye Brook	Adirondack Park
Background ozone level	0.04 ppm	0.04 ppm
Background visual range	40 km	40 km
Plume–Source-Observer angle	11.25 degrees	11.25 degrees
Stability class	F (6)	F (6)
Wind Speed	1.00 m/s	1.00 m/s
Source-Observer distance	270 km	98 km
Minimum Source-Class I distance	270 km	98 km
Maximum Source-Class I distance	281 km	253 km
Particulates	211 tons/year	211 tons/year
NO_x (as NO_2)	202 tons/year	202 tons/year

6.12.2 Growth

The construction and work force for the Project will not be large enough to generate significant secondary growth. Thus, no new significant emissions from secondary growth during either operations or the construction phase are anticipated.

6.12.3 Soils and Vegetation

PSD regulations require an analysis of the air quality impacts on sensitive vegetation types with significant commercial or recreational value, or sensitive types of soil. An evaluation of the impacts on sensitive vegetation are performed by comparison of predicted maximum total impacts with screening levels presented in the 1981 EPA document, "*A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals.*" (EPA 1981).

Most of the designated vegetation screening levels are equivalent to or exceed NAAQS and/or PSD increments, so that satisfaction of NAAQS and PSD increments assures compliance with sensitive vegetation screening levels.

However, for SO_2, the annual and 3-hour sensitive vegetation screening level is more stringent than the comparable NAAQS standard. Additionally, there is a 1-hour screening level for SO_2 for which there is no NAAQS equivalent. A comparison of the SO_2 sensitive vegetation screening levels with SO_2 impacts from the proposed Project, including ambient background concentrations, for maximum impact conditions is presented in Table 6-49 for the 1-hour and 3-hour averaging periods. Maximum impacts for the 1- and 3-hour averaging periods are well within allowable screening levels. The maximum predicted 3-hour concentration from the proposed Project with background is only 70.2 $\mu g/m^3$, which is well below the screening thresholds. The maximum 1-hour SO_2 concentration predicted by ISCST3 is 78.6 $\mu g/m^3$, which is also below the screening threshold.

Table 6-49: Vegetation Sensitivity Screening Concentrations for SO_2 Concentrations from the Project

Averaging Time	Total Background Concentration ($\mu g/m^3$)	Maximum Contributions from Project ($\mu g/m^3$)	Maximum Predicted Concentration Project Plus Background ($\mu g/m^3$)	Sensitive Vegetation Sensitivity[(1)] Concentration ($\mu g/m^3$)
1-hour[(2)]	75.3	13.0	88.3	917
3-hour	67.8	8.8	76.6	786
Annual	8.0	0.05	8.05	18

[(1)] Minimum reported levels at which damage or growth effects to vegetation may occur.

[(2)] 1-hour background concentration calculated from 3-hour concentration by dividing the 3-hour concentration by the 0.9 scaling factor.

Deposition of trace elements on soils were evaluated using the screening techniques presented in EPA's document, "*A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*" (Section 5.1.3 – Calculating Deposited Soil Concentrations). This analysis provides screening level estimates of deposited trace element concentrations in soil based on a 3 cm soil depth, lifetime of the facility (assume 30 years) and maximum annual ground level concentrations of trace elements. Soil concentrations are calculated as follows:

$$DC = 21.5 * (N/d) * X_g$$

Where:

- DC is the soil concentration (ppmw)
- N is the expected lifetime of the source (assume 30 years)
- d is the depth of the soil through which the deposited material is found (3 cm)
- X_g is the maximum annual ground level concentration, from the Project, of the trace element ($\mu g/m^3$)

Using this equation, calculated soil concentrations were compared to acceptable soil screening levels provided by EPA for this technique. Soil concentrations were also used to calculate plant tissue concentrations assuming default plant-to-soil ratios provided by the screening methodology. Plant tissue concentrations were then compared to acceptable tissue screening concentrations and dietary screening concentrations for animals.

Results of predicted soil concentrations from the Project's emissions are compared to the Soil Screening Levels in Table 6-50. The results indicate Project impacts are well below the screening concentrations. The screening methods also provide for an assessment to compare trace element soil concentrations with average endogeneous levels; this comparison is presented in Table 6-51. These results demonstrate all trace concentrations are below the average endogeneous levels.

Finally, Table 6-52 provides a comparison of plant tissue concentrations, based on plant uptake from the soil, against plant tissue screening levels and animal dietary screening levels. Again, plant tissue concentrations fall below both sets of screening level concentrations. Supporting calculations for the soils and vegetation impact analysis are provided in Appendix H.11.

Table 6-50: Project Trace Element Soil Concentrations Compared to Screening Levels

Pollutant	Maximum Predicted Deposition Concentration (ppmw)	Screening Level (ppmv)
Arsenic	0.003	3
Boron	0.013	0.5
Cadmium	0.002	2.5
Chromium	0.002	8.4
Cobalt	0.002	N/A
Copper	0.004	40
Fluorides	0.479	400
Lead	0.007	1,000
Manganese	0.004	2.5
Mercury	0.002	455
Nickel	0.002	500
Selenium	0.011	13
Vanadium	0.002	2.5
Zinc	0.023	N/A

Table 6-51: Project Trace Element Soil Concentrations Compared to Average Endogeneous Concentrations

Pollutant	Maximum Predicted Deposition Concentration (ppmw)	Endogeneous Concentration (ppmw)
Arsenic	0.003	6.00
Boron	0.013	10
Cadmium	0.002	0.06
Chromium	0.002	100.00
Cobalt	0.002	0.02
Copper	0.004	0.02
Fluorides	0.479	200.00
Lead	0.007	10.00
Manganese	0.004	850.00
Mercury	0.002	2.00
Nickel	0.002	40.00
Selenium	0.11	0.50
Vanadium	0.002	100
Zinc	0.023	50

Table 6-52: Plant Tissue Concentrations from Project Emissions Compared to Plant Tissue and Dietary Animal Screening Levels

Pollutant	Maximum Predicted Deposition Concentration (ppmw)	Plant: Soil Ratio	Tissue Concentration (ppmw)	Screening Level-Tissue (ppmw)	Screening Level-Dietary (ppmw)
Arsenic	0.00284	0.140	0.0004	0.25	3
Boron	0.00126	5.300	0.0668	11	NA
Cadmium	0.00219	10.700	0.0235	3	15
Chromium	0.00221	0.020	0.0000	1	NA
Cobalt	0.00151	0.020	0.0002	19	2
Copper	0.00428	0.110	0.0020	0.73	25
Fluorides	0.00479	0.030	0.0144	310	200
Lead	0.00656	0.450	0.0030	126	115
Manganese	0.00426	0.066	0.0003	400	2,500
Mercury	0.00213	0.500	0.0005	NA	NA
Nickel	0.00228	0.045	0.0001	60	1,000
Selenium	0.00105	1.000	0.0105	100	15
Vanadium	0.00185	0.01	0.0000	NA	250
Zinc	0.00228	0.64	0.0146	300	750

6.13 Global Warming

Stipulation No. 1, Clause 6, requires an assessment, based on publicly available information, of the global warming issue associated with emissions of CO_2 and other greenhouse gases. Specifically the assessment is required to include:

1. A summary of the emission reduction goals of the Kyoto Protocols;
2. An estimate of the facility's annual and life cycle emissions of CO_2 and other significant greenhouse gases;
3. A comparison of the projected facility emissions with New York State, national and/or global emissions; and
4. A statement as to the probable importance of the proposed facility's emissions.

In October 1999, the White House Climate Change Task Force presented data and analyses that they concluded:

> *Strengthen earlier findings that the surface temperature of the earth is increasing and that the increase can be attributed, in large part, to human-caused increases of greenhouse gases into the atmosphere. The continuation of these trends is likely to be associated with climatic changes capable of adversely affecting ecosystems, wildlife, and large numbers of people.*

In response to concerns regarding global climate change, in particular global warming, the United Nations convened the Framework Convention on Climate Change in 1992 that led to the 1997 Kyoto Protocol. Within the Protocol are provisions requiring member countries to reduce the emissions of certain greenhouse gases. In particular, the Protocol would set binding reduction targets for emissions of these greenhouse gases from their 1990 baseline level by the first budget period of 2008-12. The targets include:

- Eight percent reduction for the European Union;
- Seven percent reduction for the United States; and
- Six percent for Japan.

Greenhouse gases addressed in this Application are CO_2, nitrous oxide (N_2O), methane (CH_4), hydrofluocarbons (HFCs), polyflurocarbons (PFCs) and sulfur hexafluoride (SF_6). Other greenhouse gases include ozone-depleting substances regulated under the Montreal Protocol. Certain criteria pollutants such as SO_2, CO and O_3 further interfere with the ability of the ecosystem to "sink" or assimilate these greenhouse gases. Greenhouse gases are weighted against their Global Warming

Potential (GWP). The GWP of a gas attempts to compare the ability of each greenhouse gas to trap atmospheric heat with CO_2 chosen as a reference. Global warming potentials are used to convert greenhouse gases to CO_2 equivalents. Other gases have substantially greater global warming potential than CO_2. For example, methane is 21 times more effective than CO_2 in trapping heat in the atmosphere; NO_x – 310 times; HFC-23 – 11,700 times; and SF_6 – 23,900 times.

The United States has yet to ratify the emission reductions set forth in the Kyoto Protocol and is, therefore, far from developing regulations to address emission limits of greenhouse gases within the context of global climate change. However, the United States is complying with provisions to quantify and report the annual emission of greenhouse gases.

The Intergovernmental Panel on Climate Change (IPCC) has developed *Guidelines for National Greenhouse Gas Inventories* (IPCC/OECD/IEA/UNEP 1995) for developing emission factors for various fossil fuels. The emission factors are expressed as carbon equivalents, a metric measure used to compare the emissions of the different greenhouse gases based on the amount of carbon they contain. Greenhouse gas emissions in the United States are most commonly expressed as "million metric tons of carbon equivalents" (MMTCE).

In a report issued by EPA in April 1999, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 1997* (EPA 236-R-99-003) inventories of greenhouse gases in the United States are rising at an average rate of 1.5 percent per year from 1990 levels. In its report, EPA cites that in 1997, CO_2 from fossil fuel combustion accounted for 81 percent of the emissions of greenhouse gases, with the electric utility sector accounting for 36 percent. Fossil fuels include coal, natural gas and petroleum.

Table 6-53 summarizes greenhouse gas emissions from coal, oil and natural gas from United States electric utilities.

Table 6 – 53: Electric Utility Related Greenhouse Gas Emissions Trend (MMTCE)

Fuel	1990	1991	1992	1993	1994	1995	1996	1997
Coal	409.0	407.2	411.8	428.7	430.2	433.0	457.5	470.9
Oil	26.6	25.1	19.9	22.5	20.6	14.0	15.4	17.6
Gas	41.2	41.1	40.7	39.5	44.0	47.2	40.3	43.8

The total 1997 estimated greenhouse gas emissions from electric generation is 532.3 MMTCE. EPA cites fuel switching from natural gas to more carbon-intensive coal as a reason for a part of the overall increase in greenhouse gas emissions in the

United States since 1990. This fuel switch resulted primarily from the temporary shutdown of several nuclear power plants and price fluctuations in the natural gas market.

At the Fifth Conference of the Parties of the United Nations Framework Convention on Climate Change, held October 25 through November 5, 1999 in Bonn, Germany, United States officials reported data which demonstrate that economic growth doesn't have to lead to increasing emissions. United States Undersecretary of State for Global Affairs, Frank Loy, stated that he is: "cautiously encouraged by the drop in United States emissions in 1998 – a year when the United States economy grew almost 4 percent while CO_2 emissions barely moved, rising only 0.4 percent..."

Fuel selection, therefore, plays an important role in programs designed to reduce CO_2 emissions. Table 6-54 demonstrates the relative carbon emission rates between the primary fuels used in electrical generation.

Table 6- 54: Fossil Fuel Emission Factors

Fossil Fuel	MMTCE/QBtu[1]
Coal	25.56 – 27.66
Natural Gas	14.47
Petroleum	16.99 – 27.85

[1] Million metric tons of carbon equivalent/quadrillion Btu.

Based on fossil fuel emission factors alone, the combustion of natural gas would result in significantly less CO_2 emissions than either coal or petroleum. Relative emission rates are not the only advantage to conversion of aging coal-fired technologies to today's state-of-the-art natural gas-fired combined-cycle technologies. Much of the coal-fired generating capacity in the United States has heat rates of the order of 12,000 British thermal units per kilowatt (Btu/kW). The Project has a design heat rate of less than 7,000 Btu/kW at 100 percent load. Thus, considering both factors, replacing an aging coal-fired electric generating facility with a state-of-the-art combined-cycle gas-fired project can achieve a greater than 2/3 reduction in CO_2 emissions simply due to the differences in thermodynamic efficiency.

The Energy Information Administration, of the U.S. Department of Energy (DOE) reported that New York State ranks fifth in the United States with 35,712 MWe of generating capacity and 15th with respect to CO_2 emissions, with an estimated 62,070,000 tons emitted in 1996. The metric tons of carbon equivalents is calculated:

$$62{,}070{,}000 \text{ tons} \times 0.907 \text{ metric tons/ton} \times 12 \text{ moles C/44 moles } CO_2 = 15.356 \text{ MMTCE}$$

Based on an estimated stack gas concentration of 4.17 percent CO_2, the Project would have the potential to emit 1,434,976 tons/year (calculated assuming 8,760 hours/year of operation at 100% load). This would represent CO_2 emissions of 0.35 MMTCE. According to the EPA report, total fossil fuel emissions of greenhouse gases in the United States during 1997 were 1,447.7 MMTCE (532.3 MMTCE from electric utility generation). Maximum emissions from this facility would therefore account for 0.024 percent of the emissions from fossil fuel combustion, 0.067 percent of the total greenhouse gases from electric utility generation and approximately 2.3 percent of the greenhouse gas emissions from electric generation in New York State.

The DOE's summary statistics on New York State's generating capacity showed that in 1996 the average age of coal-fired generating plants was 35 years and that for oil-fired plants was 26 years. Section 1.3.3.1 of the Application states that the results of the MAPS simulations show that the Project is expected to displace other less controlled power plants and reduce total CO_2 emissions annually by approximately 806,905 tons.

In summary, this section has demonstrated the importance of the combination of high-efficiency combined-cycle technology and the lower carbon content of natural gas relative to both coal and oil, with respect to the Project's impact on greenhouse gas emissions. This Project, and others like it, will play an important role in meeting the State of New York's goal under national greenhouse gas reduction targets, when and if instituted in conjunction with the Kyoto Protocol.

6.14 Construction Related Activities

Project related air quality impacts during construction are expected to include fugitive dust emissions, from ground excavation, cut-and-fill operations, and removal of debris, as well as vehicle emissions. However, because the construction period is limited and activities change during the construction phases, these emissions are only temporary and vary throughout this period.

Potential emission increases of fugitive dust will depend on such factors as soil properties (i.e., moisture content, volume of spoils, and soil silt content), meteorological variables, and construction practices employed. For fugitive dust as airborne particulates, the NYSDOT recommends the use of control measures to minimize these emissions. Consistent with the NYSDOT's Environmental Procedures Manual, emissions of fugitive dust will be mitigated using the following measures:

- The use of water or other wetting agents on areas of exposed soils on a scheduled basis;
- The use of covered trucks for soils and other dry materials;
- Limited storage of spoils on the construction site; and

- Final grading and landscaping of exposed areas as soon as possible.

The NYSDOT reports that such measures have "proved effective" in limiting fugitive dust during the construction period.

Emissions from vehicles will include onsite equipment and those from construction workers. As noted in the NYSDOT's Environmental Procedures Manual, these emissions are "temporary" and "self-correcting once the project is completed." Nevertheless, mitigation measures will be implemented to minimize emissions. Such measures will include proper maintenance of construction equipment, controlling unnecessary idling of equipment, and providing sufficient parking facilities for construction workers.

The NYSDOT requires more detailed analysis at roadway locations affected by construction diversions lasting 2 years or more. No such construction diversions are anticipated for this Project.

7. CULTURAL RESOURCES

This section addresses the requirements of Stipulation 2, Clauses 1 through 5(e).

7.1 Applicable Regulatory Requirements

Section 106 of the National Historic Preservation Act of 1966 affects construction in areas of cultural significance. The federal legislation requires that any federal action (including granting of permits) with the potential to impact cultural resources listed in or eligible for listing in the National Register be reviewed by the Advisory Council on Historic Preservation. The OPRHP is the agency delegated to implement this federal review process in New York State, both on its own behalf and to recommend actions to the Advisory Council. This office is also the state agency responsible for the coordination of New York State's Historic Preservation Programs. The Project has, therefore, consulted with OPRHP to determine whether any such potential impact is likely to occur.

7.2 Review of Site for Cultural Resource Potential

This section addresses requirements of Stipulation No. 2, Clauses 1, 2(a) and 2(b).

As part of the environmental permitting for the existing Independence Station, cultural resources within and in the immediate Project vicinity were evaluated under the direction of Marjorie K. Pratt of Pratt and Pratt Archaeological Consultants, Inc.

In the Phase I assessment, the history of the Project vicinity was developed, information on previously recorded cultural resources was sought and evaluated, and the Project site was examined for previously unrecorded resources. In addition, the Phase I assessment included a field inspection. This field inspection, undertaken in August 1991, involved surface reconnaissance and limited subsurface testing to determine the potential presence of previously unrecorded cultural resources at the site.

The results of this study and analysis determined that neither Project construction nor operation would have an impact on cultural resources either listed on, or pending nomination to, the National Register of Historic Places. In addition, no such properties were found within or in the immediate vicinity of the Project area. It was also determined that the limited cultural materials found during the cultural resources investigation would not qualify for nomination to the National Register of Historic Places and are not of historic significance. This work was summarized in the New York State Department of Environmental Conservation Structural-Archaeological Assessment Form (SAAF) completed for Independence Station. OPRHP was actively involved at the time in the review of the documentation, and concurred with the findings.

Given the fact that the Project footprint is located entirely within the area previously studied, correspondence with the OPRHP has concentrated upon confirming the validity of applying the previous results to the Project. A letter was sent requesting review of the Project activities by OPRHP; subsequently, Project maps and descriptive information were forwarded at the request of OPRHP to facilitate its review.

Correspondence (provided in Appendix I) has acknowledged that the Project will have *no effect* upon cultural resources in or eligible for inclusion in the Natural Register of Historic Places. This review was conducted for both historic and archaeological resources. OPRHP has reviewed the Project information, including preliminary information regarding the Project's potential viewshed (as further discussed in Section 16). Based upon that review, no historic structures have been identified for further consideration. In fact, OPRHP verbally recommended that no additional field reconnaissance was necessary to identify potentially eligible structures within the Project's viewshed area. However, based on the requirements in Stipulation No. 2, Clauses 5(a) through 5(e), a review of the Project viewshed was conducted, as discussed in Section 7.4.

7.3 Unanticipated Discovery Plan

The Project has been surveyed for cultural resource potential, and OPRHP has confirmed that such potential is unlikely. However, it is prudent to have plans in place for the unanticipated event of cultural resource discovery during the course of Project excavation activities during construction. This section responds to Stipulation No. 2, Clauses 3 and 4, in developing such a plan.

In the unexpected event that resources of cultural, historical or archaeological importance are encountered in the excavation process, procedures outlined in the Unanticipated Discovery Plan presented in Appendix J will be activated. Construction related work in the vicinity of the discovery will cease upon encountering possible archaeological or human remains. OPRHP and the State Police, if appropriate, will be notified. The methodology used to assess any such discoveries will follow the most recent *Standards for Cultural Resource Investigations and Curation of Archaeological Collections in New York State.* Such an assessment will be conducted by a professional archaeologist meeting qualification standards of the New York Archaeological Council and the National Parks Service.

In the event that significant cultural resources are identified, the Applicant would identify potential measures to avoid or minimize adverse effects to those resources. The OPRHP coordinator will be consulted throughout the investigation, as outlined in the Plan, and DPS Staff will be informed of the status and results of the investigations.

7.4 Review of Project Viewshed for Cultural Resource Potential

This section addresses Stipulation No. 2, Clauses 5(a) through 5(e).

No sites or structures have been identified as listed or eligible for listing on the state or national Register of Historic Places within the Project viewshed (as defined in Section 16). In addition, OPRHP verbally recommended that no survey be conducted for potentially eligible structures in this vicinity. This recommendation was based upon OPRHP's familiarity with the Project setting due to its prior review of the site, and upon its assessment that the Project will be sited in such a manner as to blend into the existing character of the viewshed.

A survey has, however, been conducted within the Project viewshed to identify any structures appearing to be at least 50 years old (and, thus, a potential cultural resource). This survey identified only 16 structures meeting these criteria. Completed Building-Structure Inventory Forms for each are presented in Appendix K.

The location of each identified structure is shown in Section 16 (Figure 16-4), and a discussion with regard to potential visual impact from these locations is provided. As discussed in that section, the limited number of structures of the appropriate age are scattered within the viewshed area, and the anticipated view from these locations are well-represented by the locations assessed within Section 16. No visual mitigation has been identified as appropriate in conjunction with these structures, other than the mitigation measures that are an element of the Project's design discussed in Section 16.6.

8. ELECTRIC TRANSMISSION FACILITIES

8.1 Introduction

This section addresses the requirements of 16 NYCRR § 1001.1(c) and the requirements of Stipulation No. 3.

The Applicant is proposing certain improvements to electric transmission facilities owned by NMPC that will serve to connect the 800 MW Project with the New York State bulk transmission system. These improvements to the transmission facilities (the interconnection) are the electric interconnection between the Project and the existing NMPC Independence Substation and the possible replacement and/or addition of equipment at NMPC substations in the vicinity of the Project.

With respect to the Project's potential impacts on the transmission system, Section 1001.1(c) of the Article X regulations requires the Applicant to discuss:

> *...the benefits and detriments of the proposed facility on ancillary services and the electric transmission system, including impacts associated with reinforcements and new construction.*

This section will describe the proposed interconnection to the transmission grid. Furthermore, in Stipulation No. 3, the Applicant agreed to provide, in addition to the discussion required by Section 1001.1(c), other studies concerning transmission impacts and proposed mitigation. On October 29, 1999, the Applicant engaged NMPC to conduct system studies for the Project. NMPC informed the New York Power Pool (NYPP) of the study on November 1, 1999. As agreed in Stipulation No. 3, the results of the NMPC studies will be provided as a supplement to this Application. The study results reported in this Application are those studies performed by the Applicant, and provide a preliminary indication of certain effects the Project will have on the transmission system.

8.2 Electric Interconnection

The two Project generators of 400 MW each will be connected to the Project with individual 19 kV/345 kV transformers. These transformers will each connect to separate 345 kV transmission lines, which will run approximately 1,200 feet to the NMPC Independence Substation (Figure 8-1). There will be three poles similar or identical to the existing 140-foot towers connecting the existing generating units on-site to the NMPC Independence Substation. To provide reliability, flexibility and continuity of service, a 3-breaker split ring radial configuration (the collector) has been incorporated into the design for the new switchyard to be located within the NMPC Independence Substation. Two overhead circuits within the NMPC Independence Substation will connect the Project collector to the other equipment in this substation.

Figure 8-1: Heritage Station Electrical Interconnection

8.3 Impacts to the Transmission System

The system impact analysis presented below is based upon studies undertaken by the Applicant. Results of the system impact study being conducted by NMPC will be filed as a supplement to this Application pursuant to Stipulation No. 3, Clause 1. The NMPC Study will include the thermal, fault duty, stability and voltage impact analyses. The preliminary study undertaken by the Applicant focuses on thermal limitations.

Thermal studies were performed based on the 2003 summer peak load, using the NYPP network model and the database that is on file with FERC. Proposed generation additions at Athens, Bethlehem Energy Center, and Ramapo were not included. These plant additions are all east of the Central East and Total East interfaces; thus, it is expected that these preliminary thermal study results will overestimate the effect of the Project on these interfaces. All generation units in the Project area were assumed at full production (Oswego Station, 1,450 MW; Nine Mile Point 1 and 2, 1,642 MW; Independence Station, 1,040 MW; and J. A. Fitzpatrick, 870 MW).

The Flexible AC Transmission Systems (FACTS) capacitors at the Oakdale substation, the Middletown tap, and OH-Michigan phase angle regulators were not represented. It is expected that these network model refinements will not materially affect the Project's impact on New York thermal loadings.

These transmission system studies were performed by displacing various generation sources in New York and surrounding regions with Project production. Displacements were chosen in accordance with New York Power Pool Operating Studies Task Force (OSTF) study procedures to test network reliability. The purpose of the analysis is to test the transmission network under stressed conditions and not to necessarily reflect dispatch according to competitive market conditions. Transmission overloads were tested against normal and long term emergency (LTE) ratings for all major circuits in New York State and relevant PJM circuits for single and multiple element contingencies as published by the NYISO. According to standard practice used in OSTF studies, phase angle regulators (PARs) were modeled as regulating (holding scheduled flow at base case level) precontingency, and free flowing post-contingency.

8.4 Study Results

The impact of the Project was examined in terms of "Getaway Capability," Intra-Pool transfers, and Inter-Pool transfers, as discussed below.

- **Getaway Capability** – This analysis tests whether transmission circuits in the Project vicinity become overloaded when Project production displaces other generation in New York.

- **Intra-Pool Transfers** – There are three major interfaces in the Eastern portion of New York State: Total East, Central East, and Upstate New York-Southeastern New York (UPNY-SENY). These interfaces are the gateways through which energy is traditionally transferred from generation-rich areas such as western New York, Hydro Quebec, and New England to the heavy load centers of the eastern and southern regions of New York State. The analyses test whether the addition of the Project impacts the transfer capability of these interfaces.

- **Inter-Pool Transfers** – Transactions between the NYPP and New England systems and the NYPP and PJM systems were also evaluated in the same manner as the Intra-pool evaluation.

8.4.1 Getaway Capability

The thermal analysis for the 2003 summer peak load confirms that circuits in the Project vicinity will not adversely affect economic dispatch in New York State, including the operation of the Oswego, Independence, Nine Mile Point, and Fitzpatrick generating stations.

8.4.2 Intra- and Inter- Pool Transfer Capability Impacts

Project production was found to have the following impacts on New York Intra- and Inter- Pool transfer capability:

- The Project's impact on transfer capability from New York to PJM will be insignificant.

- The Project's impact on transfer capability from New York to New England will be insignificant.

- Sales of power from the Project will increase loading on transmission lines in the Project vicinity and the New York West to East flow for some dispatch scenarios. Further study of these transmission flows and a description of remediation measures, if required, will be included in the supplemental filing to this Application.

8.5 MAPS Simulation Results

As described in Section 1.3, production cost analyses using the MAPS model to simulate the competitive dispatch of the electric system by the NYISO were performed to evaluate the impact on New York State production cost savings created by the addition of the Project.

Examining the MAPS results from a transmission perspective, the conclusions are:

- The addition of low cost generation at the Project tends to displace generation further West and South of the Project, and east of Total East.
- Based on NYISO's selection of the least cost dispatch of generation, transmission circuits West to East across New York become more heavily loaded due to addition of the Project.
- Transmission circuits in the vicinity of the Project did not adversely affect economic dispatch in New York State in any hour.
- The additional West to East transmission loading does not adversely affect electricity supply to the New York City area, evidenced by the negligible increase in city generation with the addition of the Project.
- Capacity factors at Oswego Station, Independence Station, Nine Mile Point 1 and 2, and Fitzpatrick were not impacted by the addition of the Project.

8.6 Auto-Reclosing

No autoreclosing or high speed reclosing is utilized in the Project vicinity, thus a study of it is not required.

8.7 Benefits to the New York Electric System

Pursuant to Stipulation No. 3, Clause (c), Project will benefit the electric system in several material respects. The addition of low cost production in the competitive market will lower production cost for the state without causing transmission related reliability problems. The addition of modern efficient generation such as the Project will add to capacity reserves, making the state's electric grid more reliable, reducing the likelihood of power shortages and providing the NYISO greater flexibility to deal with operating contingencies.

8.8 Electric and Magnetic Field Studies

This section addresses Stipulation No. 3, Clause 16.

The cumulative effect of the Project and its 345 kV interconnection to the Independence Substation on levels of 60-hertz electric and magnetic fields was estimated by measurements and calculations. The criteria for evaluating potential Project impacts are edge of right-of-way standards for fields at the edge of high voltage transmission right-of-ways. The electric field standard is 1.6 kV per meter (kV/m) (PSC, Opinion 78-3) and the interim magnetic field standard is 200 milligauss (mG) (PSC. *Statement of Interim Policy on Magnetic Fields of Major Electric Transmission Facilities.* September 11, 1990).

Project operation will not increase existing field levels above the limits set by the PSC for new transmission line right-of-ways. The maximum electric and magnetic field levels calculated at the nearest right-of-way are shown in Table 8-1.

Table 8-1: Calculated Edge of Right-of-Way Maximum Field Levels in Relation to PSC Standards

Standard or Conductor Loading Scenario	Electric Field (kV/m)	Magnetic Field (mG)
PSC Field Standard	1.6	200
Maximum Field of Winter Normal Loading	0.27	119
Maximum Field of Long Term Emergency Conductor Loading	0.27	170
Maximum Field of Short Term Emergency Conductor Loading	0.27	188

Source: E^xponent 2000 (See Appendix L).

The magnetic field value calculated for a Winter Normal conductor loading demonstrates compliance with the Public Service Commission's interim magnetic field limit (PSC 1990). However, the magnetic field calculated for proposed interconnection does not exceed the magnetic limit even at other higher LTE or short-term emergency (STE) conductor ratings.

9. GAS TRANSMISSION FACILITIES

This section addresses Stipulation No. 4, Clauses 1(a) through (d).

9.1 Description of the Proposed Gas Pipeline Interconnection

9.1.1 Interconnection Facilities

The natural gas pipeline to serve the Project will be a high-pressure dedicated service lateral that will interconnect with NMPC's Pipeline No. 63 (certificated under PSL §§ 120, *et seq.* (Article VII) in Case 92-T-0252 (Opinion No. 93-17), August 20, 1993). The interconnection facilities will include valves, regulators, metering equipment, service taps and related pipeline facilities to assure safe and reliable service, e.g., fencing and pipeline markers. The interconnection facilities and lateral will be located entirely within the Project's property boundaries.

9.1.2 Pipeline Route

The lateral will be approximately 950 feet in length. The route of the pipeline lateral is shown in Figure 9-1.

9.1.3 Size and Operating Pressure

Based on Project operating requirements, the approximate nominal diameter of the lateral pipeline will be 14 inches, with a maximum allowable operating pressure of 800 psig. A booster compressor will be installed on-site to satisfy the gas turbines' requirements. The gas compressor building will be an approximately 60-foot wide by 85-foot long by 20-foot high pre-engineered structure with metal factory insulated foam panel walls and standing seam factory insulated foam panel roof system. Doors and exterior fixtures will match the existing building. The building will be ventilated with louvers and motor operated fans. Heating will be by electric unit heaters.

The building will house three electrically driven natural gas compressors to boost natural gas supply up to 650 psig to the Project. Individual compressors are rated at 50 percent of the total requirement. Two compressors will be running during normal Project operation, with one compressor as a standby. Equipment in the building will be electrically rated for Class I, Division 2.

9.1.4 Volume of Gas Required to Serve the Project

The Project is being structured to operate as a merchant power plant over a range of generation outputs, and will consist of two 400 MW combined-cycle gas-fired units with a nominal rated total capacity of 800 MW. Each unit will be able to run individually, and at outputs down to approximately 55 percent capacity.

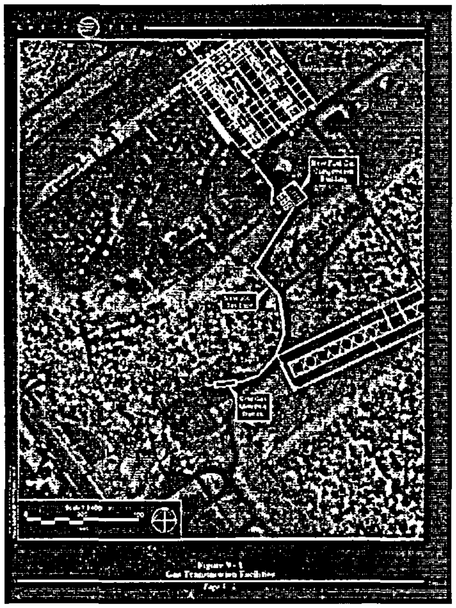


Figure V - 1
Gas Transmission Facilities

The two units will be able to operate efficiently in various output configurations, thereby allowing the Project to increase or decrease generation output and required gas consumption. Depending on the ambient temperature, volumes of gas required will range from approximately 30,000 million British thermal units (MMBtu)/day if one combustion turbine is operating at 60 percent of capacity up to approximately 134,000 MMBtu/day if both combustion turbines are running at 100 percent electric output.

9.1.5 Nature and Extent of Transportation

The Project intends to use PSC-approved Empire State Pipeline tariffs and/or FERC approved pipeline tariffs for Consolidated Natural Gas Transmission (CNGT) transportation services. The transportation services will include interruptible transportation, displacement, and exchange services to increase overall deliverability to the Project. In addition, transportation services may use secondary-firm, as released capacity or bundled supply from marketers becomes available. Empire State Pipeline interconnects with NMPC Pipeline No. 63 at the Chestnut Street Station in Phoenix, New York. CNGT is interconnected to Pipeline No. 63 at the existing Biddlecum Road meter. Pipeline 63 has sufficient available capacity to service the incremental volume requirements of the Project.

9.1.6 Construction, Operation and Ownership

The on-site Project pipeline lateral downstream of the NMPC meter will be owned and operated by the Project and will be constructed by certified contractors in accordance with all applicable safety requirements. NMPC will install and own the meter, valves and any related facilities from Pipeline 63.

9.2 Gas Supply and Pipeline Capacity

As required by Stipulation No. 4, Clauses 1(b) and (d), the following is an analysis demonstrating there is sufficient gas supply and available pipeline capacity to support the requirements of the Project.

9.2.1 Supply Sufficiency

The Applicant has examined available information on the status of gas supply availability for the nation and the Northeast. Reports show that adequate supplies of gas will be available to meet forecast demands that assume high, middle and low growth scenarios. For example, the New York SEP included a high demand growth case that assumed all new electric generation capacity needs within the planning horizon to the year 2016 would be met through new natural gas-fired generation units located in New York. The SEP states that natural gas supplies are expected to be adequate to meet this range of demand in the planning period. *See, e.g., New York State Energy Plan and Final Environmental Impact Statement* (November 1998) at

3-30 and *Appendix* (1998) at 6.1 (see Appendix M). Other studies also show that adequate gas supplies will be available to meet the nation's and northeast region's needs over the planning horizon. See *Potential Supply of Natural Gas in the United States,* Report of the Colorado Potential Gas Committee (March 1999) and United States Department of Energy Information Administration, *Natural Gas Issues and Trends* at 109-127 (April 1999). A theoretical maximum annual consumption of the two turbines at 100 percent output would be approximately 48 billion cubic feet (bcf) or 48,000,000 MMBtu, well within the forecasts in the SEP and supply forecasts of others. Since the range of output will be flexible and consistent with gas supply availability over the course of each year or seasonal period, there will be additional margin to assure that supply will be available.

As a merchant facility, the Project will not have long term electric sales agreements, nor will it have fixed-price gas purchase commitments to producers or pipelines. The Project will be part of an integrated portfolio of generating facilities in the Northeast. Its fuel supply will be provided from marketers selling gas from a diversified combination of geographic basins, such as Western Canada, mid-continent, Gulf Coast and Appalachia, as well as through new pipeline capacity being developed in Nova Scotia into New England.

Gas supply to the Project will not have an adverse effect upon supply to Independence Station. Independence Station's gas supply is secured through a long term supply contract and an array of firm transportation arrangements. Moreover, Independence Station began commercial operation in 1994 and its contribution to the state's gas demand is incorporated into the SEP analyses which, as noted above, project adequate additional supply over the planning period.

Bundled services, including released pipeline capacity, exchange with other marketers and other Sithe portfolio supply positions, will be employed to provide supply and pipeline capacity from a variety of upstream and downstream resources.

Because Sithe's Northeast generation portfolio will consist of peaking, intermediate and base load units across the New England Power Pool (NEPOOL), PJM and NYPP, with each area having different fuel costs, locational importance and availability, purchases of supply will be competitively available year-round on a daily, weekly, and monthly basis.

9.2.2 Pipeline Capacity

The Project will be able to access pipeline capacity from and through two sources: Empire State Pipeline (Empire) and CNGT.

CNGT is a major interstate pipeline directly serving customers in the five-state area that includes New York State. The CNGT system is designed to receive natural gas from seven other interstate pipelines and one New York State intrastate pipeline, with gas sourced from the Gulf Coast, Canada and the mid-continent of the United States, as well as from intrastate gathering systems throughout the Appalachian supply basin. In addition, CNGT owns and operates the largest integrated gas storage system in North America, with over 250 bcf of working gas storage capacity. The combination of access to geographically diverse sources of gas supply, multiple interconnects with other interstate pipelines, and utilization of storage assets, makes the CNGT system the major gas hub in the northeastern United States, with an average of over 3.5 bcf of sale/purchase activities occurring on its system daily.

The CNGT system can provide either firm and/or interruptible transportation service depending upon the service option chosen. Likewise, storage and balancing services are available in order to provide for both planned and unplanned changes in Project requirements on an hourly, daily, weekly or seasonal basis.

In addition, given the overall design of the CNGT system, and dependent upon specific contract service provisions, transportation and purchases of natural gas can occur at either of various receipt points into CNGT or at two designated trading points: CNGSP (CNGT South Point) and CNGNP (CNGT North Point) on the system. These trading points create a significant amount of liquidity on the CNGT system on an annual and seasonal basis.

Deliveries of gas from CNGT to the Project will be made at the existing Biddlecun Road interconnection between CNGT and NMPC.

Empire is a 155 mile, large volume, high pressure transportation pipeline certificated by the PSC in 1991. Empire is directly connected to TransCanada Pipelines Ltd. (TCPL) at the United States/Canadian border near Grand Island, New York and has its eastward termination near Syracuse, New York. Empire is directly connected to NMPC's Pipeline 63. TCPL accesses gas supply from the Dawn Ontario Hub, operated by Union Gas Ltd., and from western Canada. TCPL is interconnected upstream with United States pipelines such as Great Lakes Gas Transmission (GLGT), which provides access to natural gas supplies from the United States, originating in the Michigan basin, Oklahoma and the Gulf Coast producing regions through its interconnection with ANR Pipeline. Direct delivery of supply to the Project from Empire would be made at the existing Chestnut Street interconnection between Empire and NMPC.

Transportation of gas to the Project will not adversely affect transportation to Independence Station. Independence Station has firm transportation on both Empire and NMPC Pipeline No. 63. In addition, both Empire and NMPC Pipeline No. 63 are capable of transporting gas at higher pressures and volumes to serve both the Project and Independence Station. CNGT will also be available to provide pipeline capacity on a competitive basis. It should also be noted that the Project's operational flexibility does not require that it be served with firm transportation and there will be sufficient pipeline capacity to serve both the Project and Independence Station.

In addition, Empire's new interconnection with CNGT in Lysander, New York, which will be operational in the first quarter of 2000, will provide added diversity of supply options, deliverability security and economic advantages. This new interconnection will enhance CNGT and Empire transportation services reducing the possibility of the Project encountering any pipeline constraints or operational flow problems on either system.

9.3 Impacts on Local Distribution Company (LDC)

Because the Project will receive gas from a high-pressure dedicated pipeline lateral, no impact on LDC distribution reliability, pressure or service adequacy should occur. Pipeline 63 and its interconnection with Empire were specifically built to provide high volume and high pressure service to Independence Station. It is noted that Independence Station (a 1,040 MW natural gas-fired electric generating facility adjacent to the Project) has taken gas through NMPC's Pipeline 63 in large volumes since 1994 with no impact upon any NMPC local distribution services. Likewise, service from Empire and NMPC Pipeline 63 to the Project would have no impact on the LDC or its franchise customers. NMPC does not have any firm capacity on Empire. With respect to CNGT, based on information provided to the Applicant, it appears that NMPC currently has a firm transportation arrangement with CNGT, which would not be adversely affected by the Project. To the extent transportation service is provided by CNGT, it would be at a lower level of priority such that no impact could occur on the LDC or its franchise customers. The priority of service to the Project would be below that of NMPC's firm arrangements, and under the CNGT tariff, higher priority customers' needs would take precedent over transportation to the Project.

10. LAND USES AND LOCAL LAWS

This section addresses Stipulation No. 5, Clauses 1 through 6.

10.1 Applicable Regulatory Requirements

The standard by which land use compatibility is generally assessed is through comparison to land uses within the immediately surrounding area and local zoning and other laws established as community planning tools. Where no such direct guidance is available, as is the case for this Project, community goals must be assessed through other means, including a review of long range planning documents. Other policy documents for which the Project must demonstrate consistency are the Coastal Zone Management policies. The following sections provide a review of the characteristics of the site and its surroundings, as well as specific information with regard to local laws and other policy requirements to demonstrate the Project's compatibility with land uses and local laws.

10.2 Existing and Planned Land Use

This section addresses Stipulation No. 5, Clauses 1(a-e), 3 and 4.

10.2.1 Land Use

10.2.1.1 On-site Land Use Characteristics

The Project will be developed on a 190-acre property, the location of the existing Independence Station, a 1,042 MW natural gas fueled power-generating plant. The existing facility primarily consists of one main turbine building covering approximately 304,000 sf, cooling towers covering approximately 110,000 sf, a 1-acre detention pond, a wastewater holding pond, and an electrical substation covering approximately 295,000 sf. Ancillary facilities associated with Independence Station include aboveground storage tanks located within the main turbine building, as well as eight aboveground storage tanks located directly outside the main turbine building. The remainder of the property consists of a mix of open fields, scrub-shrub uplands and wetlands and mixed forested uplands and wetlands.

Abutting properties include Alcan to the west, Lake Ontario to the northeast, and Route 1A and its residential land uses to the south. Also, along the Lake Ontario shoreline is the 50-acre Independence Park, donated to the county as part of the Independence Station Project. Several residences, most of which are seasonal, are located to the northeast of the site, just beyond Independence Park.

10.2.1.2 Environmental Site Assessment

A Phase I Environmental Site Assessment (ESA) was performed in conformance with the scope and limitations of the American Society for Testing and Materials (ASTM) Practice E1527-97 for the property. The objective of this ESA was to assess the property for the potential presence of recognized environmental conditions (RECs). In order to meet this objective, the following activities were undertaken:

- Reviewed selected local, state, and federal regulatory agency databases for listings of the property and for sites within selected radii around the property.
- Contacted local officials and employees (and a former employee) of the facility at the property to inquire about records or knowledge of environmental conditions at the property and in its vicinity.
- Reviewed the history of the property through the selected ASTM Standard Historical Sources cited in ASTM E1527-97 Standard Practice for Phase I Site Assessments.
- Conducted reconnaissance of the property on October 26 and 27, 1999 to make observations for evidence of a release or threat of release of oil and hazardous materials (OHM) to the environment.
- Performed a limited review of adjoining properties to identify the potential for use of OHM that could affect the property.
- Reviewed a March 1991 Phase II Environmental Liability Assessment (ELA) prepared by O'Brien & Gere, which included the area of the current study.
- Reviewed a March 1992 Supplemental Phase II ELA prepared by HMM Associates, which included the area of the current study.
- Reviewed a November 1992 Supplemental Phase II ELA prepared by HMM Associates, which included an adjacent area to the current study.
- Reviewed selected information concerning the remedial investigation on the adjacent Alcan Rolled Products Company North Ponds Site Investigation contained in the Dames and Moore report prepared for Alcan, dated November 17, 1997. This report was provided by the NYSDEC regional office in Syracuse.

No subsurface explorations or chemical testing of soil, groundwater, or surface water were conducted, and no assessment for the presence of lead hazards, asbestos, radon, or methane, at the surface or in the subsurface, was completed.

On the basis of the observations made and the information reviewed as part of this effort, this assessment has revealed no RECs in connection with the property. The ESA concluded that no further investigation is warranted. The adjacent site contamination on the Alcan Rolled Products site, specifically in the North Pond area, will not have an adverse environmental impact on the Project site.

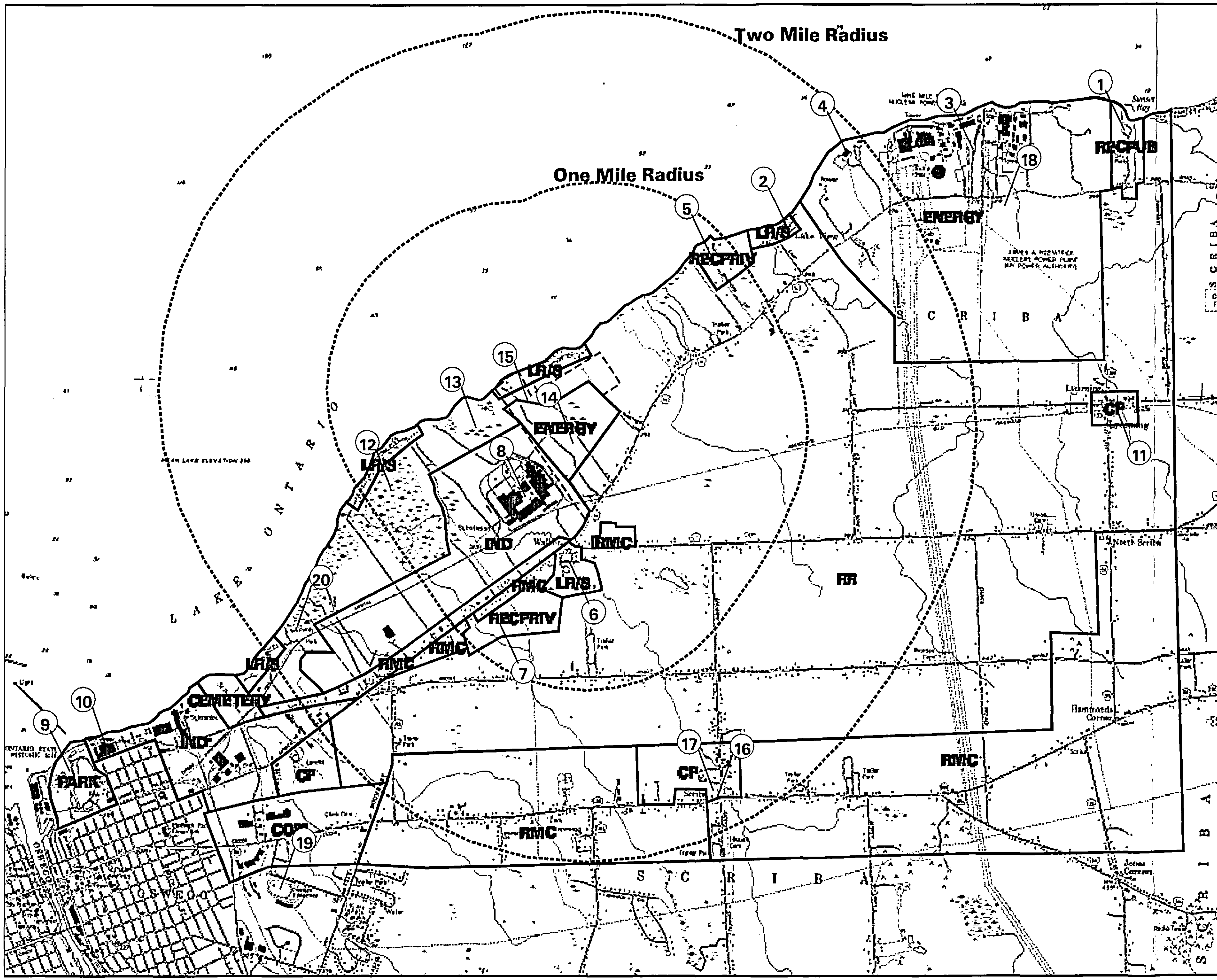
10.2.1.3 Surrounding Land Use

A land use inventory was conducted in September 1999 to identify existing land uses within a 2-mile radius of the Project site, expanded as necessary to include identification of major land uses outside that radius. The data collection effort employed a windshield survey methodology with general land use characteristics assigned and annotated on a USGS-based map of the study area. Due to the magnitude of the area contained within the 2-mile radius, individual parcels were not assessed, and characterization of backland area (area beyond the view from the roadway) relied on aerial photography.

The categories used to describe land uses observed within the 2-mile radius are illustrated in Figure 10-1 and on the aerial photograph provided as Figure 10-2, and are identified in Table 10-1.

Table 10-1: Land Use Categories

Rural Residential	Residential with woodlands and agricultural uses. Primarily low density although mobile homes and trailer parks are not differentiated.
Residential with Mixed Commercial	Primarily residential with commercial uses interspersed.
Seasonal/Year-Round High Density Residential	Includes waterfront neighborhoods, cottage camps and campgrounds.
Community Facilities/Services	Primary uses are public buildings, offices or services.
Public Open Space/Recreation	Includes public parks, cemeteries and other public sites.
Private Open Space/Recreation	Includes golf courses and other privately controlled and/or fee-based uses.
Commercial Strip	High-density retail and service uses.
Industrial	Manufacturing and other industrial/commercial uses.
Energy-related Uses	Energy-generating facilities and associated uses.



EARTH TECH

CEMETERY	Cemetery
CF	Community Facility
COM	Commercial
ENERGY	Energy Related Use
IND	Industrial
LR/S	Seasonal/Lake Front
PARK	Fort Oswego
RECPRIV	Recreation(Private)
RECPUB	Recreation (Public)
RMC	Residential/Mixed Commercial
RR	Rural Residential

1 Town of Scriba: Sunset Bay Park
2 Ontario Bible Conference Camp
3 Nine Mile Point and Fitzpatrick Nuclear Power Plants
4 Energy Center Educational Facility
5 Bay Shore Grove Indoor/Outdoor Function Facility
6 Twin Pines Campground
7 Tamarack Golf Course
8 Alcan Rolled Materials
9 Fort Ontario State Historic Site
10 Port of Oswego Vacant Site
11 Lycoming Village (Post Office, Church, etc.)
12 Teal Marsh
13 Alcan Nature Reserve
14 Independence Station
15 Independence Park
16 Scriba Recreation Center
17 Veteran''s Park
18 NMPC Battlefield
19 Oswego Speedway
20 Oswego County Lakeshore Park

Oswego Economic Development Zone

Figure 10 - 1
Land Use Mapping

Scale 1:36000
0 3000 6000
Feet

Date:15 Feb 00 16:46:20 Tuesday
/usr2/bdstuff/oswego/landuse.map

EARTH TECH

CEMETERY	Cemetery
CF	Community Facility
COM	Commercial
ENERGY	Energy Related Use
IND	Industrial
LR/S	Seasonal/Lake Front
PARK	Fort Oswego
RECPRIV	Recreation(Private)
RECPUB	Recreation (Public)
RMC	Residential/Mixed Commercial
RR	Rural Residential

Digital orthophoto supplied by USGS.
Date of photo: April 22, 1994.

Figure 10 - 2
Aerial Photo of Exising Land Use

Scale 1:36000
0 3000 6000
Feet

Land uses observed within the 2-mile study area radius are primarily residential in nature, with three dominant characteristics. The most prevalent residential land use can be described as rural residential, with a low-density pattern of single-family homes either including or adjacent to agricultural, farming or wooded areas. Outbuildings for farm equipment or animals are a frequent sight associated with this land use. The second common residential land use observed in the area are dense clusters of manufactured housing units situated in trailer parks or on small adjacent lots along the roadside. Large areas of undeveloped wooded areas typically separate these two residential uses. Finally, along the lakefront area are cottage communities of seasonal homes or those that have been converted to year-round use. These are found in clusters along the entire waterfront area, often accessed from unimproved roadways.

Energy-related uses dominate the northeastern portion of the study area. The Independence Station facility, neighbor to the Project within the site is closest in proximity, while the Nine Mile Point and Fitzpatrick nuclear plants (and their ancillary uses) are the most obvious in terms of land area, visibility and impact on the study area.

Interspersed among the residential uses in the study area are home businesses or random commercial enterprises. The greatest concentration of commercial uses is in the area west of the Alcan complex on Route 1 toward Oswego, where industrial, commercial and service uses are found adjacent to residential parcels. Town of Scriba community facilities are concentrated on Creamery Road near Route 104, and a small village center hosting postal, fire and church facilities is located on County Route 29 in Lycoming.

Specific uses of note are identified in Figure 10-1.

10.2.1.4 Recreational Land Use

Recreational land uses within a 2-mile radius of the site are described below and are shown on Figure 10-1. Lake Ontario and the Independence Park represent recreational land uses that are adjacent to the site. The balance of the recreational uses are some distance away and will not be affected by the Project.

Lake Ontario, which forms the northern boundary of the Project site, is a major recreational resource in the area. The salmonid stocking program initiated in 1968 by the NYSDEC has made Lake Ontario an outstanding fishery that provides year-round angling. Fish species available include chinook and coho salmon, lake trout, Atlantic salmon, rainbow/steelhead trout, brown trout, and a variety of other native and exotic species. The lake is also used for a variety of other water recreational activities including boating, swimming and water-skiing. Along the shore, bird watching, photography, and hiking are other popular activities. A large waterfowl population which provides hunting opportunities is also associated with Lake Ontario.

Independence Park is a 50-acre tract of wooded land that was donated to Oswego County as a part of the Independence Station project. The property has been developed with a walking trail system and with an observation platform that allows views of Lake Ontario. The property, as shown in Figure 10-1, is situated between the site and several lakeshore cottages and has approximately 600 feet of shoreline frontage. Typical usage of this park area consists of walking and hiking activities, photography, observation of wildlife, and viewing of Lake Ontario. A parking area is provided off of Riker's Beach Road.

The *Scriba Recreation Center* is located on the corner of New York State Route 104 East and Creamery Road on approximately 2 acres. Youth programs at the facility include a school-age child care program, a preschool play group, Saturday elementary programs (gym, arts and crafts), Youth Council meetings, elementary game time (gym activities), basketball, karate classes, and drop-in recreation (ping pong, video games, board games, etc.). A variety of adult programs such as aerobics classes, dog obedience classes, senior citizen craft group, senior citizen bus trips, basketball, and weight lifting are also held at the facility. Special events held at the Center include sledding parties, Youth Council dances, an Easter party, a Halloween party and haunted house, and a Christmas party and caroling. The facility was used by 36,270 people during 1990 and 11,224 people during January through June 1991 (pers. comm., Talbot 1991).

The small 132-foot by 165-foot *Veteran's Park* is located at the corner of Route 104 East and Creamery Road. A Veteran's Day observance is held at the site. Data concerning the rate of use are not available.

The *Alcan Nature Reserve* is located at the site of the Alcan facility. A self-guided trail winds through the Reserve for a total distance of 1 mile. The area consists of five habitat communities: palustrine dead forested wetland, intermediate successional forest, palustrine scrub-shrub wetland, palustrine impounded dead forested wetland, and the Lake Ontario shoreline. The Reserve occupies approximately 50 acres. The Alcan Nature Reserve is open to the public by appointment only. It generally receives limited use by the public.

The *Energy Center*, consisting of three operating nuclear power plants and a visitor's center, is located on Lake Road, approximately 6 miles northeast of Oswego. The visitor's center provides displays and hands-on exhibits explaining electric generation and transmission. NYPA and NMPC sponsor the project. The Energy Center is open to the public all year except for three holiday periods.

A *baseball field* is located across from the Fitzpatrick Nuclear Plant. This field, located on NMPC property, is open to NMPC employees.

The *Oswego Speedway* is located on East Albany Street in Oswego. The facility is a 5/8-mile paved oval track. Weekly supermodified auto racing is held here. In addition, several summer twin bills attract top northeast racing competitors. Thousands of spectators attend the races during the operating season, May through September.

The *Oswego County Lakeshore Park* is adjacent to the Oswego County Industrial Park. The property is in an environmentally sensitive area and was dedicated for recreation and lake access. Approximately half of the site is part of Teal Marsh, a Class I state-regulated wetland. A beach and rock shoreline approximately 1,200 feet in length runs along the Lake Ontario shoreline. A trail was developed in 1993.

Twin Pines Cabins and Campgrounds is a private commercial campground located approximately 0.6 mile southwest of the Project site at the corner of County Routes 1 and 1A. There are about 12 cabins, 36 campsites, and 18 trailer sites on the 48-acre parcel. The facility is used mostly during the spring and summer months.

The *Ontario Bible Conference Camp* is a private campground located about 2 miles east of the Project in the hamlet of Lakeview. The campground is located adjacent to Lake Ontario and is heavily wooded. Park facilities include a number of cabins, a general store, a baseball field, and a swimming pool.

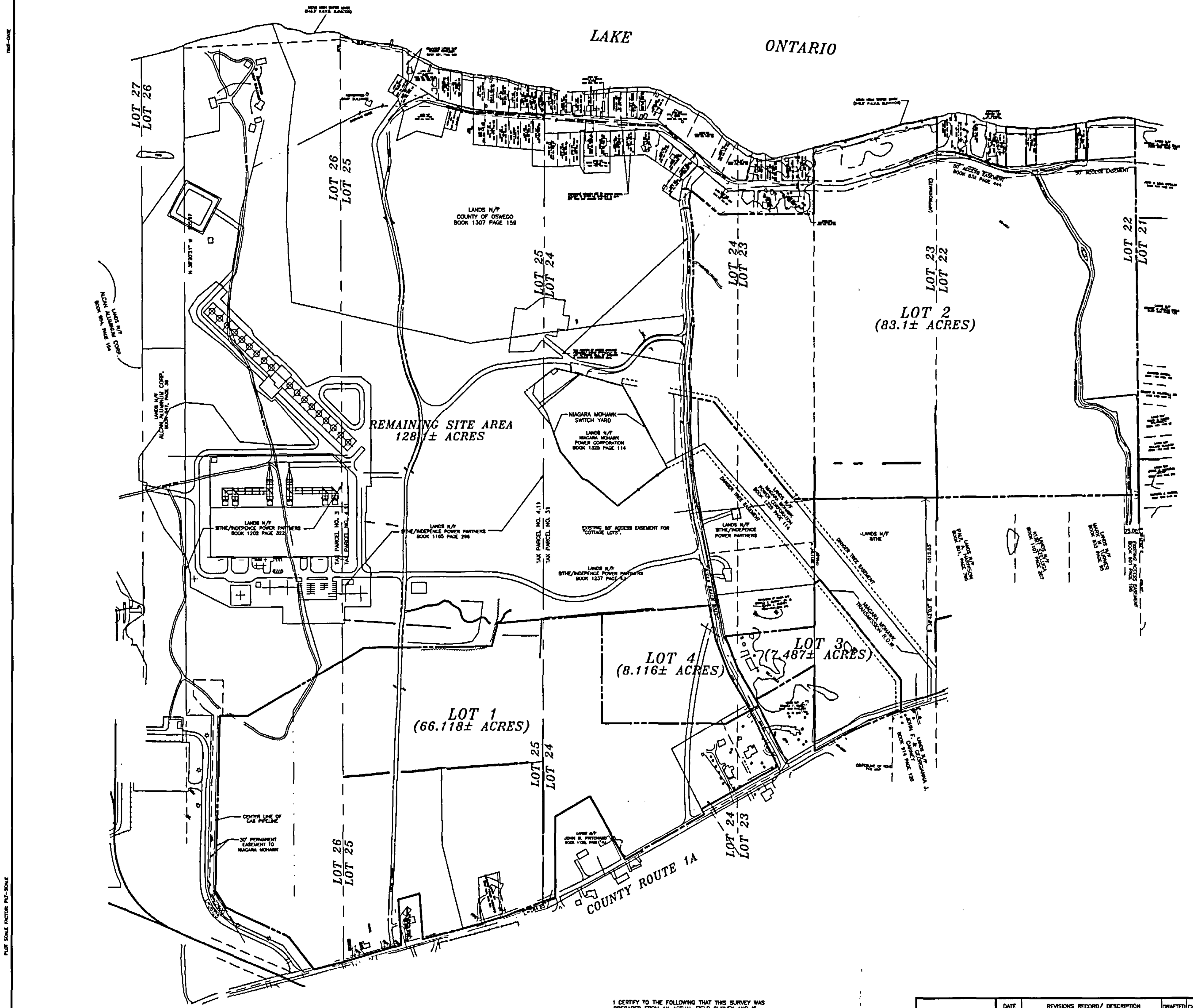
Bay Shore Grove is a small, local lakeside restaurant and catering service. It is located adjacent to the Lake Ontario shoreline about 1.5 miles east of the Project. The facility is used for clambakes, private parties, and weddings. Several picnic tables are available to customers.

The *Tamarack Golf Course* is a recently developed nine-hole public golfing facility located on the south side of Route 1A.

The Seaway Trail extends for 454 miles along Lake Erie, the Niagara River, Lake Ontario, and the St. Lawrence River. The route has been designated a National Recreational Trail by the National Park Service. The Seaway Trail passes about 2 miles south of the Project site. There are no designated scenic views in that area. The trail offers very limited recreational opportunities within the Project vicinity.

10.2.2 Zoning and Other Planned Land Use

The Project site is located in the Independence Industrial Energy Park (Figure 10-3), part of the expanded Oswego Economic Development Zone in the town of Scriba.



LEGEND

UNDERGROUND GAS LINE; UNDERGROUND WATER LINE; OVERHEAD WIRES; UNDERGROUND ELECTRIC; UNDERGROUND TELEPHONE; CATCH BASIN; GAS VALVE; DECIDUOUS TREE; CONIFEROUS TREE; SIGN; CHAINLINK FENCE; FIRE HYDRANT; WATERVALVE; UTILITY POLE; UTILITY POLE WITH LIGHT; GUY WIRE; SANITARY MANHOLE; DRAINAGE MANHOLE; MONUMENT; IRON PIPE FOUND; IRON ROD FOUND; CAPPED IRON ROD FOUND; CAPPED IRON ROD SET

MAP REFERENCE

1.) ALCAN PROPERTY MAP, PART OF LOT 26 HURLBUTT TRACT, TOWN OF SCRIBA, OSWEGO COUNTY, N.Y., 1"=100', SEPT. 17, 1979, BY JACK COTTRELL, PLS.

2.) BOUNDARY MAP, LANDS TO BE ACQUIRED BY LAKE VIEW, INC., PART OF LOTS 22, 23, 24, & 25, 18TH TOWNSHIP, SCRIBA'S PATENT, 1"=100', OCT. 19, 1980, BY PHILLIPS & ASSOCIATES SURVEYORS, PC.

3.) MAP OF SURVEY, PARCEL OF LAND, PART OF LOTS 23 & 24, 18th TOWNSHIP OF SCRIBA'S PATENT, TOWN OF SCRIBA, OSWEGO COUNTY, NEW YORK, 1"=100', 2-26-90, PREPARED BY RYAN SURVEY, SYRACUSE, N.Y.

REFERENCE NOTES

1.) PERIMETER PROPERTY LINE IS BASED ON AN ALTA/ASCM ON THE GROUND SURVEY PERFORMED BY C.T. MALE ASSOCIATES, PC. PLAN DATED AUGUST 4, 1995.

2.) COUNTY OF OSWEGO (BOOK 1307, PAGE 159) PARCEL SHOWN BASED ON THE DEED REFERENCE DECRIPTION.

3.) PLANIMETRIC FEATURES SHOWN ON SHEET 2 OF 2 OF THIS SUBDIVISION PLAN ARE TAKEN FROM THE ORIGINAL SITE PLANS FOR THE SITHE INDEPENDENCE POWER PARTNERS, L.P., PREPARED BY EBASCO SERVICES INCORPORATED DATED JUNE 1993 AND CONTROLLED AERIAL PHOTOGRAPHY OBTAINED DURING MARCH 1991 BY "TOPOGRAPHIC DATA CONSULTANTS".

4.) VEGETATED WETLAND FEATURES SHOWN ON SHEET 2 OF 2 OF THIS SUBDIVISION PLAN HAVE BEEN IDENTIFIED BY "TERESTRIAL ENVIRONMENTAL SCIENTISTS" AND FIELD LOCATED BY C.T. MALE FROM 1991 THROUGH 1993.

5.) NORTH ORIENTATION AND COORDINATE DATUM ARE BASED ON THE CENTRAL ZONE OF THE NEW YORK STATE PLANE COORDINATE GEOMETRY SYSTEM AS ESTABLISHED BY DIFFERENTIAL G.P.S. METHODS ORIGINATING FROM N.Y.S.D.O.T. REGION 3 G.P.S. MONUMENTS #15 &20.

6.) SURVEY PARCEL IS SUBJECT TO THE RIGHTS OF TEH PUBLIC IN COUNTY ROUTE 1A (REPUTED 49.5' RIGHT-OF-WAY).

7.) REFERENCE IS MADE TO TITLE REPORT # T-54-91-00291 (REV.1) AND ABSTRACT OF TITLE # A-54-91-00698 PREPARED BY TICOR TITLE GUARANTEE COMPANY.

8.) WETLAND OUTLINES (AREA 2-6, 8-11 & 13-38) SHOWN ON SHEET 2 OF 2 OF THIS SUBDIVISION PLAN HAVE BEEN IDENTIFIED BY "EARTH TECH" AND FIELD LOCATED BY C.T. MALE ON OCTOBER XX-XX, 1999 USING REAL-TIME DIFFERENTIAL CORRECTION GPS.

9.) THIS MAP WAS REVISED ON 10/18/99 TO SHOW WETLAND LOCATION PER NOTE #8. A FIELD EDIT OF EXISTING PLANIMETRIC AND TOPOGRAPHIC FEATURES WAS NOT PERFORMED.

I CERTIFY TO THE FOLLOWING THAT THIS SURVEY WAS PREPARED FROM AN ACTUAL FIELD SURVEY AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND HAS BEEN PREPARED IN ACCORDANCE WITH THE EXISTING CODE OF PRACTICE OF THE N.Y.S. ASSOCIATION OF PROFESSIONAL LAND SURVEYORS.

DAVID M. SLISKI PLS #050105 DATE

"ONLY COPIES OF THIS MAP SIGNED IN RED INK AND EMBOSSED WITH THE SEAL OF AN OFFICER OF C.T. MALE ASSOCIATES, P.C. OR A DESIGNATED REPRESENTATIVE SHALL BE CONSIDERED TO BE A VALID TRUE COPY."

DATE		REVISIONS RECORD/ DESCRIPTION	DRAFTED	CHECK	APPR.
26FEB97	1	ADD LOT 4	RCI		
9/3/99	2	WETLAND LOCATIONS	DMS		
10/18/99	3	WETLAND LOCATIONS	DMS		
	4				
	5				
	6				
	7				
	8				
	9				

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

PROJ. NO:
DESIGNED :
DRAFTED :
CHECKED :

Figure 10-3
Independence Industrial Energy Park

C.T. MALE ASSOCIATES, P.C.
300 GATEWAY PARK DRIVE, P.O. BOX 3248, SYRACUSE, NY 13220
(315) 458-6466 * FAX (315) 458-4427
ENGINEERING * LAND SURVEYING * BUILDING SYSTEMS
LAND PLANNING * ENVIRONMENTAL SERVICES * GPS/GIS

SCALE: SCALE
SHEET
DATE: DATE
DWG. NO:

Immediately adjacent uses include the Independence Station electric generating facility and the Alcan manufacturing plant. Outside of this area, adjacent uses are primarily rural residential in nature, as noted above.

No proposed development projects have been identified within a 2-mile radius by state, county or local officials or other sources that would influence or be influenced by the Project. The Oswego Wire Company has announced expansion plans, which will add 20 additional employees. Sithe Energies has continued to encourage recruitment of compatible businesses to the Independence Industrial Energy Park (described in greater detail in Section 12). Also, the county has plans for expansion and improvement of Route 1A; this is discussed in greater detail in Section 15. The town of Scriba has no zoning and, therefore, no defined land use zones. The boundaries of the Oswego Economic Development Zone that extend into Scriba and includes the Independence Industrial Energy Park, and the Project site, are identified in Figure 10-1.

10.3 Consistency with Local Laws

This section addresses Stipulation No. 5, Clause 6.

Local laws, regulations and policies that may potentially apply to the Project (outlined in Table 10-2) include the town of Scriba Site Plan Review Ordinance and the Oswego County Comprehensive Plan. The Town of Scriba Comprehensive Plan is still in development, but a draft version has nevertheless been reviewed and is discussed below. As discussed above, there is no existing or proposed zoning within the town of Scriba.

The Project will be consistent with all local land use requirements except for the town of Scriba Site Plan Review Ordinance Section 5.75, which would require removal of all structural materials from the site within 60 days of destruction, demolition or abandonment of the Project. The Project's sheer magnitude and complexity requires a longer demolition time limit and this particular requirement should not be applied by the Board. Local requirements, and the Project's compliance with them, are discussed in the sections below.

Table 10-2: Consistency with Local Laws

		Compliance Degree
Town of Scriba Site Plan Ordinance Sections (adopted September 27, 1999, as amended April 1999)		
1.40	Purpose	Full
1.90	Applicability	Full
2.20	Specific Definitions	Full
4.10	Parking Design Standards	Full
4.11	Parking Space Requirements	Full
4.12	Loading Areas	Full
4.13	Modification of Parking and Loading Requirements	Full
4.14	Ingress & Egress	Full
4.20	Signs	Full
4.26	Sign Setback (Amendment to Ordinance)	Full
4.30	Landscaping and Buffering	Full
4.40	Protection of Environment and Community	Full
4.50	Protection of Highway System	Full
5.10	General Standards	Full
5.55	Public Utility Facilities	Full
5.68	Location of Driveways	Full
5.70	Permit for Temporary Uses and Structures	Full
5.75	Abandonment of Construction Projects and Structures	Substantive
5.80	Height Exceptions	Full
5.98	Wetlands Map Overlay	Full
Town of Scriba Comprehensive Plan (Draft dated September 22, 1999)		
Page		
28-31	Infrastructure and Utilities; Power Generation and Transmission	Full
46-48	Economic Development; Opportunities and Constraints	Full
Oswego County Comprehensive Plan (March 13, 1997 version)		
V-11	3(b). Power Generation and Transmission	Full
V-17	2. Power Generation	Full
V-20	3. Power Generation	Full
IX-9	3. Natural Resources Based Development	Full
Appendix VIII-C:	Oswego County Waterfront Projects: Independence Park Nature Trails and Wildlife Observation Platform	Full

10.3.1 Town of Scriba Site Plan Review Ordinance Sections

1.40 – Purpose: The Applicant's Article X Application addresses town concerns regarding: orderly development (building in an existing industrial park); safe, efficient and orderly construction (development of a site plan and sequenced construction process); and attention to every element included in a typical site plan review (such as water supply, drainage, sewage, parking, screening, landscaping, protection of adjacent land uses, etc.).

1.90 – Applicability: The Project is a permitted industrial use to be located in an existing industrial park dedicated to such uses. The Article X process addresses the same types of issues that would otherwise be addressed by the Site Plan Review Ordinance.

2.20 – Specific Definitions – Development, Egress, Generally Accepted Standards, Industrial Use, Ingress, Land Use, Public Access Road, Public Utility Facility, Private Road, Public Road, Yard: The Article X Application's usage of these terms is consistent with the definitions contained within the Ordinance.

4.10, 4.11 and 4.12 – Parking Design Standards, Parking Space Requirements and Loading Areas: The Project will incorporate a parking design which will be consistent with the Ordinance's goals and purposes, and with accepted industry planning practices for such land uses.

4.13 – Modification of Parking and Loading Requirements: It is expected that the Project's design will be consistent with the Ordinance's parking and loading requirements. In the event a specific dimensional or configurational requirement proves infeasible, the Applicant will provide an explanation and proposed alternative improvements as required by the Ordinance within the context of the Article X process.

4.14 – Ingress & Egress: Designs for the Project will comply with this section.

4.20 – Signs: In the event new signage is necessary for the Project, it will comply with the positional and dimensional requirements of this section.

4.26 – Sign Setback (Amendment to Ordinance): In the event new signage is necessary for the Project, it will comply with the goals and purposes of this section with regard to off-site properties. Because the Project will be located in an existing industrial park reserved for such uses and will be sited within a 190-acre site upon land leased from the owners of the adjacent Independence Station, typical setback requirements will not be applicable in this isolated instance. Adjacent property owners will still enjoy the protections afforded by this section, and the Project is consistent with local laws in that regard.

4.30 – Landscaping and Buffering: Landscaping will generally follow the requirements of this section. Where the Project adjoins the existing Independence Station, landscaping will be designed so as to achieve a complementary effect between the two facilities. Buffering is not an issue because the entire property will continue to be owned by Sithe Independence Power Partners, with the Project's owners maintaining a leasehold interest only on portions of the 190-acre site. The Project will be located within an industrial park dedicated to such uses and isolated from surrounding properties by open land and wooded areas.

4.40 – Protection of Environment and Community: Section 17.6 of the Application contains an analysis of the nature and degree of any wetlands impacts associated with the Project together with a description of measures designed to mitigate those impacts in a manner consistent with the goals and policies reflected in Section 4.40. Lighting for the Project area will similarly be designed in a manner compatible with and complementary to town goals and policies, as discussed in Section 16.

4.50 – Protection of Highway System: Setbacks from arterial roads and major collector roads will be met in accordance with the requirements of this section.

5-10 – General Standards: The specific review components included within this section are addressed in detail throughout the Application. In summary, the Project is expected to be consistent with each of these components.

5.55 – Public Utility Facilities: This portion of the Ordinance includes fencing and landscaped setback requirements to improve the safety, security and appearance of a given facility for on-site workers, visitors and adjacent land users. In this particular case, the design of fencing, landscaping and setbacks for the Project takes into account the Applicant's leasehold relationship with Sithe, the Project's location in a well-buffered industrial park and the similar purpose and function of the adjacent Independence Station in such a way as to ensure consistency with local requirements.

Setbacks typically imposed for protection of adjoining landowners are not at issue where one landlord (Sithe) controls the underlying property; both setbacks and fencing are not at issue where an industrial park with extensive built-in buffers has been dedicated for similar adjacent uses. For this Project, structures and features will be placed so as to take advantage of these particular features, and they will be fenced individually or in groups as necessary to promote safety, security and visual attractiveness. Accordingly, the Project will be fully consistent with this section.

Surrounding property is shielded from the Project site by the extensive wooded and open area buffers within the industrial park, so equipment will be well-shielded from view. Nevertheless, low profile equipment will be incorporated into the Project's operations where it is practical and appropriate to do so, consistent with this section's intent.

5.68 – Location of Driveways: Planning of driveway access to the Project must take into account the adjacent utility use and existing traffic patterns to the general site. Driveways will be built to sustain the expected traffic burden, and are expected to be consistent with town highway specifications to the extent that they will be no less protective of emergency access, traffic safety, convenience and ease of flow. There are no plans to dedicate these driveways to the town.

5.70 – Permit for Temporary Uses and Structures: Construction of the Project will entail usage of temporary structures such as trailers, storage containers, etc. Such usage will be consistent with accepted construction industry practices and will address the substantive intent of this section of the Ordinance. To the extent a permit would be required out of consideration for the effects (aesthetic and otherwise) of these temporary structures upon adjacent properties, the location of the Project within an industrial park with significant buffer areas will eliminate those effects.

5.75 – Abandonment of Construction Projects and Structures: Section 10.5 of the Application contains a plan for decommissioning or halting of the Project. The only inconsistency with the Ordinance involves the Ordinance's 60-day time limit for restoration of the site, which, in view of existing technology, is too short a period given the scope and magnitude of improvements associated with this Project. Pursuant to PSL §168(2)(d), the Applicant requests that the Siting Board determine that the provision is unreasonably restrictive in view of the Project's complexity and not apply it to the Project.

5.80 – Height Exceptions: Sithe is in compliance with this exception. Notwithstanding Subsection (A)'s express exception of "essential public utility structures" from any height restrictions otherwise imposed by the Ordinance, Section 16 of this Application contains a Visual Analysis which focuses on identification and mitigation of any visual impacts associated with placement of structures deemed essential to the Project.

5.98 – Wetlands Map Overlay: Section 17.6 of this Application contains an analysis of any potential wetlands impacts from the Project. Appropriate jurisdictional and permitting issues are addressed and mitigation is incorporated into the Project as necessary.

10.3.2 Draft Town of Scriba Comprehensive Plan Sections

Pages 28-31: Infrastructure and Utilities; Power Generation and Transmission: The town's draft Comprehensive Plan explicitly recognizes the importance of the power industry to the town's continued economic vitality. Integration of the Project into the town's land use plans is consistent with the town's stated interests in this regard. Town concerns regarding the extension of water supplies to new land uses are not applicable to this Project because an existing supply line will service the Project.

Pages 46-48: Economic Development; Opportunities and Constraints: The Project is directly referenced within this section of the town's draft Comprehensive Plan as a positive example of the town's ability to attract new business and the town's continued status as an industrial base within the county.

10.3.3 Oswego County Comprehensive Plan Sections

Page V-11: 3(b). Power Generation and Transmission: Existing cogeneration facilities in the county are listed, including the Independence Station located on the same site as the Project.

Page V-17: 2. Power Generation: The rise of competition among power generators in the wake of deregulation is discussed in general terms.

Page V-20: 3. Power Generation: The county seeks to encourage a stable environment for the power industry to enable it to remain an important part of the county economy. The Project is consistent with the realization of the county's goal to the extent that it represents expansive and efficient utilization of the county's abundant natural resources.

Page IX-9: 3. Natural Resources Based Development: Sithe's Independence Station cogeneration use is included as a positive example of a "special opportunity" to utilize the county's significant water resources.

Appendix VIII-C: Oswego County Waterfront Projects: Independence Park Nature Trails and Wildlife Observation Platform, developed as part of the mitigation effort for the Independence Station facility and its associated gas, water, and electric infrastructure, is cited as an example of a positive waterfront project within the county.

10.4 Compatibility Analysis

This Section addresses Stipulation No. 5, Clauses 1(d-e) and 5.

10.4.1 Land Use Compatibility

The Project is readily compatible with existing land uses within the 2-mile radius study area, as well as the broader region. As a proposed tenant of the Independence Industrial Energy Park, it represents not only an industrial use, but a similar use as that of an existing tenant, Independence Station. Within the Scriba/Oswego community, it represents one of several energy-related uses.

The Project is consistent and compatible with local and regional land use plans in the following fashion:

1. The Project is sited in a locally-targeted economic development zone, the expanded Oswego Economic Development Zone in the town of Scriba, within the Independence Industrial Energy Park.

2. Also within the Infrastructure and Utilities component of the *Town of Scriba Comprehensive Plan*, there is a separate section entitled "Power Industry." The

text of this section states that "the power industry is important to the town of Scriba. This industry is a significant part of the economy." The Project will provide a measure of stability in what is characterized in the Comprehensive Plan as an " industry ... in a state of flux."

3. The Project is specifically identified in the Economic Development component of the *Town of Scriba Comprehensive Plan* as an economic development opportunity. The Project is consistent with Objective 5 of that section, which is to "Target economic development opportunities based on linkages to current industries and resources," and to "Encourage economic development opportunities associated with changes in the power industry."

4. The Oswego County Comprehensive Plan (Volume 1, March 1997) includes an Economic Development component with a "Goals, Objectives and Strategies" element. Objective 8, "Target economic development opportunities based on linkages to current industries and resources," includes two strategies which are advanced by the Project: strategy c), "target industrial development opportunities which can utilize our plentiful water resources," and strategy d), "Target economic development opportunities associated with changes in the power industry."

None of the Project components are anticipated to extend off-site. Therefore, the Project is able to provide for continued industrial development within an area planned for such growth without intrusion into other locations within the community.

10.4.2 Coastal Zone Consistency

The Project is located within the coastal zone. Projects located in such areas are required to demonstrate consistency with 44 policies established to achieve New York State objectives for coastal development. A completed Federal Consistency Assessment Form is provided as Appendix N. The following discussion reviews the Project's consistency with the New York State Waterfront Revitalization and Coastal Resources Act (NYWRCRA).

No other coastal or waterfront regulations or policies at the local, state or federal level are applicable to the Project. The Saint Lawrence – Eastern Ontario Commission was abolished by the New York State Legislature in 1995, and while its unfinished business, assets and liabilities were transferred to the Tug Hill Commission, that Commission's jurisdiction does not include the town of Scriba. Neither the town of Scriba nor the county of Oswego have adopted Local Waterfront Revitalization Plans, and the jurisdiction of the city of Oswego's Plan is confined to the city limits (which are more than 3 miles from the Project). The Project peak water demand is no more than 4.9 million gallons of Lake Ontario water per day, so it will not trigger the Great Lakes Initiative's notice and consultation threshold for diversionary or consumptive water use.

Public access along the Lake Ontario shoreline in the immediate vicinity of the Project will be preserved by virtue of the continued presence of Independence Park, which fronts the industrial park along the lake's shore. Independence Park incorporates a lakeshore nature preserve with parking access, nature trails and a wildlife observation platform. It was developed by Sithe as part of a NYSDEC mitigation plan and dedicated to Oswego County for use as a public park in 1995. The Project has been designed to fit within the current boundaries of the industrial park and take advantage of a narrow existing lake accessway, which will neither interfere with nor encroach upon the public's utilization of Independence Park and consequent access to the Lake Ontario shoreline.

In regard to the coastal area and the applicability of the NYWRCRA, Executive Law Article 42 provides the following policy statement:

> *Declaration of policy. It is hereby declared to be the public policy of the state of New York within the coastal areas and inland waterways:*
>
> 1. *To achieve a balance between economic development and preservation that will permit the beneficial use of coastal and inland waterway resources while preventing the loss of living marine resources and wildlife, diminution of open space areas or public access to the waterfront, shoreline erosion, impairment of scenic beauty, or permanent adverse changes to ecological systems.*
>
> 2. *To encourage the development and use of existing ports and small harbors including use and maintenance of viable existing infrastructures, and to reinforce their role as valuable components within the state's transportation and industrial network.*
>
> 3. *To conserve, protect and where appropriate promote commercial and recreational use of fish and wildlife resources and to conserve and protect fish and wildlife habitats identified by the department of environmental conservation as critical to the maintenance or re-establishment of species of fish or wildlife. Such protection shall include mitigation of the potential impact from adjacent land use or development.*
>
> 4. *To encourage and facilitate public access for recreational purposes.*

5. *To minimize damage to natural resources and property from flooding and erosion, including proper location of new land development, protection of beaches, dunes, barrier islands, bluffs and other critical coastal and inland waterway features and use of non-structural measures, whenever possible.*

6. *To encourage the restoration and revitalization of natural and man-made resources.*

7. *To encourage the location of land development in areas where infrastructure and public services are adequate.*

8. *To conserve and protect agricultural lands as valued natural and ecological resources which provide for open spaces, clean air sheds and aesthetic value as well as for agricultural use.*

9. *To assure consistency of state actions and, where appropriate, federal actions, with policies within the coastal area and inland waterways, and with accepted waterfront revitalization programs within the area defined by such programs.*

10. *To cooperate and coordinate with other states, the federal government and Canada to attain a consistent policy towards coastal and inland waterway management.*

11. *To encourage and assist local governments in the coastal area and inland waterways to use all their powers that can be applied to achieve these objectives.*

To achieve the goals set forth in the above statement, development projects within the coastal resources area must address compliance with 44 separate policies identified in the NYWRCRA. Those policies, and Project-specific responses regarding applicability and compliance, are provided in the following sections.

10.4.2.1 Development Policies

Policy 1 – Restore, revitalize, and redevelop deteriorated and underutilized waterfront areas for commercial, industrial, cultural, recreational, and other compatible uses. The Project is not sited in a redevelopment area, although it is located in a targeted economic development zone. The Project is fully compatible with the other industrial land uses in its immediate surroundings, and represents a unique opportunity to enhance the industrial tax base with minimal impact to waterfront areas and other environmental and community issues. Note that only a very small portion of the property actually extends along the Lake Ontario shoreline itself (see Figure 3-4).

Policy 2 – Facilitate the siting of water-dependent uses and facilities on or adjacent to coastal waters. The Project will require up to 4.9 mgd of water under normal operation for cooling and process steam generation. Lake Ontario (via the city of Oswego intake and treatment facility and the town of Scriba Consolidated Water District) will provide that water supply. Discharge of treated wastewater will also be to Lake Ontario, via the existing outfall structure in use for Independence Station. Because the site is already developed for power generation uses, the Project represents a compatible and consistent site use with that previously certified.

Policy 3 – Further develop the state's major ports of Albany, Buffalo, New York, Ogdensburg, and Oswego as centers of commerce and industry, and encourage the siting, in these port areas, including those under the jurisdiction of state public authorities, of land use and development which is essential to, or in support of the waterborne transportation of cargo and people. The Project is not directly within the port of Oswego, nor is its use essential to or in support of waterborne transportation of cargo and people. The Project does not, however, interfere with the state's ability to implement this policy.

Policy 4 – Strengthen the economic base of smaller harbor areas by encouraging the development and enhancement of those traditional uses and activities which have provided such areas with their unique maritime identity. The Project is not located within a small harbor area. However, the Project does not interfere with the state's ability to implement this policy.

Policy 5 – Encourage the location of development in areas where public services and facilities essential to such development are adequate. The Project is located in a targeted economic development zone chosen for its ability to provide essential services to industrial users. The siting of the Project in the Independence Industrial Energy Park within the extended Oswego Economic Development Zone further assists the community by providing jobs and development necessary to satisfy the conditions of a grant which will fund the extension of additional infrastructure services. None of those additional infrastructure services, however, are needed by the Project. The Project's needs in terms of natural gas, electrical tie-in, water and wastewater can all be met through on-site interconnects. The necessary public services are, therefore, not only available, but are available without the need for off-site interconnections and their associated environmental and community impacts.

Policy 6 – Expedite permit procedures in order to facilitate the siting of development activities at suitable locations. The analysis of anticipated Project operational impacts is expected to result in a determination of consistency with the state's coastal policies by the New York State Department of State (NYSDOS). This determination will contribute to the expeditious issuance of a Certificate under the Article X process. The Article X process itself is designed to expediently balance all environmental and community issues towards the same goal articulated in this policy.

10.4.2.2 Wildlife Policies

Policy 7 – Significant coastal fish and wildlife habitats will be protected, preserved, and where practical, restored so as to maintain their viability as habitats. Use of water via existing intake and discharge structures, and compliance with wastewater discharge standards will minimize impacts to fish habitats. Similarly, location of Project components on previously disturbed site areas and immediately adjacent to existing industrial buildings will minimize impacts to wildlife habitats.

Policy 8 – Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bio-accumulate in the food chain or which cause significant sublethal or lethal effect on those resources. All Project-related wastewaters will be treated prior to collection in the wastewater holding pond. Discharge will be of sufficient quality so as to meet New Source Performance Standards and state water quality standards. Waste materials such as oil and grease that cannot be discharged into Lake Ontario will be collected for removal and off-site disposal by a licensed contractor.

Policy 9 – Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources. The potential recreational use of wildlife resources, in terms of passive enjoyment, has increased as a result of the dedication of Independence Park nature area to Oswego County. Independence Park provides 50 acres of land, with walking trails and an observation platform, set aside for public use and enjoyment. All of the Project's facilities will be located within the Independence Station site. Donation of Independence Park, in addition to other donations to recreational resource improvement, was considered to be mitigation for the development of Independence Station and its associated gas, water and electric infrastructure.

Policy 10 – Further develop commercial finfish, shellfish, and crustacean resources in the coastal area by encouraging the construction of new, or improvement of existing, on-shore commercial fishing facilities, increasing marketing of the state's seafood products, maintaining adequate stocks, and expanding aquaculture facilities. Neither the construction nor the operation of Project will result in an increase or decrease of commercial fishing industry development of any kind. The Project does not interfere with the state's ability to implement this policy.

10.4.2.3 Flooding and Erosion Hazards Policies

Policy 11 – Buildings and other structures will be sited in the coastal area so as to minimize damage to property and the endangering of human lives caused by

flooding and erosion. According to the Coastal Erosion Hazard Map (NYSDEC Coastal Erosion Management Program 1988), the Project site is not located within a coastal erosion hazard area. Most Project structures will be constructed at least 1,200 feet inland. The existing rocky beaches and the protective wooded shoreline will remain undisturbed by Project construction and operation.

Policy 12 – Activities or development in the coastal area will be undertaken so as to minimize damage to natural resources and property from flooding and erosion by protecting natural protective features including beaches, dunes, barrier islands and bluffs. No dunes, barrier islands or bluffs occur on-site or near the site. Appropriate erosion control measures will be employed as necessary to minimize shoreline erosion. The existing rocky beaches and the protective wooded shoreline will remain undisturbed by Project construction and operation.

Policy 13 – The construction or reconstruction of erosion protection structures shall be undertaken only if they have a reasonable probability of controlling erosion for at least 30 years as demonstrated in design and construction standards and/or assured maintenance or replacement programs. The Project does not envision the construction or reconstruction of any erosion protection structures; as such, this policy does not apply.

Policy 14 – Activities and development, including the construction or reconstruction of erosion protection structures, shall be undertaken so that there will be no measurable increase in erosion or flooding at the site of such activities or development, or at other locations. The Project will not appreciably increase erosion or flooding at the site or at other locations. None of the Project will be located within the mapped 100-year floodplain. Only the northern edge of the property boundary adjacent to Lake Ontario is included in the FEMA-mapped 100-year floodplain (as further discussed in Section 17); the remainder of the site is mapped as Zone C, an area of minimal flooding potential.

Erosion potential will be controlled during Project construction through the use of Best Management Practices such as silt fencing, to ensure that the work areas are controlled and that erosion and sedimentation potential is minimized to the extent possible. Following construction, all surfaces will be graded and stabilized as appropriate to eliminate the potential for erosion and sedimentation. Stormwater runoff from the site will be controlled during both construction and operation utilizing the existing on-site detention basin. The design will ensure that the increase in impervious surface on the site will not change peak rates of runoff over current discharge conditions, further ensuring no flooding to downstream areas.

Policy 15 – Mining, excavation or dredging in coastal waters shall not significantly interfere with the natural coastal processes which supply beach materials to land adjacent to such waters and shall be undertaken in a manner

which will not cause an increase in erosion of such land. There will be no mining, excavation or dredging in coastal waters associated with the Project. This policy, therefore, does not apply.

Policy 16 – Public funds shall only be used for erosion protective structures where necessary to protect human life, and new development which requires a location within or adjacent to an erosion hazard area to be able to function, or existing development; and only where the public benefits outweigh the long-term monetary and other costs including the potential for increasing erosion and adverse effects on natural protective features. There will be no public funds used for erosion protective structures nor for the Project.

Policy 17 – Non-structural measures to minimize damage to natural resources and property from flooding and erosion shall be used whenever possible. As discussed in response to Policy 14, the Project will not involve any structural shoreline activities to prevent flooding and erosion potential. Rather, the Project has been located outside of flood hazard areas, and the stormwater management system has been designed to accommodate site drainage and prevent downstream flooding. Erosion control measures will also be inherent in the Project activities, with physical means utilized during construction and appropriate grading and stabilization utilized during Project operation to ensure erosion and sedimentation potential is minimized.

10.4.2.4 General Policy

Policy 18 – To safeguard the vital economic, social and environmental interests of the state and of its citizens, proposed major actions in the coastal area must give full consideration to those interests, and to the safeguards which the state has established to protect valuable coastal resource areas. The Project is committed to providing environmentally sound development that provides economic and social benefits to the state of New York and its citizens. Significant economic benefits from payment in lieu of taxes and additional jobs will result from Project construction and operation. These benefits will not occur at the expense of valuable Lake Ontario waters or its resources. The Project will not affect Lake Ontario water levels and flows, nor will it result in shoreline alterations. The appropriate measures will be implemented to ensure that impacts to environmental resources are minimized.

10.4.2.5 Public Access Policies

Policy 19 – Protect, maintain, and increase the level and types of access to public water-related recreation resources and facilities. There is no public access to the waterfront available at the Project site. The Independence Park nature trails and wildlife observation platform, located between the Project and Lake Ontario, provides passive recreation and direct views to Lake Ontario. The Project will not pose any new limitations on possible future public access to the waterfront.

Policy 20 – Access to the publicly-owned foreshore and to lands immediately adjacent to the foreshore or the water's edge that are publicly-owned shall be provided and it shall be provided in a manner compatible with adjoining uses. The property provided for the Independence Park Nature Trails and Observation Platform has been transferred from Sithe to Oswego County. This donated recreational land provides publicly owned access to areas near to and with views of Lake Ontario. The Project benefits from this donation as a use contained totally within the original Independence Station property.

10.4.2.6 Recreation Policies

Policy 21 – Water-dependent and water-enhanced recreation will be encouraged and facilitated, and will be given priority over non-water-related uses along the coast. The Project is an industrial use within a targeted industrial park area, contained within the Oswego County Economic Development Zone. The Independence Park nature trails and wildlife observation platform provides a water-enhanced recreation area that can be associated with the entire Independence Industrial Energy Park. The Project's frontage along Lake Ontario is limited to approximately 450 linear feet, the location of an existing holding pond and outfall structure. The Project will not change the use of this area.

Policy 22 – Development, when located adjacent to the shore, will provide for water-related recreation, whenever such use is compatible with reasonably anticipated demand for such activities, and is compatible with the primary purpose of the development. The Project is an industrial use within a targeted industrial park area, contained within the Oswego County Economic Development Zone. Independence Park provides for a water-enhanced recreation area that is associated with the entire Independence Industrial Energy Park site.

10.4.2.7 Historic and Scenic Resources Policies

Policy 23 – Protect, enhance and restore structures, districts, areas or sites that are of significance in the history, architecture, archaeology or culture of the state, its communities, or the nation. The Project is entirely within the property analyzed as part of a Phase 1A archaeological assessment for the Independence Station Project. This analysis, verified by the OPRHP, determined that there were no archaeological or historic sites of significance on the property. Correspondence has been received from the OPRHP (Appendix I) confirming that no known additional on-site investigation is warranted, and that no cultural resources will be directly affected as a result of the Project.

Policy 24 – Prevent impairment of scenic resources of statewide significance. According to correspondence provided as part of the original Independence Station Project, from the New York Department of State Coastal Resources and Waterfront Revitalization Program, no scenic resources of statewide significance occur on-site or on Lake Ontario or other locations in the vicinity of the Project.

Policy 25 – Protect, restore or enhance natural and man-made resources which are not identified as being of statewide significance, but which contribute to the overall scenic quality of the coastal area. Within the context of the surrounding coastal area, the addition of Project-related structures will not reduce the scenic quality of the area, nor will the structures reduce or obstruct any scenic views. Industrial structures associated with power plants in the city of Oswego, the Alcan facility, and the Nine Mile Point Nuclear Power Station are prominent visible features existing along the Lake Ontario shoreline. A detailed discussion with regard to the Project's visibility is included in Section 16.

10.4.2.8 Agricultural Lands Policy

Policy 26 – Conserve and protect agricultural lands in the state's coastal area. Less than 10 acres of state-important agricultural soils will be affected as part of the Project. None of these soils are in active agricultural use. Disturbed soils will be stockpiled and reused in on-site landscaping.

10.4.2.9 Energy and Ice Management Policies

Policy 27 – Decisions on the siting and construction of major energy facilities in the coastal area will be based on public energy needs, compatibility of such facilities with the environment, and the facility's need for a shorefront location. The Project will provide an economical and reliable source of energy for the state of New York. The Project is consistent with goals and strategies of the SEP, and with local and regional goals to stabilize the contribution of energy-related uses to the local and regional economies. The Project will be designed to minimize impacts to wetlands, terrestrial ecosystems, cultural resources, aquatic ecosystems, aesthetics and other important resources.

Because of the Project water needs, it is necessary that it be located near a reliable water source. Considering the economic development goals of the Scriba and Oswego area and the availability of water from the city of Oswego, the Project site is an appropriate location for Heritage Station.

Policy 28 – Ice management practices shall not interfere with the production of hydroelectric power, damage significant fish and wildlife and their habitats, or

increase shoreline erosion or flooding. No ice management practices are proposed by the Project. Wastewater will be discharged through an existing outfall structure from Independence Station.

Policy 29 – Encourage the development of energy resources on the outer continental shelf, in Lake Erie and in other water bodies, and ensure the environmental safety of such activities. The Project is an energy use utilizing the available water supply resources of Lake Ontario. The Project will be designed to minimize impacts to wetlands, terrestrial ecosystems, cultural resources, aquatic ecosystems, aesthetics and other important resources.

10.4.2.10 Water and Air Resources Policies

Policy 30 – Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to state and national water quality standards. All plant wastewaters will be treated prior to collection in the wastewater holding pond. Discharge from the pond will be of sufficient quality so as to meet New Source Performance Standards and state water quality standards. Project discharge will comply with the conditions of a SPDES permit.

Policy 31 – State coastal area policies and management objectives of approved local waterfront revitalization programs will be considered while reviewing coastal water classifications and while modifying water quality standards; however, those waters already overburdened with contaminants will be recognized as being a development constraint. The Project is not sited within an area possessing a Local Waterfront Revitalization Plan. Furthermore, effluent discharges from the Project will meet New Source Performance Standards and state water quality standards and will be subject to the conditions of a SPDES permit. No change in water quality standards will be requested as a part of the Project.

Policy 32 – Encourage the use of alternative or innovative sanitary waste systems in small communities where the costs of conventional facilities are unreasonably high, given the size of the existing tax base of these communities. The Project will tie in to the existing Independence Station on-site package treatment system for sanitary waste produced on-site. The operation of the Project will not require the expansion or modification of public sanitary waste treatment systems. The Project does assist the community by providing jobs and development necessary to satisfy the conditions of a grant that will fund the extension of sewers along Route 1A in the vicinity of the site at some point in the future.

Policy 33 – Best management practices will be used to ensure the control of stormwater runoff and combined sewer overflows draining into coastal waters. Appropriate stormwater management practices will be employed to ensure the protection of the coastal environment and to ensure that the quantity and quality of stormwater runoff from the project will not adversely affect the Lake Ontario coastal area. The runoff collection basin, drains and piping systems will be sized in accordance with all applicable New York rules and regulations.

Policy 34 – Discharge of waste materials into coastal waters from vessels subject to state jurisdiction will be limited so as to protect significant fish and wildlife habitats, recreational areas and water supply areas. There will be no waterborne vessels associated with the Project.

Policy 35 – Dredging and dredge spoil disposal in coastal waters will be undertaken in a manner that meets existing state dredging permit requirements, and protects significant fish and wildlife habitats, scenic resources, natural protective features, important agricultural lands, and wetlands. There will be no dredging associated with the Project.

Policy 36 – Activities related to the shipment and storage of petroleum and other hazardous materials will be conducted in a manner that will prevent or at least minimize spills into coastal waters; all practicable efforts will be undertaken to expedite the cleanup of such discharges; and restitution for damages will be required when these spills occur. No waterborne shipment of such products is proposed for the operation of the Project. The Project will be fired by natural gas as the sole fuel; therefore, the storage of large quantities of oil on-site will not be necessary. Other materials, such as aqueous ammonia and water treatment chemicals, will be stored safely on-site. Appropriate containment measures will be utilized, and training will be conducted to ensure that staff are equipped to respond to unforeseen events. These measures will minimize the risk of any spills with potential to influence coastal waters.

Policy 37 – Best management practices will be utilized to minimize the non-point discharge of excess nutrients, organics and eroded soils into coastal waters. Erosion will be controlled by minimizing the areas of disturbance, minimizing slopes on cut and fill areas, limiting the slope of drainage ditches, providing erosion stops (haybales, timbers, etc.), and revegetating disturbed areas as soon as practical. Sedimentation will be localized and controlled by the use of proper erosion control methods such as sedimentation basins, where appropriate.

Because all erosion control measures implemented will conform to applicable state rules and regulations, nonpoint discharges will be minimized and are not expected to adversely affect water quality in Lake Ontario.

Policy 38 – The quality and quantity of surface water and groundwater supplies will be conserved and protected particularly where such waters constitute the primary or sole source of water supply. The Project will not use groundwater as a water source. Water for the Project is planned to be purchased from the city of Oswego. The process design employs recycling and reuse of water so as to maximize the efficient use of this valuable natural resource. Groundwater quality will be protected from potential indirect impacts through the use of appropriate chemical containment and procedures. This will reduce the risk of contaminants entering into groundwater through accidental spills. The Project has been carefully designed to minimize encroachment on wetland areas. Surface water impacts will be minimized by keeping wetlands impacts to the minimum necessary and directing stormwater runoff to a stormwater detention pond. Unavoidable wetlands encroachment will be mitigated through on-site wetland replication and/or appropriate off-site measures approved by the NYSDEC and DPS.

Policy 39 – The transport, storage, treatment and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner so as to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural land, and scenic resources. Chemicals required for the Project will be transported, stored and used in a manner that is consistent with state criteria, providing safe containment. Because the Project will utilize only natural gas as fuel, no large volumes of oil will be stored on-site.

Policy 40 – Effluent discharged from major steam electric generating and industrial facilities into coastal waters will not be unduly injurious to fish and wildlife and shall conform to state water quality standards. Effluent from the project will meet New Source Performance Standards and the conditions of the SPDES permit, thereby meeting state water quality standards and avoiding undue effects to fish and wildlife.

Policy 41 – Land use or development in the coastal area will not cause national or state air quality standards to be violated. The Project will utilize clean-burning natural gas as its only fuel. With this fuel and GE's state-of-the-art H technology, the Project will represent an extremely clean and efficient means of generating electricity for New York State. Modeling analyses have been completed that demonstrate Project impacts not only comply with NAAQS, but are below SIL thresholds that are only a small fraction of the NAAQS. The NAAQS have been established to be protective of public health for the most sensitive members of our population, the elderly, emphysemics and asthmatics. With impacts lower than the SILs, Project impacts can be considered extremely low.

Policy 42 – Coastal management policies will be considered if the state reclassifies land areas pursuant to the prevention of significant deterioration regulations of the federal clean air act. Air quality impacts resulting from the Project will not be significant and will not require reclassification of land areas pursuant to the PSD regulations.

Policy 43 – Land use or development in the coastal area must not cause the generation of significant amounts of acid rain precursors: nitrates and sulfates. Because the Project will utilize natural gas only, as well as state-of-the-art combustion technology, emissions have been minimized. However, the Project is considered to be a major source of nitrogen oxides, an acid rain precursor. For this reason, the Project has incorporated Lowest Achievable Emission Rate technology for nitrogen oxides, and will be purchasing "offsets" that will ensure that the Project's emissions will be more than offset by other reductions of this emission parameter in the region.

Policy 44 – Preserve and protect tidal and freshwater wetlands and preserve the benefits derived from these areas. The Project has been carefully designed to minimize encroachment on wetland areas. Unavoidable wetlands encroachment, discussed in Section 17, will be mitigated through on-site wetland replication and/or appropriate off-site measures approved by the NYSDEC and DPS.

10.5 Financial Resources for Restoration of Disturbed Areas and Decomissioning

This section addresses Stipulation No. 5, Clause 2.

Although the town of Scriba has no final comprehensive plan and no zoning in place, its draft comprehensive plan has designated a large parcel of property along Lake Ontario as appropriate for a variety of present and future industrial uses, including the Project. Known as the Independence Industrial Energy Park, the property includes the Project site, the existing Independence Station cogeneration facility, and additional space for future industrial users. Given the town's declared intention to use and re-use this property for industrial purposes, and the support of the local community for power generation projects, it may be beneficial for certain structures associated with the Project to remain in place rather than be automatically removed in the event the Project is discontinued or decommissioned. The potential reuse of a structure with little or no reconditioning required would enhance the town's efforts to attract future industrial users and could conserve virgin property for some later use. At the appropriate time, the Applicant will solicit offers for the property that will maximize its value.

In light of these circumstances that are unique to this Project site, the criteria for "restoration" will vary depending upon two possible scenarios:

Scenario A: Project construction is begun but never completed. Individual structures may or may not yet be erected depending upon the stage of construction reached. Specialized features such as the holding pond or cooling tower array may be of little use to other industries, while the main building and associated roads and other improvements could be utilized by future industrial users. "Restoration" in this case may involve filling or removal of specialized features, removal of equipment, and retention of the main building and associated improvements.

Scenario B: The Project is constructed, operated and decommissioned at a later date. "Restoration" would include the filling or removal of specialized features and equipment and retention of buildings and structures useful to a new property owner.

An estimate of the potential decommissioning costs under this worst case (approximately $2.4 million for Scenario B) is presented in Table 10-3 below. The decommissioning costs under Scenario A will be less than that under Scenario B. The estimate below assumes dismantling and removing all equipment and aboveground structures that would not be useful to a new industrial property owner. Items such as fire protection water loop piping, on-site roadways, and buildings would remain intact for future use. The estimate assumes salvaging metals and other recyclable materials at current published market estimates.

As indicated in Section 1, Heritage Station will be developed, owned and operated by Heritage Power LLC, a joint undertaking of affiliates of Sithe and GE. Sithe is one of the largest independent power producers in the United States and among the five largest in the world, owning and operating over 11,000 MW of electric generation. GE Power Systems is a $9.5 billion unit of GE. GE Power Systems also has a very strong incentive to complete and begin operation of the Project in order to launch, showcase and market the 7H technology.

Accordingly, prior to the commencement of construction, the Applicant will post a corporate guarantee, bond or other financial instrument in the amount of $2.4 million to cover decommissioning costs in the event construction is not completed. Upon the commencement of commercial operation of the Project, this security will be terminated and a new security fund will be created to cover the cost of decommissioning, dismantling, closing or reusing the facility when it has reached the end of its service life or if the plant permanently discontinues operation. The full amount of the security fund will be available before decommissioning takes place. The Applicant will contribute $75,000 per year for 30 years to an interest bearing, insured account, an amount that will meet the cost estimates contained in Table 10-3.

Table 10-3: Estimated Decommissioning Costs

Scenario B The Project is constructed, operated and decommissioned at a later date.		
		Costs ($000s)
1	Equipment within Buildings	$1,384
2	Cooling Towers and Foundations	175
3	Pond and Foundations	75
4	Aboveground Piping and Foundations	725
	Total Cost	**$2,359**

In addition, in the course of construction, the Applicant will post, or cause its construction contractor to post, insurance coverages consistent with industry standards, including builder's risk insurance, general liability, auto liability, and workers' compensation. During operation of the Project, the Applicant will have in place insurance coverages typical for a power generation facility, including broad form property, general liability, boiler and machinery insurance and workers' compensation.

10.6 Security Fund and Insurance

The Siting Board Rules at 16 NYCRR Section 1001.7(b)(1) require the Application to include a description of any security fund and any insurance in place or to be obtained.

In the course of construction, the Applicant will post, or cause its construction contractor to post, insurance coverages consistent with industry standards, including builder's risk insurance, general liability, auto liability, and workers' compensation. During operation of the Project, the Applicant will have in place insurance coverages typical for a power generation facility, including broad form property, general liability, boiler and machinery insurance and workers' compensation.

11. NOISE

This section addresses Stipulation No. 6, Clauses 1 through 10. Included is information regarding existing noise levels in the vicinity of the Project, as well as the results of a noise impact assessment. Baseline field measurements were conducted at the site during the fall of 1999 to establish existing conditions. An operational noise impact assessment was performed using the CNR Method, and acoustic design goals for operational noise were developed. In addition, construction noise impacts were estimated for the various phases of construction. The detailed noise modeling calculations are presented as part of Appendix O.

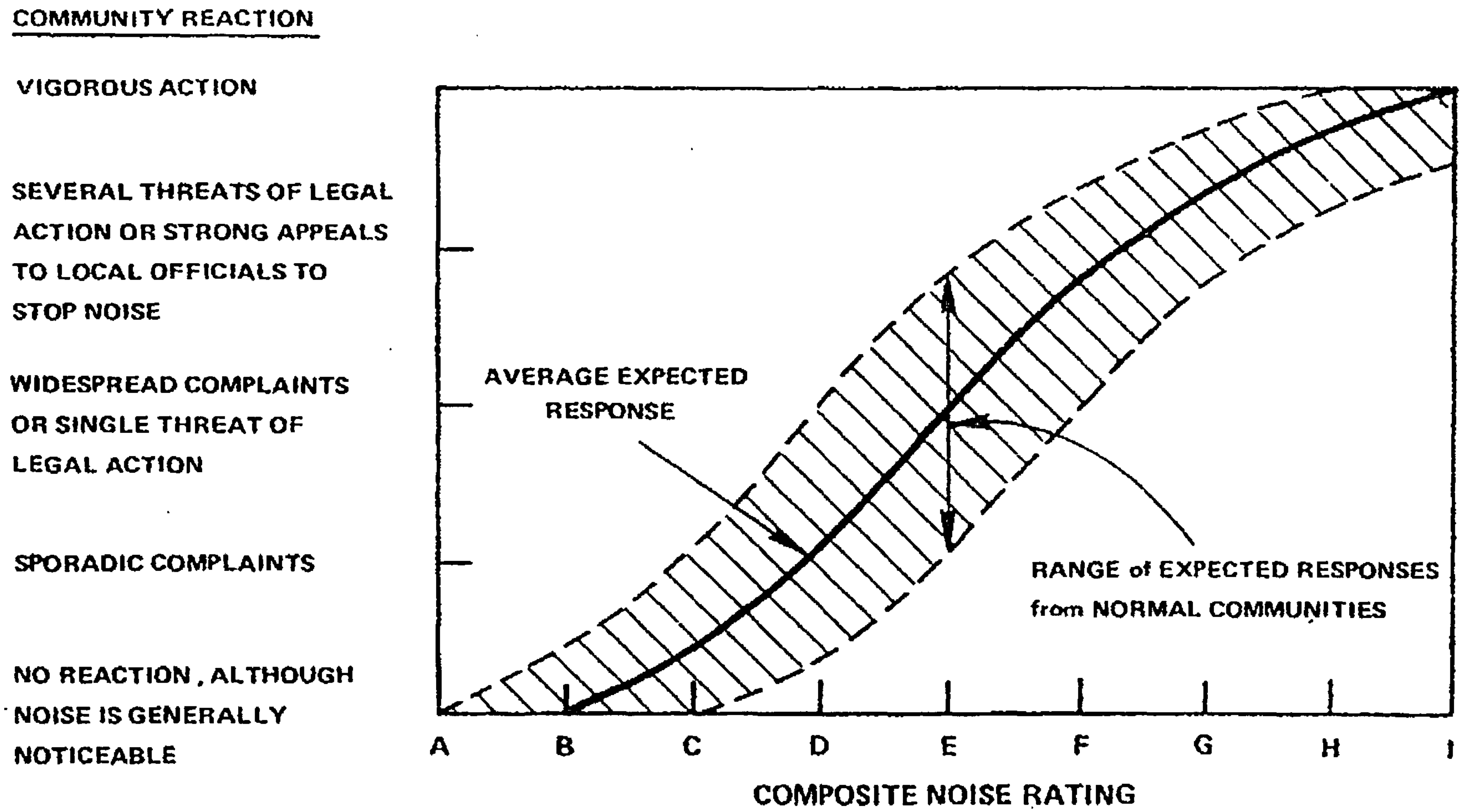
The methodology for assessing the potential impacts from noise follow the procedures and use predictive techniques provided in the following documents:

- Empire State Electric Energy Research Corporation, *Power Plant Construction Noise Guide*, Bolt, Beranek and Newman, Inc., Report No. 3321, May 1977.
- Edison Electric Institute, *Electric Power Plant Environmental Noise Guide*, Volume I, 2^{nd} Edition, Bolt Beranek and Newman, Inc. Report No. 3637, 1984.
- United States Environmental Protection Agency, *Model Community Noise Control Ordinance*, EPA Report No. EPA 550/9-76-003, September 1975.

11.1 Applicable Regulatory Requirements

In accordance with Stipulation No. 6, the Project sound levels will be evaluated through the application of the modified CNR method. The modified CNR method is a thorough and rigorous noise evaluation procedure that considers measured existing community sound levels along with the Project's predicted operational and construction sound levels to rank the acceptability of the proposed noise source within the current environment. The ranking is then adjusted to account for other factors such as the time of day the noise will be present, seasonal variations, frequency distribution, and the tonal and impulsive character of the emitted sound.

The facility design goal, as required to be identified in Stipulation No. 6, Clause 3, is to achieve a modified CNR ranking of "C" or better at the nearest sensitive receptors. A CNR rank of "C" predicts an average community response to the Project's noise midway between "No Reaction" and "Sporadic Complaints" at the nearest receptors. Figure 11-1 shows the Composite Noise Rating scale as a function of community reaction. No reaction is expected from receptors further from the Project site, as sound levels decrease with increasing distance from the source.



Source: *Electric Power Plant Environmental Noise Guide, 2nd Edition, 1984.*

Figure 11 - 1

Estimated Noise Response vs. Composite Noise Rating

In addition to the CNR evaluation, consistent with Stipulation No. 6, Clause 8, the noise assessment will address the following potential acoustic issues:

- Hearing damage;
- Sleep interference;
- Indoor and outdoor speech interference;
- Low frequency noise annoyance;
- Community complaint potential;
- Potential for structural damage due to vibration or infrasound;
- Facility operational noise;
- Facility construction noise;
- Recreational enjoyment;
- Steam and air-line cleaning noise events; and
- Construction and operation traffic noise.

New York State does not have regulations that limit noise emissions from industrial facilities. The regulation of noise within New York is governed at the local level. The county of Oswego has not established industrial noise regulations. The town of Scriba regulates industrial noise through the Site Plan Review Ordinance (Local Law #2 of 1996). Section 5.10, "General Standards," states that an industrial use may not cause perceptible noise beyond the boundaries occupied by the industrial use. Since the literature generally defines a perceptible increase as a change of 3 A-weighted decibels (dBA) or more, this standard suggests that the Project should increase sound levels at the lot line by no more than 3 dBA over the existing measured ambient sound levels.

11.2 Existing Project Area Sound Levels

This section responds to the requirements of Stipulation No. 6, Clauses 1 and 2.

11.2.1 Measurement Types

Because the sounds in our environment usually vary with time they cannot simply be described with a single number. Two methods are used for quantifying variable sounds. These are *exceedance levels* and *equivalent level*, both of which are derived from continuous A-weighted sound level measurements. The exceedance levels are the sound levels exceeded a given percent of the time. For example, the ambient noise level (L_{90}) is the sound level in dBA exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the *residual* or background sound level, which is the sound level observed when there are no louder, transient noises. The L_{90}, therefore, is a conservative level by which to assess the impact of steady-state noise sources such as the Project.

The *equivalent level* is the level of continuous sound that has the same energy (i.e., the same time-averaged mean square sound pressure) as the actual measured fluctuating sound. The equivalent level is designated L_{eq}, and is also A-weighted. The equivalent level represents the time average of the fluctuating sound, but because sound is reported on a logarithmic (dB) scale and the averaging is done with linear mean square sound pressure, the L_{eq} is strongly influenced by occasional loud, intrusive noises. The L_{eq} is the best descriptor for the intermittent sound levels emitted by construction activities.

11.2.2 Measurement Locations and Periods

An ambient noise level survey was conducted from September 28 through September 30, 1999 to characterize the existing noise environment in the vicinity of the Project. A survey of the site area was made to determine the locations of the nearest noise sensitive receptors in representative directions from the Project. Four measurement locations were selected to obtain an adequate spatial representation of the ambient noise environment. These locations were consistent with those used in the prior study of Independence Station in 1991 and 1992. The nearest three residential locations north, east, and south of the Project were monitored again, along with the nearest hiking trail to the site. Independence Park, the location of the hiking trail, is a new land use established following the completion of Independence Station. The measurement locations are shown in Figure 11-2 and described below.

- Location 1 represents the nearest residence to the south of the site at 360 Lake Road (Route 1A). This is roughly the same location as Noise Monitoring Location (NML)-1 in the 1992 Independence Station analysis (Independence Station Draft Environmental Impact Statement, June 1992).
- Location 2 represents the nearest residence to the east of the site along Riker's Beach Road (Buskey Mobile Home Park). This is roughly the same location as NML-3 in the 1992 Independence Station analysis.
- Location 3 represents the nearest residence to the north of the site along Lake Ontario (171 Riker's Beach Road). This is roughly the same location as NML-2 in the 1992 Independence Station analysis.

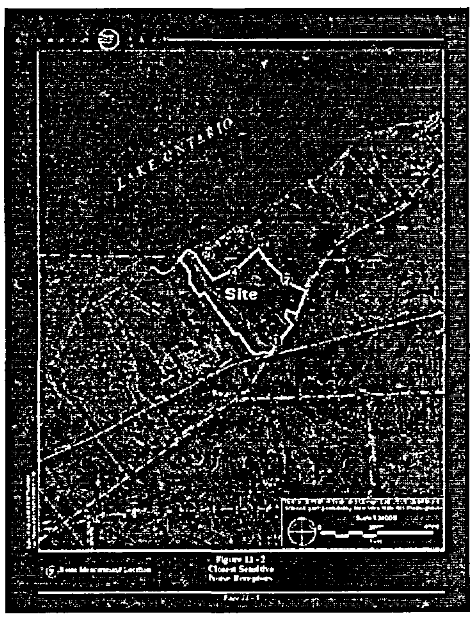


Figure 11 - 2
Closest Sensitive
Noise Receptors

- Location 4 represents the nearest passage of the hiking trails on the recreational parcel donated to the county as part of the Independence Station project (Independence Park). This trail system was established following the siting of Independence Station with the knowledge and understanding that this location would be near the adjacent power plant. These walking trails are for daytime use only.

Ambient sound level measurements were made for approximately 20 minutes per location at all four monitoring locations during daytime, evening and nighttime periods. No nighttime measurements were conducted on the hiking trail since this location is not expected to be in use during this time period. A concurrent octave band sound pressure level spectrum analysis was made at each receptor location along with the broadband A-weighted levels. Residual octave band sound pressure levels (L_{90}) were measured within each of nine frequency ranges to quantify the general spectrum shape and frequency content of the existing ambient noise. The existing Independence Station was running at base load throughout the entire noise measurement period, representative of normal conditions and consistent with Stipulation No. 6, Clause 2.

11.2.3 Survey Weather Conditions

The measurements were made under moderate southerly wind conditions with dry roadway surfaces and no snow cover. Weather conditions during the survey ranged from clear to cloudy skies, temperatures from 58°F to 83°F, and relative humidity of 66 percent to 87 percent. Winds were from the south to southeast at 5 to 9 miles per hour (mph). Meteorological comments are based on on-site observations using a Weksler sling psychrometer, and a hand-held Dwyer wind gauge.

11.2.4 Measurement Equipment

A CEL Instruments CEL-593.B1 Real Time Sound Level Meter (SLM) was used for all measurements. The meter meets the requirements of ANSI S1.4-1983 for Type 1 Precision meters. The octave band filter set meets the requirements of ANSI S1.11-1986. It was field-calibrated before, during, and after the measurements with a CEL-284 Class 1 field acoustic calibrator, meeting the requirements of ANSI S1.40-1984. The analyzer used a Type 1 0.5-inch CEL-192 condenser microphone. The instrument has a measurement range of 5 dB to 140 dB in seven 75-dB ranges. The noise floor is typically 13 dBA. Ground level noise measurements were made with the meter mounted on a tripod 5 feet above the ground. The microphone was always equipped with a 4-inch foam windscreen. All measurement equipment was within its annual independent laboratory calibration and certification period.

11.2.5 Noise Measurement Results

The results of the survey are tabulated in Tables 11-1 through 11-4 for Locations 1 through 4, respectively. Background L_{90} ambient sound pressure levels ranged from 47-50 dBA at Location 1. Background L_{90} ambient sound pressure levels ranged from 50-52 dBA at Location 2. Background L_{90} ambient sound pressure levels ranged from 52-56 dBA at Location 3. Background L_{90} ambient sound pressure levels ranged from 55-59 dBA at Location 4. The noise levels at Locations 3 and 4 were dominated by the Independence Station cooling tower. Locations 1 and 2 were significantly influenced by insect noise at 4,000 Hertz (Hz), especially at night. This was the only "pure tone" audible during the baseline measurement period. Based on the sound level survey results from the summer of 1991 and winter of 1992 for Independence Station at these locations, summer sound levels were lower than winter noise levels, largely due to increased surf on Lake Ontario during winter months (Independence Station DEIS, 1992). Therefore, the sound levels measured in September 1999 will be assumed to represent summer (i.e., quietest) baseline sound levels for evaluating Project impacts. By using the lower background sound level data as a basis for comparison, Project impacts will be calculated conservatively.

11.3 Predicted Project Noise Impacts

This section addresses Stipulation No. 6, Clauses 4 and 6.

11.3.1 Operational Noise

Operational noise impacts will be associated with sound from several individual noise sources. The total noise impact is the result of the combined impact of each individual noise source located on-site. Predictive noise modeling was conducted for each potentially significant noise source at the plant assuming full operation (100% load) which is the worst-case operating scenario for noise impacts. These individual impacts were then combined to determine overall sound levels as a result of the Project. The modeling requires information on equipment noise emission levels, the location of the source relative to the receiver, and information on how the noise may propagate from the source to the receiver.

Table 11-1: Pre-Construction Ambient Sound Level Measurement Data – Nearest Residence South (Location 1)

		Broadband (dBA)		Residual Octave Band Sound Levels (L_{90}) dB (re: 20 micro Pascals) Octave Band Center Frequency (Hz)										
Date	Time*	L_{90}	L_{eq}	31.5	63	125	250	500	1,000	2,000	4,000	8,000	16,000	Noise Sources
9/28/99	14:19	50	52	59	58	51	46	41	39	35	46	38	22	Alcan, crickets
9/28/99	20:13	47	49	58	57	49	44	40	38	37	42	31	17	Alcan, crickets
9/29/99	2:45	48	48	57	56	47	43	38	34	36	45	35	18	Alcan, crickets
9/29/99	12:41	49	60	59	58	52	47	44	42	40	43	42	27	Alcan, crickets
9/29/99	17:41	47	51	58	58	51	46	42	41	38	39	30	18	Alcan, crickets, Route 1A
Average (energy basis)		48	55	58	57	50	45	41	40	38	44	37	22	

*Start time of 20-minute sample.

Table 11-2: Pre-Construction Ambient Sound Level Measurement Data – Nearest Residence to East (Location 2)

		Broadband (dBA)		Residual Octave Band Sound Levels (L_{90}) dB (re: 20 micro Pascals) Octave Band Center Frequency (Hz)										
Date	Time*	L_{90}	L_{eq}	31.5	63	125	250	500	1,000	2,000	4,000	8,000	16,000	Noise Sources
9/28/99	14:50	50	56	59	58	52	50	47	41	36	40	42	28	Independence Station, crickets
9/28/99	21:32	52	53	59	57	53	51	49	41	42	45	38	24	Independence Station, crickets
9/29/99	3:39	51	52	58	56	51	50	47	39	39	46	38	22	Independence Station, crickets
9/29/99	14:00	51	56	59	58	52	51	49	43	39	42	39	25	Independence Station, crickets
9/29/99	18:59	50	53	59	57	51	50	48	43	42	41	34	23	Independence Station
Average (energy basis)		51	54	59	57	52	50	48	42	40	43	39	25	

*Start time of 20-minute sample.

Table 11-3: Pre-Construction Ambient Sound Level Measurement Data – Nearest Residence to North (Location 3)

		Broadband (dBA)		Residual Octave Band sound Levels (L_{90}) dB (re: 20 microPascals) Octave Band Center Frequency (Hz)										
Date	Time*	L_{90}	L_{eq}	31.5	63	125	250	500	1,000	2,000	4,000	8,000	16,000	Noise Sources
9/28/99	15:21	52	54	62	63	60	49	50	46	40	36	35	21	Independence Station, cooling tower
9/28/99	21:07	54	55	63	64	60	49	51	47	43	45	38	26	Independence Station, cooling tower, crickets
9/29/99	3:12	55	56	63	64	60	49	52	48	44	47	39	22	Independence Station, cooling tower, crickets
9/29/99	13:34	56	59	64	65	61	53	54	51	47	45	42	31	Independence Station, cooling tower
9/29/99	18:33	54	57	64	65	60	52	53	48	45	40	34	24	Independence Station, cooling tower
Average (energy basis)		54	57	63	64	60	51	52	48	44	44	39	26	

*Start time of 20-minute sample.

Table 11-4: Pre-Construction Ambient Sound Level Measurement Data – Hiking Trail Nearest to Project Site (Location 4)

		Broadband (dBA)		Residual Octave Band sound Levels (L_{90}) dB (re: 20 microPascals) Octave Band Center Frequency (Hz)										
Date	Time*	L_{90}	L_{eq}	31.5	63	125	250	500	1,000	2,000	4,000	8,000	16,000	Noise Sources
9/28/99	15:50	55	56	68	67	57	53	54	49	44	36	23	15	Independence Station, cooling tower
9/28/99	20:42	57	59	68	67	58	56	57	52	47	39	28	15	Independence Station, cooling tower
9/29/99	13:09	59	61	69	69	59	57	59	54	49	41	33	21	Independence Station, cooling tower
9/29/99	18:10	58	60	68	68	58	57	58	52	48	40	30	18	Independence Station, cooling tower
Average (energy basis)		57	59	68	68	58	56	57	52	47	39	30	18	

*Start time of 20-minute sample.

11.3.1.1 Predictive Methodology

The operational noise levels of the equipment were modeled using a well proven spreadsheet-based computer model developed with procedures specified in the *Electric Power Plant Environmental Noise Guide.* This model has been used for dozens of power plant modeling analyses similar to the Project. Follow-up measurement programs have confirmed the accuracy of the model calculations. Noise levels were calculated at specified noise receptors using a hemispherical free field (HFF) noise model incorporating geometrical spreading, atmospheric and anomalous attenuation, on-site structural barrier effects, and effects of prominent terrain features. For conservatism, no excess attenuation credit was taken for soft ground absorption, foliage, tree cover, and other excess attenuation factors. The model accounted for noise levels at each of the standard nine octave bands and used octave-band specific factors in the model. All atmospheric attenuation calculations were based on data for standard day conditions as defined in the *Electric Power Plant Environmental Noise Guide* (15°C and 70% relative humidity).

Operational noise levels were predicted at the nearest four discrete receptors identified in the baseline measurement program (three nearest residences and nearest hiking trail). In addition, calculations were made at various distances out to 6,000 feet in each of the compass directions sufficient to generate a gridded receptor field for noise contouring (isobels).

11.3.1.2 Facility Noise Sources

The primary Project noise sources will include noise radiated from the combustion turbines, steam turbines, generators, HRSGs, transformers (main and auxiliary), mechanical draft cooling towers, and the gas compressor building. The combustion turbines, steam turbines, generators, HRSGs and auxiliary equipment will be housed within an insulated power generation building. Therefore, building walls, roof vents and exhausts, and turbine air intakes may be potential noise sources. There is already a gas metering and pressure reduction station on-site as part of the Independence Station so this source was not included in the Project modeling. The circulating water pumps for the cooling towers will be housed within a completely enclosed building and will not be a significant source of noise. A complete listing of the noise sources modeled for the Project are presented below.

- Two gas turbine exhaust stacks 225 feet above ground level;
- Two gas turbine air intakes;
- Two eight-cell cooling towers;
- Two gas turbine compartment vent fans;
- Two main and two auxiliary transformers;

- Generation building supply and exhaust fans;
- Generation building walls (incorporates steam turbines and generators); and
- Natural gas compressor building.

11.3.1.3 Equipment Sound Levels

The equipment sound levels are based on noise data provided by the equipment vendor or design engineer when available. For equipment where vendor data were not available, the noise levels were either calculated from the procedures described in the *Electric Power Plant Environmental Noise Guide* (Edison Electric Institute (EEI) 1984) using site-specific ratings and specifications, or from consultants' data collected on other similar projects. The noise methodology contained in the EEI Guide is derived from extensive measurement programs at a variety of electric generation facilities.

The noise levels for the exhaust stack, turbine air intakes, turbine compartment vent fans, cooling towers, and generation building walls are based on vendor data for this project. Noise levels for the transformers and generation building fans were calculated using project-specific component ratings and information in the EEI Guide. Sound levels for the gas compressor building are from vendor data on another project.

11.3.1.4 Predicted Operational Noise Levels

Based upon the methodology and data sources outlined above, computer modeling was used to determine the potential noise effect of the Project under normal operational conditions. As a worst-case noise impact scenario, both units were assumed to be operating simultaneously under full load steady conditions. Noise modeling contours for the Project operating under base load are shown in Figure 11-3.

11.3.2 Construction Noise

Construction noise is highly variable. Many construction machines operate intermittently and the types of machines in use at a construction site change with the construction phase. Construction of the Project will occur over a 34-month period. The first Project unit is scheduled for commercial operation 30 months after site mobilization followed 4 months later by the second Project unit.

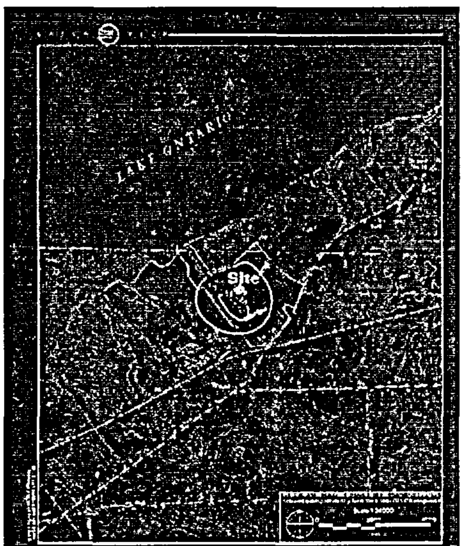


Figure 11 - 3
Modeled Operational Sound Levels
Heritage Station

11.3.2.1 Construction Phasing and Schedule

The initial civil/structural phase includes activities leading up to setting the steam turbines, combustion turbines, and heat recovery steam generators including clearing and grubbing, excavation, underground utilities, foundations, and building erection. The total duration for these activities is approximately 14 months. Activities for the initial 2 to 4 months will focus primarily on site preparation, excavation, and underground utilities. Installation of foundations will commence during month 3 or 4 and will continue for approximately 5 months. Construction of concrete equipment support columns and elevated platforms will proceed as foundation installation permits and continue for 7 to 8 months. Installation of warehouse foundations, concrete slabs, and structural steel will start in the 3rd or 4th month and will continue for approximately 4 months.

Erection of the structural steel power block building structure will begin approximately 8 to 10 months after mobilization and continue for 5 to 6 months. The mechanical/electrical phase of the Project will proceed as equipment deliveries and building construction permits. This phase of the Project includes the installation of the combustion turbines, steam turbines, HRSGs, balance of plant equipment, conduit, wire, piping, duct, insulation, controls, and other equipment. The mechanical/electrical phase is scheduled to initiate 10 to 11 months after site mobilization and will continue for approximately 11 to 12 months.

The commissioning or startup/checkout phase of the Project will follow immediately after completion of the mechanical/electrical phase. Startup and checkout for the first unit is scheduled to begin approximately 21 months after site mobilization, and will continue in support of a commercial operation date, which is approximately 30 months after mobilization. Startup and checkout, and commercial operation for the second unit are scheduled to follow the first by 4 months.

11.3.2.2 Construction Noise Sources

Construction noise consists of a series of intermittent sources, most of which originate from the diesel engine drive systems used to power most construction equipment. Various combinations of equipment are used during different phases of construction. The detailed schedule of construction for the Project outlined in the previous section can be divided into five basic phases that are applicable to most power generation facilities:

1. Site clearing and excavation;
2. Concrete pouring;
3. Steel erection;

4. Siding and machinery installation; and
5. Site clean-up, plant start-up and system blow-out.

Project construction will use standard construction equipment including one front-end loader, two excavators, five dump trucks, one bulldozer, one vibratory roller, one backhoe, one concrete pump, six 80-foot lifts, two air compressors, dewatering pumps, a flatbed truck, a water truck, and miscellaneous cranes and trailers. Based on a preliminary analysis of the existing soil data, pile driving is not expected to be required for construction. Limited blasting may be required in areas where the necessary depth of excavation is below the level that can be removed by conventional hoe rams or excavator with ripper attachments. If blasting is required, it will be limited to daytime hours only with advance notification of the local residents. System blow-out occurs during the clean-up phase when either high pressure air or steam is used to clean out all debris from the plant steam line piping. This process is very brief in duration, typically lasting 2 to 3 minutes per blow. Approximately 30-50 blows are required to clean the lines which occurs over a 2 to 3 week period. This type of event will also be limited to daytime hours only.

11.3.2.3 Equipment Sound Levels

The most comprehensive study ever done for power plant construction noise is contained in the *Power Plant Construction Noise Guide* (Empire State Electric Energy Research Corporation 1977). The average long term or composite of the multiple sources of noise emissions associated with each of the above phases is compiled in this report based on an extensive measurement program at 15 different power plant construction sites. The variance in the noise emissions is estimated at ± 3 dBA for this compilation. Typical equivalent sound level values, L_{eq}, per phase from this publication at a reference distance of 2,390 feet are listed below.

1. Site clearing and excavation	55 dBA
2. Concrete pouring	51 dBA
3. Steel erection	55 dBA
4. Siding and machinery installation	50 dBA
5. Site clean-up, plant start-up	45 dBA

11.3.2.4 Predicted Construction Noise Levels

The information outlined in the previous sections was used to calculate noise impacts from each construction phase at the nearest sensitive residences in each direction from the site, and the nearest hiking trail. The details of these calculations are found in Appendix O. Since the cooling tower is significantly closer to the residences to the south as compared to the power block building, a second area of construction activity was modeled at the cooling tower. Table 11-5 summarizes the sound level impacts from the various phases of construction. Figure 11-4 presents predicted contours of the construction noise impacts for the worst-case phase (site clearing and excavation.)

Table 11-5: Summary of Construction Noise Impacts by Phase

Construction Phase	Nearest Residence South	Nearest Residence East	Nearest Residence North	Nearest Hiking Trail
1 – Clearing/Excavation	64	59	54	62
2 – Concrete pouring	60	55	50	58
3 – Steel erection	64	59	54	62
4 – Machinery installation	59	54	49	57
5 – Site clean-up	54	49	44	52
Ambient L_{eq}	55	54	57	59

11.4 Evaluation of Facility Noise Levels

As provided in Stipulation No. 6, Clause 9, facility operational noise levels were evaluated using the modified CNR method. In addition, as outlined in Stipulation No. 6, Clause 8, facility noise levels were evaluated with respect to potential impacts of hearing damage, sleep interference, indoor and outdoor speech interference, low frequency noise annoyance, community complaint potential, recreational enjoyment, potential for structural damage due to vibration or infrasound, steam and air-line cleaning noise events, and vehicular traffic noise.

11.4.1 Evaluation of Operational Noise with Modified CNR

The modified CNR criteria evaluate the impact of a new noise source within an existing community. The rating method considers the new facility noise levels, the existing background noise levels, temporal and seasonal factors, and the community's previous exposure to similar noise sources. The rating method establishes a noise ranking for the proposed source. The ranking is expressed in terms of a letter designation. A new noise source that results in a CNR ranking of "C" or better is generally considered an acceptable noise source within a community.

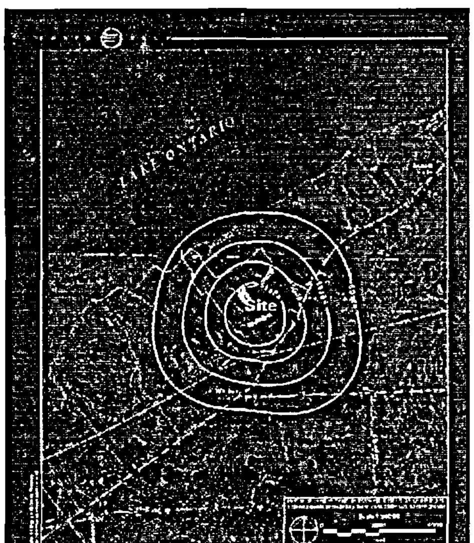


Figure 11.4-4
Modeled Construction Sound Levels
Site Clearing and Excavation Phase
Heritage Station

The Project's predicted octave band sound pressure levels were plotted on the Noise Level Rank Curves for the Modified CNR Rating System for the nearest residences in three directions from the Project, as well as the nearest hiking location. These curves are the left-hand graphs in Figures 11-5 through 11-8 for the nearest residences to the south, east, north, and the hiking trail, respectively. According to the Project's projected sound levels, the initial Noise Level Rank Curves for these four locations range from a "C" at the nearest residence to the north, to a "D" at the other nearest residences and the hiking trail.

The existing average of the minimum ambient sounds (L_{90}) were also plotted on the Background Noise Curves for the Modified CNR Rating System for these same four locations. These curves are the right-hand graphs in Figures 11-5 through 11-8 for the nearest residences to the south, east, north, and the hiking trail, respectively. Based on the measured ambient background data collected for the Project in September 1999, correction factors based on the Background Noise Curves range from -1 at the nearest residences to the south and east, to -2 at the nearest residence to the north and the nearest hiking trail. The correction factors are based on the curve where the major portion of the background spectrum falls.

Adjustments were made to the noise level ranks based upon current community noise levels, the temporal and seasonal character of the noise source, and previous community exposure. Facility noise will be continuous; therefore, no adjustments were made for temporal noise. No adjustments were made for very low frequency, tonal noise, or impulsive sound. The neighboring community has been exposed to this same type of noise from Independence Station since 1994. Community relations have generally been good over this 5-year period so that an adjustment of -1 has been made for the nearest residences to the south and east, as well as the hiking trail. No adjustment was made for the nearest residence to the north based on some complaints in 1995.

The resulting modified CNR noise ranking at each of these four locations is summarized in Table 11-6. The resulting rank is "B" for the nearest residences to the south and east, and an "A" for the nearest residence to the north and the hiking trail. The estimated range of community response would be "No reaction, although noise is generally noticeable." This is better than the noise design goal of a modified CNR rating of "C".

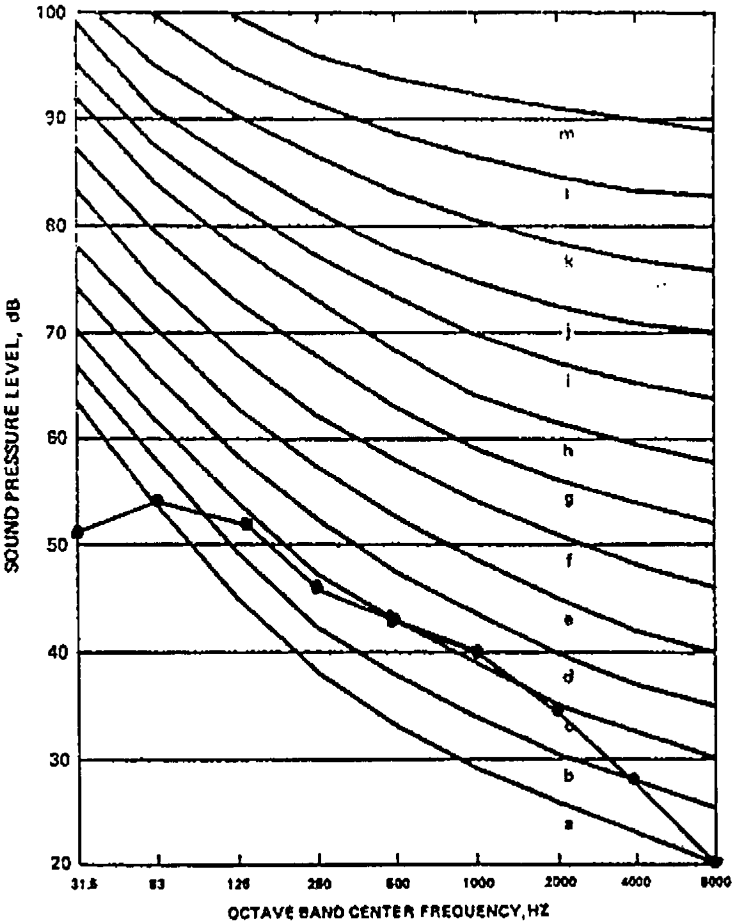


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

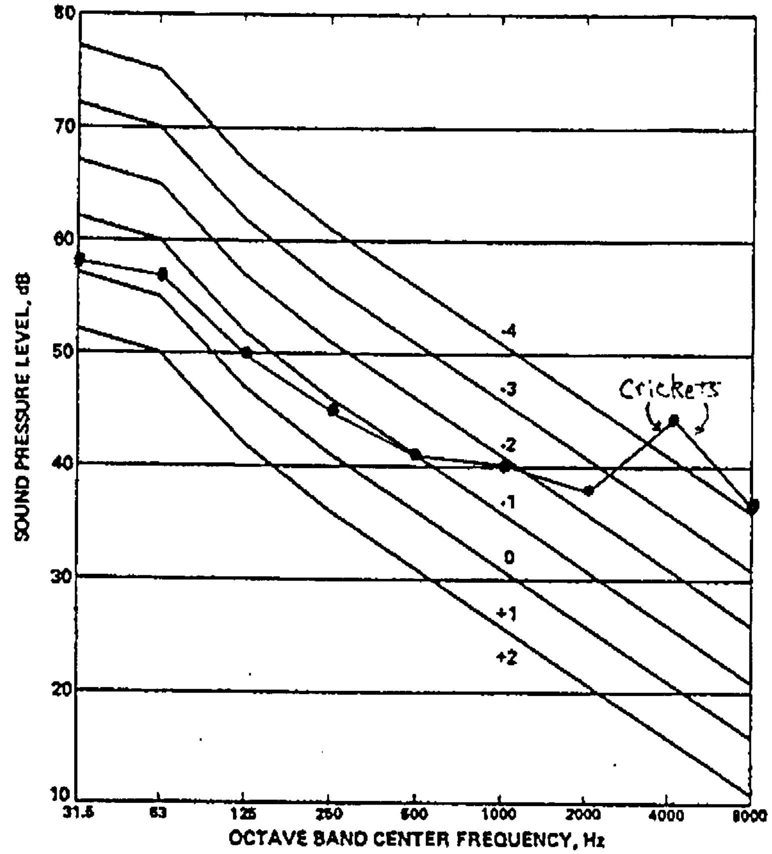


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-5

Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence South, Operational Noise

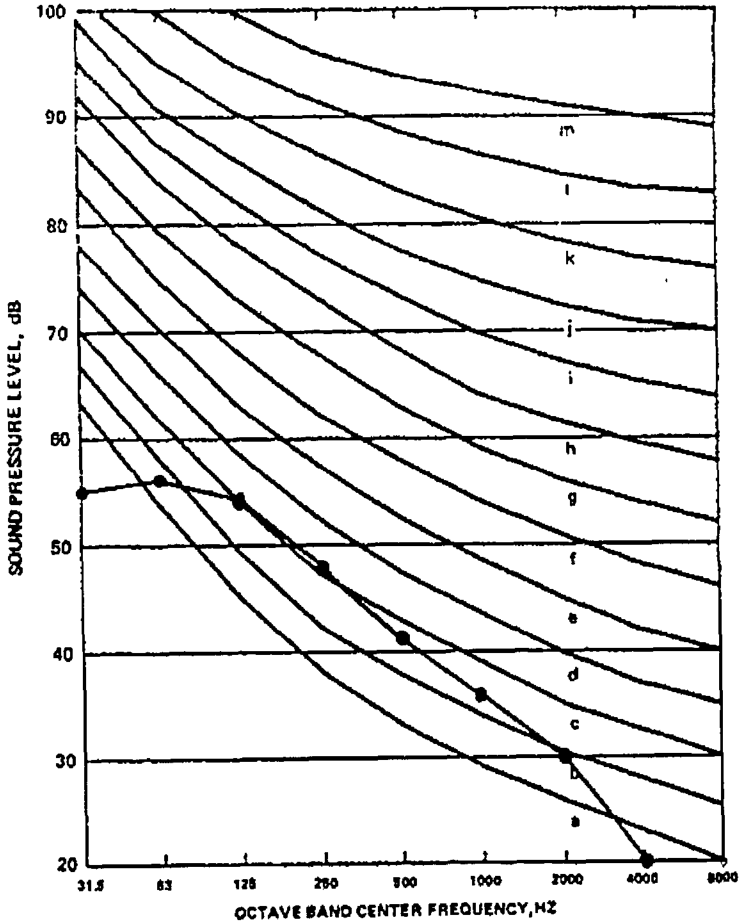


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

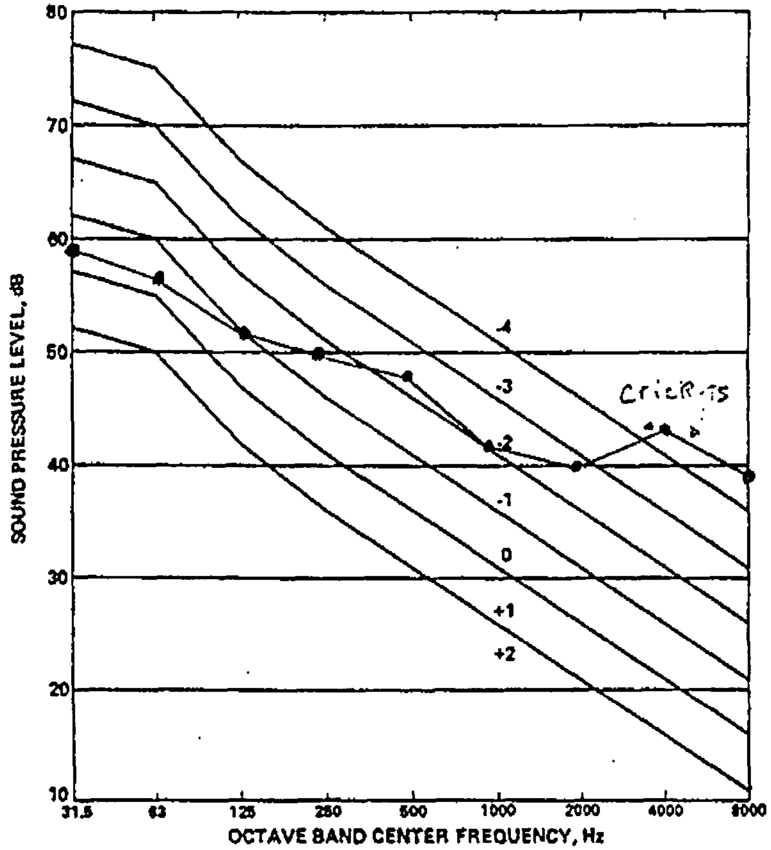


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-6
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence East, Operational Noise

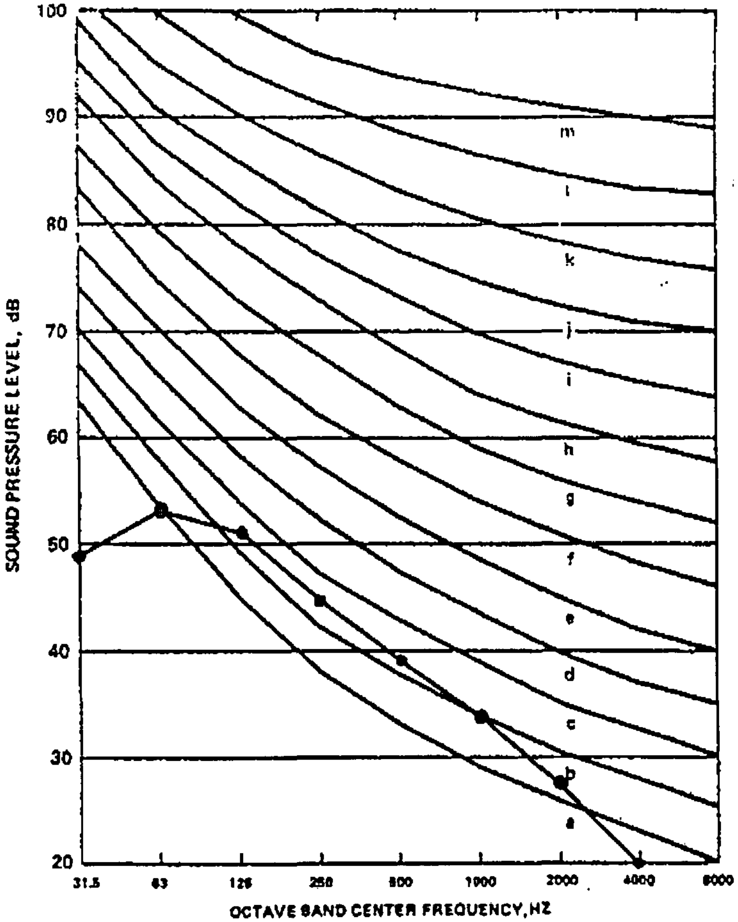


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

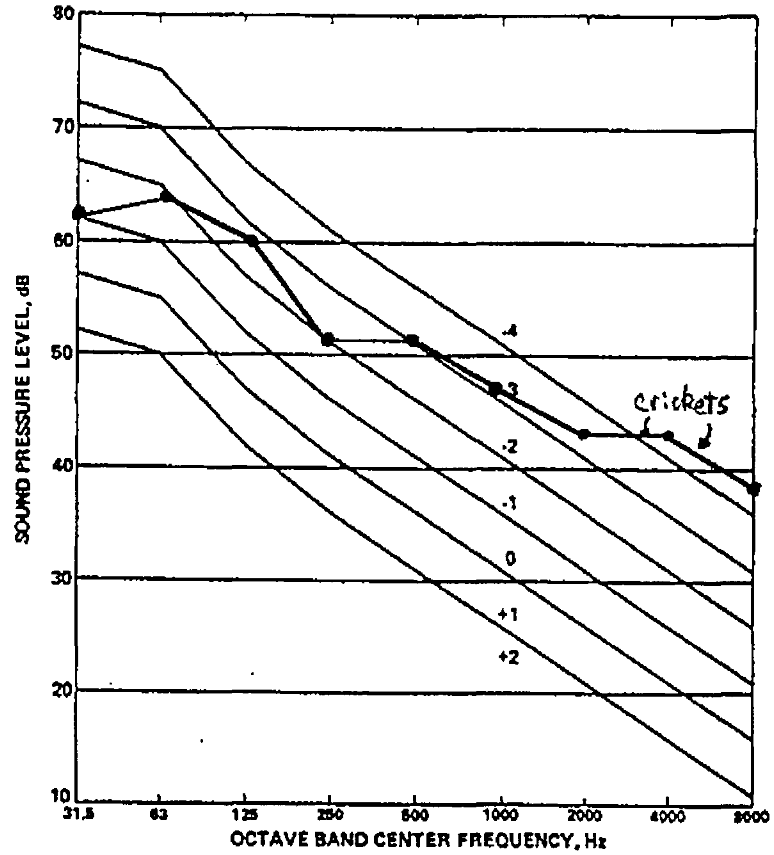


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-7
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence North, Operational Noise

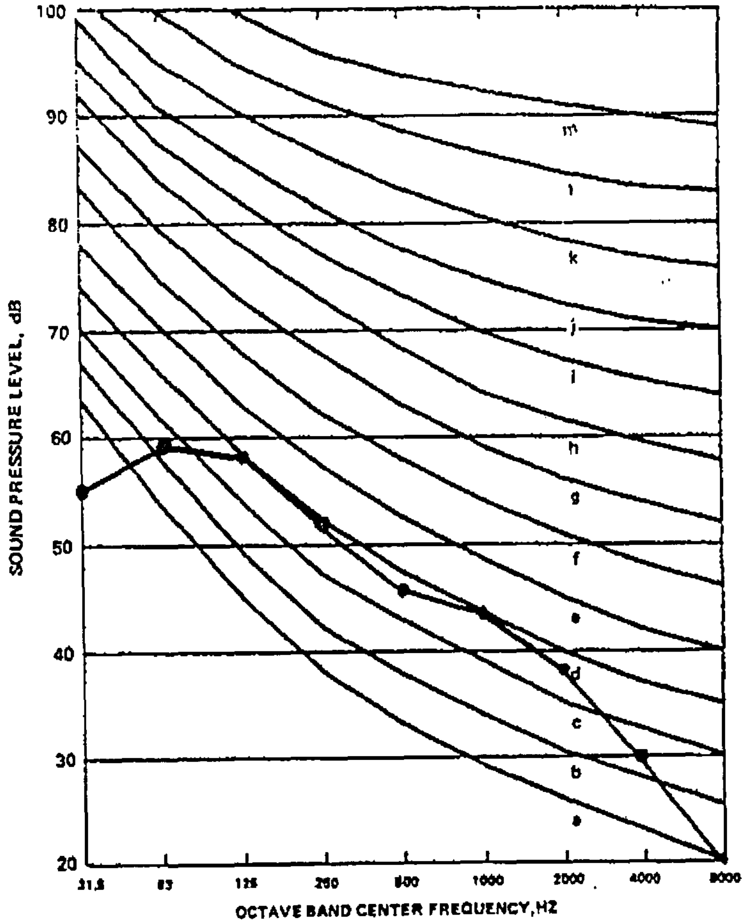


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

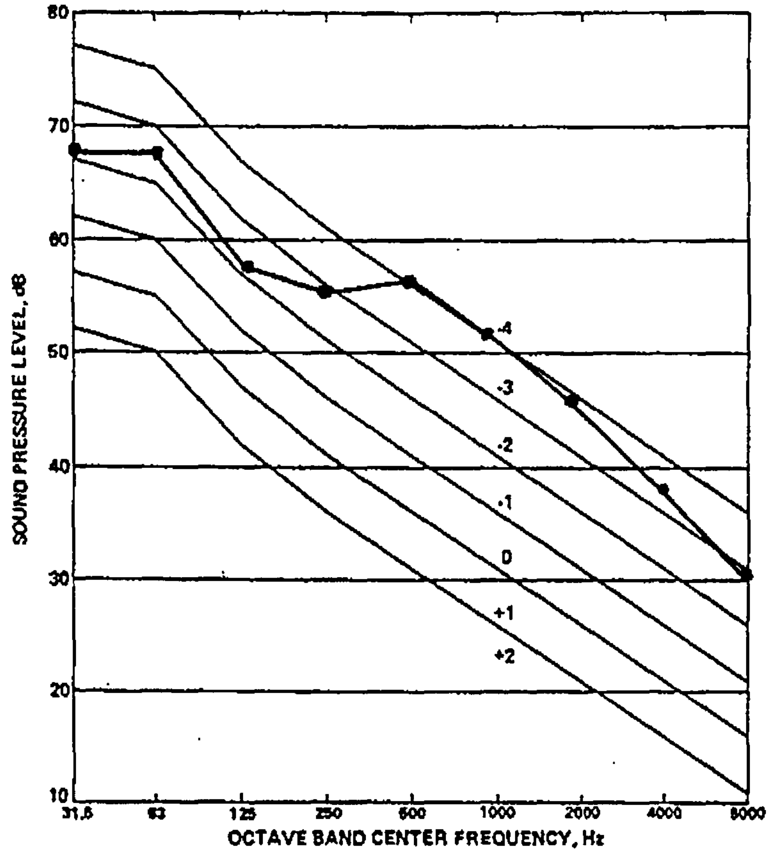


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-8
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Hiking Trail, Operational Noise

Table 11-6: Facility Operational Noise Ranking in Accordance with the Modified Composite Noise Rating

	Nearest Residence – South	Nearest Residence – East	Nearest Residence – North	Nearest Hiking Trail
Facility Noise Emission Rank	D	D	C	D
Background Correction	-1	-1	-2	-2
Temporal Adjustment	0	0	0	0
Noise Character Adjustment	0	0	0	0
Previous Exposure Adjustment	-1	-1	0	-1
Composite Noise Rating	B	B	A	A

A comparison must also be made of the Project sound levels to the existing sound levels to test for "a perceptible noise" off the property boundary to demonstrate compliance with the town of Scriba noise ordinance. Table 11-7 shows the results of this comparison. Predicted worst-case sound levels due to the Project are expected to range from 42 to 46 dBA at the nearest residences, and 49 dBA at the nearest hiking trail. These Project sound level ratings will result in a 0 to 2 dBA increase at the nearest locations just off the Project property line. This is in compliance with the town of Scriba noise ordinance and demonstrates that the Project will not cause a perceptible noise increase.

Table 11-7: Comparison of Future Operational Sound Levels to Existing Sound Levels and Town of Scriba Criteria

	Nearest Residence – South	Nearest Residence – East	Nearest Residence – North	Nearest Hiking Trail
Existing Measured Sound Level (includes Independence Station) Average L_{90}	48 dBA	51 dBA	54 dBA	57 dBA
Maximum Modeled Impact – Heritage Station	46 dBA	44 dBA	42 dBA	49 dBA
Total Cumulative Sound Levels – Independence and Heritage	50 dBA	52 dBA	54 dBA	58 dBA
Change in Sound Level Over Ambient	2 dBA	1 dBA	0 dBA	1 dBA
Town of Scriba Noise Criteria	3 dBA	3 dBA	3 dBA	3 dBA
Compliance with Noise Criteria?	Yes	Yes	Yes	Yes

11.4.2 Evaluation of Construction Noise

Noise levels associated with facility construction activities are discussed in Section 11.3.2. The estimated construction noise levels at the nearest residence will be approximately 64 dBA during the clearing and excavation phase, as well as the steel erection phase. The concrete pouring and mechanical phases will be 4-5 dBA quieter than these phases. Major, noise generating construction activities will occur during daytime periods to the extent practical. The existing daytime ambient sound levels range from 54 dBA to 59 dBA. The construction noise is anticipated to be audible during periods of heavy activity. However, the construction noise will be far below a level that could cause any hearing damage or speech interference off-site. The construction activities will primarily occur during daytime periods, therefore, no sleep interference would result and the construction noise will not produce any significant tonal or infrasound emissions.

The construction noise was also evaluated with respect to the modified CNR method. The estimated sound levels for the worst-case phase of construction (site clearing/excavation, and steel erection) were evaluated. The octave band data for the construction activities and daytime ambient background levels are shown on Figures 11-9 through 11-12 for the nearest residences and hiking trail. Since the construction noise will primarily occur during daytime periods, the ambient correction factor of –1 is used. The results of the modified CNR calculations are shown below in Table 11-8. A ranking of "D" is expected at the nearest residences to the south and east as well as at the nearest hiking trail and a ranking of "C" is expected at the nearest residence to the north. A decrease of one letter grade is expected for the other construction phases (i.e. a "D" goes to a "C"). The construction noise will likely be audible at the nearest residential locations and the nearest hiking trail. The ranking of "D" is above the targeted operational modified CNR rating goal of "C" or better. However, these sound levels are well below levels requisite to protect the public health and welfare, and will occur during the scheduled daytime construction period.

Table 11-8: Facility Construction Noise Ranking in Accordance with the Modified Composite Noise Rating

	Nearest Residence – South	Nearest Residence – East	Nearest Residence – North	Nearest Hiking Trail
Facility Noise Emission Rank	G	G	F	H
Background Correction	-1	-1	-2	-2
Temporal Adjustment	-1	-1	-1	-1
Noise Character Adjustment	0	0	0	0
Previous Exposure Adjustment	-1	-1	0	-1
Composite Noise Rating	D	D	C	D

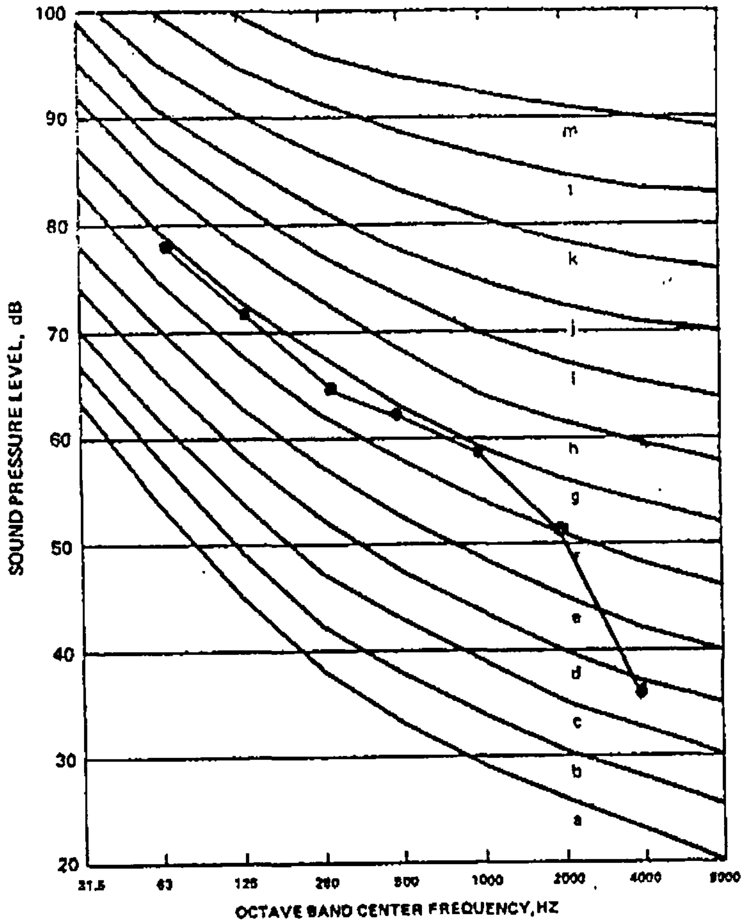


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

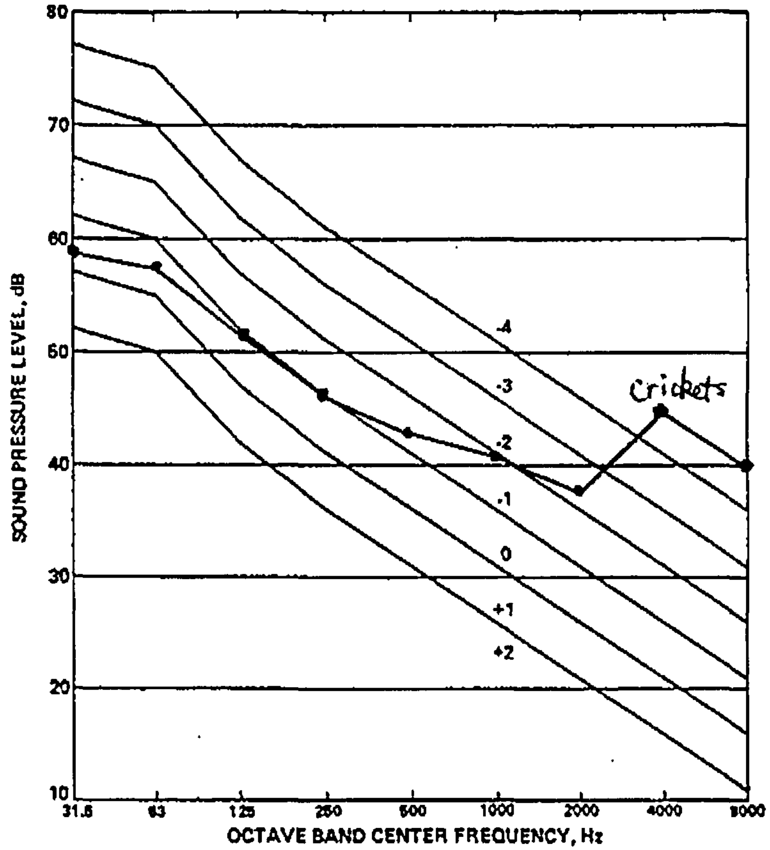


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-9
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence South, Construction Noise

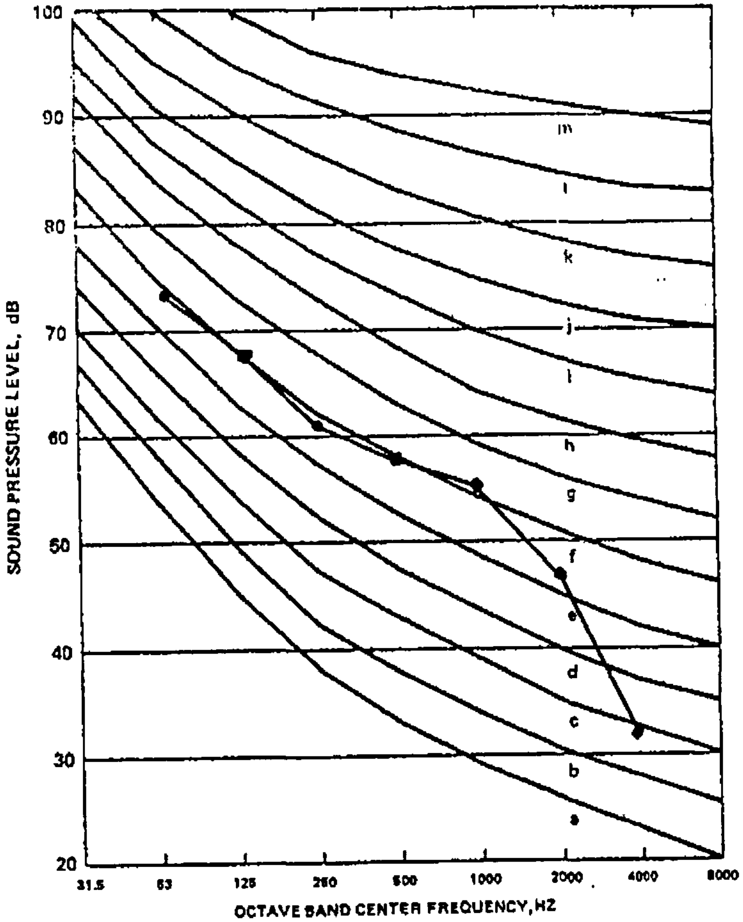


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

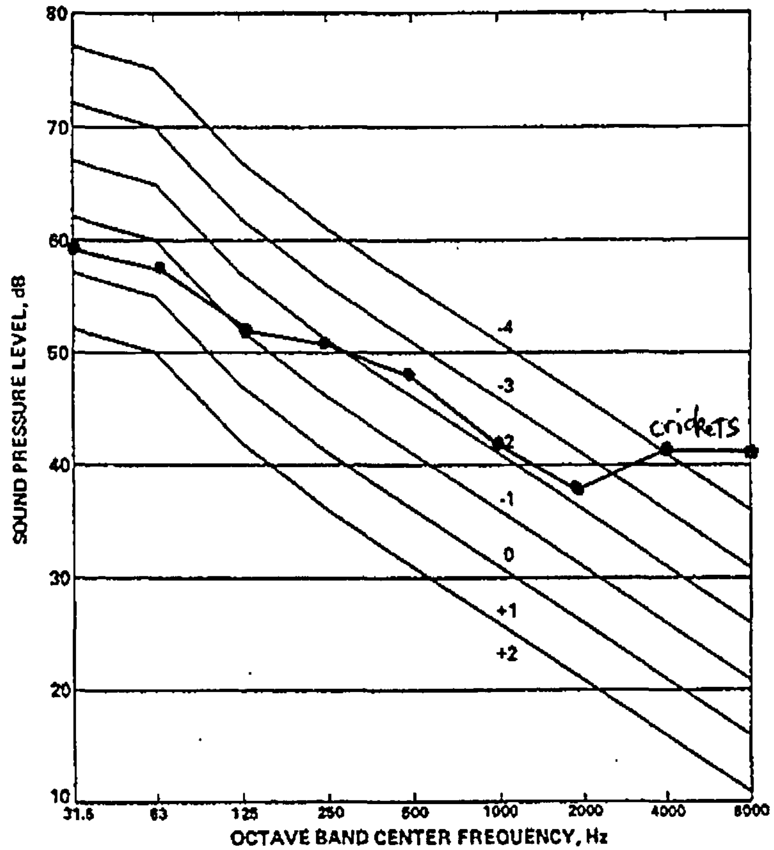


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-10
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence East, Construction Noise

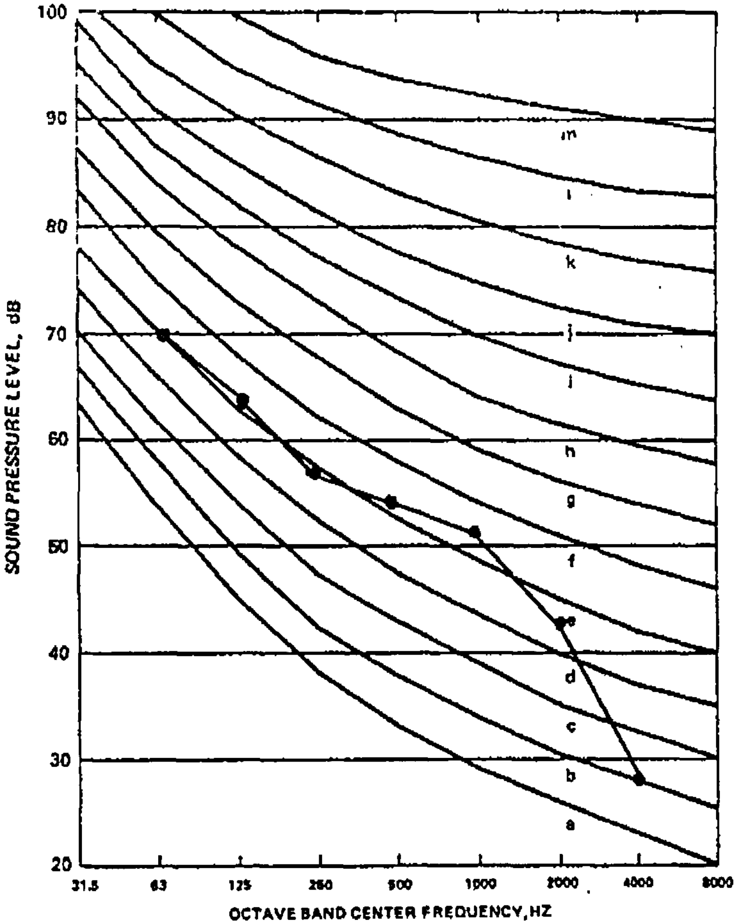


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

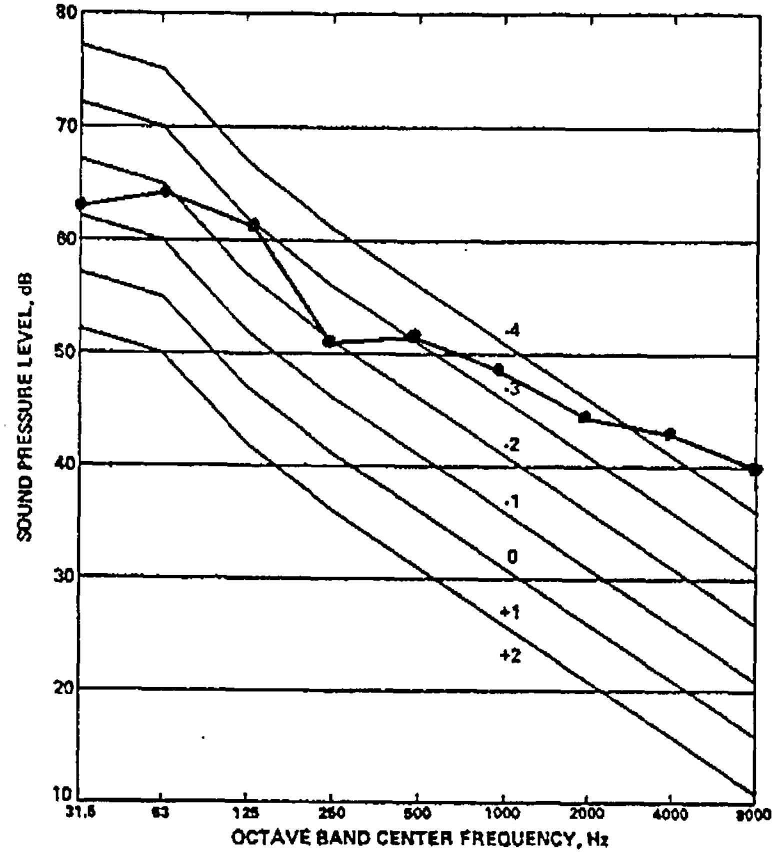


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-11
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Residence North, Construction Noise

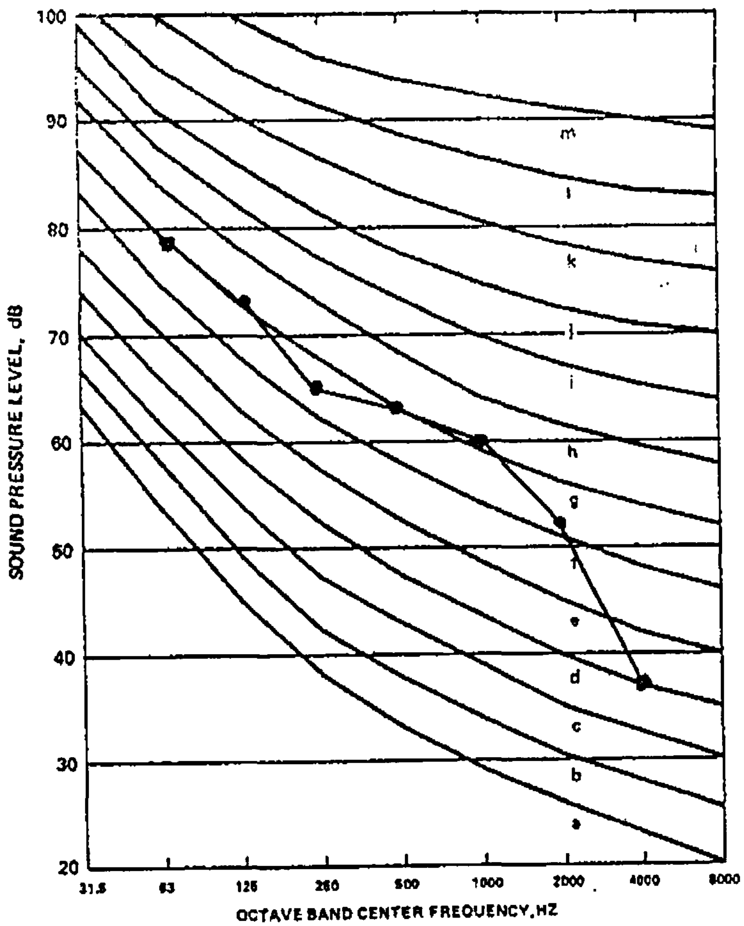


Figure 2.6 Noise Level Rank Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the noise to be evaluated are plotted on the grid. The highest zone into which the spectrum protrudes is designated as the noise level rank.

2-16

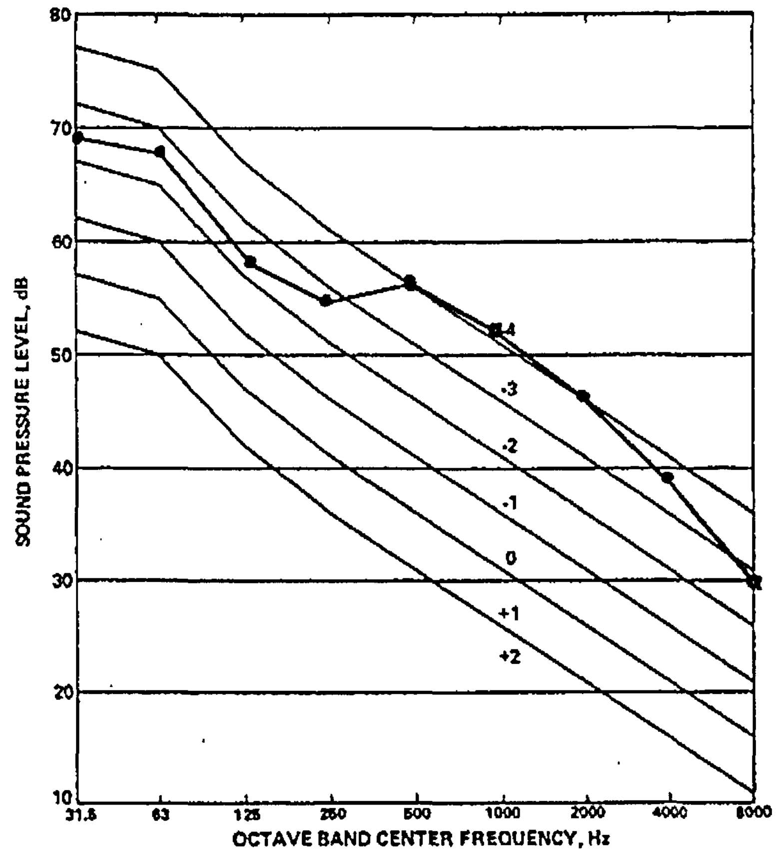


Figure 2.7. Background Noise Curves for Modified CNR Rating System. The measured octave band sound pressure levels of the average of the minimum ambient sounds (L_{90}) (in the absence of specific identifiable nearby events, such as auto or truck passes, bird chirps, or dog barks) are plotted on the grid. The zone into which the major portion of the spectrum falls designates the correction number to be applied for background noise.

2-17 Rev. 1984

Figure 11-12
Noise Level Rank Curves and Background Noise Curves for Modified CNR – Nearest Hiking Trail, Construction Noise

11.4.3 Review of Potential Noise Impacts

11.4.3.1 Hearing Damage

The potential for hearing damage occurs only at relatively high noise levels. Facility noise levels within the community will not be at a level that could cause any hearing damage. Hearing protection is regulated by the OSHA of the U.S. Department of Labor within the workplace. In this application, hearing damage considerations are limited to facility maintenance and operation employees that may be exposed to on-site equipment noise. The Project will comply with all applicable OSHA requirements that regulate worker noise exposure.

11.4.3.2 Sleep Interference

Elimination of sleep interference is contained within the acoustic design goals established by the modified CNR method. In meeting the goals of the CNR ranking and the local ordinance through the mitigated design, there will be no sleep interference resulting from operation of the Project. A nighttime sound level of approximately 32 dBA or less within a house is the level that is recommended for no sleep interference (EPA 1974). Using a conservative outdoor-indoor attenuation of 17 dBA due to the house structure with open windows yields a nighttime exterior sound level of 49 dBA or less which will ensure no sleep interference. Maximum exterior predicted sound levels from the Project at the nearest residences will range from 42-46 dBA which are well under the threshold to protect against sleep interference. With windows closed, the nighttime exterior sound level to protect against sleep interference increases to 59 dBA.

11.4.3.3 Indoor and Outdoor Speech Interference

Elimination of indoor and outdoor interference is contained within the acoustic design goals established by the modified CNR method. In meeting the goals of the CNR ranking and the local ordinance through the mitigated design, there will be no speech interference resulting from operation of the Project. The U.S. EPA "Levels" document referenced in the proceeding section also states that an outdoor sound level of 60 dBA (43 dBA interior) allows for 100 percent speech intelligibility within the home. All worst-case exterior sound levels from the Project will be well below 60 dBA and therefore, no indoor speech interference will result from the Project. Project impacts are expected to range from 42-46 dBA at the nearest residences. The U.S. EPA "Levels" document notes these sound levels would allow for a normal outdoor speech distance of approximately 10 meters (30 feet). This is considered acceptable and would provide an adequate outdoor conversation environment.

11.4.3.4 Low Frequency Noise Annoyance

Various acoustic experts recommend different low frequency noise limits to ensure protection from low frequency noise disturbance. Recommendations generally range from a linear dB level of 70 to 78 dB to ensure no disturbance due to infrasound. In general, a linear dB noise level of 70 dB or less will virtually guarantee no disturbance from low frequency noise. The predicted linear sound levels at the nearest residences to the south, east, north, and the hiking trail are predicted to be 58, 60, 56 and 63 dB, respectively. Therefore, the Project's sound levels are well below the range of acceptable low frequency sound levels and are not expected to cause annoyance within the community.

11.4.3.5 Community Complaint Potential

Elimination of community complaints is contained within the acoustic design goals established by the modified CNR method. In meeting the goals of the CNR ranking of "C" or less through the mitigated design, the community complaint potential will be "no reaction, although noise is generally noticeable" at the nearest receptors. In addition, mitigation of the Project to achieve compliance with the local ordinance results in no perceptible increase in noise at the site boundary. By achieving the objectives of the modified CNR and local ordinance, the possibility of community complaints resulting from operation of the Project is expected to be minimal.

11.4.3.6 Recreational Enjoyment

The nearest recreational area to the Project is the hiking trail area on the recreational parcel donated to the county as part of Independence Station (Independence Park). Average minimum sound levels currently measured on the nearest hiking trail (Location 4 in the September 1999 measurements) were 57 dBA with Independence Station operating. Worst-case predicted sound levels at the hiking trail due to the Project operations are expected to be 49 dBA. The future sound level with the two sources combined would be approximately 58 dBA that is a 1 dBA increase. Sound level changes of less than 3 dBA are not considered perceptible to the human ear. Therefore, no adverse effect on recreational enjoyment will result from the Project.

11.4.3.7 Infrasound or Vibration Damage

There is a phenomenon described as "infrasound vibration" that has occurred near certain simple-cycle combustion turbine installations. Low frequency noise of a high magnitude can couple with wood frame walls and windows to cause a mild but perceptible vibration. While these sound levels are virtually inaudible, the vibration could potentially cause an unfavorable reaction to facility noise. Combustion turbines, when installed in combined-cycle mode, do not radiate the same magnitude of low frequency noise emissions. The HRSG tubes and the cooling of the exhaust gases greatly reduce the low frequency noise. No "infrasound vibration" issues are expected with this combined-cycle plant.

11.4.3.8 Steam and Air Line Cleaning Noise Events

Steam and air line cleaning events can be excessively loud and will be clearly audible to nearby residents. However, this process will occur only sporadically during the construction process and would be expected to be limited to approximately a 2 to 4 week period. Mitigation for this activity is through public notification of dates of activity, and limiting these events to the daytime only.

11.4.3.9 Vehicular Traffic Noise

Vehicle traffic to the site will consist of the commuting workforce once the Project is operational, and construction employee and equipment deliveries during the construction phase. The daily traffic volume to the site during the peak construction phase is anticipated to be 1,024 vehicles per day (vpd) during months 10 to 22. This will be a combination of construction deliveries and construction employees. During facility operation, the facility traffic volume is anticipated to be 50 to 60 vpd. Details with regard to traffic can be found in Section 15.

Route 1A currently carries approximately 3,100 vpd in the area of the site drive, and approximately 5,300 vpd along Route 1A in the area of Alcan. The incremental amount of operational traffic will not be significant along Route 1A, and thus the operational traffic noise due to the Project will be insignificant. This route already serves several other power generation facilities along this corridor as well as the Alcan aluminum products manufacturing plant that borders the site to the west. Some noticeable increase in construction traffic noise is likely during the peak morning and afternoon hours when traffic is heaviest. However, the construction traffic will generally only be present during the daytime, and since by the nature of construction, this is only a temporary activity, no long-term noise effects are predicted.

11.5 Noise Abatement Measures

Noise abatement measures, as discussed in Stipulation No. 6, Clauses 5 (construction) and 7 (operations), will be incorporated into the facility construction and design to satisfy the acoustic design criteria outlined in Section 11.2. While specific noise mitigation measures will be determined during the facility design process, the noise abatement measures identified thus far are expected to include the ones listed below. No other abatement options were identified for the Project.

11.5.1 Construction

The construction mitigation measures will be essentially the same for each primary phase of construction. Each of the five construction phases will include the following noise abatement measures:

- The federal regulations limiting truck noise will be complied with.
- The construction equipment manufacturers' normal sound muffling devices will be used, and will be kept in good repair throughout the construction process.
- The majority of the potentially noisy construction work will be performed during daytime hours, between 7 a.m. and 5 p.m.

Additional noise abatement features that are applicable to specific construction phases would include the following:

Site Clearing and Excavation

- Any blasting will be conducted within below ground blast holes and blast mats. Minimal above grade blasting may be required to remove larger boulders. This blasting will be limited to daytime periods, and will involve minor charges. Local residents will be notified in advance of any blasting activities.

Siding and Machinery Installation

- The building shell will be installed as early in the erection process as possible in order to contain construction noise emissions generated within the building interior. Equipment installation and assembly will be performed within the building shell to the fullest extent possible.

Site Clean-up, Plant Start-up and System Blow-out

- A temporary vent silencer will be installed on the steam-blow vent during pipe cleanout. This process will be limited to daytime hours only. Local residents will be notified of the approximate starting date of this process that typically lasts 2-3 weeks.

11.5.2 Operation

As part of the sound level modeling, the following silencing options were incorporated into the Project's conceptual design. These noise abatement options will apply to all operating scenarios. The Project will operate at between 50 percent and 100 percent load capacity as the needs of the electric grid dictate. Noise impacts were calculated for 100 percent load as that will be the worst-case for noise impact purposes. Other operating scenarios will produce lower impacts.

- The combustion turbines, HRSGs, steam turbines, generators, boiler feed pumps, and other auxiliary equipment will be housed within the generation building. The generation building will be constructed of 26-gauge steel and sound insulating blankets within the walls. The generation building will attenuate noise levels from this equipment.

- Use of building ventilation louvers will be minimized and located so as not to radiate noise off-site. Air intake and exhaust for the power generation building will also be through quiet supply and exhaust fans (silenced as appropriate) on the building's roof.

- The combustion turbines, steam turbines, and generators will be enclosed with vendor supplied equipment to reduce equipment noise within the power generation building.

- The combustion turbine air intakes will be fitted with 8 feet of silencing.

- The HRSG and SCR will mitigate the combustion turbine exhaust noise. In addition, a stack silencer will be installed in each HRSG exhaust stack.

- The combustion turbine compartment vent fans will be fitted with inlet silencers.

- The circulating water pumps for the cooling towers will be housed within a building.

- Quiet transformers will be selected, or transformer barrier walls will be built on the north and east sides of the main and auxiliary transformers.

- Special low-noise cooling towers will be specified, including low noise fans, appropriate noise shields and other measures.

Section 5 of this application contains an extensive discussion and analysis of alternative cooling technologies as they impact noise (and other disciplines). Since the cooling tower is one of the key components of the noise analysis, an alternative technology analysis is most appropriate for this piece of equipment. As discussed in Section 5, the use of a mechanical wet cooling tower system has been determined to be the most appropriate technology for the Project. The wet cooling tower option best balances the range of technical, environmental and cost criteria examined.

11.6 Post-Construction Noise Evaluation

Stipulation No. 6, Clause 10, requires that post-construction noise evaluation studies be undertaken to establish conformance with noise design goals. A post-construction noise survey will be conducted to ensure the Project conforms to design criteria. A monitoring protocol will be prepared and submitted in the Compliance Filing prior to conducting the measurements. The protocol will outline the measurement procedures, facility operating conditions, and required documentation to verify compliance. The general test procedure will involve establishing current (at the time of the test) background noise levels without the Project, measuring noise levels with the Project operating, and then mathematically subtracting the background noise levels from the measured operational levels with the Project to determine the facility noise level.

12. SOCIOECONOMICS

12.1 Applicable Regulatory Requirements

This section addresses Stipulation No. 7, Clauses 1 through 20. In accordance with that stipulation, the construction and operation of the Project was assessed to determine the net effect of the Project on local and regional socioeconomic conditions. No specific regulatory requirements exist in this regard. Rather, the goal is to provide for economic development within the region that provides a net economic benefit without significantly impinging on the community's environment or existing services. The Project, as identified in the following sections, meets such community development goals.

12.2 Economic Effects of Project Construction

12.2.1 Construction Jobs by Discipline

It is expected that the Project will generate a total of approximately 1,000 construction jobs over the anticipated 34-month construction period. A breakdown (by percentage) of the various disciplines to be employed during the construction period is provided below in accordance with Stipulation No. 7, Clause 1:

- Electricians – 15%
- Pipefitters – 15%
- Carpenters – 9%
- Ironworkers – 9%
- Laborers – 9%
- Boilermakers – 8%
- Millwrights – 7%
- Cement Finishers – 6%
- Insulation Workers – 5%
- Management – 4%
- Operating Engineers – 4%
- Sheetmetal Workers – 3%
- Painters – 2%
- Sprinklerfitters – 2%
- Teamsters – 2%

12.2.2 Construction Work Force by Phases

This section addresses Stipulation No. 7, Clause 2.

The Project's construction period is expected to be 34 months. Of this 34 months, the initial 2 to 3 months will include site preparation and underground utilities. The following 12 months will include installation of civil/structural foundations, support columns, elevated and on-grade slabs as well as structural steel buildings. Ten to

11 months after mobilization, the mechanical/electrical phase of the Project will begin. This phase involves installation of plant equipment including combustion turbines, steam turbines, other equipment and associated piping, controls, conduit, wire and insulation. Initial startup/checkout activities for the first unit are scheduled to begin approximately 21 months after mobilization and will be completed for the second unit at the end of the 34th month.

During the initial 2 to 3 months of excavation and underground utility installation, manpower is anticipated to be a maximum of 120 to 150 employees. The following 9 months of civil/structural activities will require a maximum of 350 employees. The peak manpower for this Project will be required for the period of time when civil/structural activities are being completed and mechanical/electrical activities are at their maximum. A maximum of 600 employees are expected for this period of time which extends from the 10th to the 22nd month. The first six months of the 8-month startup/checkout schedule will require manpower ranging from 200 to 400 employees while the final 6 to 8 months will require a maximum of 150 employees.

12.2.3 Construction Payroll

Table 12-1 provides an estimate of construction payroll, by trade segment, for each year of the Project in accordance with Stipulation No. 7, Clause 3.

Table 12-1: Estimate of Construction Payroll

Year	Civil/Structural	Mechanical/Electrical	Other
2001	$2-2.7 million	$0.7-1.2 million	$0.5-0.8 million
2002	$2.5-3 million	$11-12 million	$2-2.5 million
2003	$0.4-0.7 million	$7-8 million	$1.7-2 million
Total	**$4.9-6.4 million**	**$18.7-21.2 million**	**$4.2-5.3 million**

12.2.4 Direct Non-Payroll Expenditures

This section addresses Stipulation No. 7, Clause 3.

Local purchases of materials, supplies and services used for construction will comprise another direct and positive socioeconomic impact. A very conservative approach is to assume that local purchases would be limited to concrete and its basic constituents, construction consumables, and site services (including temporary toilets, office supplies, waste disposal, surveying and site security). Based on this assumption, a minimum of $3 million in materials, supplies and services will be purchased locally during construction.

12.2.5 Secondary Economic Impact

This section addresses Stipulation No. 7, Clause 4.

Assuming the primary economic impact estimates noted above, regional input-output models can be used to estimate the secondary impact. The U.S. Department of Commerce, Bureau of Economic Analysis (BEA), uses an updated version of the Regional Industrial Multiplier System (RIMS II) input-output model to estimate secondary impacts that are specific both to certain types of industries and to certain regions. Oswego and Onondaga Counties (the Oswego and Syracuse area) were chosen as the local study area.

The estimated primary investment (calculated above) is \$30-\$33 million in payroll expenditures and at least \$3 million in other local investments. Thus, at least a \$33 million investment in the local economy is assumed. Using the conservative methodology of substituting peak employment for total employment (which is conservative because many job requirements will occur only before or only after the peak months), at least 600 jobs will be created.

The regional output multiplier for industrial construction in the study area is calculated by BEA to be 1.91 (U.S. Department of Commerce, BEA, November 1999). Thus, economic output in the area will increase by at least: \$33 million × 1.91 = \$63 million.

The regional multiplier for changes in earnings due to industrial construction payroll in the local area is also calculated by BEA to be 1.91. The multiplier for earnings due to industrial construction investment is 0.54. Thus, earnings in the area can be estimated to increase by [(\$30 million × 1.91) + (\$3 million × 0.54)] = \$59 million.

The regional employment multiplier for the local area is calculated by BEA to be 2.03 jobs for every new industrial construction job. Thus, employment in the area is expected to temporarily increase by more than 1,200 jobs, conservatively assuming 600 jobs directly associated with the Project.

12.3 Economic Effects of Project Operation

This section addresses Stipulation No. 7, Clauses 5 and 6.

The Project is expected to provide an estimated 20 permanent jobs under the operational scenario. The on-site payroll is estimated to be approximately \$1.5 million per year. Over the first 20 years of operation, approximately \$30 million in direct wages will be paid to the Project's operating staff and maintenance personnel.

During each year of operation, significant purchases of non-fuel O&M expenditures will be made in the study area. It is estimated that, for the first year of operation, total non-fuel O&M expenditures, including a 20 percent contingency, will equal approximately $7.5 million. Of this total, it is expected that approximately $4.4 million in O&M expenditures will be made within the study area. Study area O&M costs will include wages of the operating staff, contracted services such as janitorial, security, maintenance and general engineering support, plus the cost of chemicals, water, routine inspection and repairs, and forced outage repairs. An appropriate industry aggregation describing these activities (for purposes of choosing earnings multipliers for non-payroll expenditures) is "business services."

The RIMS II model has also been used to estimate secondary impacts of Project operation on an annual basis.

Total expenditures in the study area are estimated to be: $1.5 million (payroll) + $4.4 million (services and supplies) = $5.9 million. The regional output multiplier for electrical services in the study area is calculated by BEA to be 1.43. Thus, output in the area is estimated to increase by $5.9 million × 1.43 = $8.4 million per year.

The regional multiplier for changes in earnings associated with electric industry payroll in the study area is calculated by BEA to be 1.91. The multiplier for "business services" is 0.64. Thus, earnings in the area can be estimated to increase by ($1.5 million × 1.91) + ($4.4 million × 0.64) = $5.7 million per year.

The regional employment multiplier for the local area is calculated by BEA to be 3.38 jobs for every new job in the electrical industry. Thus, a reasonable estimated employment increase is 68 permanent new jobs.

12.4 Work Force Availability

This section addresses Stipulation No. 7, Clauses 7 and 8.

An estimate has been provided which identifies the maximum number of workers in each craft required for the construction of the Project. Those estimates are provided below.

- Electricians – 100
- Pipefitters – 100
- Carpenters – 60
- Ironworkers – 60
- Laborers – 60
- Boilermakers – 50
- Millwrights – 45
- Cement Finishers – 40
- Insulation Workers – 30
- Operating Engineers – 25
- Sheetmetal Workers – 20

- Painters – 10
- Teamsters – 10
- Sprinklerfitters – 10

The labor organizations associated with each of these crafts have been contacted to determine their membership and availability to staff the Project's construction needs (Personal Correspondence, 1999). The responses are provided in Table 12-2, which links maximum staffing needs to labor supply availability.

The discussions with the various craft union representatives have included unanimous responses in regard to their ability to staff the Project. Many representatives referenced reciprocal agreements with other union chapters to further supplement their ranks, if necessary. Several referenced apprentice programs that will also increase their ranks. Only two mentioned known future projects that would be competing for labor. The Operating Engineers' representative identified the Onondaga Lake Cleanup Project, which will run from 2001 through 2003, and the

Table 12-2: Worker Availability for Project Construction

Craft	Maximum Need	Local Supply	Additional Regional Supply
Electricians	100	1,200	200
Pipefitters/Sprinklerfitters	110	340	800
Carpenters/Millwrights	105	832	
Ironworkers	60	600	
Laborers	60	250	100
Boilermakers	50	225	
Cement Finishers	40	500	500
Insulation Workers	30	Not provided	
Operating Engineers	25	1,700	
Sheetmetal Workers	20	200	
Painters	10	Not provided	
Teamsters	10	Not provided	

Electrical Workers' representative identified a major mall expansion in Syracuse scheduled to start in 2000 with a 12 to 24 month duration. These latter unions also have the greatest membership, and the Project's needs would represent a small percentage of their available labor supply.

It is expected that there will be no temporary construction worker in-migration associated with the craft occupations required for construction of the Project. Not only have local labor organizations confirmed that a more-than-adequate labor supply will be available, but that the Project may provide opportunities for members to return home from temporary assignments outside the commuting area.

It is possible that the need for 30 to 40 specialized construction management personnel will result in temporary relocation of these workers from outside the region over the 34-month construction period. In addition, it is estimated that 3 of the 20 operations personnel will relocate from outside the commuting area on a permanent basis, arriving in the final 6 months of the construction period.

12.5 Work Force Accommodation During Construction

This section addresses Stipulation No. 7, Clauses 9, 10 and 12.

12.5.1 Identification of Temporary Housing

Sources such as the Oswego County Comprehensive Plan and Operation Oswego County marketing literature rely on U.S. Census Bureau information (1990) to identify the relative level of available housing in Oswego County. These sources indicate that of a total of over 42,000 total housing units, approximately 2,500 (nearly 6 percent of the housing supply) were unoccupied and assumed available for occupancy. A more detailed breakdown provided in the Oswego County Comprehensive Plan indicated that, of a total of over 48,000 units, approximately 6,100 were considered vacant. This sample included seasonal or occasional use homes in the vacancy total; without those units (approximately 3,600), the vacancy rate is still over 5 percent of the available housing stock.

Information provided on the official Oswego County web site listing hotel and motel room and efficiency unit accommodations indicated that approximately 900 rooms and 100 efficiency units are available in Oswego County.

Information for the Syracuse Metropolitan Statistical Area (outside Oswego County but within commuting distance) indicated a housing stock total of nearly 300,000 units, with 7.9 percent vacancy rate, or nearly 24,000 units. These figures indicate that the possibility of 30 to 40 workers temporarily relocating to the study area can be easily accommodated by the available housing supply.

The magnitude of Project-related temporary needs (30 to 40 units) represents less than 1/10 of 1 percent of the available county housing supply and, as such, is anticipated to result in minimal impact.

12.5.2 Incremental Cost to School Districts

Information provided in the 1997 Oswego County Comprehensive Plan indicates that the total public school enrollment in Oswego County school districts in 1993 was 25,777 students. Population and household data and projections provided by Woods & Poole Economics (1999) indicate that there were a total of 43,660 household in Oswego County in 1993. This information provides a rate of 0.59 students per Oswego County household. Using this rate, the estimated increase in students associated with the potential temporary relocation of 30 to 40 construction workers would be 18 to 24 students, assuming that all workers would relocate with their entire families. This total represents less than one-tenth of one percent of the total school enrollment in Oswego County, or less than one new student per 1,000 existing students. This negligible increment is not expected to result in any additional incremental school operating and infrastructure costs beyond those considered within the parameters of normal school needs planning. Discussions with the Oswego Superintendent's Office (telephone conversation, Dr. Eastwood, January 2000) indicate that their office generally estimates a cost of approximately $8,500 per student for operating costs. The predicted increase in students associated with the construction phase of the Project is small; without specific information on which grades any incoming students would enter, no specific comment on potential impact was possible.

12.5.3 Incremental Cost to Municipal Services

Since the maximum population increase associated with workers relocating to the study area during the construction period is between 30 to 40 workers and their families, the increased demand for hospital, fire, ambulance, police and utility services is expected to be minimal. This conservative estimate represents less than one-tenth of one percent of the total number of households in Oswego County.

At the construction site itself, an increase in demand for occasional use of medical facilities, emergency services, and disposal of construction wastes is anticipated. In order to limit the demand for medical and emergency services, a safety orientation program, site security and fire response plan will be in place to reduce the likelihood of the need for emergency services. The emergency plan currently in place at the neighboring Independence Station will be adopted for use at the Project's construction site.

Waste disposal during construction will be minimized through the employment of an aggressive recycling program that will focus on scrap metal and reusable timber. Given this effort, it is estimated that during construction, eight dumpsters with an average holding capacity of 7 tons will be emptied a maximum of four times per month. The tipping fee for the disposal of construction waste materials is $50 per ton (Oswego County Department of Public Works, Division of Solid Waste 1999). In total, approximately 7,616 tons and $380,000 in tipping fees will result from Project construction. This results in approximately 2,688 tons of solid waste per year during the construction period, or less than 3 percent of the 93,176 tons of various waste materials handled by the Division of Solid Waste. Given this relatively small percentage increase in solid wastes at the county level, and previous information (1991) that the county landfill was projected to have 40 to 60 years of remaining capacity, construction activities will not significantly impact solid waste disposal in the county. Contact with the Oswego County Department of Public Works (1999) has confirmed the above information.

12.6 Work Force Accommodation during Operation

This section addresses Stipulation No. 7, Clauses 11 and 13.

12.6.1 Incremental Cost to School Districts

As previously discussed in Section 12.5.2, the total public school enrollment in Oswego County school districts in 1993 was at a rate of 0.59 students per Oswego County household. Using this rate, the estimated increase in students associated with the potential permanent relocation of three operations personnel would be two students. This total represents less than 1/100 of 1 percent of the total school enrollment in Oswego County, or less than one new student per 10,000 existing students. This negligible increment is not expected to result in any additional incremental school operating or infrastructure costs beyond those considered within the parameters of normal school needs planning. Discussions with the Oswego Superintendent's Office (telephone conversation, Dr. Eastwood, January 2000) indicate that their office generally estimates a cost of approximately $8,500 per student for operating costs. The predicted increase in students associated with the operation phase of the Project is small enough such that there would be no significant increase in the existing student body.

12.6.2 Incremental Cost to Municipal Services

An increase in the demand for community facilities and services could arise from the location of new employees and families in the study area and from Project operation. However, because the majority of operations employees are expected to be hired from within the study area, the increased demand for community facilities and services due to relocating operations personnel and their families will be unnoticeable.

Project operation will have an impact on the demand for community services and facilities. These impacts will be limited. Impacts to safety services will be especially minimal due to overlapping resources associated with the existing Independence Station.

The Project will require up to 4.9 mgd of water for various plant uses including make up to the plant cooling systems and steam cycle. Water will be delivered from the city of Oswego using the existing SCWMD water pipeline. Water is currently treated at the existing city water treatment plant and delivered via a city water line and SCWMD water line serving Independence Station. The present water pipeline is adequate to serve the increased demand of the Project, and with some required modifications within its fenceline, the existing city treatment plant will sufficiently accommodate the new water demand. The city's existing lake water intake structure is underutilized and has sufficient capacity to accommodate the Project's needs. Adding the maximum of 4.9 mgd required by the Project would raise the total treated water capacity requirement for the treatment plant to approximately 25 mgd. This flow falls within the city's current allocation of the capacity of the lake water intake. The total requirement of the SCWMD would rise to 15 mgd. This flow is well within the existing capacity of the dedicated clear well pump station and force main. However, meeting the additional requirement imposed by the Project requires upgrades to the treatment plant, as shown in Table 3-2. The total cost for these improvements has been estimated by Barton & Loguidice to be $3-4 million (see Appendix F). It is anticipated that the Project would enter into a long-term water supply agreement with the city whereby the Project would finance the required improvements. All of the identified improvements would be conducted within the existing water treatment plant site.

The total requirement of the SCWMD would rise to 15 mgd. This flow is well within the existing capacity of the dedicated clear well pump station and force main of 17 mgd. It will be necessary for both the city of Oswego and the town of Scriba to apply for modifications to their respective Article 15, Part 15 Water Supply Permits to accommodate the Project's requirements.

Solid wastes generated during operation will be taken to the county transfer station or landfill locations. There will be no excessive demands placed on the county's solid waste facilities, since only approximately three dumpsters, estimated to hold about 7 tons of waste materials, will be filled each month during operation. This represents less than one-half of one percent of the materials handled at the county transfer stations and landfills during the latest reported year of operation (1997). Solid waste generated during operation will result in approximately $252,000 in tipping fees over the first 20 years of operation. This has been confirmed through consultation with the Oswego County Department of Public Works (1999).

12.7 Real Property Taxation

This section addresses Stipulation No. 7, Clauses 14, 15, 16 and 17.

12.7.1 Taxing Jurisdictions

The Project site is located within the following tax jurisdictions: County of Oswego, Town of Scriba and Oswego City School District. The company intends to make application to the county of Oswego IDA for financial assistance which may take the form of issuance of bonds, real property tax abatement, mortgage recording tax exemption and/or sales tax exemption.

12.7.2 Current Tax Rates

Table 12-3 summarizes tax rate information for taxing jurisdictions associated with the Project.

Table 12-3: Tax Jurisdictions and Associated Tax Rates

Tax Jurisdiction	Tax Rate	Total Tax Levy
County of Oswego	$80.21013/$1,000	$18,293,182.00
Town of Scriba (Total)	$9.27117/$1,000	$2,161,468.00
– Town of Scriba General	$3.53233/$1,000	–
– Town of Scriba Highway	$4.86316/$1,000	–
– Town of Scriba Fire District 1	$0.87568/$1,000	–
– Town of Scriba Water District 1	$0.00000/$1,000	–
– Town of Scriba Water District 2	$0.00000/$1,000	–
Oswego City School District	$121.73000/$1,000	$35,256,008.00
Combined Tax Rate	**$211.21130/$1,000**	–

12.7.3 Current Assessed Value

The Project site consists of approximately 10 acres of vacant land located on portions of three of the nine tax parcels comprising the Independence Station lands. The average assessed value of vacant land on these three tax parcels is $3,375 per acre.

12.7.4 Resultant Taxes

Due to the fact that the Project site is within the vacant lands covered under the PILOT agreement for Independence Station, the affected taxing jurisdictions currently receive revenue from the Project site through their pro-rata shares of those PILOT payments. It is currently the Applicant's intention to apply for either a PILOT agreement through the local IDA or other applicable statutory tax treatment. Whatever tax status is chosen, the Project will bring significant new revenue to the affected taxing jurisdictions.

12.8 Safety and Emergency Response

This section addresses Stipulation No. 7, Clauses 18 and 19.

The Project will be governed by an emergency response plan, which will be continuously updated to reflect improvements in industry safety standards. It will be similar to the plan in place at Independence Station, now in its ninth revision (September 1999). That emergency plan is provided for reference purposes as Appendix P.

A five-page list of plant emergency equipment, including quantity and location within the various plant buildings, is provided in the emergency plan attached in Appendix P. This list is representative of the equipment which will be provided for the Project.

The purpose of the emergency plan is to define the response for non-operational plant emergencies such as oil spills, release of chemical or hazardous materials, medical emergencies, fire emergencies, law enforcement emergencies, weather emergencies, plant evacuation and other emergencies at nearby facilities. Attachments within the plan include emergency phone numbers, oil spill response and emergency checklist, chemical/hazardous material release emergency response checklist, medical emergency response, fire emergency response, law enforcement/security response emergency, severe weather emergency response, plant evacuation emergency response, other emergency response, hazardous material/oil spill report form, listing of plant emergency equipment, tank bulk storage/spill flow diagram and emergency incident investigation report.

12.9 Economic Development Efforts

This section addresses Stipulation No. 7, Clause 20.

During the early 1990s when Independence Station was in the permitting stage, it was generally believed that the mere presence of inexpensive electric and thermal energy would be enough to attract new economic development opportunities to the area. At the time Sithe agreed to actively pursue those opportunities. It should be noted that this was before most states, including New York, had begun to give serious consideration to restructuring or deregulating the energy industry and, at the time, energy costs were a primary consideration in the selection process for new manufacturing facilities.

As part of those efforts Sithe subdivided the Independence Station property into five distinct parcels, as shown in Figure 10-3. The parcels that were to be used for future development purposes, Lots #1-4 and the remaining parcel that consists of all those lands necessary for the operation and maintenance of Independence Station. Of the four lots designated as sites for future development only one (Lot #1) will be affected by the Project.

Development efforts began somewhere around 1991-92 and soon became generically known as the "Liberty" project, following on the name of one of the initially proposed paper mill ventures. With respect to paper-related projects, "Liberty" has in fact been six different projects. The first was a venture with the Jefferson Smurfit Company. The North American office had approved the project, but the corporate office in Ireland turned it down and the project was built in Ireland. The second was a venture with Visy Paper that eventually located in Staten Island based on a tremendous cost advantage for feedstock. The third (and the actual "Liberty") was with a Wisconsin-based paper machine company named Beloit. Market prices during the paper company's permitting process changed to the extent that the operation's profitability became questionable.

The fourth and fifth "Liberty" projects were proposals with Southern Container and Ponderosa Fibers that both collapsed due to changes in tipping fees for compostable paper sludge. The sixth and most recent "Liberty" project (1996-97) was a Union Camp linerboard mill that the company decided to site closer to their box mills.

Including the aforementioned paper mill projects, Sithe has worked to seek out other economic development opportunities as summarized below:

- The company has had discussions with over 2 dozen project sponsors with a potential 3,100 jobs and potential investment of $2.33 billion. Sithe continues to pursue and encourage economic development activities.

- Sithe has solicited several hundred companies that have been identified by Dun & Bradstreet Market Services, Anderson Consulting and others as the fastest growing in their fields and most likely to expand.

- Sithe has investigated approximately 30 leads from a business-based investment web site. Of those leads, Sithe has had at least preliminary discussions with ten companies.

- Sithe has undertaken a cooperative venture with Operation Oswego County to find business leads from economic development sources such as the Site Selection Network that is part of the National Association of Manufacturers Economic Development program, as well as through SelecTOWN, an on-line service that identifies qualified leads, community profiles, resources and other information in an effort to match businesses with communities.

- Sithe has responded to over 60 inquiries generated by the various ads it has developed and placed in economic development/site selection publications.

- All activities undertaken by Sithe as part of this effort to attract qualified tenants to the Independence Industrial Park and stimulate further economic development have resulted in an investment to date of approximately $1.5 million on the part of Sithe.

- The company also has site information and materials on hand and available at various locations. They include Operation Oswego County, the Conrail division of economic development, the Empire State Development Corporation, the Metropolitan Development Corporation, a Syracuse-based commercial real estate firm, a local law firm, a Tennessee-based site consultant, and the international headquarters of a labor union.

13. SOILS, GEOLOGY AND SEISMOLOGY

This Section addresses Stipulation No. 8.

13.1 Applicable Regulatory Requirements

Geologic and other earth resource characteristics do not generally trigger specific regulatory measures. However, the presence of some natural features requires adherence to special regulations or design guidelines. Soil erosion and sedimentation control measures are components of the design of the construction process. The details of these measures, since they are related to the control and discharge of stormwater, are discussed in Section 17.7. This section describes the existing characteristics of soils and geology at the site, and reviews the potential impacts or design considerations associated with the site's characteristics. In addition, this section outlines specific measures to be taken in the event that blasting is required, and addresses the potential for regional seismology to affect the Project. Because there are few regulatory standards specific to earth resources, the significance of such impacts are assessed according to the needs of facility design and engineering, and any resulting impacts on other environmental systems.

13.2 Soils Analysis

This section addresses Stipulation No. 8, Clauses 2(a-d).

13.2.1 Soil Types in Areas of Disturbance

The Project site is underlain by unconsolidated sediments deposited during the most recent period of glaciation which ended approximately 10,000 years ago, and which marked the end of the Pleistocene Epoch. The varieties of overburden formed by this process ultimately determined the kinds of soils that are currently found throughout the region.

Most of the glacial deposits found in the region consist of glacial tills. These are categorized as either lodgement or ablation tills, depending on the nature of their formation. Lodgement till was deposited beneath the advancing glacier and consists of clay to boulder-size particles, which were subjected to tremendous compaction forces, producing a fairly impermeable layer. Ablation till consists of similar material, but was carried as drift on top of or within the glacier and laid down as the ice melted. Ablation till is more permeable and is typically found overlying the lodgement till. Most soils of Oswego County (Empeyville, Sodus, Scriba, Worth, Ira, and Westbury) were formed in glacial till. Other soils, such as Palms muck, were formed in very shallow glacial lakes, while in deeper lakes, fine silt and clay deposits gave rise to Hudson, Rhinebeck, Williamson, and Raynham soils. Herkimer, Rumney, and Middlebury soils formed in the alluvial fans of glacial rivers (USDA Soil Conservation Service 1981).

Most of the soils on the Project site (see Figure 13-1), including Ira, Sodus, and Scriba, are derived from glacial till parent material. There is a small area of Palms muck mapped in the southwestern portion of the Project site, which was derived from shallow lake or pond sediments. Also, a small portion of the site along the shore of Lake Ontario is mapped as Beaches (USDA Soil Conservation Service 1981).

Based primarily on soil characteristics, specific soil units in Oswego are classified as important farmlands. The three categories are prime farmland (soils suited for producing food, feed, fiber, forage, or oilseed crops, considered to be areas producing the most food and feed with the least amount of energy); unique farmland (soils that can be used for the production of specific high-value crops such as lettuce and onions); and farmland of statewide importance (soils which exhibit some of the properties of prime farmland). Farmlands of importance may be in cropland, pastureland, rangeland, forest land, or other land uses but not urban or built-up land or water use.

The Scriba unit ScB and Ira unit IrB soils are classified in Oswego County as farmland of statewide importance. Currently, at the Project site, these areas are primarily deciduous forested uplands. The Palms unit (PA) is classified as unique farmland. The Palms unit is currently deciduous forested wetlands. The remaining two units, i.e., BC and IUD, are not classified as important farmlands.

13.2.2 Soil Suitability and Dewatering Needs

Characteristics associated with the soils on the Project site are shown in Table 13-1.

It should be noted that information from the Soil Survey of Oswego County, New York indicates a mapping unit of IUD as the primary unit upon which most of the Project will be built. The slopes which are associated with the IUD unit (i.e., 15-25%) are not characteristic of the Project site. Slopes on the Project site are primarily in the range of 0-8 percent. This range of slopes moderates the degree of soil limitation and thus the site has a higher suitability for building site development than reflected in the information provided by the Soil Survey of Oswego County, New York.

Wetness is a second factor identified as a limitation on building site development, particularly with shallow excavations. Wetness within the IrB, IUD and ScB units is associated with a perched water table. However, it is anticipated that perched water may be encountered and that dewatering of perched water can be accomplished by local pumping and sumps. None of the proposed facilities will require continuous post-construction dewatering.

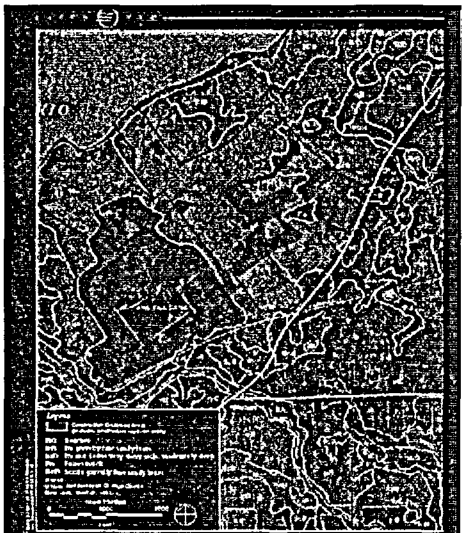


Figure 11-1

Soils on the Project Site

Table 13-1: Soil Characteristics*

						Suitability for Building Site Development[4]		
Soil Unit	% Slope	Water Table/Kind[1] (feet below surface)	Hydrological Group[2]	Depth to Bedrock (feet)	Permeability[3] (in/hr)	Shallow Excavations	Small Commercial Building	Roads and Streets
BC-Beaches	0-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
IrB-Ira gravelly fine sandy loam	3-8	1.5-2.0/ perched	C	>5	0.06-2.0	Severe: wetness	Moderate: frost action slope	Moderate: frost action
IUD-Ira and Sodus very stony soils	15-25	1.5-2.0 Ira 2.0-3.0 Sodus/ perched	C Ira C Sodus	>5 Ira >5 Sodus	0.06-2.0 Ira 0.06-2.0 Sodus	Moderate: wetness (Ira, Sodus)	Moderate: frost action (Ira, Sodus)	Moderate: frost action (Ira, Sodus)
Pa-Palms muck	0-2	0.0-1.0/ apparent	A	>5	0.2-6.0	Severe: wetness excess humus cut bank cave ins	Severe: wetness floods	Severe: Wetness low strength floods
ScB-Scriba gravelly fine sandy loam	0-8	0.5-1.5/ perched	C	>5	0.06-2.0	Severe: wetness	Severe: wetness frost action	Severe: frost action

[1] Water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years.

Water Table Kind

Apparent Water Table: A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Perched Water Table: A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

[2] Refers to soils grouped according to their runoff producing characteristics. Group A soils have a high infiltration rate (i.e., 0.3-0.45 in/hr), when thoroughly wet, and a slow runoff potential. Group D soils, at the other extreme, have a very slow infiltration rate (i.e., 0.00-0.05 in/hr), and a high runoff potential. Primarily, soils on the site are Group C (infiltration rate 0.05-0.15 in/hr). These soils have a slow infiltration rate, when thoroughly wet. These soils generally have a layer that impedes the downward movement of water.

[3] Permeability is the quality that enables a soil to transmit water or air. Terms used to describe permeability of the soils for this site include:

Slow (0.06 to 0.20 in/hr);
Moderately slow (0.20 to 0.6 in/hr);
Moderate (0.6 to 2.0 in/hr); and
Moderately rapid (2.0 to 6.0 in/hr).

[4] The degree of soil limitation that affects shallow excavations, dwellings, and roads for the soils on-site is as follows:

Moderate: Soil properties on site and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design.

Severe: Soil properties on site and site features are too unfavorable or difficult to overcome.

*Information from Soil Survey of Oswego County, New York, USDA Soil Conservation Service, September 1981.

Infiltration capacity or the limit of water penetration of the soils on the Project site is dependent on such factors as soil-moisture content, soil pore size, and the presence or absence of any soil restrictive layer. In general, soils are assigned to four groups (i.e. hydrological groups, as shown in Table 13-1) on the basis of intake of water. Hydrologically poor conditions represent a state of land use that will provide high runoff. As noted in Table 13-1, the soils on the Project site are primarily Group C, where the minimum infiltration rate is slow (i.e., 0.05-0.15 inches/hour) due to a layer in the soil which impedes downward movement of water, and runoff potential is moderate. However, use of proper erosion and sediment control measures will be components of the design of the construction process, as discussed in Section 17.7, and will minimize this runoff potential.

13.2.3 Depth to Bedrock

Depth to bedrock, according to information in Table 13-1, is generally greater than 5 feet. According to a geotechnical report "Subsurface Investigation and Foundation Evaluation, Independence Station, Scriba, New York" prepared by EBASCO August 1992; depth to bedrock ranges from 3 to 4 feet below existing ground surface, over the area of the existing Independence Station generation building, to 12 to 14 feet within the area of the existing switchyard. A bedrock elevation contour map within the proximity of the Independence Station Generation Building at 1-foot contour intervals, prepared prior to construction of the Independence Station, is included as Figure 13-2. According to this map, the rock contours in the Project's power block area are at Elevation 270 and a spot area with higher rock surface at Elevation 275 may exist along the Project's circulating water pipe route.

13.2.4 Existing Topography

The Pleistocene ice sheet, referred to previously in Section 13.2.1, also affected the topography of the landscape. Most of Oswego County lies within the Erie-Ontario Plain physiographic province, which extends from Lake Erie in the west to the Mohawk and St. Lawrence valleys in the east and north. The limits of this province outline the extent of inundation by glacial Lake Iroquois, and most of this land was at one time lake bottom. Oswego County has been covered and uncovered by several advances and retreats of glacial ice. This repeated advance and retreat has markedly influenced the topography present at the Project site. The predominant glacial deposition is glacial till. In contrast, the northeastern corner of the county extends into the Tug Hill Plateau that is characterized by much steeper terrain and much higher elevations. The surface of the Erie-Ontario Plain is gently rolling with elevations ranging from approximately 240 to 600 feet above mean sea level (msl). The northeastern corner of the county, however, rises to elevations over 1,700 feet msl (Black & Veatch 1992).

Surface features on the Erie-Ontario Plain include numerous north-south oriented hills and ridges formed from moraines deposited at the ice front. The Tug Hill Plateau is characterized by irregular mounds of ablation moraine overlying the native bedrock. Though stream gradients on the Erie-Ontario Plain are quite low, those on the Tug Hill can be quite steep and often result in ravines deeply cut into the bedrock (Black & Veatch 1992).

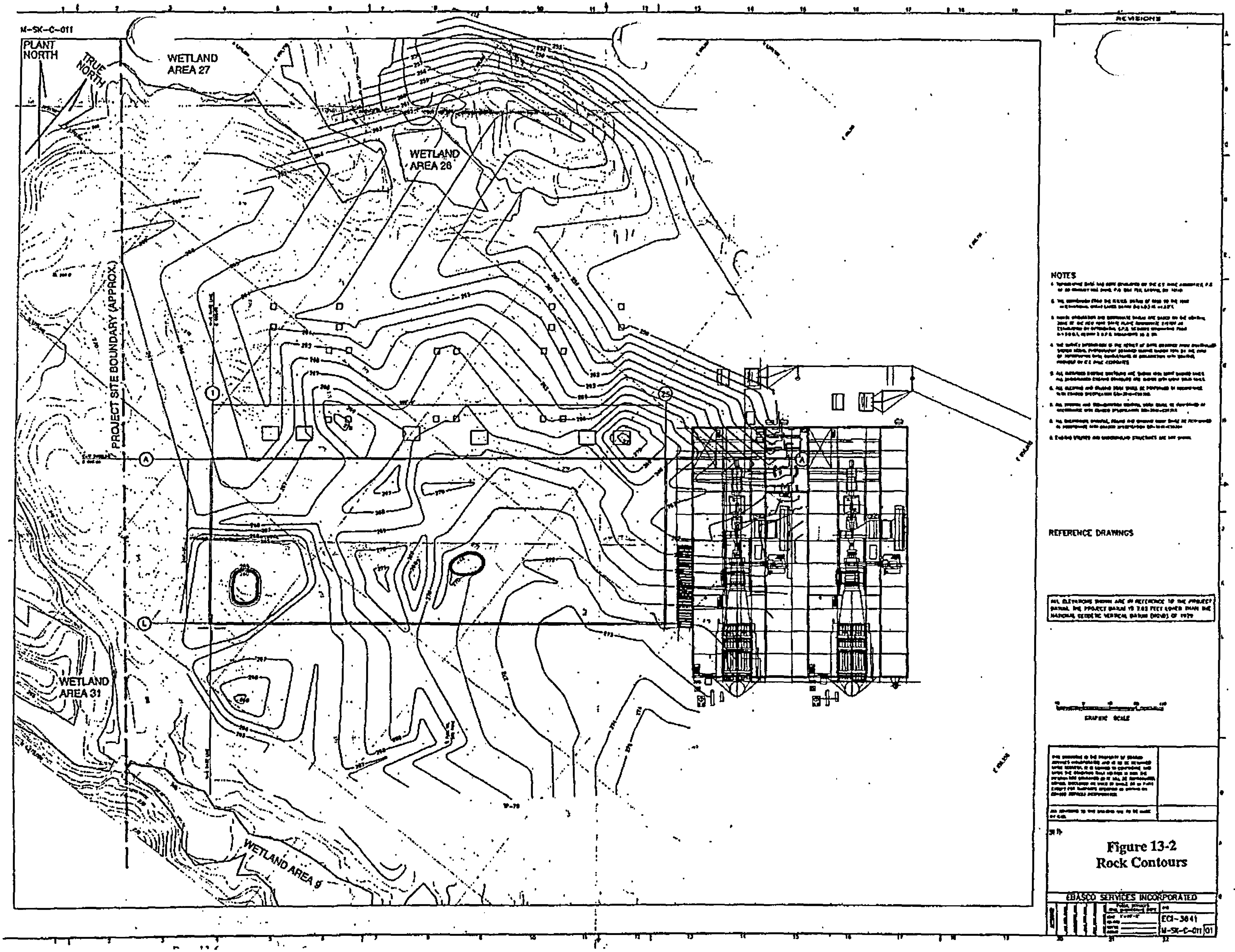


Figure 13-2
Rock Contours

The Project site is entirely within the Erie-Ontario Plain physiographic province. The Lake Ontario shore, including the Project site, is characterized by only minor relief, with slope profiles of only 0 to 3 percent. Elevations on the Project site range from 250 to 310 feet above msl. The little vertical relief that does exist is due almost entirely to the deposits of glacial till, and these deposits were no doubt leveled considerably by lake currents, and later by wave action as the ancient Lake Iroquois receded (Black & Veatch 1992).

Existing topography and slopes on the Project site are shown in Figure 13-3.

13.3 Geological Analysis

This section addresses Stipulation No. 8, Clauses 2(e-m).

13.3.1 Bedrock Types Underneath Areas of Disturbance

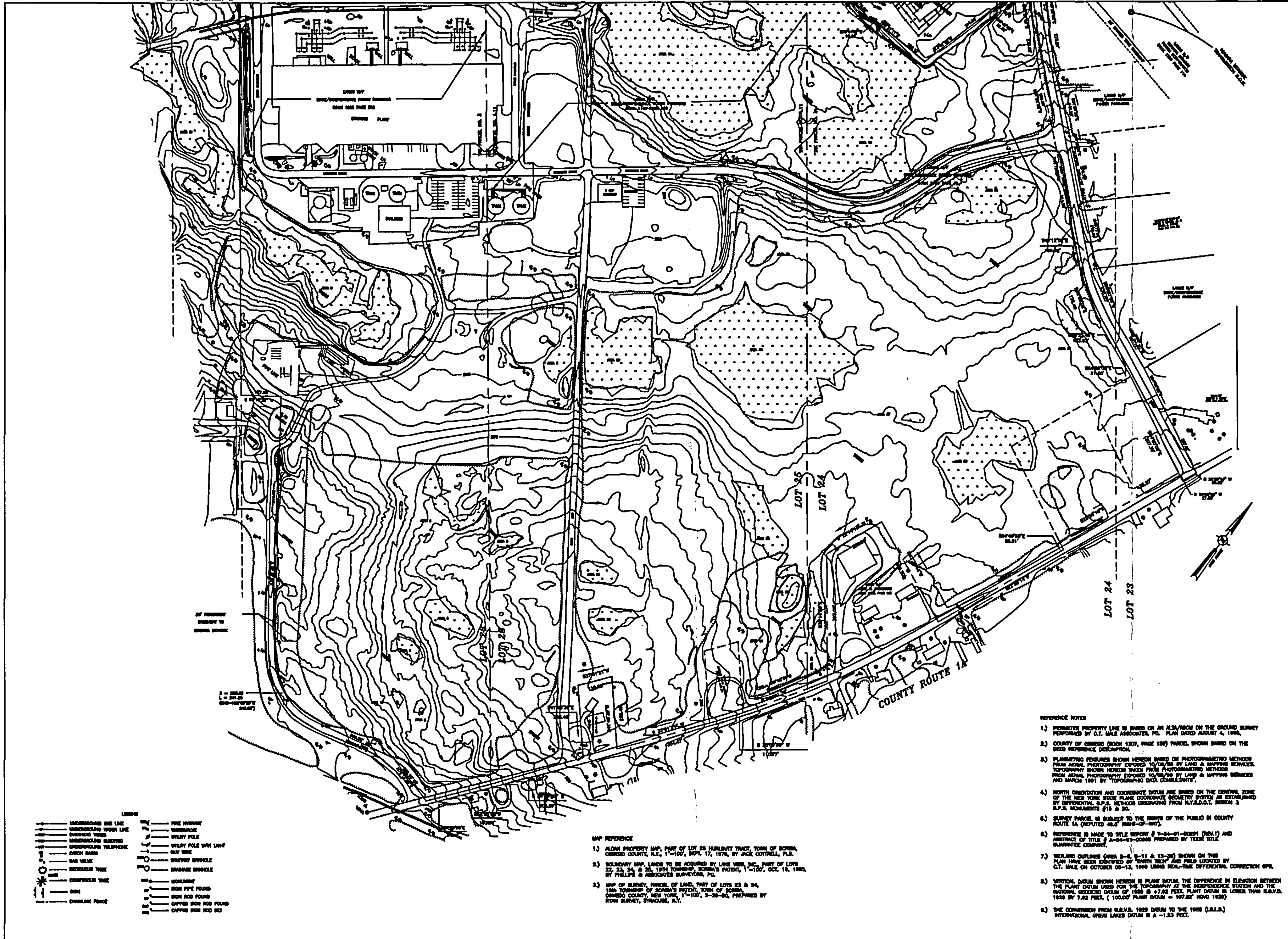
The bedrock underlying most of the region, extending from west of Oswego to Oneida Lake, and to the northeast into the Tug Hill Plateau (including all of the Oswego County), consists of nearly flat-lying sedimentary formations of the Ordovician and Silurian periods, which were deposited over 400 to 500 million years ago (Figure 13-4). These bedrock formations tilt slightly from northeast to southwest at a gradient of approximately 50 feet per mile. As a result, progressively older bands of rock are exposed to the northeast. In some cases, this bedrock is exposed along the shoreline of Lake Ontario as a result of erosion (Black & Veatch 1992).

The Project site is underlain by the Oswego Sandstone Formation, a subunit of the Lorraine Group. It is a gray, medium-textured sandstone. The Oswego Sandstone is overlain on the Project site almost exclusively by till. This till is part of an end moraine that was deposited at the margin of a continental glacier as a result of minor advances and retreats of the glacier (Black & Veatch 1992).

13.3.2 Bedrock Suitability and Blasting Needs

According to the geotechnical report "Subsurface Investigation and Foundation Evaluation, Independence Station, Scriba, New York" prepared by EBASCO, August 1992, the top 3 to 4 feet of Oswego Sandstone generally exhibits near horizontal bedding planes and contains few inclined clay (weathered shale) filled joints. Due to the presence of the weathered shale seams, the rock may be rippable for the uppermost 1 to 2 feet.

According to data provided by Raytheon (1999), the bedrock elevation contours in the power block area are at Elevation 270 and a spot area with higher rock surface at Elevation 275 may exist along the proposed Project circulating water pipe route. The deepest foundations are expected to be at Elevation 265. No blasting is, therefore,

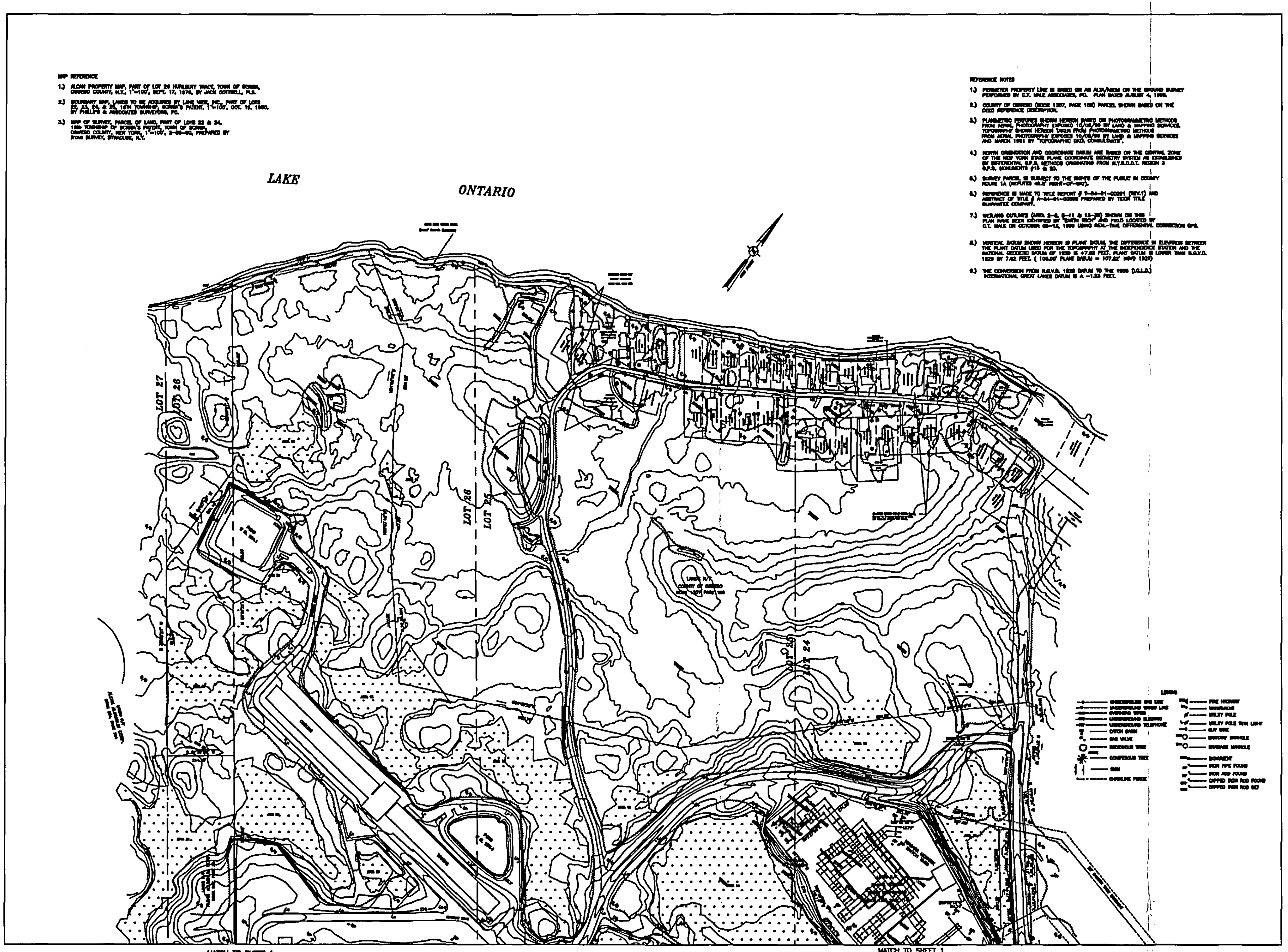


VERTICAL DATUM SHOWN HEREON IS PLANT DATUM. THE DIFFERENCE IN ELEVATION BETWEEN THE PLANT DATUM USED FOR THE TOPOGRAPHY AT THE INDEPENDENCE STATION AND THE NATIONAL GEODETIC DATUM OF 1929 IS +7.62 FEET. PLANT DATUM IS LOWER THAN N.G.V.D. 1929 BY 7.62 FEET. (100.00' PLANT DATUM = 107.62' NGVD 1929)

FIGURE 13–3

SITE TOPOGRAPHY
HERITAGE STATION

C.T. MALE ASSOCIATES, P.C.



VERTICAL DATUM SHOWN HEREON IS PLANT DATUM. THE DIFFERENCE IN ELEVATION BETWEEN THE PLANT DATUM USED FOR THE TOPOGRAPHY AT THE INDEPENDENCE STATION AND THE NATIONAL GEODETIC DATUM OF 1929 IS +7.62 FEET. PLANT DATUM IS LOWER THAN N.G.V.D. 1929 BY 7.62 FEET. (100.00' PLANT DATUM = 107.62' NGVD 1929)

DATE	REVISIONS RECORD/DESCRIPTION	DRAFTER	CHECK	APPR.

APPROVED:
DRAFTED : DMS/JMD
CHECKED : DMS
PROJ. NO : 96.1432
SCALE : 1" = 100'
DATE : NOV. 12, 1999

FIGURE 13-3 (CONTINUED)

SITE TOPOGRAPHY
HERITAGE STATION

TOWN OF SCRIBA — OSWEGO COUNTY, NEW YORK

C.T. MALE ASSOCIATES, P.C.

SHEET 2 OF 2
DWG. NO: 96.467

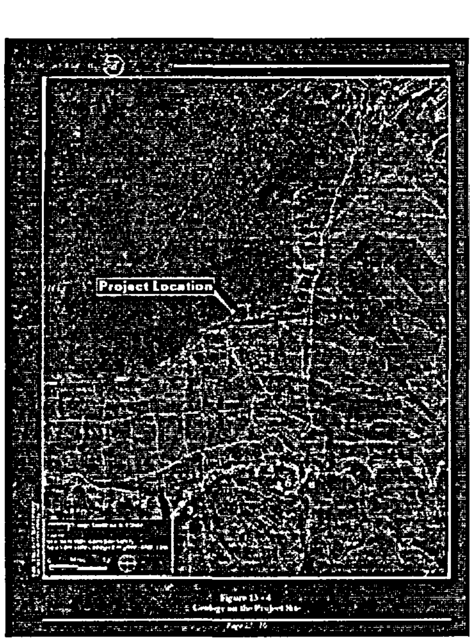


Figure 13-4
Geology on the Project Site

anticipated for the power block construction. The higher rock spots along the circulating water pipe line route and at the pump pit location may require some local blasting if machine ripping is not possible.

According to the EBASCO 1992 geotechnical report, it was found that the site is covered by a thin veneer of very dense sandy and gravelly glacial till over the Oswego Sandstone. Both the fill material and Oswego Sandstone are capable of sustaining heavy loads without appreciable settlements. An allowable bearing capacity of 4 tons per square foot and 20 tons per square foot are recommended for the in situ glacial till and Oswego Sandstone, respectively (EBASCO 1992).

13.3.3 Analysis of Slopes from Contouring Plan

As shown in Table 13-1, slopes according to the Oswego Soil Survey range on-site up to 15-25 percent. However, slopes on the Project site are primarily in the 3-8 percent range, as shown on the topographic site plan provided in Figure 13-3.

13.3.4 Cut and Fill Analysis

The current topography of the Project site is uneven. To construct the Project facilities, a certain amount of excavation and fill activity is needed to achieve a site level enough for construction. A preliminary estimate on cut and fill associated with the proposed Project, in cubic yards (cy) identifies the following:

Excavation:	Topsoil -	20,400 cy
	Subsoil -	65,000 cy
	Rock -	19,000 cy (may be less depending on depth of ripping)
Backfill:	62,000 cy (will be used, on-site excavated materials)	

This cut and fill will occur in the areas of the Project's turbine building, cooling tower, circulating water lines, other miscellaneous buildings and switchyard. The goal will be to reuse excavated materials on-site to the extent possible, balancing cuts and fill. Excavated material is expected to be suitable for use as backfill material, although the rock may require processing for use as structural backfill.

Excavation of soil in cut areas is expected to be completed using a scraper and earthmoving equipment. The soil will be moved to the fill areas and deposited in lifts, with each lift compacted using bulldozers and heavy roller equipment. As the broken rock above bedrock is reached, bulldozers with ripper teeth will be used to break up the fractured rock for handling by front-end loaders and dumptrucks. Processing (crushing) of the broken rock will be completed, as required, prior to fill operations. If machine ripping is not possible, bedrock removal will be by blasting, with front-end loaders and dumptrucks used to haul the rock to an on-site processing station and then to the fill areas. The areas around the processing station will be used for temporary storage of any fill material that cannot be immediately used as fill. Topsoil for use in final grading will be stored on-site until needed.

All excess excavated materials (spoils), approximately 32,400 cy, will be disposed of on-site, providing for a balanced cut and fill.

13.4 Blasting Analysis

This section addresses Stipulation No. 8, Clauses 2(n-p). Rock excavation by blasting may be required for Project construction for an estimated 19,000 cubic yards of rock. It is anticipated that the required blasting depth will be less than 5 feet, and that a blasting control program will be developed. Using modern blasting techniques, rock excavation by blasting can be completed without vibration damage to adjacent structures.

Blasting is specialized work, and only pre-qualified contractors will be allowed to bid the work. The blasting contractor will be provided with a technical specification covering the blasting work that details allowable vibration levels at nearby structures. It will be the blasting contractor's responsibility, based on the specifications, to develop a proposed formal plan and individual shot plans for excavating the rock without causing damage to nearby structures. This plan will be submitted in the Compliance Filing. Only after the proposed plan is approved will blasting work commence.

13.4.1 Controlled Blasting Techniques

Controlled blasting techniques will be used to ensure that nearby structures are not damaged by blasting vibrations. The vibrations resulting from a blast are related to the amount of explosives detonated at any one time and the distance from the blast to the structure. Controlled blasting techniques include limiting the amount of explosives detonated at any one time to ensure that excessive vibrations are not created.

All the explosives in a blast do not detonate at one time. A blast is actually a series of discrete, smaller explosions timed far enough apart to ensure the vibrations created by a single explosion have a chance to dissipate before the next explosion begins. By detonating a series of smaller explosions instead of one large one, vibrations are greatly reduced. The time between detonations is called a "delay." By controlling the pounds of explosives per delay, the level of vibrations created by a blast can be limited to acceptable values.

Researchers from the Bureau of Mines have studied the vibrations from blasting and have developed equations to predict vibrations at a distance from the blast based on the amount of explosives in a delay. At the start of the blasting work, the amount of explosives detonated per delay will be limited to amounts known to produce low vibration levels for any site. The equations that predict the amount of vibration are conservative and will overpredict the actual vibrations. As the actual dissipation characteristics of the site are confirmed during blasting efforts, the amount of explosives per delay may be increased to optimize production without causing vibration damage.

13.4.2 Blasting Plan Requirements

Before blasting starts, the blasting contractor will be required to submit a detailed conceptual blasting plan for approval by the General Contractor. The conceptual blasting plan will include types and amounts of explosives, hours of operation, warning system information, methods for transportation and handling of explosives, pre-blast survey, compliance with local, state and federal laws, coordination with local safety officials, and safety measures.

Blasting will be limited to normal working hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, and will occur three to four times per week during the site preparation phase. No explosives will be stored on-site, and the handling of explosives will be coordinated with local safety officials. A pre-blast survey of structures within 1,500 feet of blasting will be completed by an independent third party, and the inspection will be videotaped.

Before each blast, an individual shot plan will be submitted to the General Contractor for approval. Each individual shot plan will specify the amounts and types of explosives per hole and per delay, the quantity to be excavated, the number and diameter of blast holes, distances to the nearest structures, seismograph locations, and whether blasting mats will be used. The General Contractor will review individual shot plans to ensure that they comply with the approved blasting plan.

13.4.3 Acceptable Vibration Levels

Blasting creates transient vibrations. Controlled blasts usually last about one second because they are actually a series of small blasts timed far enough apart to allow the vibrations from each individual detonation to dissipate somewhat before the next detonation.

The vibrations felt from a blast at points away from the blast are a function of the amount of explosives detonating at one time and the distance. The transient vibrations created by blasting dissipate quickly away from the blast. By controlling the amount of explosives detonating at one time, the vibrations created by the blast at points away from the blast can be predicted and controlled. At the Project site, controlled blasting will be used to ensure that vibrations created by blasting dissipate to acceptable levels at the adjacent Independence Station facility. Since the vibrations dissipate rapidly, structures further away will experience much lower vibrations and will be protected from vibration damage.

Through thousands of case studies of blasts that did and did not cause damage, the Bureau of Mines and other researchers have determined levels of vibration that will cause damage. Residential construction can withstand vibrations equivalent to a peak particle velocity of 2 inches per second (ips), and concrete structures can withstand vibrations equivalent to a peak particle velocity of at least 4 ips without damage. Plaster walls are brittle and readily susceptible to vibration damage. Vibrations with a peak particle velocity of 2 ips will not crack a plaster wall. Therefore, the 2 ips value is the industry standard for preventing damage. Most below grade structures have been found to be safe under peak particle velocities of 4 ips or less.

For Project rock excavation, the peak particle velocity will be limited to 1 ips at the Independence Station that is the closest aboveground structure. A peak particle velocity limit of 2 ips will be used at the underground natural gas pipeline, the closest below grade structure.

All perceptible vibration does not necessarily cause damage. The threshold level of vibrations perceptible to humans is about 0.02 ips. The safe limit for residential construction is, therefore, at least 100 times greater than the perceptible threshold. A 2-ips limit would be comparable to the experience of standing within a few feet of a large operating bulldozer or heavy dump truck. It is likely that persons within 1,500 feet of the blasting will feel the vibrations, however, vibration can be perceived at levels that do not do damage. No impacts are anticipated, at this vibration level, to environmental features, aboveground structures, below ground structures, or the nearby nuclear facilities.

13.4.4 Preblast Survey and Vibration Monitoring

The independent pre-blast survey will be used as a comparison document to verify that damage reported due to blasting actually occurred as a result of the blasting, and was not a pre-existing condition. The readings received from seismographs will also be used to establish vibration levels to which existing structures were exposed by blasting.

To ensure that excessive vibrations are not created by blasting, seismographs will be placed between Independence Station and the blast, as close to the structure as possible. The seismograph records will be used to document the vibration levels created by the blasting. Blast mats will be used as required to control flyrock (airborne debris potentially thrown by the blast).

As an additional precaution against potential damage from flyrock, traffic at both ends of Lake Road will be stopped 1,500 feet from the blast. Stoppage will occur 5 minutes before the blast and will resume as soon as the road is checked for rocks. Total stoppage time will be less than 10 minutes.

The most likely blasting method will use non-electric delays or electric delays with a sequential timer to start the blast. The delay controls when each hole detonates. With these methods, it is possible to fire several hundred holes at one time. This allows the blasting contractor to achieve a high production rate without causing vibration damage to nearby structures.

13.4.5 Blast Warning System

The warning system will include signs erected at all access points to the area, stating that blasting operations are taking place and describing the audible warning that a shot is going to take place. It is expected that audible signals will be used 5 minutes and 1 minute before the blast, as well as an all clear signal after the blast. The blasting contractor's personnel will warn outsiders of the impending blast and block access to prevent outsiders from approaching the blast area.

13.4.6 Mitigation

All blasting will be done by certified blasting personnel and inspected by licensed blasting inspectors. In areas where blasting is required, Project construction will proceed according to industry standards and the applicable regulations. Sufficient matting as well as time-delay charges will be used to minimize the possibility of flyrock leaving the construction work area.

To ensure that excessive vibrations are not created by blasting, seismographs will be placed between existing structures and the blast. The seismographs will be used to document vibration levels created by the blasts.

Insurance requirements will be established as a part of the contract with the selected blasting contractor. This insurance will provide for compensation in the unlikely event that impacts to off-site structures were to occur as a result of on-site blasting. The pre-blast survey by an independent third party will allow for documentation of conditions before and after blasting efforts, as warranted.

13.5 Seismological Analysis

This section addresses Stipulation No. 8, Clauses 2(q-s).

13.5.1 Regional Geology, Tectonics and Seismology

An historical earthquake data search was obtained from the New York State Geological Survey via its web-site at http://www.nysm.nysed.gov/geosie.html. Specifically acquired was an article entitled "Significant Historical Earthquakes in New York State." According to the New York State Geological Survey, damaging earthquakes have occurred in New York State on average once every 20 years, and earthquakes of up to magnitude 6.0-6.5 are possible anywhere in New York.

As a measure of magnitude of an earthquake, seismologists use a magnitude scale developed by Charles F. Richter to express the seismic energy released by each earthquake. Typical effects of earthquakes in various magnitude ranges are as shown in Table 13-2.

Table 13-2: Richter Magnitude Scale of Relative Earthquake Severity

Richter Magnitudes	Earthquake Effects
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causing damage
Under 6.0	At most, causing slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometers across residential areas.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometers wide.

The most damaging earthquake in New York occurred on September 5, 1944 near Massena Center in northern New York State. It had a magnitude of 6.0. Significant earthquakes in New York State between 1737 and 1996 are as shown in Table 13-3.

The seismic zoning map for the state of New York was completed in 1993 as part of the technically approved but not yet legally adopted draft for the seismic provisions of the New York State Building Code (http://nccer.eng.buffalo.edu/faqs/nysszmap.html). According to the map, Oswego, New York is identified as Seismic Zone C with an effective peak acceleration determined to be 0.15g ("g" is the acceleration due to gravity). This value corresponds to a 10 percent exceedance probability in 100 years exposure time to ground motion in zones of lowest seismic hazard. This value will be used in accordance with the appropriate design code to determine the seismic forces imposed on structures during an earthquake.

According to Bogner (1979), the town of Scriba is located in a relatively inactive seismic region. The historic record of earthquakes in central New York over the past 200 years indicates that only a moderate number of small earthquakes have been recorded in the area and no known earthquake activity has originated in the immediate area.

Table 13-3: Significant Earthquakes in New York State, 1737-1996

Date	Locality	Latitude (North)	Longitude (West)	Magnitude
December 18, 1737	New York City	40.60	73.80	5.0[1]
March 12, 1853	Lowville	43.70	75.50	4.8[1]
October 23, 1857	Buffalo	42.90	78.30	4.6[1]
December 18, 1867	Canton	44.05	75.15	4.8[1]
December 11, 1874	Tarrytown	41.00	73.90	4.8[1]
August 10, 1884	Rockaway Beach (NYC)	40.50	73.80	5.3[1]
May 28, 1897	Plattsburgh	44.50	73.50	–
March 18, 1928	Saranac Lake	44.50	74.30	4.5[1]
August 12, 1929	Attica	42.84	78.24	5.2
April 20, 1931	Warrensburg	43.50	73.80	4.5
April 15, 1934	Dannemora	44.70	73.80	4.5
September 5, 1944	Massena	45.00	74.85	6.0
September 9, 1944	Massena	45.00	74.85	4.5
January 1, 1966	Attica	42.84	78.25	4.6
June 13, 1967	Attica	42.84	78.23	4.4
October 7, 1983	Newcomb	43.94	78.26	5.1
October 19, 1985	White Plains	40.98	73.83	4.0

(1) Estimated magnitude.

13.5.2 Potential Geologic Impacts

No unique or unusual geologic resources exist on the site, as discussed in Section 13.3, thus construction of the Project will not affect any such resources.

13.5.3 Potential Impacts of Seismic Activity on Project Operation

Although a number of earthquakes have occurred in New York State since 1737 only 17 of significance (magnitude 4.0 – 6.0) have been noted (Table 13-3). Of these 17, only three (Lowville – 61 miles away, Canton – 115 miles away, and Massena – 146 miles away) occurred within 150 miles of the Project site. Of these three, only the earthquake at Massena in 1944 has exceeded a magnitude of 5.0.

The low number of significant earthquakes in New York State since 1737, and the fact that no earthquake has been recorded as occurring closer than 61 miles to the Project site, indicate minimal risk associated with seismic activity. However, Project construction will include measures allowing for structural resiliancy for the unlikely event of an earthquake in the area.

14. TERRESTRIAL ECOLOGY

This section addresses Stipulation No. 9, Clauses 1-12.

14.1 Applicable Regulatory Requirements

14.1.1 Federal Endangered Species Act

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) share the responsibilities of administering the Federal Endangered Species Act of 1973. The Federal Endangered Species Act of 1973 imposes prohibitions and requirements with regard to endangered or threatened species of plants and animals ("listed species") and the habitats of such species that have been designated as "critical habitat." All activities which are likely to jeopardize the continued existence of any "listed species" or which may result in the destruction and/or adverse modification of "critical habitat" are strictly prohibited under the Federal Endangered Species Act without a license or permit from the USFWS or the NMFS.

14.1.2 State of New York Legislation

The New York Natural Heritage Program is responsible for analyzing existing sources of information, monitoring and taking censuses of plant and animal populations, and cooperating with other public agencies and scientific and educational institutions to identify the location and status of rare, threatened or endangered plant and animal species and various ecological communities within the state of New York. Under the New York Fish and Wildlife Law (ECL §11-0535), "the taking, importation, transportation, possession or sale" of any endangered or threatened plant or animal species is regulated by the state. All these activities are prohibited without a license or permit. Furthermore, ECL §9-1503 regulates protected plants "by reason of their endangered, rare, threatened or exploitably vulnerable status."

14.2 Vegetative Communities

This section addresses Stipulation No. 9, clauses 1-6.

14.2.1 Vegetative Community Survey Methodology

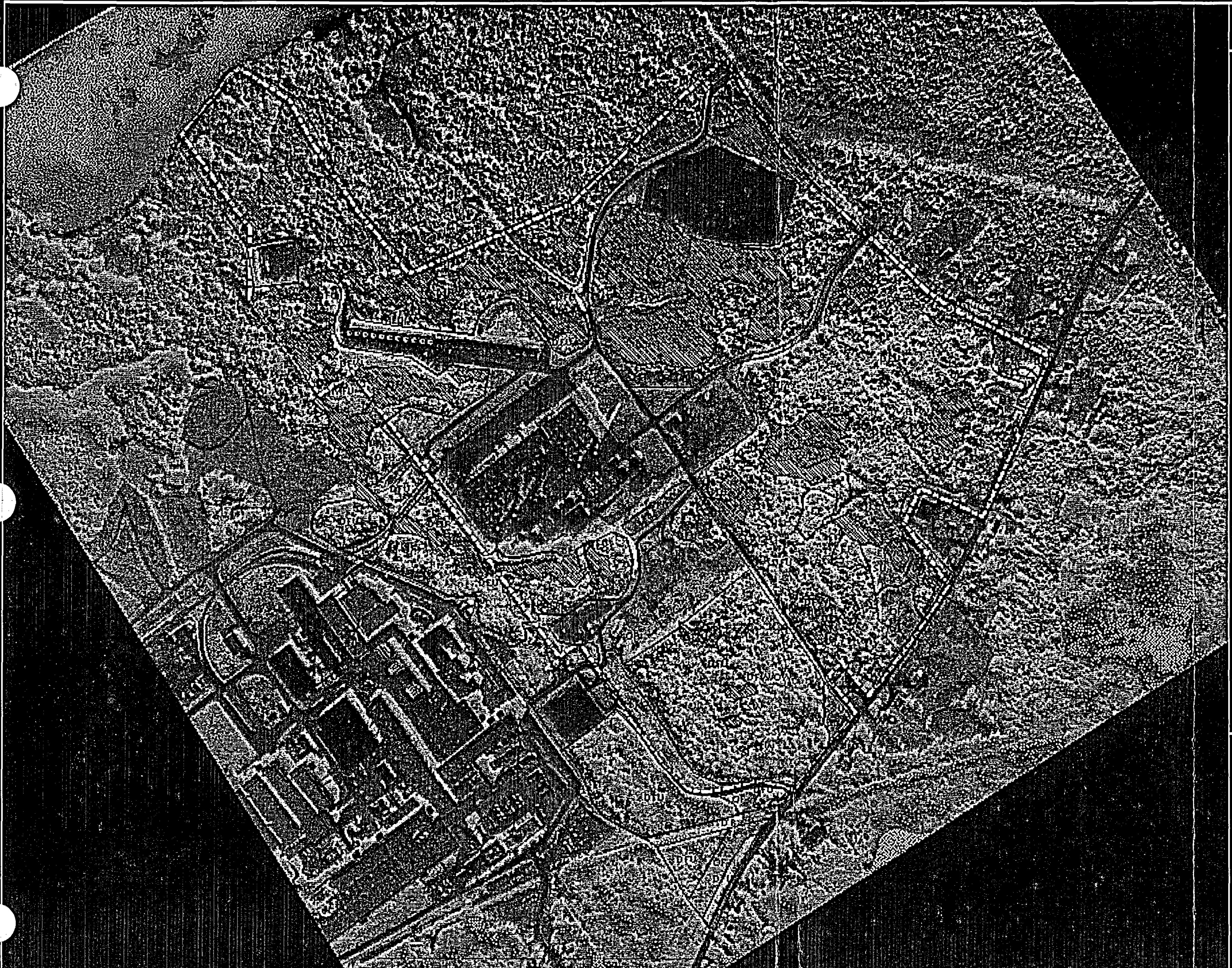
Earth Tech biologists completed field investigations in late September through early October 1999 in order to characterize the existing vegetative communities on the Project site, with particular attention to those areas to be developed as part of the Project. Prior to completing the fieldwork associated with the vegetative community characterization, Earth Tech personnel reviewed several existing maps, reports and other background information. An aerial photograph, dated April 22, 1994, proved valuable in mapping the vegetative communities on the Project site. A report submitted by Terrestrial Environmental Specialists (TES) of Phoenix, New York prepared in September of 1991 for Sithe/Independence Power Partners, L.P. in conjunction with the permitting and subsequent construction of Independence Station, was also referenced as part of this investigation. This report, entitled "Terrestrial Ecology Report, Independence Station," presents the results of a comprehensive botanical and wildlife study performed by TES on the Project site prior to construction of Independence Station. Where applicable, the TES "Terrestrial Ecology Report" has been utilized as a reference throughout this document. The focus of this field effort has been to confirm changes to the Project site which have resulted from the construction of Independence Station.

Wetland delineation activities throughout the entire Project site were completed by Earth Tech scientists in late September through early October 1999. The wetland delineation activities included the identification of all state and federal jurisdictional wetland areas on the Project site, as well as the collection of vegetation data for 79 plots located throughout the site. Half of these plots were located in upland areas. The plots were circular and varied in size by layer, with a 30-foot radius for trees, a 15-foot radius for saplings and shrubs, and a 5-foot radius for herbaceous species. In each plot, the dominant vegetative species within each strata was recorded onto ACOE Wetland Data Forms (Appendix Q), as per the 1987 ACOE Wetlands Delineation Manual.

Existing vegetative cover types on the Project site were identified through review and field verification of the previous TES report and mapping (1991). A map showing existing vegetative community cover types on the Project site is provided in Figure 14-1. As per Stipulation No. 9, Clause 4, this information has also been provided as an oversized drawing at the scale of 1" = 100' in Appendix R. Cover types mapped by TES, but not disturbed during construction of Independence Station, were ground-truthed in September and October 1999 by Earth Tech biologists. Those areas which had been disturbed as a result of construction of Independence Station were also revisited by Earth Tech biologists in order to characterize current site conditions. Wetland areas delineated by Earth Tech were located by survey and shown on plans provided in Section 17.6. Acreage of wetland and upland cover types on the Project site were calculated based upon these plans.

In addition to Earth Tech's investigations, Brooks Forestry and Resource Management Company (Central Square, New York) performed a forest overstory inventory in order to estimate the species and number of all trees 12 inches or greater in diameter at breast height within each forest cover type on the Project site. A complete copy of the results of this investigation is provided in Appendix S. As

EARTH TECH



Wetland Cover Types

US	Unconsolidated Shore
SSW	Scrub Shrub Wetland
DFW	Deciduous Forest Wetland
MFW	Mixed Forest Wetland
EW	Emergent Wetland
OW	Open Water

Upland Cover Types

DR	Developed (Roads/Residential)
DFU	Deciduous Forest
MFU	Mixed Forest
SSU	Scrub Shrub
EP	Evergreen Plantation
OF	Open Field

Wetland

Wetlands delineated by Earth Tech, September/October 1999.
Date of photo: October 1999.

Figure 14 - 1

Existing Vegetative Cover Map

Scale 1:6000

0 500 1000

Feet

part of this investigation, 58 statistical samples were undertaken over the Project site, which resulted in an average of 11 trees per sample being measured. A total of 656 trees were directly observed and measured.

14.2.2 Vegetative Communities on the Project Site

The Project site is generally flat on the northern two thirds and slopes to the north on the southern third of the Project site. The average elevation across the Project site is approximately 273 feet msl. The Project will be situated such that it will be interior to the 190-acre site and located directly adjacent to Independence Station. The portions of the Project site which have not been developed as part of Independence Station are either wooded or open areas, some of which were previously utilized for laydown during construction of Independence Station. Lake Ontario is located on the north side of the Project site boundary. Along the shoreline, in addition to Project property, is a 50-acre parcel of land that was donated, as part of the Independence Station project, to Oswego County for recreational use.

Soils mapped on the site by the U.S. Soils Conservation Service (USSCS) are predominately Scriba gravelly fine sandy loam and Ira and Sodus very stony soils (USSCS 1981). Stones are common on the surface in the upland communities throughout the site. Additional detail with regard to soils on the Project site is provided in Section 13.

In general, Earth Tech's 1999 field investigations confirmed that the cover types identified by TES in its 1991 site investigations continue to represent the cover types found on the Project site at the present time. It is important to note that some of these communities, although made up of the same species, have matured since then and some of these communities are not present in the same area of coverage due to the construction of Independence Station. Also, it is important to note that several of the existing wetland areas on the Project site appear to have greater amounts of standing water in them as a result of changes in hydrological patterns on the Project site which have resulted from the construction and presence of Independence Station. Several additional wetland areas, beyond those on-site at the time of the TES evaluation, have been identified on the Project site. Note that all wetland issues are discussed in detail in Section 17.6.

Upland cover types on the Project site include developed areas, open field, scrub-shrub upland, deciduous forest upland, mixed forest upland, and evergreen plantation. Wetland community types on the Project site include unconsolidated shore, scrub-shrub wetland, deciduous forest wetland and mixed forest wetland. The following sections provide general descriptions of each upland and wetland community type identified on the Project site. Table 14-1 provides a complete list of vegetative species found within each community type. For the purposes of this

Table 14-1:[1] Plant Species Noted on the Heritage Station Site (Page 1 of 5)

		Vegetation Cover Types[3]								
Common Name	**Scientific Name**[2]	**OF**	**SSU**	**DFU**	**MFU**	**EP**	**EW**	**SSW**	**DFW**	**MFW**
TREES										
American Beech*	*Fagus grandifolia*			X	X					
American Elm*	*Ulmus Americana*		X	X	X			X	X	X
Apple*	*Malus pumila*		X	X						
Ash, Green*	*Fraxinus pennsylvanica*		X	X	X	X		X	X	X
Ash, White*	*F. americana*	X	X	X	X	X				
Aspen, Big-tooth*	*Populus grandidentata*		X	X						
Aspen, Quaking*	*P. tremuloides*	X	X	X	X			X	X	
Basswood*	*Tilia americana*		X	X	X				X	
Birch, Yellow*	*Betula alleghaniensis*		X	X	X			X	X	X
Cherry, Black*	*Prunus serotina*	X	X	X	X	X				
Cherry, Sweet	*P. avium*		X	X						
Cottonwood	*Populus deltoides*		X	X	X			X	X	
Eastern Hemlock*	*Tsuga canadensis*			X	X				X	X
Hop Hornbeam*	*Ostrya virginiana*		X	X	X			X	X	
Maple, Red*	*Acer rubrum*	X	X	X	X	X	X	X	X	X
Maple, Silver*	*A. saccharinum*			X				X	X	X
Maple, Sugar*	*A. saccharum*		X	X	X				X	
Musclewood*	*Carpinus caroliniana*		X	X	X			X	X	X
Oak, Red*	*Quercus rubra*		X	X	X					
Pine, Scotch*	*Pinus sylvestris*		X	X		X				
Pine, White*	*P. strobus*					X				
Spruce, Norway*	*Pices abies*					X				
Spruce, White	*P. glauca*					X				
Willow*	*Salix sp.*		X					X	X	X
Willow, Black*	*S. nigra*						X	X	X	X
SHRUBS										
Apple*	*Malus pumila*		X	X						
Arrowwood	*Viburnum recognitum*	X	X	X	X	X		X	X	X
Blackberry, Highbush*	*Rubus alleghaniensis*	X	X	X	X	X		X		
Blackberry, Running	*R. hispidus*	X	X				X	X	X	
Buckthorn	*Rhamnus cathartica*	X	X					X	X	
Buttonbush	*Cephalanthus occidentalis*						X	X	X	
Cherry, Choke	*Prunus virginiana*		X	X		X				
Cherry, Pin	*P. pensylvanica*		X	X						
Dogwood, Green Osier	*Cornus alternifolia*		X	X	X					
Dogwood, Red Osier*	*C. sericea*						X	X	X	X
Dogwood, Silky*	*C. amomum*		X	X			X	X	X	X
Elderberry, Common*	*Sambucus canadensis*		X	X				X	X	
Elderberry, Red	*S. racemosa*		X	X						
Gooseberry	*Ribes sp.*		X	X	X			X	X	
Gooseberry, Northern	*R. hirtellum*		X	X	X					
Hawthorn	*Crataegus sp.*		X	X				X		
Hobblebush	*Viburnum lantanoides*			X	X			X	X	X
Honeysuckle*	*Lonicera sp.*		X	X	X	X		X	X	X
Honeysuckle, Fly	*L. canadensis*		X	X						
Maple, Mountain	*Acer spicatum*			X	X			X	X	X
Maple, Striped*	*A. pensylvanicum*		X	X	X				X	X
Maple-leaf Viburnum*	*Viburnum acerifolium*			X	X					
Meadowsweet*	*Spiraea sp.*							X	X	X
Meadowsweet, Broadleaf	*S. latifolia*							X	X	X
Meadowsweet, Narrowleaf	*S. alba*							X	X	X
Multiflora Rose*	*Rosa multiflora*	X	X	X				X		
Nannyberry*	*Viburnum lentago*		X	X	X			X	X	X
Raspberry*	*Rubus sp.*	X	X	X	X	X		X	X	X
Raspberry, Black	*R. occidentalis*	X	X	X						
Raspberry, Dwarf	*R. pubescens*		X					X	X	

Table 14-1:[1] Plant Species Noted on the Heritage Station Site (Page 2 of 5)

		Vegetation Cover Types[3]								
Common Name	**Scientific Name[2]**	**OF**	**SSU**	**DFU**	**MFU**	**EP**	**EW**	**SSW**	**DFW**	**MFW**
SHRUBS (Cont'd)										
Raspberry, Purple-flowering	*R. odoratus*	X	X	X	X					
Raspberry, Red	*R. idaeus*	X	X	X				X	X	
Serviceberry	*Amelanchier sp.*		X	X	X					
Speckled Alder*	*Alnus incana*		X					X	X	X
Spicebush*	*Lindera benzoin*			X	X			X	X	X
Swamp Rose	*Rosa palustris*						X	X		
Wild Raisin*	*Viburnum cassinoides*		X					X	X	
Willow*	*Salix sp.*	X	X	X	X		X	X	X	X
Winterberry*	*Ilex verticillata*							X	X	X
Witch Hazel*	*Hamamelis virginiana*		X	X	X			X	X	
Yew	*Taxus sp.*				X					X
HERBACEOUS										
Agrimony	*Agrimonia sp.*		X	X				X	X	
Alfalfa	*Medicago sativa*	X								
Anemone, Canada	*Anemone canadensis*	X	X	X						
Aster*	*Aster sp.*	X	X	X	X		X	X	X	X
Aster, New England*	*A. novac-angliae*	X	X				X	X	X	X
Aster, Wood	*A. acuminatus*			X	X				X	X
Avens*	*Geum sp.*	X	X	X	X		X	X	X	X
Avens, Large-leaf	*G. macrophyllum*						X	X	X	X
Avens, White	*G. canadense*	X	X	X			X	X	X	X
Avens, Yellow	*G. aleppicum*		X	X				X	X	
Baneberry, Red	*Actaea spicata*			X	X					
Baneberry, White	*Actaea pachypoda*			X	X					
Barnyard Grass	*Echinochloa crus-galli*	X					X			
Bedstraw*	*Galium sp.*	X	X				X	X		
Bedstraw, Northern	*G. boreale*	X	X				X	X		
Bedstraw, Sweet-scented	*G. triflorum*	X	X	X	X		X	X		
Beechdrops	*Epifagus virginiana*			X	X					
Beggar-ticks*	*Bidens sp.*						X	X	X	X
Bellwort	*Uvalaria sessilifolia*			X	X					
Bird's Foot Trefoil	*Lotus corniculata*	X								
Bittersweet Nightshade	*Solanum dulcamara*	X	X					X	X	X
Black Bindweed	*Polygonum convolvulus*	X	X	X						
Black-eyed Susan*	*Rudbeckia hirta*	X	X							
Bladderwort, Cone-spur	*Utricularia gibba*						X			
Blue Cohosh	*Caulophyllum thalictroides*			X	X				X	
Blue-eyed Grass	*Sisyrinchium mucronatum*	X	X							
Blue Flag	*Iris versicolor*						X	X	X	X
Bluegrass, Canada	*Poa compressa*	X	X					X		
Bluegrass, Kentucky	*P. pratensis*	X	X							
Blue Vervain	*Verbena hastata*						X	X	X	
Boneset*	*Eupatorium perfoliatum*						X	X	X	
Bulrush	*Scirpus atrovirens*	X	X				X	X		
Bulrush, Soft-stem*	*S. tabernaemontanii*						X			
Burreed	*Sparganium sp.*						X	X		
Burreed	*S. chlorocarpum*						X			
Buttercup, Tall	*Ranunculus acris*	X	X				X	X		
Cardinal Flower*	*Lobelia cardinalis*						X	X	X	X
Cattail, Common*	*Typha latifolia*						X	X		
Cattail, Narrow-leaf*	*T. angustifolia*						X	X		
Cheeses	*Malva neglecta*	X	X							
Clearweed*	*Pilea pumila*						X	X	X	X
Cleavers	*Galium aparine*	X	X					X		
Clover, Red*	*Trifolium pratense*	X	X							
Clover, Sweet	*Melilotus alba*	X	X							
Curly Dock	*Rumex crispus*	X	X							

Table 14-1:[1] Plant Species Noted on the Heritage Station Site (Page 3 of 5)

		Vegetation Cover Types[3]								
Common Name	**Scientific Name[2]**	**OF**	**SSU**	**DFU**	**MFU**	**EP**	**EW**	**SSW**	**DFW**	**MFW**
HERBACEOUS (Cont'd)										
Dairy Fleabane	*Erigeron annuus*	X	X					X		
Dandelion*	*Taraxacum officinale*	X	X							
Ditch Stonecrop	*Penthorum sedoides*						X	X		
Dodder	*Cuscuta sp.*		X					X		
Duck Potato	*Sagittaria latifolia*						X	X		
Duckweed	*Lemna sp.*						X			
Dwarf Ginseng	*Panax trifolius*		X	X	X					
Enchanter's Nightshade*	*Circaea lutetiana*		X	X	X			X	X	X
False Lily of the Valley	*Maianthemum canadense*		X	X	X				X	X
False Nettle*	*Boehmeria cylindrica*							X	X	X
False Solomon's Seal*	*Smilacina racemosa*		X	X	X					
Fireweed	*Epilobium sp.*						X	X	X	
Floating Heart	*Nymphoides cordata*						X			
Foam Flower	*Tiarella cordifolis*			X	X			X	X	X
Foxtail, Short-awn	*Alopecuris aegualis*						X			
Garlic Mustard	*Alliaria petiolata*			X	X			X	X	
Goldenrod*	*Solidago sp.*	X	X	X	X	X	X	X	X	X
Goldenrod, Canada*	*S. canadensis*	X	X					X	X	
Goldenrod, Flattop*	*Euthamia graminifolia*	X	X				X	X		
Goldenrod, Tall Hairy*	*Solidago rugosa*	X	X				X	X		
Golden Saxifrage	*Chrysoplenium americanum*						X	X	X	X
Goldthread	*Coptis trifolia*			X	X				X	X
Grape*	*Vitis sp.*	X	X	X	X			X	X	X
Grape, Fox	*V. labrusca*	X	X	X	X	X		X	X	X
Heal All*	*Prunella vulgaris*	X	X							
Hedge Bindweed	*Calystegic sepium*	X	X							
Herb Robert	*Geranium robertianum*	X	X	X	X	X		X		
Indian Cucumber	*Medeola virginiana*			X	X					
Indian Hemp	*Apocynum cannabinum*	X	X					X		
Indian Pipe	*Monotropa uniflora*			X	X					
Jack in the Pulpit*	*Arisaema triphyllum*		X	X	X			X	X	X
Jewelweed, Spotted*	*Impatiens capensis*						X	X	X	X
Joepyeweed, Spotted*	*Eupatorium maculatum*						X	X	X	X
Liverwort	*Hepatica sp.*			X	X					
Mannagrass	*Glyceria sp.*						X	X	X	X
Marsh Marigold	*Caltha palustris*						X	X	X	X
Mayapple	*Podophyllum peltatum*		X	X	X					
Meadow-rue	*Thalictrum sp.*		X	X				X	X	X
Milkweed, Swamp	*Ascepias incarnata*						X	X	X	X
Miterwort	*Mitella diphylla*				X				X	X
Moneywort	*Lysimachia nummularia*		X	X			X	X	X	X
Morning Glory	*Ipomoea sp.*	X	X	X						
Mullein*	*Verbascum thapsus*	X	X							
Old Field Cinquefoil*	*Potentilla simplex*	X	X			X				
Orchard Grass*	*Dactylis gomerata*	X	X							
Panic Grass	*Panicum sp.*	X	X							
Partridgeberry*	*Mitchella repens*		X	X	X					
Perennial Rye Grass*	*Lolium perenne*	X								
Poison Hemlock	*Conium maculatum*						X	X	X	X
Poison Ivy*	*Toxicodendron radicens*	X	X	X	X	X		X	X	X
Purple Loosestrife*	*Lythrum salicaria*	X	X				X	X		
Ragweed*	*Ambrosia artemisiifolia*	X	X							
Redtop*	*Agrostis gigantea*	X	X				X	X	X	
Reed Canary Grass*	*Phalaris arundinacea*	X	X				X	X	X	
Reedgrass	*Calmagrostis canadensis*						X	X	X	X
Rice Cutgrass*	*Leersia oryzoides*						X	X	X	
Rush, Soft*	*Juncus effusus*	X	X				X	X		
Rush, Yard*	*J. tenuis*	X	X				X	X		

Table 14-1:[1] Plant Species Noted on the Heritage Station Site (Page 4 of 5)

		Vegetation Cover Types[3]								
Common Name	Scientific Name[2]	OF	SSU	DFU	MFU	EP	EW	SSW	DFW	MFW
HERBACEOUS (Cont'd)										
Sedge	*Carex sp.*	X	X	X	X		X	X	X	X
Sedge, Fox	*C. vulpinoidea*						X	X	X	X
Sedge, Fringed	*C. crinita*							X	X	
Sedge, Hop	*C. lupulina*						X	X	X	
Sedge, Pennsylvania	*C. pensylvanica*		X	X	X					
Sedge, Stalkgrain	*C. stipata*						X	X	X	X
Sedge, Tussock*	*C. stricta*						X	X	X	X
Sheep Sorrel	*Rumex acetosella*	X	X							
Skullcap, Common	*Scutellaria galericulata*						X	X	X	
Smartweed, Heart's-case	*Polygonum persicaria*	X	X					X		
Smartweed, Paie	*P. lapathifolium*	X	X					X	X	
Smartweed, Water	*P. punctatum*						X	X	X	
Snakeroot, White	*Eupatorium rugosum*		X	X	X				X	X
Solomon's Seal	*Polygonatum pubesces*			X	X					
Sphagnum Moss*	*Sphagnum sp.*							X	X	X
Spikerush*	*Eleocharis sp.*		X				X	X	X	X
Spring Beauty	*Claytonia virginica*			X	X					
Squirrel Corn	*Dicentra canadensis*			X	X					
Starflower*	*Smilacina stellata*			X	X					
Stinging Nettle*	*Urtica dioica*							X	X	X
St. Johnswort, Marsh	*Triadenum virginicum*						X	X	X	X
St. Johnswort, Spotted	*Hypericum punctatum*	X	X					X		
Summer Snowflake	*Leucojum aestivum*							X		
Swamp Dock	*Rumex verticillatus*						X			
Sweet Vernal Grass	*Anthoxanthum odoratum*	X	X							
Tearthumb*	*Polygonum arifolium*						X			
Thistle, Canada	*Cirsium arvense*	X	X							
Timothy*	*Phleum pratense*	X	X							
Toothwort, Cut-leaf	*Cardamine diphylla*		X	X	X					
Toothwort, Two-leaved	*C. concatenata*		X	X	X					
Trillium	*Trillium sp.*		X	X	X					
Trillium, Painted	*T. undulatum*		X	X	X					
Trillium, Purple	*T. erectum*		X	X	X					
Trillium, White	*T. grandiflorum*		X	X	X					
Trout Lily	*Erythronium americanum*		X	X	X			X	X	X
Turtleheads	*Chelone glabra*						X	X	X	X
Twisted Stalk	*Streptopus roseus*			X						
Velvet Grass	*Holcus lanatus*	X	X							
Violet	*Viola sp.*	X	X	X	X			X	X	X
Violet, Canada	*V. canadensis*		X	X						
Violet, Common Blue	*V. sororia*	X	X	X				X	X	
Violet, Common White	*V. macloskeyi*		X	X	X			X	X	X
Violet, Yellow-stemmed	*V. pubescens*	X	X	X	X					
Virginia Creeper	*Parthenocissus quinquefolia*		X	X	X	X		X	X	
Virginia Waterleaf	*Hydrophyllum virginianum*		X	X						
Water Hemlock	*Cicuta bulbifera*						X	X		
Water Horehound	*Lycopus americanus*						X	X		
Water Parsnip	*Sium suave*						X	X		
Water Plantain	*Alisma plantagoaquatica*						X	X		
Water Willow	*Decodon verticillatus*						X	X		
Weed Orchid	*Epipactis helleborine*		X	X	X					
White Lettuce	*Prenanthes alba*		X	X	X					
Wild Carrot	*Daucus carota*	X	X							
Wild Ginger	*Asarum canadense*			X	X					
Wild Leek	*Allium tricoccum*		X	X	X				X	X
Wild Sarsaparilla*	*Aralia nudicaulis*			X	X					
Wild Strawberry	*Fragaria virginiana*	X	X	X						

Table 14-1:[1] Plant Species Noted on the Heritage Station Site (Page 5 of 5)

		Vegetation Cover Types[3]								
Common Name	**Scientific Name[2]**	**OF**	**SSU**	**DFU**	**MFU**	**EP**	**EW**	**SSW**	**DFW**	**MFW**
HERBACEOUS (Cont'd)										
Woodreed, Drooping	*Cinna latifolia*							X	X	
Wood Sorrel	*Oxalis sp.*	X	X	X						
Woolgrass*	*Scirpus cyperinus*	X	X				X	X		
Yellow Nut Grass	*Cyperus esculentus*	X	X				X			
FERNS AND FERN ALLIES										
Bracken Fern	*Pteridium aquilinum*		X	X	X					
Broad Beech Fern	*Phegopteria hexagonoptera*			X						
Christmas Fern*	*Polystichum acrosticoides*		X	X	X				X	X
Cinnamon Fern*	*Osmunda cinnamomea*						X	X	X	X
Crested Wood Fern	*Dryopteris cristata*						X	X	X	X
Hay-scented Fern*	*Dennstaedtia punctilobula*	X	X	X						
Lady Fern*	*Athyrium asplenoides*		X	X	X			X	X	X
Marginal Wood Fern	*Dryopteris marginalis*			X	X					
Marsh Fern	*Thelypteris palustris*						X	X	X	X
New York Fern	*T. noveboracensis*		X	X	X			X	X	X
Royal Fern*	*Osmunda regalis*							X	X	X
Sensitive Fern*	*Onoclea sensibilis*	X	X	X	X		X	X	X	X
Spinulose Wood Fern*	*Dryopteris intermedia*		X	X	X				X	X
Ground Cedar	*Lycopodium complanatum*		X	X					X	
Ground Pine	*L. obscurum*			X	X				X	
Running Cedar	*L. clavatum*		X	X						
Shining Clubmoss	*L. lucidulum*			X	X				X	X
Field Horsetail	*Equisetum arvense*	X	X	X	X			X	X	X
Wood Horsetail	*E. sylvaticum*				X				X	X

[1]Source: Terrestrial Environmental Specialists, Inc., "Terrestrial Ecology Report, Independence Station, town of Scriba, Oswego County, New York," September 1991.

[2]Nomenclature follows Mitchell (1986).

[3]OF = Open Field
SSU = Scrub-shrub Upland
DFU = Deciduous Forest Upland
MFU = Mixed Forest Upland
EP = Evergreen Plantation
EW = Emergent Wetland
SSW = Scrub-Shrub Wetland
DFW = Deciduous Forest Wetland
MFW = Mixed Forest Wetland

*Plant species identified by Earth Tech in September and October 1999.

report, all plant species are presented by common name only in the text. Table 14-1 identifies each plant species by both common and scientific name. Table 14-2 provides a summary of the acreage of the vegetative cover types on the Project site.

Table 14-2: Acreage of Vegetative Cover Types on the Project Site

Vegetative Cover Type	Acres	Percent of Total Acreage
Upland Types		
Developed	50.0	26
Scrub-shrub Upland	4.4	2
Deciduous Forest Upland	81.8	43
Mixed Forest Upland	7.8	4
Evergreen Plantation	1.2	1
Open Field	10.8	6
Wetland Types		
Emergent Wetland	1.5	1
Scrub-shrub Wetland	9.6	5
Deciduous Forest Wetland	17.3	9
Mixed Forest Wetland	5.6	3
Total	**190.0**	**100**

14.2.2.1 Upland Community Types on the Project Site

Developed Areas

Developed areas on the site (as shown previously on Figure 14-1 and in Appendix R) are primarily associated with Independence Station. There are several paved and gravel roadways and parking lots around the existing facility and its ancillary structures. Maintained lawn area is prevalent immediately adjacent to the existing facility. A railroad spur is located behind the existing power station and extends onto the property to the west. Out of the approximately 190-acre Project site approximately 50 acres (26% of the Project site area) are currently developed areas.

Scrub-Shrub Upland

Scrub-shrub upland areas are present on the site where agricultural fields were abandoned and where the forest was cut over for various reasons. Shrub areas are found primarily in the southern third of the Project site. A dense shrub layer with scattered trees and open field species characterize this community type. Dominant species in the shrub layer include arrowwood, red maple, green ash, silky dogwood, serviceberry, blackberry and quaking aspen. Red maple and sugar maple saplings are dense in scrub-shrub areas along forest edges. The herbaceous layer of the scrub-shrub uplands is dominated by goldenrods, blackberry, wild strawberry and grape (TES 1991). Out of the approximately 190-acre Project site, approximately 4.4 acres (2% of the Project site area) are currently scrub-shrub upland. Refer to Table 14-1 for a complete list of all plant species within this community type on the Project site.

Deciduous Forest Upland

Although there has been a significant reduction to deciduous forest upland on the Project site as a result of construction of Independence Station, the composition and structure of the present deciduous forest upland cover type on the Project site is consistent with descriptions provided by TES in its 1991 report. This cover type is prevalent throughout the entire Project site.

The older stands of deciduous forest on the Project site are characterized by the prevalence of sugar maple in the overstory. Associates include white ash, black cherry, American beech, yellow birch, basswood, and red oak. Red oak and American beech are more abundant on the dry knolls. The shrub layer is usually sparse, dominated by an occasional tree sapling such as sugar maple or striped maple and maple-leafed viburnum. The ground layer varies in percent cover during the year, with the highest cover occurring in the spring. Dominant species in the ground layer include blue cohosh, spinulose wood fern, white baneberry, fly honeysuckle, solomon's seal, squirrel corn, cut-leaf toothwort, false solomon's seal, and hay-scented fern (TES 1991).

The younger deciduous forested upland on the Project site is dominated by green ash, red maple, black cherry, and quaking aspen in the overstory. The shrub layer of this age group is more dense than that of the older forest age group, and consists of choke cherry, arrowwood, serviceberry, hobblebush, nannyberry, and blackberry. Spring flowering plants in the ground layer are not as common as in the older forest, but poison ivy, grape and Virginia creeper are more prevalent (TES 1991).

Tree species within the deciduous forest upland cover type which are typically greater than 12 inches in diameter at breast height included white ash, sugar maple, red maple, black cherry, basswood and aspen. Together, these species account for approximately 82 percent of the total basal area within this cover type on the entire Project site. Specific estimates regarding the amount of individual species which are greater than 12 inches in diameter at breast height are provided in Appendix S.

Out of the approximately 190-acre Project site, approximately 81.8 acres (43% of the Project site area) are presently deciduous forest upland. Refer to Table 14-1 for a complete list of plant species within the deciduous forest upland communities on the Project site.

Mixed Forest Upland

Mixed forest is located predominantly in the northern third of the Project site at the lower portions of sloping areas. These forests are a mix of eastern hemlock and several deciduous tree species. Red oak and sugar maple are the most frequent deciduous dominants. Other associates are red maple, yellow birch, and American beech. The shrub layer in this cover type is very sparse, consisting of hobblebush, and saplings of sugar maple, red maple and hemlock. The ground layer is also quite sparse, especially where hemlock is dense. Herbaceous dominants include spinulose wood fern, false lily of the valley, and maple-leaf viburnum.

Tree species within the mixed forest upland cover type which are typically greater than 12 inches in diameter at breast height included hemlock, red oak, red maple and sugar maple. Together, these species account for 86 percent of the basal area within the mixed forest upland cover types on the Project site. Specific estimates regarding the amount of individual species which are greater than 12 inches in diameter at breast height are provided in Appendix S.

Out of the approximately 190-acre Project site, approximately 7.8 acres (4% of the Project site area) are presently mixed forest upland. Refer to Table 14-1 for a complete list of plant species within the mixed forest upland communities on the Project site.

Evergreen Plantation

Two small areas of evergreen plantation occur in the southeastern third of the Project site. One area is dominated by a dense stand of white spruce, which is transitioning to a black cherry and red maple community. Currently there is a low species diversity in the tree layer within this area. The other evergreen plantation area is dominated by Scotch pine. The shrub and ground layers are fairly dense and are dominated by black cherry, choke cherry and poison ivy (TES 1991). Out of the approximately 190-acre Project site, approximately 1.2 acres (less than 1% of Project site area) are presently evergreen plantation.

Tree species within the evergreen plantation cover type which are typically greater than 12 inches in diameter at breast height included white spruce, Scotch pine, white ash and red maple. Together, these species account for 94 percent of the basal area within the evergreen plantation cover types on the Project site. Specific estimates regarding the amount of individual species which are greater than 12 inches in diameter at breast height are provided in Appendix S. Refer to Table 14-1 for a complete list of plant species within the evergreen plantation communities on the Project site.

Open Field

Open field generally consists of areas abandoned from agricultural use or those areas previously cleared in conjunction with construction laydown associated with Independence Station. The large open area associated with the Independence Station construction laydown area, located in the central portion of the Project site, is a combination of field and successional scrub-shrub habitat. This area has poor topsoil (i.e., mostly gravel) and presently pioneering species are beginning to populate this area. Dominant species in this area include quaking aspen saplings, Canada goldenrod, bush clover, wild carrot and common mullein. Dominant species in the herbaceous layer of the open fields in the southeastern portion of the Project site include timothy grass, orchard grass, sweet vernal grass, Canada goldenrod, flattop goldenrod, Canada bluegrass, redtop, strawberry, old field cinquefoil, daisy fleabane, and wild carrot (TES 1991). Out of the approximately 190-acre Project site, approximately 10.8 acres (6% of the Project site area) are presently open field. Refer to Table 14-1 for a complete list of plant species within the open field communities on the Project site.

14.2.2.2 Wetland Community Types on the Project Site

Unconsolidated Shore

A narrow (20 to 40 feet wide) band of unconsolidated shore exists along the edge of Lake Ontario in the northwestern portion of the Project parcel. It is described as a wetland type, since it may be periodically inundated during high lake levels or storm events. The area is primarily rock of cobble size, with some occasional boulders. Although nearly devoid of vegetation, some vines of poison ivy, Virginia creeper, and black bindweed extend over the rocks from the vegetated bank at the high water elevation.

Emergent Wetland

Several small emergent wetlands are located in the southeastern portion of the Project site. These areas were ponds that were previously drained. Narrow-leaf cattail, woolgrass, beggar-ticks, water parsnip, rice cutgrass and spikerush are the dominant plant species within these areas (TES 1991).

Other emergent wetland communities persist on the site within the interior of scrub-shrub wetland habitats. Cattails, sensitive fern, marsh fern, soft-stem bulrush, mannagrass, spotted jewelweed, floating heart, tearthumb and swamp dock are the dominant plant species within these areas. Pockets of standing water for long periods of time are common to these areas (TES 1991). Out of the approximately 190-acre Project site, approximately 1.5 acres (less than 1% of Project site area) are presently emergent wetland area. Refer to Table 14-1 for a complete list of species within the emergent wetland communities on the Project site.

Scrub-Shrub Wetland

Scrub-shrub wetlands are common throughout the site. Most of the scrub-shrub areas are characterized by dense, tall shrubs, with a few scattered trees. Dominant shrubs are willow, silky dogwood, speckled alder, arrowwood, and meadowsweet. Willow is usually more common in the wetter portions of the scrub-shrub wetlands. Common herbaceous plants are sensitive fern, royal fern, water willow, marsh fern, and spotted jewelweed. Tree cover varies in the scrub-shrub wetlands but usually is less than 25 percent of the total cover within these areas. Some tree species are common in the shrub layer. Dominant species are red maple, green ash, American elm, quaking aspen, and yellow birch (TES 1991). Standing water is common in some of the scrub-shrub wetland areas immediately adjacent to existing structures associated with Independence Station (i.e., detention basin and switchyard). Out of the approximately 190-acre Project site, approximately 9.6 acres (5% of the Project site area) are presently scrub-shrub wetland. Refer to Table 14-1 for a complete list of species within the scrub-shrub wetland communities on the Project site.

Deciduous Forest Wetland

Deciduous forest wetland is common throughout the Project site. The deciduous forest wetland on the site is an elm-ash-maple association, with an occasional mix of hemlock and yellow birch, which represents the influence of the hemlock-northern hardwoods association. Ponded water is common in this cover type in the spring (TES 1991). Those areas of deciduous forest wetland immediately adjacent to existing structures associated with Independence Station have more evidence of standing water than those located on undeveloped portions of the Project site.

Dominant tree species within this community type include green ash, red maple and American elm, with occasional associates of quaking aspen, ironwood, yellow birch, and black willow. The shrub layer varies in cover depending upon the tree cover and amount of ponded water within the wetland system. Dominant shrub species include spicebush, winterberry, silky dogwood, speckled alder, nannyberry and arrowwood (TES 1991).

Tree species within the deciduous forest wetland cover type which are typically greater than 12 inches in diameter at breast height included white ash, red maple, green ash, and sugar maple. Together, these species account for approximately

82 percent of the total basal area within this cover type on the entire Project site. Specific estimates regarding the amount of individual species which are greater than 12 inches in diameter at breast height are provided in Appendix S.

The herbaceous cover within the deciduous forest wetland areas varies during the growing season and from one wetland area to another depending upon the cover of the upper vegetative strata and the duration of ponded water in spring and early summer. In deciduous forest wetland areas where water is ponded for extended periods, there is little herbaceous cover. Golden saxifrage is a dominant species on the wet mud of a few areas. Sensitive fern and spotted jewelweed are the most widespread herbaceous species in this cover type. Other dominant herbaceous species within this community include mannagrass, lady fern, royal fern, white avens, foamflower, clearweed, false nettle, white snakeroot and stinging nettle (TES 1991). Out of the approximately 190-acre Project site, approximately 17.3 acres (9% of Project site) are deciduous forest wetland. Table 14-1 provides a complete list of species within the deciduous forest wetland communities on the Project site.

Mixed Forest Wetland

Mixed forest wetland is more common on the northern third of the Project site. Dominant tree species within this area include hemlock, red maple, green ash, and yellow birch. The shrub and ground layers are sparse where hemlock is dense, but are more abundant in open areas. Common shrub layer species include hemlock, red maple, spicebush, and winterberry. The herbaceous layer is dominated by sensitive fern, spotted jewelweed, golden saxifrage, clearweed and stinging nettle (TES 1991). Out of the approximately 190-acre Project site, approximately 5.6 acres (3% of the Project site area) are presently mixed forest wetland.

Tree species within the mixed forest wetland cover type which are typically greater than 12 inches in diameter at breast height included red maple, white ash and hemlock. Together, these species account for approximately 90 percent of the total basal area within this cover type on the entire Project site. Specific estimates regarding the amount of individual species which are greater than 12 inches in diameter at breast height are provided in Appendix S.

Refer to Table 14-1 for a complete list of species within the mixed forest wetland communities on the Project site.

14.3 Wildlife Resources

This section addresses Stipulation No. 9, Clauses 9 and 10.

14.3.1 Survey Methodology

Earth Tech biologists completed field investigations in late September through early October 1999 in order to characterize existing habitat cover types, habitat suitability and presence of wildlife resources on the Project site. Particular attention was given to those areas to be developed as part of Heritage Station. The assessment of wildlife resources on the Project site included a review of previously submitted permit documents, as well as field investigations. A report submitted by TES, which was prepared in September of 1991 in conjunction with Independence Station, was referenced as part of this investigation. This report titled, "Terrestrial Ecology Report, Independence Station" presents the results of a comprehensive botanical and wildlife study performed by TES on the Project site prior to construction of Independence Station.

Earth Tech biologists performed habitat assessment activities on the Project site on September 28 through October 1 and October 4 through October 7, 1999. At this time Earth Tech biologists characterized the various vegetative communities on the Project site and made notes regarding the habitat attributes of these communities. Sightings of individuals and signs of wildlife were recorded by Earth Tech biologists at this time as well.

14.3.2 Project Site Habitat Assessment Results

In 1991, prior to the construction of Independence Station, the dominant plant communities on the site were forests of one type or another. Presently, the Project site contains less forested habitat due to the presence of Independence Station. However, forest cover types are still the dominant plant community on the entire 190-acre Project site.

Previously undeveloped areas of the Project site contain a full spectrum of structural variation within its forested communities. The differences within existing forested stands on the Project site are due to age and past land uses. These differences result in a variety of habitat characteristics from one forest stand to the next, in particular within the shrub and ground layers (TES 1991). Much of the forest on the northern portion of the Project site is dominated by tall, maturing trees with very little shrub and ground layer vegetation, as well as a general lack of ground debris (e.g., logs, brushpiles, etc.). The southern portion of the site consists of younger forests with a well developed understory, a denser shrub layer and in some areas a dense ground layer. Considerable ground debris, including stone walls and rock piles are common here (TES 1991).

The other upland communities, mixed forest upland and scrub-shrub upland, while contributing important habitat variety to the Project site, do not contain the same variability among stands as demonstrated by the deciduous forest upland. Structurally, the mixed forest upland is fairly uniform, having a good understory but very little shrub and ground cover (TES 1991).

The evergreen plantation community type adds some variety to the overall Project site, but is not large enough to influence greatly the overall habitat value to any noticeable degree (TES 1991).

The open field community type also adds some variety to the overall Project site and is likely to provide a good amount of suitable habitat for wildlife species that utilize forest edges. The Independence Station construction laydown area located in the south central portion of the Project site is best characterized as a combination of open field and scrub-shrub successional community. This area has poor potential as habitat given the fact that the topsoil consists mostly of gravel, and vegetative cover is sparse and scattered throughout the area. Also, this open field habitat is fragmented, as this area is crossed by several new roads and contains a valve station associated with Independence Station. Overall, the open field communities on the Project site are of poor quality and, therefore, the Project site is likely to be poor habitat for wildlife species requiring extensive open field areas.

The presence of numerous small wetlands scattered throughout the Project site has a marked influence on the overall value as wildlife habitat. The deciduous forest wetlands, as well as the mixed forest wetlands, differ little in their upper layers from some of the upland forests on the site in terms of vegetative structure. The scrub-shrub and emergent wetland areas add overall habitat value to the Project site due to their structural and species differences. The various wetland communities on the Project site provide habitat for species that require at least temporary water sources for breeding, such as some salamanders and frogs. They also offer good habitat for some avian species as well (TES 1991).

In summation, the assessment of habitat conditions on the site revealed that the Project site is potentially best suited for forest-dwelling species and woodland edge species. The interspersion of various forest conditions, plus a mixture of several wetland communities in conjunction with a few small communities not dominated by deciduous trees, improves the overall quality of the site as wildlife habitat. However, the previous development and subsequent operational activities of Independence Station has fragmented somewhat the previously undisturbed large contiguous tracts of high-quality habitat. Nevertheless, the undisturbed portions of the site continue to provide suitable habitat to support populations of diverse wildlife species.

14.3.3 *Resident Wildlife*

The following discussion regarding resident wildlife is based primarily upon the report prepared by TES in September 1991 as part of the permit application process for Independence Station. TES completed a thorough literature review and collection of field data regarding resident reptile, amphibian, bird and mammal species found on the Independence Station site. Earth Tech biologists also recorded the presence of some species during limited field investigations on the Project site in late September and early October 1999.

14.3.3.1 Reptiles and Amphibians

Eight snake species are reported to occur in Oswego County. Based on habitat conditions, six of these species may inhabit the Project site. These species include the Eastern garter snake (*Thamnophis sirtalis sirtalis*), the Northern water snake (*Nerodia sipedon*), the Eastern milk snake (*Lampropeltis triangulum*), Northern brown snake (*Storeria dekayi*), redbelly snake (*Storeria occipitomaculata*) and Eastern ribbon snake (*Thamnophis sauritus*) (TES 1991). Table 14-3 presents a summary of those snake species actually observed on the Project site by TES in 1991.

Table 14-3: Reptiles and Amphibians Observed on the Site of the Independence Station Project, 1991

Common Name	Scientific Name
Northern water snake	*Nerodia sipedon*
Eastern garter snake	*Thamnophis sirtalis*
Spotted salamander	*Ambystoma maculatum*
Redback salamander	*Plethodon cinereus*
Green frog	*Rana clamitans*
Wood frog	*Rana sylvatica*
Northern leopard frog	*Rana pipiens*

Source: Terrestrial Environmental Specialists, Inc., "Terrestrial Ecology Report, Independence Station, town of Scriba, Oswego County, New York," September 1991.

Note: Earth Tech biologists did not observe any of the species listed during limited 1999 field investigations.

The Project site is within the range of ten salamander species, however, only four of these species are documented as occurring in Oswego County (TES 1991).

Frog and toad species that probably inhabit the Project site include the green frog (*Rana clamitans*), wood frog (*Rana sylvatica*), Northern leopard frog (*Rana pipiens*), spring peeper (*Pseudacris crucifer*), gray treefrog (*Hyla versicolor*), bullfrog (*Rana* *catesbeiana*) and the American toad (*Bufo americanus*). All of these species were reported as occurring in Oswego County (TES 1991).

Note that Earth Tech biologists did not directly observe any reptile or amphibian species on the Project site during the 1999 field investigations. This is largely based on the fact that many of these species are more readily observable during the spring breeding season. In addition, the development of the Project site from construction of Independence Station may have reduced available habitat for woodland amphibians such as spotted salamander and wood frog. However, the scrub-shrub wetlands on the east and west sides of the existing switchyard appear to have the best potential to support amphibian species. Also, plant personnel have indicated that there are several frog species in the existing wastewater treatment pond in the spring and that a snapping turtle has taken up residence in the wastewater lagoon as well. Earth Tech personnel identified an isolated scrub-shrub wetland area in the southwestern portion of the Project site which had a significant amount of standing water in it at the time of the 1999 investigations and could potentially support amphibian populations in the breeding season.

14.3.3.2 Birds

In 1991, 74 bird species were identified by TES on the Project site. Of the 74 species, 6 were noted as "fly-overs," indicating that they were probably not actually using the habitat available on the Project site. These included the great blue heron (*Ardea herodias*), osprey (*Pandion haliaetus*), American kestrel (*Falco sparverius*), killdeer (*Charadrius vociferus*), ring-billed gull (*Larus delawarensis*), and tree swallow (*Tachycineta bicolor*). The remaining 68 bird species were documented on the Project site (TES 1991). Ten of these 68 species were observed during the migratory season only. Table 14-4 provides a summary of those bird species observed on the Project site by TES and Earth Tech. This table also indicates the vegetative communities associated with each bird species sighting.

In general, the composition of the avian community is typical of this part of New York State. None of the species recorded are particularly uncommon, and all are reported as inhabitants of Oswego County.

In general, previous development on the Project site associated with the construction of Independence Station may have affected forest interior species such as the wood thrush and ovenbird. The conversion of forested habitat to early successional stages, forest fragmentation and the increase in the forest/field edge that has resulted from Independence Station may have reduced suitable habitat for forest interior species of birds.

Table 14-4: Bird Species Observed on the Heritage Station Site (Page 1 of 2)

		Cover Type Designations[1]							
Common Name	**Scientific Name**	**DF**	**EW**	**FW**	**MF**	**OF**	**SSU**	**SSW**	**FO**
American bittern	*Botaurus lentiginosus*	X							
Great blue heron	*Ardea herodias*								X
Green-backed heron	*Butorides striatus*		X						
Canada goose[2]	*Branta canadensis*		X						
Wood duck	*Aix sponsa*	X							X
American black duck[3]	*Anas rubripes*			X					
Mallard[2]	*Anas platyrhynchos*			X					
Osprey[2]	*Pandion haliaetus*								X
American kestrel	*Falco sparverius*								X
Ruffed grouse	*Bonasa umbellus*	X							
Killdeer	*Charadrius vociferus*								X
American woodcock	*Scolopax minor*							X	
Ring-billed gull[2]	*Larus delawarensis*								X
Mourning dove	*Zenaida macroura*	X							X
Cuckoo sp.	*Coccyzus sp.*			X					
Great horned owl	*Bubo virginianus*	X			X				X
Chimney swift	*Chaetura pelagica*					X			X
Ruby-throated hummingbird	*Archilochus colubris*	X		X	X	X			
Belted kingfisher	*Ceryle alcyon*		X					X	X
Red-bellied woodpecker[2]	*Melanerpes carolinus*	X		X					
Downy woodpecker	*Picoides pubescens*	X			X				
Hairy woodpecker[2]	*Picoides villosus*	X							
Northern flicker[2]	*Colaptes auratus*	X					X		
Pileated woodpecker	*Dryocopus pileatus*	X			X				
Eastern wood peewee[2]	*Contopus virens*	X		X	X			X	
Willow flycatcher	*Empidonax traillii*						X	X	
Eastern phoebe	*Sayornis phoebe*	X			X	X			
Great crested flycatcher	*Myiarchus crinitus*	X				X			
Eastern kingbird	*Tyrannus tyrannus*					X	X		
Tree swallow	*Tachycineta bicolor*								X
Blue jay[2]	*Cyanocitta cristata*	X			X	X			
American crow[2]	*Corvus brachyrhynchos*	X			X	X	X		
Black-capped chickadee[2]	*Parus atricapillus*	X	X	X	X		X	X	
White-breasted nuthatch	*Sitta carolinensis*	X							
Carolina wren	*Thryothorus ludovicianus*	X							
House wren	*Troglodytes aedon*	X				X		X	
Winter wren[2]	*Troglodytes troglodytes*	X							
Marsh wren	*Cistothorus palustris*		X					X	
Golden-crowned kinglet	*Regulus satrapa*	X							
Blue-gray gnatcatcher	*Polioptila caerulea*	X						X	
Veery	*Catharus fuscescens*	X		X	X		X		
Wood thrush	*Hylocichla mustelina*	X		X	X		X		
American robin	*Turdus migratorius*	X			X	X	X	X	
Gray catbird	*Dumetella carolinensis*		X			X	X	X	
Brown thrasher[2]	*Toxostoma rufum*[2]						X		
Cedar waxwing	*Bombycilla cedrorum*	X	X			X	X		
European starling	*Sturnus vulgaris*	X	X			X	X	X	
Warbling vireo	*Vireo gilvus*	X							
Red-eyed vireo	*Vireo olivaceus*	X		X	X			X	

Table 14-4: Bird Species Observed on the Heritage Station Site (Page 2 of 2)

		Cover Type Designations[1]							
Common Name	**Scientific Name**	**DF**	**EW**	**FW**	**MF**	**OF**	**SSU**	**SSW**	**FO**
Yellow warbler	*Dendroica petechia*	X	X			X	X	X	
Chestnut-sided warbler	*Dendroica pensylvanica*						X		
Magnolia warbler	*Dendroica magnolia*			X					
Cape May warbler	*Dendroica tigrina*	X							
Black-throated blue warbler	*Dendroica caerulescens*						X		
Yellow-rumped warbler	*Dendroica coronata*	X		X	X				
Black-throated green warbler	*Dendroica virens*						X		
Black-and-white warbler	*Mniotilta varia*	X		X					
American redstart	*Setophaga ruticilla*	X		X	X		X	X	
Ovenbird[2]	*Seiurus aurocapillus*	X			X				
Northern waterthrush	*Seiurus noveboracensis*			X				X	
Common yellowthroat	*Geothlypis trichas*	X	X	X		X	X	X	
Hooded warbler	*Wilsonia citrina*	X			X		X	X	
Scarlet tanager	*Piranga olivacea*	X			X				
Northern cardinal	*Cardinalis cardinalis*	X				X	X		
Rose-breasted grosbeak	*Pheucticus ludovicianus*	X					X		
Field sparrow	*Spizella pusilla*					X	X		
Song sparrow	*Melospiza melodia*					X	X		
Swamp sparrow	*Melospiza georgiana*							X	
White-throated sparrow[3]	*Zonotrichia albicollisd*	X							
Red-winged blackbird	*Agelaius phoeniceus*		X			X	X	X	
Common Grackle	*Quiscalus quiscula*		X			X			X
Brown-headed cowbird	*Molothrus ater*	X			X			X	
Northern oriole	*Icterus galbula*	X					X	X	
American goldfinch	*Carduelis tristis*		X			X	X	X	
Brown creeper[3]	*Certhra americana*	X							
Wild turkey[3]	*Meleagris gallopauo*	X							

Source: Terrestrial Environmental Specialists, Inc. "Terrestrial Ecology Report, Independence Station, town of Scriba, Oswego County, New York", September 1991. Breeding bird data collected on June 3, 4, 7, 13, and 14, 1991 by TES and, data collected on September 28, 29, 30 and October 1, 4, 5, 6, and 7, 1999 by Earth Tech.

[1]Cover Type Designations:

DF = Deciduous Forest Upland
EW = Emergent Wetland
FW = Deciduous and Mixed Forest Wetland
MF = Mixed Forest Upland
OF = Open Field
SSU = Scrub-shrub Upland
SSW = Scrub-shrub Wetland
FO = Fly-Over

[2]Identifies those species observed by Earth Tech during field investigations in September and October 1999.

[3]Identifies those species observed by Earth Tech in 1999 but not listed by TES in 1991.

Conversely, the development of the Project site has created a larger number of standing snags suitable for cavity nesters such as woodpeckers. Furthermore, early successional habitats, such as the previously utilized construction laydown area, provide habitat for species such as the eastern kingbird and the song sparrow.

14.3.3.3 Mammals

TES identified 17 species of mammals on the Project site in 1991 (TES 1991). Table 14-5 presents a summary of those species identified by TES and Earth Tech on the Project site with associated cover types. The decrease in forested area on the Project site and subsequent habitat fragmentation resulting from the development of Independence Station has most likely reduced the ability of the Project site to support significant populations of various mammal species. However, Earth Tech biologists did note evidence of mammal use of habitat cover types around the Project site (i.e., various burrows, dens, browse signs and tracks). This evidence indicates that, although the site has been developed, it is still being utilized by several species of mammals. Also, the electric utility lines installed as part of Independence Station may provide travel corridors and foraging opportunities for generalist species such as coyote, red fox and the white-tailed deer.

Table 14-5: Mammals Observed on the Site of the Heritage Station Project

Common Name	Scientific Name
Masked shrew	*Sorex cinereus*
Short-tailed shrew	*Blarina brevicauda*
Hairy-tailed mole	*Parascalops breweri*
Star-nosed mole	*Condylura cristata*
Eastern cottontail	*Sylvilagus floridanus*
Eastern chipmunk[1]	*Tamias striatus*
Gray squirrel[1]	*Sciurus carolinensis*
White-footed mouse	*Peromyscus leucopus*
Meadow vole	*Microtus pennsylvanicus*
Muskrat	*Ondatra zibethicus*
Norway rat	*Rattus norvegicus*
House mouse	*Mus musculus*
Woodland jumping mouse	*Napaeozapus insignis*
Porcupine	*Erethizon dorsatum*
Red fox	*Vulpes vulpes*
Raccoon	*Procyon lotor*
White-tailed deer[1]	*Odocoileus virginianus*

Source: Terrestrial Environmental Specialists, Inc. "Terrestrial Ecology Report, Independence Station, town of Scriba, Oswego County, New York," September 1991.

[1]Indicates those species directly or indirectly observed by Earth Tech in 1999 field investigations.

14.3.3.4 Migratory Wildlife

The Project site is located on a major spring raptor flyway. Both hawks and owls follow the general shoreline of Lake Ontario during this migratory movement. Based upon literature review, the long-eared owl (*Asio otus*) and the Northern saw-whet owls (*Aegolius acadicus*) start migration in mid-March and conclude by mid-April to early May. The broad-winged hawk (*Buteo platypterus*), sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis*), and the turkey vulture (*Cathartes aura*) have been documented with the most frequency during the migration season at the Derby Hill Bird Observatory several miles east of the Project site (TES 1991).

Although the habitat present on the Project site is in no way critical to migrating raptors, it is likely that both hawks and owls use the site for roosting and to some degree for opportunistic foraging. Hemlocks in the mixed forest communities are probably good roosting trees for some raptors. The small evergreen plantations appear suitable for daytime roosting by long-eared owls (TES 1991).

14.4 Protected Plant Species

This section addresses Stipulation No. 9, Clause 4, as it pertains to potential plant species.

14.4.1 Agency Consultation

As part of a 1991 study, TES contacted the USFWS and the NYSDEC Significant Habitat Unit with regards to the endangered, threatened or rare plant species on the Project site. Responses from both agencies indicated that no such plant species are known to occur on or near the Independence Station site (TES 1991). In order to obtain the most current information on the potential presence of endangered, threatened or rare plant species on the Project site, Earth Tech sent inquiries in September 1999 to both the USFWS and the NYSDEC Significant Habitat Unit. Responses from both agencies indicated that there are no state or federally-listed plant species on or in the immediate vicinity of the Project site. Appendix T provides relevant agency correspondence associated with these requests.

14.4.2 Information about Potentially Occurring Species

A list of plant species with known historical records from Oswego County and protected under 6 NYCRR Part 193.3 as endangered, threatened or rare was created by TES and presented in its 1991 "Terrestrial Ecology Report." This list was generated as a result of an extensive literature review. The list, included as Table 14-6, was used as a reference for Earth Tech biologists prior to performing the field investigations on the Project site. No plant species listed under the Endangered Species Act of 1973 are known to occur in Oswego County (TES 1991). In an effort

Table 14-6: List of Endangered, Threatened, and Rare Plant Species[1] Reported from Oswego County, New York[2]

Endangered Species	
Pterospora andromedea – Giant Pine-drops	• Under coniferous trees in dry soil[3]; and • Numerous old collections but only collected twice since 1919.
Threatened Species	
Cypripedium arietinum – Ram's-head ladyslipper	• Calcareous swamps and mixed forests over limestone; moist usually acidic soils in coniferous woods; and • Local species
Desmodium ciliare – Tick-trefoil	• Dry or sandy soil
Desmodium glabellum – Tall Tick-clover (*Desmodium dillenii*)	• Sandy woods, Dry woods
Eleocharis quadrangulata – Angled Spikerush	• Shallow water; ponds creeks, tidal shores.
Hypericum prolificum – Shrubby St. Johnswort (*Hypericum spathulatum*)	• From a variety of habitats from margins of swamps to rocky woods or cliffs, damp sandy or rocky slopes.
Primula mistassinica – Bird's-eye Primrose	• Rock, cliffs, and gravelly shores limestone cliffs, seepage banks, and wet meadows;and • Boreal species reaching limits in New York.
Salix cordata – Sand Dune Willow (*Salix syrticola*)	• Sandy and alluvial shores, Dunes and shores; and Selkirk, Sand Creek, Woodville; Great Lakes – local.
Saxifraga aizoides – Yellow Mountain-saxifrage	• On calcareous gravels or cool, damp slopes; calcareous seeps; and • Arctic species reaching southern limit in New York and Connecticut.
Rare Species	
Arabis divaricarpa – Purple Rock-cress	• Sandy or rocky soil, ledges, gravels and sands
Arethusa bulbosa – Swamp Pink	• Open bogs, Sphagnum bogs, and swamp meadows.
Carex chordorrhiza – Creeping Sedge	• Sphagnum bogs and inundated bogs.
Carex emmonsii – Emmons Sedge	• Dry wood, thickets and clearings.
Carex gynocrates – Northern Bog Sedge (Carex dioica)	• Sphagnum bogs and peat soils.
Eleocharis obtusa var. ovata Blunt Spikerush (Eleocharis annua Eleocharis ovata)	• Muddy or wet places and moist open places.
Equisetum palustre – Marsh Horsetail	• In shallow water or on moist sandy stream banks.
Listera australis – Southern Twayblade	• Open bogs and sphagnum swamps, shaded bogs and wet woods.
Potamogeton alpinus – Northern Pondweed	• Ponds and slow streams, calcareous.
Prunus pumila var. ***pumila*** – Sand-cherry	• Sand dunes and sandy soil, especially on the shores of the Great Lakes, also inland in lake states.
Scirpus heterochaetus – Slender Bulrush	• Swamps, shores, and shallow water, calcareous waters.
Utricularia geminiscapa – Hiddenfruit Bladderwort	• In quiet water.

Source: Terrestrial Environmental Specialists, Inc. "Terrestrial Ecology Report, Independence Station, town of Scriba, Oswego County, New York," September 1991.

[1]As listed in 6 NYCRR Part 193.3.

[2]Based on vouchered specimens as recorded in New York Flora Association (1990).

[3]Habitat and distribution information from Fernald (1950), Gleason (1952), Mitchell *et al.* (1980), and Mitchell and Sheviak (1981), Nomenclature follows Mitchell (1986).

to have the most current information with regard to the potential presence of protected plant species, Earth Tech contacted the NYSDEC Significant Habitat Unit and the USFWS in September 1999. Earth Tech received confirmation from both of these agencies that there are currently no known occurrences of federally-listed or state-listed plant species on the Project site (see Appendix T).

The habitats which may be associated with protected plant species can be grouped into the following categories: sandy shores and dunes, dry sandy woods; limestone and calcareous cliffs; bogs; and quiet water or muds of swamps and stream banks (TES 1991). Out of these habitat groupings only swamps and wet woods exist on the Project site. Therefore, the species with the most potential to occur on the Project site would include angled spikerush (*Eleocharis quadrangulata*), blunt spikerush (*Eleocharis obtusa*), slender bulrush (*Scirpus heterochaetus*) and hidden fruit bladderwort (*Utricularia geminiscapa*).

14.4.3 Results of Protected Plant Species Field Investigations

Searches for protected plant species were made by Earth Tech personnel in September and October 1999 incidental to existing vegetative community mapping, wildlife habitat analysis and wetland delineation activities on the Project site. No listed endangered, threatened, or rare plant species protected under state or federal law were found on the Project site during these investigations. This is consistent with the TES results from 1991, where TES reports, "Searches were made at various times during the growing season for protected plant species. No listed endangered, threatened or rare plant species protected under state or federal law were found on the site." (TES 1991).

14.4.4 Impact Assessment and Mitigation for Protected Plant Species

Due to the fact that no protected plant species were identified on the Project site either by TES in 1991 or Earth Tech in 1999, there will be no impacts to protected plant species as a result of the proposed Project. Furthermore, because there are no anticipated impacts to protected plant species, mitigation is not required.

14.5 Protected Wildlife Species

This section addresses Stipulation No. 9, Clause 9, as it pertains to protected wildlife species.

14.5.1 Agency Consultation

As part of a 1991 study, TES contacted the USFWS and the NYSDEC Significant Habitat Unit with regard to the endangered, threatened or rare animal species on the Project site. Responses from both agencies indicated that no such animal species were known to occur on or near the Independence Station site with the exception of occasional transient individuals (TES 1991). At that time, the NYSDEC did mention that the adjacent shoreline of Lake Ontario is considered significant as a duck wintering area. However, since the proposed Independence Station would have had minimal effects on such off-shore habitat, TES made no further request for information at that time.

In order to obtain the most current information on the potential presence of endangered, threatened or rare animal species on the Project site, Earth Tech sent inquiries in September 1999 to both the USFWS and the NYSDEC Significant Habitat Unit. Responses from both agencies (Appendix T) indicated that there are no state or federally-listed animal species on or in the immediate vicinity of the Project site with the exception of occasional transient individuals. The NYSDEC also identified that, although there are no known occurrences of rare or state-listed animals on the Project site, the Project location is within or adjacent to a designated significant Coastal Fish and Wildlife Habitat. This significant habitat is addressed in detail in Section 17.5, Aquatic Ecology.

14.5.2 Potential to Support Protected Species

TES, as part of its 1991 study of the Project site, performed an extensive literature review to identify those species that could potentially occur on the site, based upon geographic ranges and habitat requirements. In summary, TES concluded that no species listed by either the federal government or the state of New York as endangered are likely to use the site in more than a transient manner. No federally-threatened species are likely to use the site. One species listed by the state of New York as threatened, the red-shouldered hawk (*Buteo lineatus*) may inhabit the site. Eleven species considered to be of special concern in New York could make use of the Project site. These species include the Jefferson salamander (*Ambystoma jeffersonianum*), blue-spotted salamander (*A. laterale*), spotted salamander (*A. maculatum*), spotted turtle (*Clemmys guttata*), least bittern (*Ixobrychus exilis*), Cooper's hawk (*Accipiter cooperii*), sedge wren (*Cistothorus platensis*), eastern bluebird (*Sialia sialis*), Henslow's sparrow (*Ammodramus henslowii*), grasshopper sparrow (*Ammodramus savannarum*), vesper sparrow (*Pooecetes gramineus*) and small-footed bat (*Myotis leibii*) (TES 1991). Agency correspondence in September 1999 did not identify any documented state or federally-listed species. Therefore, it is assumed that the same species as those identified by TES in 1991 have the potential to occur on the Project site at the current time.

The following sections discuss the current habitat conditions on the Project site as they pertain to rare wildlife species that could inhabit the site.

Red-Shouldered Hawk

Based upon literature review, TES identified that the red-shouldered hawk prefers deep woods and swamps for nesting and typically nests in mature hardwood trees within large stands of contiguous forest. Given the fact that the proposed site has been partially deforested as a result of past development, no large stands of contiguous forest exist on the Project site. However, there are adjacent forested areas off the Project site which appear to represent suitable nesting habitat, despite the reported lack of nesting along the Lake Ontario shoreline (TES 1991). The lack of large contiguous hardwood forest stands on the proposed site would indicate that the site is not suitable to support red-shouldered hawks.

Jefferson's, Blue-spotted and Spotted Salamanders

The basic habitat requirements of these three salamander species are very similar, and include deciduous mixed forests in close proximity to permanent or semi-permanent ponds (TES 1991). From the standpoint of habitat suitability, the Project site appears to have suitable habitat for any of these three species, and the spotted salamander was noted by TES in 1991. Some of the wetlands appear to have the possibility to contain sufficient water long enough in the spring to permit successful breeding, while at the same time drying up during the summer months, thus excluding permanent fish populations. Wetland 4 and Wetland 15 are the wetland areas on the Project site, which would most likely support breeding amphibian populations (refer to Figure 14-1 for location of these areas in relation to the Project). Wetland 4 is a small isolated depression, which could serve as a vernal pool area. Wetland 15 contains several depressed pockets within the wetland system, which could hold enough water in the breeding season to support salamander populations. Also, the interspersion of wetlands and mature deciduous and mixed forest around most of the site offers the specific combination of habitat components needed by these salamanders (TES 1991).

Spotted Turtle

The site is on the edge of the geographic range of the spotted turtle; thus, it is unlikely that this species would inhabit the site. However, because one wetland on the site contains permanent shallow water, and because other such wetlands exist in the vicinity of the site, it is possible that at least some suitable habitat for spotted turtles exists (TES 1991).

Least Bittern

With the exception of one wetland located to the northwest of the existing Independence Station and under the electric transmission lines to the existing switchyard area, habitat on the site is not suitable for the least bittern. Even this wetland provides marginal habitat that is less suitable because of its shrub community. This species prefers extensive marsh conditions for nesting (TES 1991). According to literature review from the 1991 TES study, this species is "an unpredictable and irregularly distributed breeder" in Oswego County, typically associated with large marsh complexes along the shore of Lake Ontario and major rivers (TES 1991).

Cooper's Hawk

Based on vegetation characteristics, the site appears to provide suitable nesting habitat for Cooper's hawks. This species prefers deciduous and mixed forests. TES concluded, based upon literature review, that although the Cooper's hawk is listed as a probable breeder in Oswego County, sources indicated that this species was "virtually non-existent as a breeding species in the area" (TES 1991).

Sedge Wren

The sedge wren prefers sedge meadows, shallow sedge marshes with scattered shrubs and little or no standing water. Habitat of this nature does not exist on the Project site. The edge of a few wetlands could be considered as possible nesting habitat, but given the prevalence of scrub-shrub and forested wetlands on the site, there is very little habitat that could be considered suitable for the sedge wren (TES 1991).

Eastern Bluebird

There are three portions of the site which could be considered as potential breeding habitat for eastern bluebirds. These include a small open field just north of Route 1A, a small open field just west of the easternmost dirt road and a large open field area south of the existing Independence Station (previously used as construction laydown for construction of this facility). According to the literature review, the nesting habitat of this species is described as open country with scattered trees, farmlands, open woods, and woodland edges beside fields and meadows. Bluebirds also require low cavities for nesting. Therefore, whether or not the three open fields represent suitable habitat depends upon the presence of nesting cavities along the edges of these openings (TES 1991). No such nesting cavities were observed by Earth Tech scientists during the 1999 field work.

Henslow's, Grasshopper and Vesper Sparrows

These three sparrow species require open areas, such as open fields for nesting. The only portions of the site that could be considered suitable nesting habitat are the two small open fields and the large open field. The two small open fields are not large enough to support more than one or two breeding pairs, whereas the larger open field could support three or four breeding pairs (TES 1991). None of these species have been observed using the site.

Small-Footed Bat

TES noted that the only mammal on the NYSDEC list of special concern species that could occur on the site is the small-footed bat. However, considering the lack of caves suitable for winter hibernation available on the site, there is no reason to expect this species to inhabit the site on a year-round basis. The only possible use of the site by the small-footed bat would be of a transient nature during the warm months of the year. Earth Tech biologists did not observe any evidence of the existence of this species on the site during the 1999 field investigations.

14.5.3 Results of Protected Wildlife Species Surveys

Of those species listed by New York State as either endangered or threatened, the only one noted during the field investigation was the osprey. This species was recorded by TES in 1991 as a "fly over" during the spring migration period. No use of the Project site by this species or any of the other species in these two categories was observed by TES in 1991 (TES 1991). Earth Tech biologists did not observe any species listed by the state of New York as endangered or threatened on the Project site during the 1999 field investigations.

Of the 11 species of special concern deemed as possible inhabitants of the Project site, only the spotted salmander was noted during the TES 1991 field surveys. At that time, TES identified a spotted salamander adult in a deciduous forest wetland and an immature salamander in a mixed forest upland community. At the same time, egg masses were found in two wetlands. Furthermore, TES captured several spotted salmanders in drift nets during a later investigation performed on August 9 through August 10, 1991 (TES 1991). Earth Tech biologists did not observe any salamander species during the 1999 protected species investigations. However, given the fact that Earth Tech performed field investigations in the fall (outside the breeding season for spotted, blue-spotted and Jefferson's salamanders) it does not necessarily indicate that these species do not exist on the Project site. Earth Tech biologists did note two areas located within existing forested wetland habitat which could potentially function as amphibian breeding habitat in the spring season. These areas are identified on Figure 14-1.

14.5.4 Impact Assessment and Mitigation for Protected Animal Species

Based on past investigations, habitat assessments on the Project site and current field investigations, the proposed Project will not have a significant impact on protected animal species. Earth Tech scientists did document the presence of a potential vernal pool in the southeastern corner of the Project site. Based on the proposed Project plans, no work will occur in the vicinity of this area. Therefore, no further mitigation measures are proposed for protected animal species.

14.6 Botanical and Wildlife Resources in Areas to be Disturbed

This section addresses Stipulation No. 9, Clauses 9 and 10.

The following sections provide a detailed description of the vegetative communities and wildlife resources to be disturbed as a result of Project construction. Each community to be disturbed is described in accordance with *Ecological Communities of New York State* (Reschke 1990). Also included in the discussion of each disturbed area is a description of the dominant species within each area as documented by

Earth Tech. Information with regard to wildlife species and habitat assessments for each area to be disturbed is based upon review of previously submitted reports and field investigations performed by Earth Tech in late September and early October 1999. Figure 14-2 shows the location of the proposed facilities in relation to the existing cover types on the Project site. As per Stipulation No. 9, clause 4 this drawing has also been provided at a scale of 1" = 100' in Appendix R. Table 14-7 presents a summary of the areas to be disturbed.

14.6.1 Proposed Power Block

The Project's powerhouse will be located mostly within an area currently occupied by mowed lawn, mowed roadside/pathway, paved and unpaved roads, which are associated with Independence Station. Although the Project's power block will be located mostly within previously developed areas, a small portion of the facility and the proposed roadway associated with the power block will be located within a small fringe of deciduous forested upland and a scrub-shrub wetland area.

The deciduous forested upland area is best characterized as a successional northern hardwood forest. Dominant tree species located within this area include sugar maple, green ash, and yellow birch. Dominant woody vegetation in the understory includes scattered occurrences of witch hazel and ironwood. The herbaceous layer is dominated by sarsparilla and ground pine.

Table 14-7: Summary of Areas to be Disturbed

Project Component	Cover Type	Acreage
Power Block	Deciduous Forest Upland Scrub-shrub Wetland Developed Areas	0.36 0.38 3.69
Cooling Towers	Deciduous Forest Upland Open Field	1.0 2.2
Wastewater Holding Pond	Deciduous Forest Upland	1.1
Switchyard	Deciduous Forest Upland	1.6
Transmission Lines	Deciduous Forest Wetland Scrub-shrub Wetland Deciduous Forest Upland	0.69 1.03 0.45
Construction Laydown	Developed Areas Deciduous Forest Upland Open Field Evergreen Plantation Deciduous Forested Wetland	8.6 5.61 3.5 0.39 0.10
Total Acreage		**30.7**

The scrub-shrub wetland area is best characterized as a shrub swamp. Although dominated by shrub species, some tree species occur at the fringe of this area. These scattered species include red maple and slippery elm. Dominant shrubs in the wetland include arrowwood and silky dogwood. Common herbaceous vegetation includes various sedges, sensitive fern, poison ivy and water-horehound.

The Project's powerhouse will be located mostly within previously developed areas and therefore will not have any significant adverse impact to wildlife resources. The construction of the power block and associated roadway will result in the loss of approximately 0.36 acres of deciduous forested upland and 0.38 acres of shrub swamp. These areas are currently adjacent to developed areas and provide habitat for edge species. Following the construction of these facilities, this area will continue to provide habitat for the same edge species.

14.6.2 Proposed Cooling Towers

The area within the location of the proposed cooling towers consists of two different vegetative cover types. The portion of the proposed cooling tower footprint located to the west of the existing gravel roadway is primarily field habitat best characterized as successional old field. Approximately 2.2 acres of old field habitat will be disturbed as a result of construction of the Project's cooling towers. This area was previously a combination of deciduous and mixed forested upland (TES 1991). Presently this area is 3 to 4 year old field habitat, still showing signs of soil disturbance from its previous use as the Independence Station construction laydown area. Soils in the open field area present poor opportunities for burrowing, as they are mostly gravel. There are no trees within this area. Woody vegetation is sparse and includes quaking aspen saplings. Dominant ground cover includes goldenrods, aster, thistle, Queen Anne's lace, timothy grass and bush clover. Given the poor soils and lack of woody vegetation within this open field, this area has a poor ability to provide important food, shelter, migratory or overwintering areas for wildlife. Therefore, construction of the cooling towers in this area will not significantly impact wildlife resources on the Project site.

The portion of the proposed cooling tower footprint located to the east of the existing gravel roadway is currently a combination of mixed and deciduous forested upland best characterized as a successional northern hardwood forest. Approximately 1.0 acre of deciduous forest upland will be disturbed as a result of installation of the cooling towers. Dominant trees in this area include sugar maple, red oak, and black cherry. Dominant woody vegetation in the understory includes white ash and red pine. Herbaceous vegetation is sparse in this area, with sarsparilla being the only true dominant. Construction of the cooling towers will result in the displacement of any resident wildlife from this area, as the forest will be cleared as a result. Wildlife species which nest, feed or take cover within the canopy and understory of this area will be affected. Some examples include the gray squirrel, chipmunk, woodland jumping mouse, porcupine, woodpeckers, white-breasted nuthatch, black-capped chickadee and the redbacked salamander.

14.6.3 Proposed Wastewater Holding Pond

The area in the vicinity of the proposed wastewater holding pond is deciduous forest upland best characterized as a successional northern hardwood forest. The proposed wastewater holding pond will be located in an upland area to the east of the existing wastewater holding pond. Approximately 1.1 acres of deciduous forest upland area will be disturbed as a result of the installation of the wastewater holding pond. Dominant trees in this area include sugar maple, white ash, American beech, and red oak. Because this is a mature forest stand, the understory is relatively sparse. However, dominant woody vegetation in the understory includes yellow birch, striped maple, red oak and American beech saplings. Ground cover in this area is very sparse. Dominant herbaceous species include spinulose wood fern and Canada mayflower.

Independence Station personnel have indicated that the existing wastewater pond is utilized by various frog species and a snapping turtle. Construction of a new wastewater holding pond would create additional habitat, which may be suitable for frog or turtle species. The construction would require the clearing of a small amount of mixed forest habitat, thus fragmenting this cover type and affecting forest interior species in this area. However, there is a large tract of similar forest cover type in the immediate vicinity which will remain undisturbed because it has been permanently designated as recreational area, and this tract will provide similar habitat attributes as the area proposed for the wastewater holding pond. The underground wastewater line extending to the new wastewater pond will be located adjacent to the existing cooling tower and/or within an existing gravel roadway.

14.6.4 Proposed Switchyard

The area in the vicinity of the proposed switchyard is primarily deciduous forested upland best characterized as a successional northern hardwood forest. Approximately 1.6 acres of deciduous forested upland will be disturbed as a result of the new switchyard. The new switchyard area will be located immediately to the south of the existing switchyard facilities. Dominant trees in this area include green ash, red maple, yellow birch and quaking aspen. The understory, which is relatively sparse, includes gray birch, black cherry, wild grape and poison ivy. The herbaceous layer, which is also sparse in this area, includes asters and goldenrods.

The development of the proposed switchyard would further reduce the amount of forested upland habitat on the Project site available to wildlife species. However, this small stand is located between Route 1A, the existing paved entrance roadway to Independence Station, a large shrub wetland and the existing switchyard area. Based upon its location and relatively small size this area does not support a wide variety of wildlife species.

14.6.5 Transmission Lines

The transmission lines extending from the power block to the new switchyard will result in the clearing of approximately 0.81 acre of deciduous forested wetland area and 0.45 acre of deciduous forested upland area. In addition, approximately 1.03 acres of scrub-shrub wetland will be temporarily impacted as a result of construction of the transmission lines. However, this area will be allowed to naturally revegetate.

The deciduous forested wetland area is best characterized as a red maple-hardwood swamp. Dominant trees in this area include red maple and ironwood. Common woody vegetation in the understory includes black willow, arrowwood, speckled alder and winterberry. The herbaceous layer is sparse with sensitive fern as the dominant plant. This area will be allowed to regenerate to a scrub-shrub swamp area. Clearing of the forested wetland area for the transmission lines will result in further fragmentation of this wetland area. However, it will create the opportunity for edge species to utilize these areas.

The deciduous forested upland area is best characterized as a successional northern hardwood forest. This area is similar in composition and structure as the forest stand to be disturbed as a result of the installation of the switchyard.

14.6.6 Proposed Construction Laydown Areas

The proposed construction laydown areas have been located to the maximum extent possible within previously developed or disturbed areas associated with Independence Station. The construction laydown will result in disturbance to approximately 18.2 acres, consisting of several different cover types including: previously developed areas (8.6 acres); old field (3.5 acres); evergreen plantation (0.39 acre); deciduous forested wetland (0.10 acre) and deciduous forest upland (5.61 acres).

The deciduous forest wetland area is best characterized as a red maple-hardwood swamp. Dominant tree species in the overstory include green ash and red maple. The understory is dominated by dogwood thickets with sensitive fern, horsetail and poison ivy in the herbaceous layer. This area is a small isolated depression surrounded by upland forest.

The old field and deciduous forest upland areas are located immediately adjacent to the areas to be disturbed from construction of the proposed cooling towers. Refer to the previous discussion regarding the cooling towers for a description of anticipated impacts to vegetation and wildlife for these areas.

The evergreen plantation area is dominated by a dense stand of Norway spruce and white spruce, which are being topped by black cherry and red maple. There is a low species diversity in the tree layer within this area. The shrub and ground layers are fairly dense and are dominated by black cherry, choke cherry and poison ivy.

All other areas identified for construction laydown are currently being utilized as part of Independence Station. As such, no significant adverse impacts to vegetation or wildlife will occur within these areas as a result of construction laydown.

14.7 Assessment of Potential Impacts to Botanical and Wildlife Resources from Construction

This section addresses Stipulation No. 9, Clauses 7, 8, 11, and 12.

The potential impacts from Project construction on botanical and wildlife resources have been minimized to the extent possible by locating proposed structures within previously developed or disturbed areas around the existing Independence Station. Potential impacts as a result of Project construction can be divided into both direct and indirect impacts. The following sections present an overview of each of these types of impacts.

14.7.1 Potential Direct Impacts from Construction

There are three potential types of direct impacts to vegetation/habitat cover types as a result of construction of the Project. The first type is the permanent loss of vegetation/habitat cover type that will occur as a result of construction of the new facilities. The second category of impact represents a temporary loss of vegetation/habitat cover type. The third category includes activities that would alter existing vegetation/habitat cover types. The following paragraphs discuss the three categories of direct impacts to vegetation/habitat cover types in more detail.

14.7.1.1 Permanent Loss of Vegetation

Construction of portions of the proposed power block, cooling towers, switchyard, and wastewater holding pond will require an area of approximately 10.33 acres. The 10.33 acres includes approximately 3.69 acres of mowed lawn and previously existing gravel or paved roadways around Independence Station, 2.2 acres of old field habitat (previously disturbed as construction laydown for Independence Station), 4.06 acres of deciduous forest upland area, and 0.38 acre of scrub-shrub wetland. Therefore, the permanent loss of vegetation as a result of the Project will be 6.64 acres of non-mowed area. This represents a permanent loss of 5 percent of the total amount of deciduous forest upland, 39 percent of the total amount of old field habitat (which is a previously disturbed area), and approximately 4 percent of the total amount of scrub-shrub and deciduous forested wetland area on the Project site.

The extent to which this will affect wildlife species will depend upon the use each species makes of these areas to be impacted and, to some extent, on the size of home range characteristics of each species. Considering the abundance of forested habitat in the area, the permanent loss of 4.06 acres of forested area in Oswego County represents a negligible reduction in forested habitat.

14.7.1.2 Temporary Removal of Vegetation

Installation of the construction laydown areas will result in disturbance to approximately 18.2 acres. The 18.2 acres includes approximately 8.6 acres of mowed lawn and or previously developed communities around Independence Station, 5.61 acres of deciduous forest upland, 0.39 acres of evergreen plantation, 0.1 acre of deciduous forest wetland, and 3.5 acres of open field. These areas will be completely cleared of all vegetation and utilized during construction. Following construction these areas will be allowed to naturally revegetate. However, the deciduous forest wetland will be permanently lost, as this area must be graded for use as construction laydown. This area will be allowed to revegetate as upland following its use as construction laydown.

14.7.1.3 Alteration of Existing Vegetative Cover Types

The installation of the transmission line will result in the conversion of 0.81 acres of deciduous forested wetland to shrub swamp.

14.7.2 Potential Indirect Impacts from Construction

Indirect impacts of the proposed Project to botanical and wildlife resources are presented in the following subsections.

14.7.2.1 Erosion and Sedimentation

The habitat adjacent to any major construction project can be diminished as a result of the effects of erosion and sedimentation. The deposition of material in vegetated areas first affects herbaceous species by covering the base of plants, resulting in the depletion of oxygen from the root zone and the death of the plant. Woody species, including trees, can also be affected in this manner, although the species involved and the extent, duration, and nature of the deposited material influence the severity of the impact. In addition, the deposited material from erosion is usually heavier subsoils, which makes it difficult for natural reclamation to take place.

A loss of vegetation as a result of erosion and sedimentation would also indirectly affect wildlife species. A reduction in the quantity and quality of wildlife food and cover is likely to result from erosion and sedimentation. Species that are dependent on ground cover are more likely to suffer. Small mammals, reptiles, amphibians, and birds that feed or nest on the ground are affected. Since most of the area surrounding the construction zone is either developed or wooded, examples of wildlife species that could be impacted in this manner include the wood frog, garter snake, white-footed mouse, short-tailed shrew, ovenbird and wood thrush. Other species could also be affected if shrub and tree cover is lost. Most impacts of this nature, however, are of short duration and, if properly controlled, are limited to the area immediately adjacent to construction activities.

Erosion and sedimentation are easily controlled by practical construction techniques and control measures, as discussed in Section 17.7. With the proper installation and maintenance of siltation barriers and other control measures, the extent of any indirect impacts from erosion and sedimentation should be minor to non-existent.

14.7.2.2 Fugitive Dust

As indicated in Section 6.14, fugitive dust will likely be generated during peak periods of construction activity. However, typical winds at the site are from the west, northwest and dust settlement will largely occur while still on the Project site. It can be assumed, however, that most of the dust will be deposited within a few hundred feet of the construction area, and the amount of deposition will decrease at greater distances from the construction area. Currently, some amounts of fugitive dust are generated by traffic using the gravel roadways around Independence Station and the adjacent recreational parcel. No negative effects from dust on vegetation were noted during the 1999 field investigations, thus, no long-term negative effects from fugitive dust to vegetation or wildlife is anticipated as a result of construction of Heritage Station. In addition, good construction management techniques will include dust suppression measures that will help limit impacts.

Depending upon the location of dust deposition, there may be some effect on wetlands. Construction timing is important, since most of the wetland areas on the site lack standing water during the middle of the summer. Any such impact from fugitive dust would be similar to that resulting from erosion and sedimentation associated with surface water runoff. A temporary increase in water turbidity and subsequent sedimentation could occur. Given the limited area of impact that could be involved and the temporary nature of the impact, the overall consequences to vegetation and wildlife in wetlands resulting from fugitive dust are expected to be insignificant.

As previously described, mitigation measures will be utilized, as necessary, to control construction dust. Such measures are likely to include the wetting of soils, use of temporary stabilization methods, and minimizing work areas to the extent possible. With such measures in place, significant impacts associated with fugitive dust are not anticipated.

14.7.2.3 Vehicle Emissions

As is the case with fugitive dust, the potential impact of vehicle emissions on vegetation will be temporary, minor in nature, and influenced to a large degree by wind speed and direction during the construction period. Short-term exposure to emissions from construction vehicles, is unlikely to have a noticeable impact on botanical or wildlife resources.

14.7.2.4 Noise

Impacts to wildlife due to construction-related noise should be relatively minor given the existing noise generated from the operation of the Independence Station on the Project site. Several factors will influence the nature of any impact resulting from construction noise. First, various types of construction activities result in different noise levels. Thus, as construction progresses from one phase to the next, the level and nature of associated noise will also change.

The second factor related to noise effects on wildlife deals with habitation. With the exception of some wilderness species, most wildlife species have a high tolerance for noise resulting from human activity after a certain amount of exposure. Despite the existing sound levels on the Project site, wildlife signs (i.e., tracks, browse and scat) are evident in the areas adjacent to Independence Station.

The third factor that will influence the effect of noise on wildlife is the seasonal timing of construction. This effect will probably be most important with regard to breeding birds, especially those nesting within a few hundred feet of construction activities. Some nest abandonment may occur for species nesting immediately adjacent to those construction areas more remote from Independence Station.

14.7.2.5 Construction Vehicle Traffic

No impacts to vegetation are expected as a result of construction vehicle traffic. Section 15.3 summarizes anticipated construction vehicle traffic. The primary potential for traffic to affect wildlife is due to collisions with animals crossing roadways. Most car/wildlife accidents, especially those involving deer, occur at night, with peak occurrences typically within the first 2 hours after sunset. Since the projected increase in traffic will occur mostly during daylight hours there is limited potential for any significant impact on wildlife as a result of Project construction.

14.8 Assessment of Potential Impacts to Botanical and Wildlife Resources from Operation

This section addresses Stipulation No. 9, Clauses 7, 8, 11 and 12.

The following sections provide a discussion of anticipated impacts of certain aspects of Project operation on botanical and wildlife resources.

14.8.1 Pollutant Emissions

Emissions from the proposed facility will have no measurable impact on botanical or wildlife resources. Pollutant emissions will be dispersed over a large area, with the resulting deposition at any one point on the ground being limited in magnitude. Given the very low predicted levels of pollutant emissions from the Project and the dispersion of these pollutants over a large area, it is unlikely that any plant or animal species will be affected. As discussed in Section 6.12.3, maximum potential concentrations of pollutants expected to occur, including existing background levels, are below vegetation sensitivity thresholds.

14.8.2 Wastewater

The proposed methods of handling wastewater, as described in detail in Sections 17.2 and 17.5, will prevent botanical and wildlife resources from being affected. In general, Project wastewater will be handled the same way as wastewater from Independence Station. It will be treated at the plant, piped to a wastewater holding pond and discharged to Lake Ontario through an existing pipe. Therefore, the only opportunity for wastewater to come in contact with plants or animals is in the holding pond or the lake. By the time the wastewater reaches the holding pond and the lake it will have been treated and, thus, will not pose any threat to vegetation or wildlife in or around the pond.

14.8.3 Noise

No impacts to wildlife would be anticipated as a result of noise generated during operation. Background noise data presented in Section 11 indicate that nearby industry, existing nearby highway traffic and Independence Station contribute to the ambient noise levels on the Project site.

Impacts to wildlife due to operation-related noise should be relatively minor given the existing noise generated from the operation of Independence Station on the Project site. With the exception of some wilderness species, most wildlife species have a high tolerance for noise resulting from human activity after a certain amount of exposure. Wildlife tolerance to noise especially sustained or regularly occurring noise is readily observed but few quantitative studies have been published. Despite the existing sound levels on the Project site, wildlife signs (i.e., tracks, browse and scat) are evident in the areas adjacent to Independence Station.

Given the existing noise levels at the Project site, the noise generated by Project operation will not cause undue stress on the wildlife of the area.

14.8.4 Traffic

Traffic resulting from the operation of Heritage Station will not affect botanical resources on the Project site. The net increase in traffic as a result of the operation of the plant is anticipated to be 1 to 2 percent of the current volume. Therefore, this represents a very minor increase in traffic volumes on local highways and will have no significant impact on wildlife resources.

14.8.5 Stacks and Cooling Tower

14.8.5.1 Effects of Cooling Tower Icing on Vegetation

Icing from the Independence Station cooling towers has caused a small fringe of wooded vegetation around these structures to become stressed. During field investigations it was observed that an approximately 50-foot wide fringe of vegetation around the existing cooling towers showed signs of stress. Based upon these observations, it is assumed that the proposed cooling towers would have the same effect on any adjacent vegetation. Note that the cooling towers have been located to the extent possible in areas that have previously been disturbed, and that a 50 foot cleared area will be maintained around them. Therefore, icing impacts from the proposed cooling towers to forested areas will be minimal.

14.8.5.2 Potential Effects of Stacks and Cooling Tower on Wildlife Resources

With the exception of ducks and geese, the migratory routes of birds tend to be poorly known. However, many species of migratory birds apparently concentrate along the edges of large bodies of water during migration. The proposed Project is located near the southeastern corner of Lake Ontario and could be considered an area of concentration for birds, especially migratory passerine birds, during both spring and fall migration. The potential concentration of migratory birds is not viewed as a problem since most species of night-migrating birds fly at altitudes of 2,000 to 10,000 feet. This is well above the height of the Project stacks and cooling towers.

14.9 Mitigation Measures for Botanical and Wildlife Resources

This section addresses Stipulation No. 9, Clauses 8 and 12.

The following sections present the practical forms of mitigation that will be employed to avoid, minimize or compensate for impacts on wildlife and botanical resources both during Project construction and its operation.

14.9.1 Facility Siting Considerations

In order to reduce the amount of permanent loss of botanical resources, the Project has been located within the previously developed areas to the greatest extent possible. Of the approximately 30.7 acres to be developed on the Project site, approximately 18.0 acres (58% of total area to be developed) are currently developed or were previously cleared as a result of construction of Independence Station. Where it was not possible to locate structures within previously developed areas, proposed structures were located to the extent possible directly adjacent to existing structures. In general, areas adjacent to existing industrial facilities typically have a higher level of disturbance and a lower habitat value associated with them. Furthermore, generalist and edge species are currently utilizing the areas adjacent to the Independence Station. Following construction, these species will be able to continue to utilize the edge areas.

Wetland impacts resulting from the Project construction have been minimized by siting the proposed facilities outside of wetlands as much as possible. Undisturbed buffers around wetlands have been maintained as much as possible. Accordingly, a degree of wetland mitigation has been provided in the design process through avoidance.

The greatest amount of wetland impact results from the construction of the proposed electric transmission line from the Project powerhouse to the expanded switchyard. Selective clearing of forested wetlands necessary to accommodate the transmission line will result in the alteration of approximately 0.69 acre. This alteration will result in community type conversion from forested wetland to scrub-shrub wetland, but no wetland area will be lost. Wetland filling associated with the expansion of the existing power station totals approximately 0.48 acre.

As compensation for the permanent loss of 0.36 acre of wetland habitat at the Project site, the Applicant plans to provide mitigation in the form of two-to-one on-site wetland replication. Section 17.6.5 discusses mitigation measures for wetland impacts in detail.

14.9.2 Erosion and Sedimentation

Best management practices, as outlined in Section 17.7 will be utilized in order to prevent any adverse impacts to vegetation or wildlife as a result of potential erosion or sedimentation during Project construction. Following construction, surfaces will be appropriately graded, stabilized and vegetated to minimize erosion and sedimentation potential.

14.9.3 Fugitive Dust

As outlined in Section 6.14 several measures will be taken to minimize the amount of fugitive dust that will occur during construction. Strict implementation of these measures will minimize fugitive dust emissions. Given the limited potential for botanical or wildlife resources to be adversely impacted by fugitive dust, no additional mitigation measures are needed.

14.9.4 Traffic

As described in Section 6.14, standard methods of limiting vehicle emissions will be employed during the construction phase of the project. Because such emissions are not expected to have a significant impact on botanical and wildlife resources, no additional mitigation is needed.

No impacts to vegetation are expected as a result of construction vehicle traffic. Section 15.3 summarizes anticipated construction vehicle traffic. The primary potential for traffic to affect wildlife is due to collisions with animals crossing roadways. Most car/wildlife accidents, especially those involving deer, occur at night, with peak occurrences typically within the first 2 hours after sunset. Since the projected increase in traffic will occur mostly during daylight hours there is very limited potential for any significant impact on wildlife as a result of construction of Heritage Station and no further mitigation is proposed.

Traffic resulting from Project operation will not affect botanical resources on the Project site. The net increase in traffic as a result of the operation of the plant is anticipated to be 1 to 2 percent of the current volume. This represents a very minor increase in traffic volumes on local highways and will have no significant impact on wildlife resources. Therefore, no mitigation is proposed.

14.9.5 Noise

Given the existing sound levels at the Project site, the noise generated by Project construction is not expected to cause undue stress on the wildlife of the area. Therefore, no further mitigation is proposed.

14.9.6 Pollutant Emissions

Proposed measures to mitigate impacts on air quality are provided in Section 6. It is unlikely that any plant or wildlife species will be negatively affected by pollutant emissions from the Project; therefore, no further mitigation is needed.

14.9.7 Wastewater

No additional measures are needed to mitigate potential impacts of wastewater on botanical or wildlife resources. The wastewater collection, treatment and holding pond should serve to minimize any impact to nearby botanical or wildlife resources. Thus, no additional mitigation measures are needed.

15. TRAFFIC AND TRANSPORTATION

This section addresses Stipulation No. 10, Clauses 1 through 4. Included is a discussion on the characteristics of the study area associated with transportation of residents, employees and goods. The results of data collection and analysis and the identification of the incremental impact of traffic associated with the Project are identified.

15.1 Applicable Regulatory Requirements

Traffic conditions are typically assessed according to potential changes in operational service level (discussed in detail in Section 15.2.5) or safety. Because the Project does not require a new or modified curb cut onto a public road, and because work in public roads is not contemplated, few regulatory standards apply. The Applicant, however, will work closely with the local community, particularly during the construction period, to avoid any long-term effect on traffic.

15.2 Existing Conditions

This section addresses Stipulation No. 10, Clauses 1(a) through 1(j).

15.2.1 Description of Study Area

As required by Stipulation No. 10, Clause 1(g), several intersections were identified as comprising the study area network. Those intersections, shown on Figure 15-1, are listed below:

- Routes 104 and 63;
- Routes 1 and 1A;
- Routes 63 and 1;
- Routes 1 and 29; and
- Site Drive (Riker's Beach Road) and Route 1A.

In addition, other intersections previously analyzed as part of the Independence Station permitting process which may be along the potential route of construction and operations traffic for the Project were also considered in the definition of local area roadway network. Those additional intersections are Route 29 and Lake Road and Route 1A and Lakeview Avenue.

Field observations were conducted at each of the study area intersections to identify lane use and widths, traffic control and sight distance. Intersection descriptions are provided in the following paragraphs.

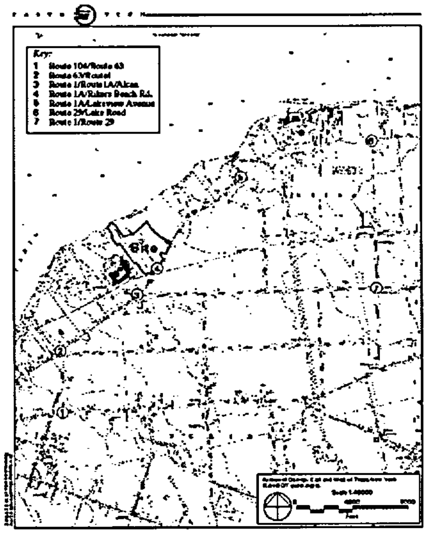


Figure 15 - 1

Study Area Analysis Locations

The intersection of *Routes 104 and 63* is a three-way intersection with Route 63 under stop-sign control as the minor approach to the intersection. A flashing red beacon is in place for traffic on the Route 63 approach, while flashing yellow beacons are in place for traffic on Route 104. The speed limit is 35 miles per hour for all intersection approaches, increasing to 45 miles per hour for vehicles exiting the intersection on Route 104. Each approach on Route 104 consists of a single through lane of approximately 11 feet, with a 10-foot paved shoulder. Field observations indicate that the shoulders are used to bypass turning traffic in the eastbound direction and as a right turn lane in the westbound direction. Travel lanes on the Route 63 segment are approximately 10 feet in width, with a 5-foot shoulder on the southbound approach and a 9-foot shoulder on the northbound receiving lane. Guardrails are in place on each side of Route 63 and extend up to Route 104. The throat of the Route 63 approach widens significantly and allows sufficient room for right-turning vehicles to bypass left-turning vehicles. Sight distance to the west for vehicles exiting Route 63 is between 300-400 feet, while sight distance to the east is greater than 600 feet.

The intersection of *Routes 1 and 1A with the Alcan driveway* is a four-way intersection with stop-sign control on all four approaches. The eastbound Route 1 approach lane consists of one 11-foot travel lane and 3-foot shoulder, while the westbound Route 1A approach consists of one 12-foot travel lane and 4-foot shoulder. A "Stop Ahead" sign is present prior to this approach to the intersection. The northbound Route 1 approach consists of one 16-foot lane and 4-foot shoulder, with a "Stop Ahead" sign in place prior to the intersection. The Alcan approach consists of one 12-foot lane and 1-foot shoulder, with a "No Trucks" sign placed on the entering lane. A separate truck entrance to Alcan is in place west of the intersection: off-tracking is evident in the unpaved area on the northwest corner of the intersection from trucks turning left from the northbound Route 1 approach. Sight distance from the Route 1 northbound and Alcan southbound approaches is approximately 400 feet to the west and between 300-400 feet to the east. The relevance of sight distance at this intersection is tempered by the presence of four-way stop-sign control.

The intersection of *Route 1 and Route 63* is a three-way intersection with stop-sign control on the northbound Route 63 approach. The Route 1 eastbound and westbound approaches each consist of a single 11-foot travel lane with 4-foot shoulder, while the northbound Route 63 approach consists of one 10-foot travel lane and 4-foot shoulder. Directional signs for the NYPA Energy Center, Alcan and Bay Shore Grove are located opposite the Route 63 approach. Sight distance from the Route 63 northbound approach is over 600 feet to the east and between 300-400 feet to the west.

Ferguson Beach Road is an unimproved road that intersects with County Route 1A and provides access to a number of shoreline residences, Independence Station and the proposed Heritage Station site. Discussions later in this section will provide details on county improvement plans at this location as well as use of this location for access during construction of the proposed Heritage Station.

The intersection of *Route 1 and Route 29* is a four-way intersection with all-way stop-sign control. The eastbound Route 1 approach to the intersection consists of a single 12-foot travel lane and 3-foot shoulder, while the westbound Route 1 approach consists of a 10-foot travel lane and 2-foot shoulder. A "Stop Ahead" sign is in place in advance of the westbound approach. Both the northbound and southbound Route 29 approaches to the intersection consist of one 11-foot travel lane and 4-foot shoulder. A posted speed limit of 40 miles per hour is in place on Route 29 north of the intersection. The speed limit on Route 1 varies from 35 to 45 miles per hour away from intersection locations. Sight distance from Route 29 northbound and southbound to the east is approximately 300 feet; sight distance from all other approaches is greater than 600 feet in any direction. The relevance of sight distance at this intersection is tempered by the presence of four-way stop-sign control.

The intersection of *Route 1A and Lakeview Avenue* is a four-way intersection with stop-sign control on the Lakeview Avenue approaches. The eastbound Route 1A approach consists of one 11-foot travel lane and 3-foot shoulder. A posted speed limit of 45 miles per hour is in place on Route 1A, which ends at this location. The westbound approach to the intersection is a private road (and posted as such) owned by NYPA, providing access to the various components associated with the Nine Mile Point and Fitzpatrick Nuclear Stations. This approach consists of a single 11-foot lane and 1-foot shoulder. Although signed as a private road, traffic is allowed to travel through without visible limitation. The northbound Lakeview Avenue approach to the intersection is devoid of pavement markings: the measured width of the entire segment at this location is 24 feet. Lakeview Avenue is posted at 45 miles per hour south of this location. The southbound leg of Lakeview Avenue is also without pavement markings and is 19 feet in width. This leg is posted as a "Dead End" and leads to the Ontario Bible Camp and Conference Center. Sight distance from the Lakeview Avenue northbound and southbound approaches is approximately 400 feet in each direction.

The intersection of *Route 1A and Riker's Beach Road* is a three-way intersection with stop-sign control on the Riker's Beach approach. The eastbound and westbound approaches on Route 1A consist of a single 11-foot travel lane and 3-foot shoulder. Route 1A has a posted speed limit of between 35 and 45 miles per hour at various locations in the vicinity of this intersection. The Riker's Beach Road approach has no pavement markings; the total roadway width of this segment is 24 feet. Riker's Beach Road is a private road owned by Sithe. Access easements are held by property owners of lakefront residences and by the county for access to Independence Park. Sight distance from the Riker's Beach Road southbound approach is between 300-400 feet to the east and over 400 feet to the west.

15.2.2 Traffic Counting Program

Intersection turning movement counts were conducted during the weekday morning (6:00-8:30) and evening (3:00-5:30) commuting periods during September 1999, at the following intersections:

- Routes 104/63;
- Routes 1/1A/Alcan;
- Routes 63/1;
- Routes 1/29;
- Route 1A/Lakeview Avenue; and
- Site Drive (Riker's Beach Road)/Route 1A.

Peak commuting hours were determined to occur from 6:00-7:00 a.m. and 3:15-4:15 p.m. The influence of shift-change times at local industries, particularly the Nine Mile Point and Fitzpatrick Nuclear Plants, are evident in the identification of these peak hours. Traffic volumes were balanced where appropriate from intersection to intersection. In order to account for seasonal variation and the potential absence of traffic associated with seasonal or occasional use homes and facilities, traffic volumes were increased by 5 percent. This figure represents the percentage of homes classified by the town of Scriba in the draft Town of Scriba Comprehensive Plan as seasonal or occasional use homes. In addition, the selected locations analyzed previously for Independence Station (Route 29/Lake Road and Route 1A/Lakeview Avenue) were adjusted to reflect 1999 conditions and were included along with the newly counted intersections. Existing year (1999) traffic volumes are illustrated in Figure 15-2.

The results of automatic traffic recorder (ATR) counts performed on Route 1A (Lake Road) west of Riker's Beach Road during September 1999 indicated a 24-hour traffic volume of approximately 3,100 vehicle trips per day.

The New York State Department of Transportation (NYSDOT) provided traffic volume and roadway surface score rating data for State Route 104 in the Project area (Table 15-1) (Personal communication, Rook, NYSDOT 1999). The surface score rating is given on a scale of 1 to 10, with a score of 10 reflecting a newly paved and/or constructed roadway and a score of 1 representing unacceptable conditions.

Figure 15-2
Existing (1999) Conditions
Intersection Turning Movement Counts
AM/PM Peak Hour
(6:00 - 7:00 AM / 3:15 - 4:15 PM)

NORTH

XXX - AM Peak
(XXX) - PM Peak

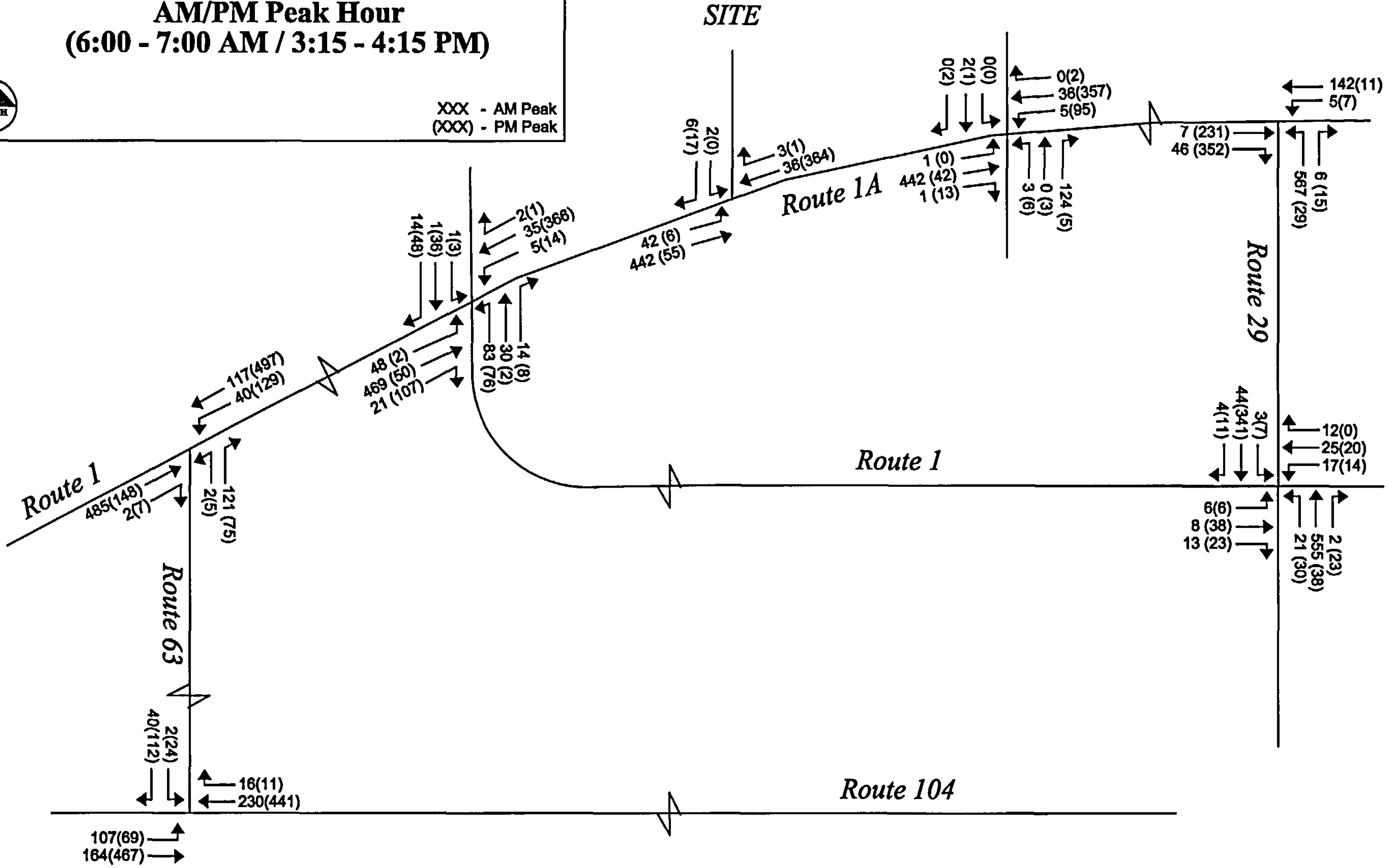


Table 15-1: Route 104 Traffic Volume and Surface Scoring Information

Route 104 from:	Year	Average Daily Traffic	Surface Score Rating
Oswego city line to Route 104B	1998	6,100	6
Route 104B to Route 6	1998	3,500	Not given
Route 6 to Route 3	1998	4,500	9

The Oswego County Planning and Community Development Department also provided traffic volume data within the study area, as reflected in Table 15-2. (Personal Communication, Weiss, Oswego County Planning 1999).

Table 15-2: Traffic Volumes from Oswego County Planning and Community Development Department

County Route 1A from:	Year	Average Daily Traffic
County Route 1 to Lakeview Road	1995	4,900
County Route 1 to County Route 63	1995	6,231

Estimates of average daily traffic (ADT) for each intersection listed above were prepared based upon the hourly distribution exhibited in the Lake Road ATR count. The ratio of peak hour volume to total 24-hour volume recorded on Route 1A was calculated for the full-hours (6:00-7:00 a.m., 7:00-8:00 a.m., 3:00-4:00 p.m., 4:00-5:00 p.m.) observed as part of the intersection turning movement counts. The percentage of total daily traffic represented by those 4 hours (42.59%) was then applied to the intersection volumes to estimate the ADT at each intersection. The results of those calculations are summarized in Table 15-3.

Table 15-3: Study Area Adjusted Average Daily Traffic

Study Area Intersection	Average Daily Traffic
Routes 104/63	7,781 vehicle trips per day
Routes 1/1A/Alcan	5,304 vehicle trips per day
Routes 63/1	5,365 vehicle trips per day
Routes 1/29	4,327 vehicle trips per day
Route 1A/Lakeview Avenue	3,386 vehicle trips per day
Site Drive (Riker's Beach Road)/Route 1A	3,149 vehicle trips per day

In addition, an estimate of daily traffic on Riker's Beach Road (using the method described above) results in a total of approximately 120 vehicle trips per day.

15.2.3 Accident Data

Accident data was obtained from NYSDOT for study area intersections, which include state-numbered routes or are otherwise captured in their recordkeeping system. Information was requested for the most recent 3-year period. A summary is provided in Table 15-4.

Table 15-4: NYSDOT Accident Data

Intersection/ Year	Fatal	Accident Type Injury Occurrence	Property Damage Only	Total Accidents Reported
Route 104/Kocher Road (Route 63)				
1996	0	3	3	6
1997	0	1	1	2
1998	0	1	2	3
Route 1A (Lake Road)/Lakeview Road				
1996	0	0	0	0
1997	0	0	0	0
1998	0	0	1	1
Route 1A (Lake Road)/Route 1 (North Road)				
1996	0	0	0	0
1997	0	0	0	0
1998	0	2	0	2

The highest accident occurrence occurs at the Route104/Kocher Road intersection, which is also the highest-volume intersection. Accident frequency is not sufficient to warrant placement of a signal as a corrective measure at this location (less than five corrective accidents per year for 3 years).

The other two intersections where accidents were reported show no pattern or frequency to indicate the need for corrective measures. Driver factors reported as contributing to the cause of accidents included following too closely, driver inattention and slippery pavement.

Accident data were not available from the Oswego County Planning and Development Department. The Oswego Sheriff's Department does not have accident data in any database or easily retrievable format.

The Oswego County Sheriff's Office was asked about the general safety of the study area roadways and intersections, and indicated that the system is capable of handling traffic associated with Project construction (personal correspondence, Sgt. Grimshaw, December 1999). The intersection of County Route 1/County Route 1A/Alcan Entrance is the most critical of the analysis locations, and was converted to four-way stop-sign control in response to previous safety concerns and accident occurrence. Since the implementation of the four-way stop-sign control, traffic safety has noticeably improved.

15.2.4 School Bus Routes

Information received from the Oswego City School District (Personal communication, Hogan, Oswego County School District 1999) indicates that all major study area routes (Route 1, Route 1A, Route 104 and intersecting roadways) are components of school bus routes in the vicinity of the Project. Table 15-5 describes school bus activity within the area bordered by Routes 1 and 1A to the north, Route 104 to the south, Route 29 to the east and Route 63 to the west.

Table 15-5: School Bus Schedules in the Project Vicinity

Facility	Number of Buses	Morning Schedule	Evening Schedule
Oswego High School	4	6:45-7:25 a.m.	2:25-3:00 p.m.
Oswego Middle School	3	6:50-7:30 a.m.	2:25-3:00 p.m.
Oswego Elementary Schools	9	8:00-8:40 a.m.	3:20-4:10 p.m.

15.2.5 Existing Intersection Operations

Intersection capacity analyses were performed for existing (1999) a.m. and p.m. peak hour conditions at study area intersections using the latest version of the Highway Capacity Software. An explanation of level of service and delay criteria is provided in Table 15-6.

The results of capacity analyses for existing (1999) a.m. and p.m. peak hour conditions at the various study area intersections are summarized in Table 15-7.

The results of capacity analyses performed for existing a.m. and p.m. peak hour conditions indicate that deficient operations occur at only one study area intersection. The intersection of Routes 1 and 1A with the Alcan driveway exhibits LOS F for all moves on the Route 1 eastbound approach during the a.m. peak hour only. This reported deficiency is a function of heavy through traffic flow with the highest volume approach being under stop-sign control. All other locations at all other times exhibit acceptable operating conditions.

Table 15-6: Level of Service (LOS) Designations[1]

Category	Description	Delay Range[2] (Seconds Per Vehicle)	Average Total Delay[3] (Seconds Per Vehicle)
LOS A	Describes a condition of free flow, with low volumes and relatively high speeds. There is little or no reduction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds. Little or no delays result for side street motorists.	0.00 to 10.0	0.00 to 10.0
LOS B	Describes a condition of stable flow, with desired operating speeds relatively unaffected, but with a slight deterioration of maneuverability within the traffic stream. Side street motorists experience short delays.	10.1 to 20.0	10.1 to 15.0
LOS C	Describes a condition still representing stable flow, but speeds and maneuverability begin to be restricted. The general level of comfort begins to deteriorate noticeably at this level. Motorists entering from side streets experience average delays.	20.1 to 35.0	15.1 to 25.0
LOS D	Describes a high-density traffic condition approaching unstable flow. Speeds and maneuverability become more seriously restricted, and the driver experiences a poor level of comfort. Side street motorists may experience long delays.	35.1 to 55.0	25.1 to 35.0
LOS E	Represents conditions at or near the capacity of the facility. Flow is usually unstable, and freedom to maneuver within the traffic stream becomes extremely difficult. Very long delays may result for side street motorists.	55.1 to 80.0	35.1 to 50.0
LOS F	Describes forced flow or breakdown conditions with queuing along critical approaches. Operating conditions are highly unstable as characterized by erratic vehicle movements along each approach.	80.1 or greater	50.1 or greater

(1) Source: "Highway Capacity Manual," Transportation Research Board Special Report 209, Third Edition; National Research Council, 1994, with revisions through 1998.

(2) Delay ranges relate to the mean stopped delay incurred by all vehicles entering the intersection and do not consider the effects of traffic signal coordination. This criterion is intended for use in the evaluation of individual signalized intersections.

(3) Average Total Delay refers to the delay encountered at each approach, averaged for the entire intersection. This criterion is limited to use in the evaluation of two-way stop-sign controlled unsignalized intersections.

Table 15-7: Results of Existing Conditions (1999) Capacity Analysis

Existing (1999) a.m. and p.m. Peak Hour Conditions				
Study Area Intersection	**1999 a.m.**	**1999 a.m.**	**1999 p.m.**	**1999 p.m.**
	LOS[1]	**Delay[2]**	**LOS[1]**	**Delay[2]**
Routes 104/63				
– Left from Route 104 eastbound	A	8.4	A	8.9
– All moves from Route 63 southbound	B	10.7	C	20.6
Routes 1/1A/Alcan				
– All moves from Route 1 northbound	B	11.2	B	10.5
– All moves from Alcan southbound	A	8.8	A	9.9
– All moves from Route 1 eastbound	F	>120	A	9.9
– All moves from Route 1A westbound	A	9.0	C	16.6
Routes 63/1				
– Left from Route 1 westbound	A	9.6	A	8.1
– All moves from Route 63 northbound	C	20.8	B	12.3
Routes 1/29				
– All moves from Route 29 northbound	D	27.4	A	8.9
– All moves from Route 29 southbound	A	8.4	C	20.6
– All moves from Route 1 eastbound	A	8.7	A	9.5
– All moves from Route 1 westbound	A	9.3	A	8.9
Lake Road/29				
– All moves from Lake Road westbound	C	16.4	B	13.2
– Through from Lake Road eastbound	A	8.8	A	7.8
Route 1A/Lakeview Avenue				
– Left from Route 1A eastbound	A	7.3	A	0.0
– Left from Route 1A westbound	A	9.1	A	7.7
– All moves from Lakeview Avenue northbound	C	19.8	C	21.8
- All moves from Lakeview Avenue southbound	C	16.0	C	16.8
Site Drive (Riker's Beach Road)/Route 1A				
– Left from Route 1A eastbound	A	7.4	A	8.4
– All moves from Riker's Beach Road southbound	B	10.3	B	11.4

(1) LOS – Level of Service.

(2) Delay – in seconds per vehicle.

15.2.6 Emergency Vehicle Routes

Local safety officials have indicated that emergency vehicles such as fire, ambulance and police would reach the site by taking either Mitchell Road or Seneca Road to Route 1, then to Route 1A before turning onto Riker's Beach Road.

15.2.7 Chemical/Hazardous Material Routes

According to the Health and Safety Director at Independence Station, the designated routes for vehicles carrying process chemicals or hazardous materials are as follows:

- From the north: Route 81 to Route 104 west to either Route 29 or Creamery Road, then to Route 1 and Route 1A to Riker's Road; and
- From the south: Route 81 to Route 481 into Oswego, then Route 104 east to either Kocher Road or St. Paul Road, to Route 1, Route 1A and Riker's Beach Road.

These routes will be the designated routes for both construction and operations-related deliveries associated with the Project.

15.2.8 Structures and Load Bearings

Available surface score ratings for State Route 104 are identified in Section 15.1.2. Discussions with the NYSDOT indicated that there are no current restrictions on study area roadways with the exception of the State Route 104 bridge over the Penn Central Railroad tracks west of George Street in Oswego. This bridge is currently restricted from use by trucks with "R" permits (permits allowing exceptions to the legal load limits). The bridge is currently being reconstructed (1999) and upon completion (2001) will no longer be posted as restricted. Two alternate routes to and from the site would include either Route 104 to East 10th Street to East Seneca Street to Route 1 to Route 1A; or Route 104 to East 10th Street to Mitchell Street to Route 1 to Route 1A. The first of these alternates involves a bridge crossing, but no issues are anticipated with its use should it be necessary.

15.3 Traffic Impacts During Construction

This section addresses Stipulation No. 10, Clauses 1(k) through 2(h) and 2(l).

15.3.1 Construction Year (2001) Baseline Conditions

In order to identify the incremental impact of Project-related construction traffic, a baseline, or No-Build, condition must be established. The projection of these baseline volumes was conducted in the following manner.

A background growth rate of 1 percent per year was applied to existing year (1999) peak hour traffic volumes to account for normal growth not captured by identification of specific development projects. The only development project identified within the study area is the planned expansion of Oswego Wire Company on Route 1 west of the Project site, which will add 20 new workers. Population growth rate estimates for Oswego County (Woods & Poole Economics 1999) indicate a 0.26 percent annual growth rate between 1996 and 2005, while employment growth rate estimates for Oswego County (Woods & Poole Economics 1999) indicate a 0.95 percent annual growth rate for the same period. Building permit information for new home construction (including mobile homes) provided in the draft town of Scriba Comprehensive Plan (September 22, 1999) indicates an approximately 2 percent annual increase in housing supply since 1990, with a 1 percent annual increase exhibited over the past 2 years. The 1 percent background growth rate is consistent with these figures. Conversations with the Oswego County Planning and Community Development Department confirmed the use of this growth rate as appropriate (personal communication, Weiss 1999). Existing (1999) peak hour intersection volumes were projected to the year 2001 using this growth rate to arrive at construction year No-Build conditions. These volumes are illustrated in Figure 15-3.

In regard to the local roadway network, the Oswego County Highway Department has indicated that improvements to Route 1A (Lake Road) are planned for construction in 2001. These improvements will extend from the Alcan entrance at Route 1/Route 1A to Riker's Beach Road, and will include an upgrade to the railroad crossing on Route 1A and line of sight improvements at the intersection of Ferguson Beach Road.

Intersection capacity analyses were once again performed for the construction year (2001) No-Build condition. The results of capacity analyses for construction year (2001) a.m. and p.m. peak hour No-Build conditions at the various study area intersections are summarized in Table 15-8.

The results of capacity analyses for the construction year (2001) No-Build conditions indicate similar conditions to those described under existing year (1999) conditions. The only deficiency continues to be that for the Route 1 eastbound approach to the Route 1/1A/Alcan intersection during the a.m. peak hour. One other individual intersection approach (Route 1 eastbound at Route 1/1A/Alcan during the p.m. peak) changes by one LOS category (LOS A to LOS B and LOS C to LOS D, respectively) as a result of background traffic growth.

Figure 15-3
Construction Year (2001) No-Build Conditions
Intersection Turning Movement Counts
AM/PM Peak Hour
(6:00 - 7:00 AM / 3:15 - 4:15 PM)

XXX - AM Peak
(XXX) - PM Peak

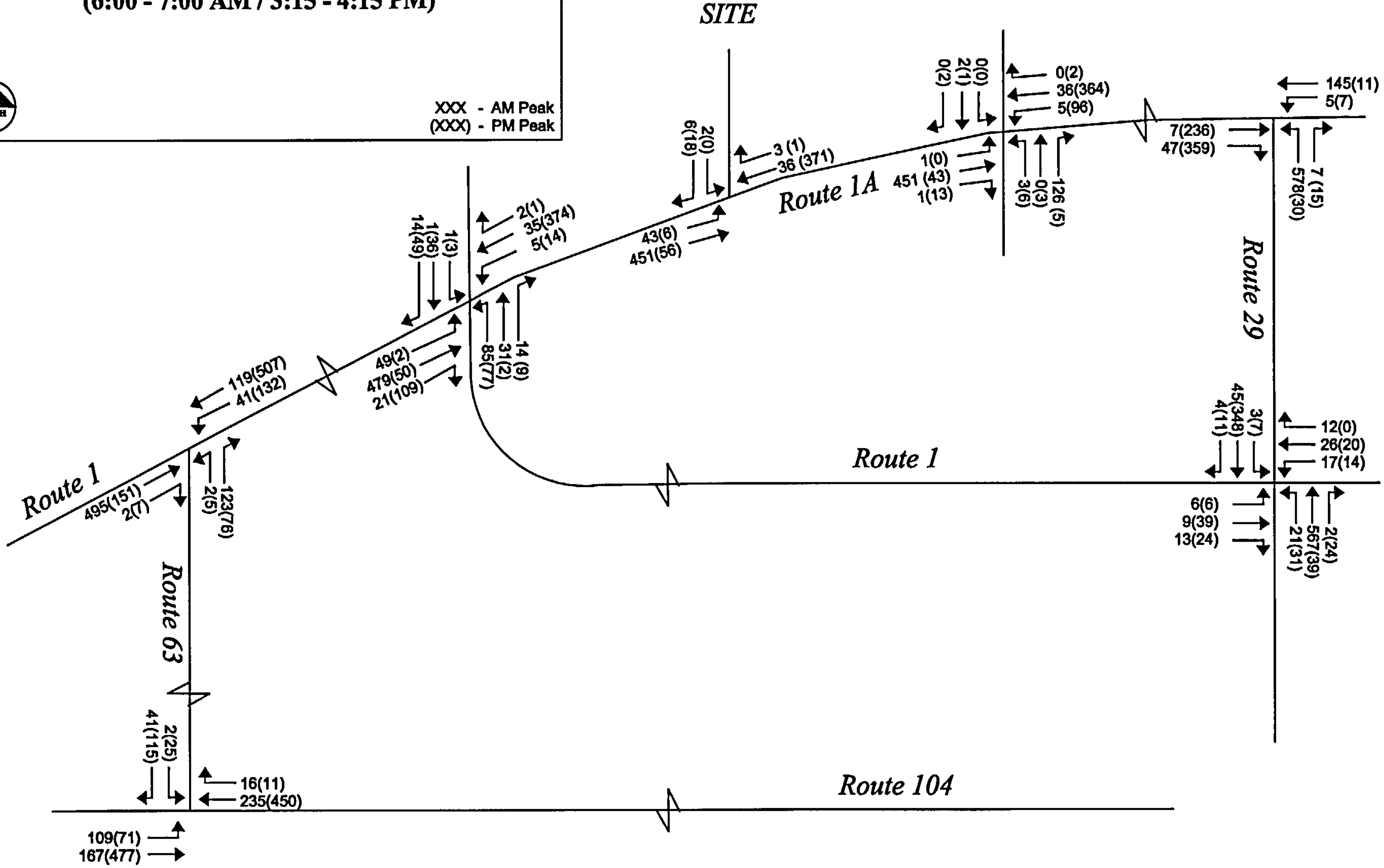


Table 15-8: Results of Construction No-Build (2001) Capacity Analyses

Construction Year (2001) No-Build a.m. and p.m. Peak Hour Conditions				
	2001 a.m.	2001 a.m.	2001 p.m.	2001 p.m.
	LOS(1)	Delay(2)	LOS(1)	Delay(2)
Study Area Intersection				
Routes 104/63				
– Left from Route 104 eastbound	A	8.4	A	8.9
– All moves from Route 63 southbound	B	10.7	C	21.7
Routes 1/1A/Alcan				
– All moves from Route 1 northbound	B	11.3	B	10.6
– All moves from Alcan southbound	A	8.8	A	10.0
– All moves from Route 1 eastbound	F	>120	B	10.0
– All moves from Route 1A westbound	A	9.0	C	16.9
Routes 63/1				
– Left from Route 1 westbound	A	9.7	A	8.1
– All moves from Route 63 northbound	C	21.6	B	12.5
Routes 1/29				
– All moves from Route 29 northbound	D	26.6	A	9.0
– All moves from Route 29 southbound	A	8.4	C	20.7
– All moves from Route 1 eastbound	A	8.8	A	9.6
– All moves from Route 1 westbound	A	9.3	A	8.9
Lake Road/29				
– All moves from Lake Road westbound	C	16.8	B	13.4
– Through from Lake Road eastbound	A	8.9	A	7.8
Route 1A/Lakeview Avenue				
– Left from Route 1A eastbound	A	7.3	A	0.0
– Left from Route 1A westbound	A	9.1	A	7.7
– All moves from Lakeview Avenue northbound	C	20.5	C	22.3
– All moves from Lakeview Avenue southbound	C	16.2	C	17.1
Site Drive (Riker's Beach Road)/Route 1A				
– Left from Route 1A eastbound	A	7.4	A	8.5
– All moves from Riker's Beach Road southbound	B	10.4	B	11.5

(1)LOS* – Level of Service.

(2)Delay** - in seconds per vehicle.

15.3.2 Traffic Volumes During Construction

15.3.2.1 Construction Phasing and Manpower Schedule

The Project's construction period is expected to extend over 34 months. Of this 34 months, the initial 2 to 3 months will include site preparation and installation of underground utilities. The following 12 months will include installation of civil/structural foundations, support columns, elevated and on-grade slabs as well as structural steel buildings. Ten to 11 months after mobilization, the mechanical/ electrical phase of the Project will begin. This phase involves installation of plant equipment including combustion turbines, steam turbines, HRSGs, other equipment and associated piping, controls, conduit, wire, insulation, etc. Initial startup/checkout activities for the Project's first units are scheduled to begin approximately 21 months after mobilization and will be completed for the other Project unit at the end of the 34th month.

During the initial 2 to 3 months of excavation and underground utilities, manpower is anticipated to be a maximum of 120 to 150 employees. The following nine months of civil/structural activities will require a maximum of 350 employees. Peak manpower for this Project will be required for the period of time when civil/structural activities are being completed and mechanical/electrical activities are at their maximum. A maximum of 600 employees is expected for this period of time, which extends from the 10th to the 22nd month. The first 6 months of the 8-month startup/checkout schedule will require manpower ranging from 200 to 400 employees, while the final 6 to 8 months will require a maximum of 150 employees.

The majority of the installation effort will be performed on an 8 hour per day, 5-day per week basis. Normal work hours will fall between the hours of 7:00 a.m. and 5:00 p.m. Based on these assumptions, it is expected that peak hours for arrival and departure of the workers will fall between 6:30-7:30 a.m. and 4:30-5:30 p.m. These hours result in partial overlap of construction traffic with the No-Build morning commuter peak hour of 6:00-7:00 a.m. and no overlap with the No-Build evening commuter peak hour of 3:15-4:15 p.m. Occasional overtime on a Monday through Saturday basis will be required with minimal crew sizes. A small second shift installation effort will be required during the mechanical/electrical phase of the Project.

15.3.2.2 Construction-Related Trip Generation

Trip generation calculations are based upon the estimated manpower figures noted above and the application of an appropriate vehicle occupancy rate. Journey-to-work information specific to Oswego County (Bureau of Transportation Statistics, U.S. Department of Transportation) indicates a rate of approximately 1.3 passengers per vehicle. Estimated trip generation for construction employees during the various Project phases previously identified are summarized below in Table 15-9.

Table 15-9: Estimated Construction Worker Trip Generation

Project Phase	Employees	Daily Trips (maximum)	a.m. Peak (maximum)	p.m. Peak (maximum)
Months 1-3	120-150	230 vpd[1]	115 vph[2]	115 vph
Months 3-10	350	538 vpd	269 vph	269 vph
Months 10-22	600	924 vpd	462 vph	462 vph
Months 22-28	200-400	616 vpd	308 vph	308 vph
Months 28-34	150	230 vpd	115 vph	115 vph

(1) Vehicles per day.

(2) Vehicles per hour.

Equipment and materials deliveries will be at their highest level during two separate phases of the Project. During the Project's civil/structural phase, the maximum number of deliveries will occur on days of turbine generator foundation and elevated slab pours when 90 to 120 trucks will be required during a 10-hour shift. Normal deliveries during the civil/structural phase of the Project are expected to occur at a rate of 20 to 40 trucks per day. The second highest level of deliveries will occur during the mechanical/electrical phase of the Project when HRSG, combustion turbine and steam turbine deliveries are scheduled. These deliveries should occur on weekdays during non-peak hours and should arrive at a rate of 30 to 50 trucks per day. An estimate of truck trip generation during the various phases is provided in Table 15-10.

Truck traffic associated with cut and fill activity will not affect trip generation on local roadways beyond the original site mobilization effort. Excavation of materials on-site is expected to consist of approximately 20,400 cubic yards of topsoil, 65,000 cubic yards of subsoils, and 19,000 cubic yards or less of rock. Backfill material needs of approximately 62,000 cubic yards will be satisfied through the use of the abovementioned excavated materials. All excess excavated materials will be disposed of on-site.

Table 15-10: Estimated Construction Deliveries

Project Phase	Deliveries	Daily Trips (maximum)	a.m. Peak (maximum)	p.m. Peak (maximum)
Months 1-3	20-40	80 vpd[1]	8 vph[2]	8 vph
Months 3-10	90-120	240 vpd	24 vph	24 vph
Months 10-22	30-50	100 vpd	10 vph	10 vph
Months 22-28	20-40	80 vpd	8 vph	8 vph
Months 28-34	20-40	80 vpd	8 vph	8 vph

(1) Vehicles per day

(2) Vehicles per hour

It is expected that some barge and rail deliveries of equipment will occur over the course of construction. The magnitude of deliveries is dependent upon several variables, including time of year, weather, and vendor. The type of equipment that may be barged or delivered by rail includes gas turbine components, generators, steam turbine components, HRSG modules and transformers.

Barge deliveries would be at the Oswego Port Authority on the east side of the Oswego River where the equipment could be sent by rail or truck to the site. There is an existing rail line from the Port to the Alcan site with a spur to the Project site. This line is regularly used by Alcan and is expected to be sufficient for deliveries to Heritage Station. The line will be investigated for maintenance needs to confirm its ability to serve the Project.

The composite trip generation estimates for construction worker and delivery trips are provided below in Table 15-11.

Table 15-11: Composite Trip Generation Estimates during Construction

Project Phase	Employees and Deliveries	Daily Trips (maximum)	a.m. Peak (maximum)	p.m. Peak (maximum)
Months 1-3	120-150/20-40	310 vpd[1]	123 vph[2]	123 vph
Months 3-10	350/90-120	778 vpd	293 vph	293 vph
Months 10-22	600/30-50	1,024 vpd	472 vph	472 vph
Months 22-28	200-400/20-40	696 vpd	316 vph	316 vph
Months 28-34	150/20-40	310 vpd	123 vph	123 vph

(1) Vehicles per day.

(2) Vehicles per hour.

In regard to site-specific issues, there are currently a number of seasonal and year-round homes along the shoreline north of the site. All of the residences have access easements over Riker's Beach Road to County Route 1A. The county of Oswego also has a public access easement over Riker's Beach Road to the county-owned Independence Park, north of the site. This access will remain available throughout the construction and operation of the Project, with impacts limited to those described for vehicles entering and exiting Riker's Beach Road during the construction shift change peak hours.

A modification to Ferguson Beach Road has been proposed which improves access to some shorefront properties. Access that currently extends from the shorefront via Ferguson Beach Road to Route 1A would be discontinued, and vehicles would use the existing shoreline road or East-West Road to Riker's Beach Road to access County Route 1A. Figure 15-4 illustrates the proposed rerouting of traffic. All property owners with current access easements across Ferguson Beach Road have been contacted regarding this improved alternative access to their properties.

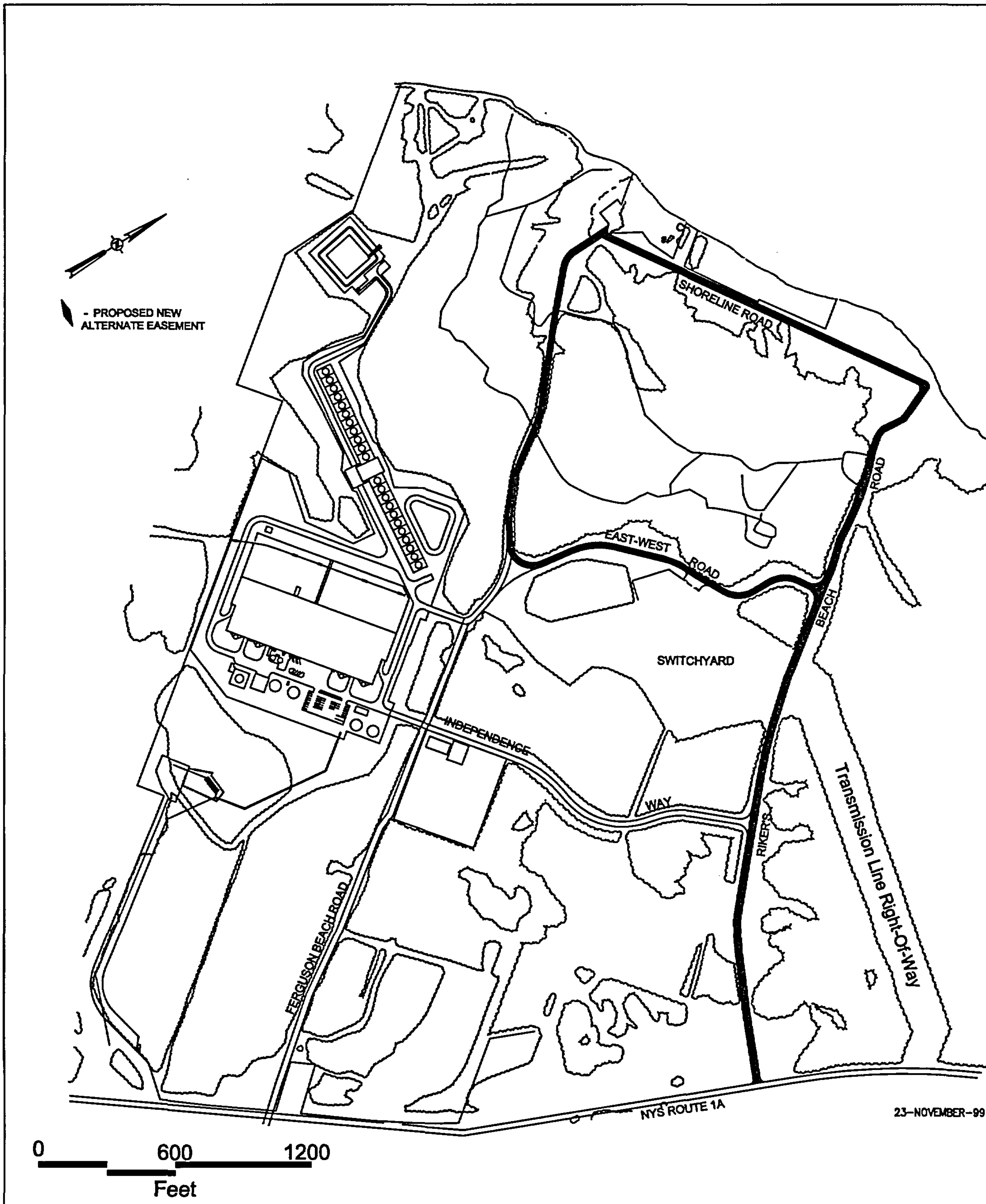


Figure 15-4

Alternative Access to Ferguson Beach Road Properties

During construction, the segment of Ferguson Beach Road extending from County Route 1A into the site will be used for delivery of construction materials to support activity on that portion of the site, as well as for ingress and egress of construction worker traffic to and from the west on County Route 1A. The latter use will help to minimize construction-related impacts to users of Riker's Beach Road.

The distribution of construction-related trips over the study area network was performed based upon the turning movement patterns exhibited at the study area intersections as well as journey-to-work data specific to the Scriba area (Bureau of Transportation Statistics, U.S. Department of Transportation). This information identifies the residence locations of those who work in Scriba. The ten most frequent communities identified as residence locations of those working in Scriba are illustrated in Figure 15-5.

Trip generation and distribution using this information is illustrated in Figure 15-6.

In order to more accurately represent construction year (2001) Build conditions, analysis hours different than those represented in the No-Build condition were selected. For analysis purposes, traffic volumes for the hours expected to coincide with the likely construction shift peak hour (6:30-7:30 a.m. and 4:30-5:30 p.m.) were used as the baseline to which construction-related trip generation was added. The use of these analysis hours, although different from the existing roadway peak, will more clearly indicate any Project-related impact that might occur during the actual anticipated shift change period. By contrast, addition of Project-related traffic to the later roadway peak hour would overestimate any potential Project-related traffic impacts. These analysis volumes representing the construction year (2001) Build conditions are summarized in Figure 15-7.

15.3.3 2001 Operations of Study Area Intersections with Construction Traffic

Intersection capacity analyses were performed for year 2001 conditions with Project-related construction traffic added to the peak hours coinciding with the likely construction shift changes. These analyses are compared to the regular commuter peak hours to determine the operating conditions that may be encountered during both peak hours on the study area network with the addition of construction-related traffic. The results of those analyses are summarized in Table 15-12.

The results of intersection capacity analyses with the addition of construction-related traffic indicate minor changes in the levels-of-service on individual approaches at Routes 1/Route 1A/Alcan during the p.m. peak hour (Alcan southbound approach, from LOS A to LOS B; westbound/Route 1A westbound approach, from LOS C to LOS D) and Route 63/Route 1 during the a.m. peak hour (Route 1 westbound, from

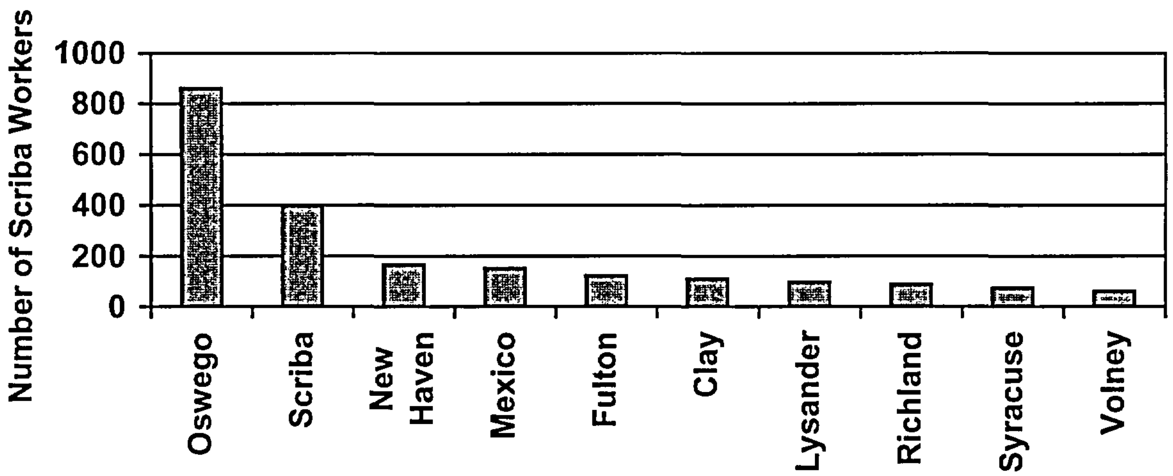
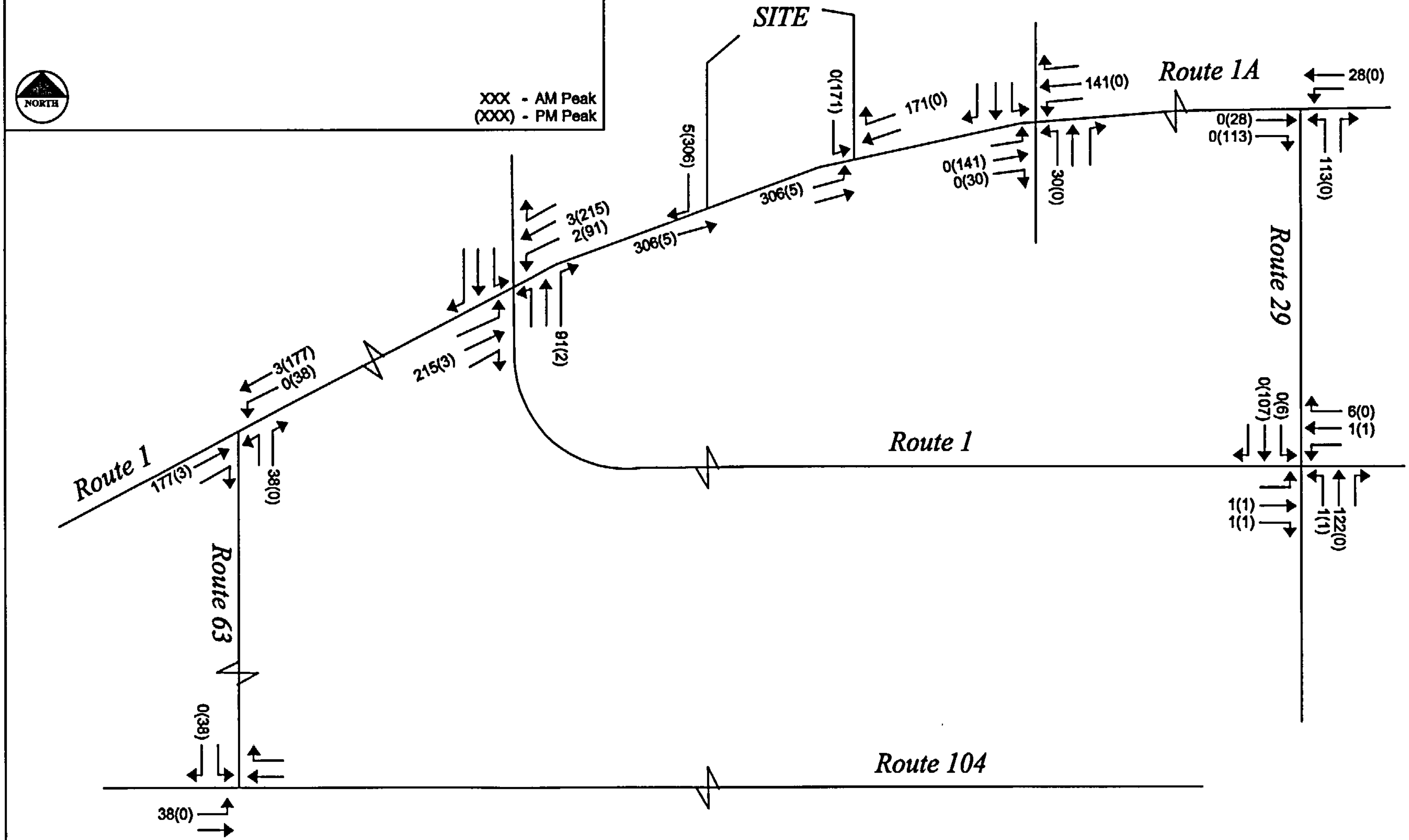


Figure 15-5: Residence Locations of Workers in Scriba

Figure 15-6
Construction Related Trip Generation
Intersection Turning Movement Counts
AM/PM Peak Hour



EARTH TECH

Figure 15-7
Construction Year (2001) Build Conditions
Intersection Turning Movement Counts
AM/PM Peak Hour
(6:30-7:30 AM / 4:30 - 5:30 PM)

NORTH

XXX - AM Peak
(XXX) - PM Peak

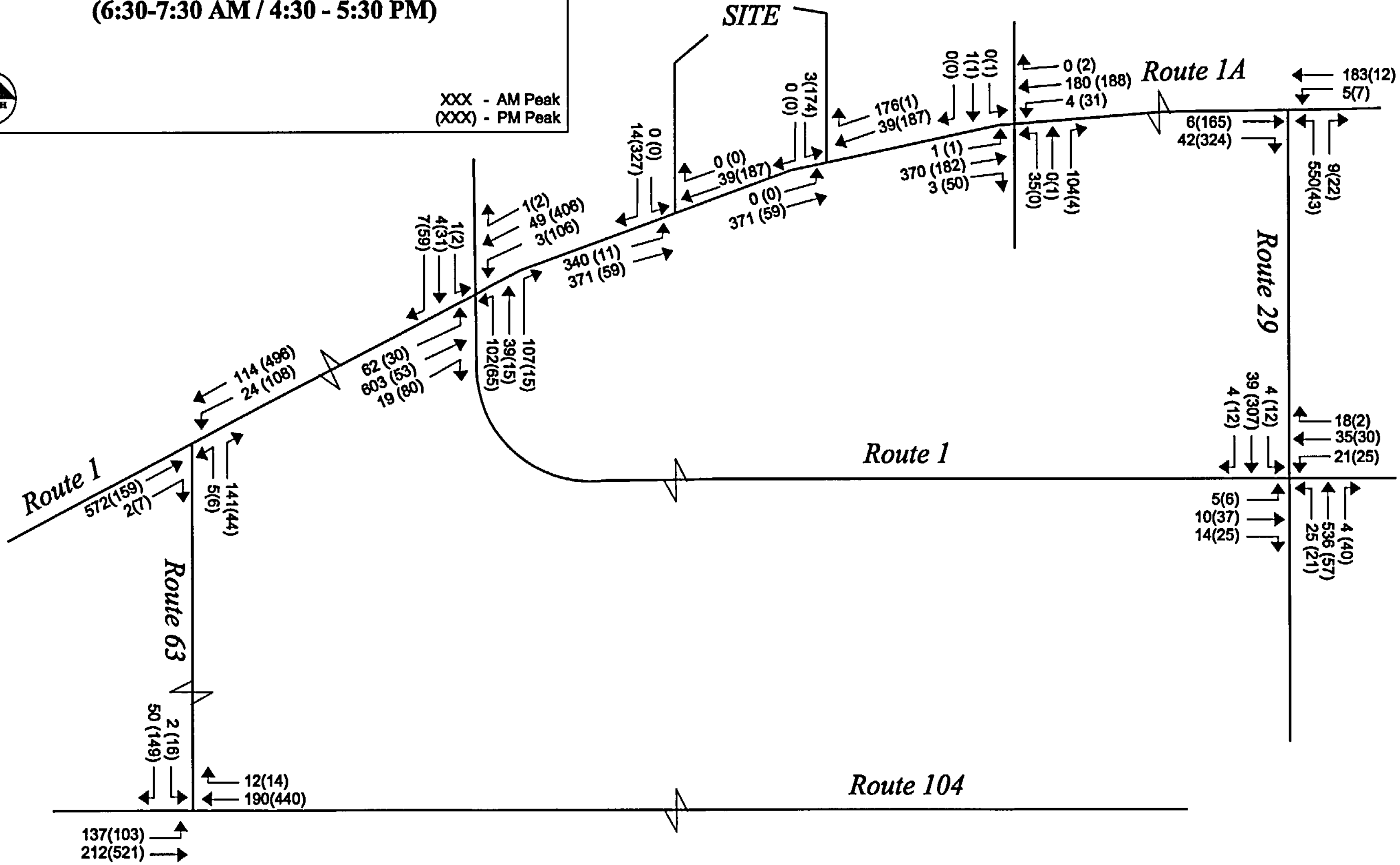


Table 15-12: Results of Construction Build (2001) Capacity Analyses

Construction Year (2001) Comparative Analysis	No-Build				Build			
Study Area Intersection Morning and Evening Peak Hour	2001 a.m.	2001 a.m.	2001 p.m.	2001 p.m.	2001 a.m.	2001 a.m.	2001 p.m.	2001 p.m.
	LOS(1)	Delay(2)	LOS(1)	Delay(2)	LOS(1)	Delay(2)	LOS(1)	Delay(2)
Routes 104/63								
– Left from Route 104 eastbound	A	8.4	A	8.9	A	8.3	A	9.1
– All moves from Route 63 southbound	B	10.7	C	21.7	B	10.4	C	21.4
Routes 1/1A/Alcan								
– All moves from Route 1 northbound	B	11.3	B	10.6	B	14.9	B	114
– All moves from Alcan southbound	A	8.8	A	10.0	A	9.3	B	10.8
– All moves from Route 1 eastbound	F	>120	B	10.0	F	>120	B	11.1
– All moves from Route 1A westbound	A	9.0	C	16.9	A	9.9	D	34.4
Routes 63/1								
– Left from Route 1 westbound	A	9.7	A	8.1	B	10.1	A	8.0
– All moves from Route 63 northbound	C	21.6	B	12.5	D	32.8	B	13.3
Routes 1/29								
– All moves from Route 29 northbound	D	26.6	A	9.0	C	24.6	A	9.2
– All moves from Route 29 southbound	A	8.4	C	20.7	A	8.5	C	18.1
– All moves from Route 1 eastbound	A	8.8	A	9.6	A	8.8	A	9.6
– All moves from Route 1 westbound	A	9.3	A	8.9	A	9.5	A	9.6
Lake Road/29								
– All moves Lake Road westbound	C	16.8	B	13.4	C	17.8	B	11.6
– Through from Lake Road eastbound	A	8.9	A	7.8	A	8.8	A	7.7
Route 1A/Lakeview Avenue								
– Left from Route 1A eastbound	A	7.3	A	0.0	A	7.6	A	8.0
– Left from Route 1A westbound	A	9.1	A	7.7	A	8.7	A	8.1
– All moves from Lakeview northbound	C	20.5	C	22.3	C	21.1	B	11.4
– All moves from Lakeview southbound	C	16.2	C	17.1	C	16.5	C	17.1
Site Drive (Riker's Beach Road)/Route 1A								
– Left from Route 1A eastbound	A	7.4	A	8.5	A	0.0	A	0.0
– All moves Riker's Beach Road southbound	B	10.4	B	11.5	B	13.7	B	14.7
Ferguson Beach Road/Route 1A								
– Left from Route 1A eastbound	N/A	N/A	N/A	N/A	A	8.3	A	7.8
– Right from Ferguson Beach Road southbound	N/A	N/A	N/A	N/A	A	8.6	C	20.6

(1)LOS – Level of Service.

(2)Delay in seconds per vehicle.

LOS A to LOS B; Route 63 northbound, from LOS C to LOS D). The use of Ferguson Beach Road as a component of the construction access management strategy takes advantage of the directional distribution of construction traffic and allows acceptable levels of service to be maintained at both the Riker's Beach Road and Ferguson Beach Road intersections with County Route 1A during both a.m. and p.m. peak hours. The No-Build deficiency reported at Route 1/Route 1A/Alcan for eastbound vehicles on Route 1 during the a.m. peak hour is maintained under the Build Scenario.

15.3.4 2001 Operations of Study Area Intersection and Construction Traffic and Outage/Refueling Scenario at Nine Mile Point/Fitzpatrick Station

As noted above, the anticipated shift times or schedule associated with Project construction fall on the edge of the morning commuter peak hour (6:00 – 7:00 a.m.) and avoid the evening commuter peak hour (3:15 – 4:15 p.m.). These reported commuter peak hours are influenced by the operating shift schedules at the nearby Nine Mile Point and Fitzpatrick Nuclear Facilities. Similar influence is likely during the occurrence of regularly scheduled plant outage or refueling periods. During these periods, the nuclear facilities have an additional 300 to 1,000 employees working at their sites on a two-shift schedule. This additional traffic is likely to influence peak hour intersection volumes in a manner consistent with regular operations.

In regard to the relationship between additional traffic associated with these major exercises and Project construction traffic, it is anticipated that the same type of shift offset will occur, and that overlapping peaks will be kept to a minimum. Since these major outage and refueling tasks are planned well in advance, and will occur infrequently during Project construction peak, coordination with Nine Mile Point/Fitzpatrick and the County Emergency Planning Office will allow the Project to manage its shift times to avoid the peak hours associated with outage and refueling traffic. The planned outages scheduled at this time are as follows: Nine Mile Point 2 (early spring 2000), Fitzpatrick (October 2000), Nine Mile Point 1 (April 2001), Nine Mile Point 2 (spring 2002), Fitzpatrick (October 2002) and Nine Mile Point 1 (April 2003).

Similarly, the adjacent Independence Station plant conducts regularly scheduled plant outages twice each year. During these periods, between 90 and 300 additional employees are present at the site. As with the other outages, coordination between Independence Station and the construction activity for Heritage Station will occur to minimize shift overlap and reduce or avoid additional impact to the local roadway network.

15.3.5 Mitigation Proposal

Mitigation for construction-related impacts is recommended in several forms. First, as noted in Section 15.3.2.2, Ferguson Beach Road will be used for equipment and material deliveries, and for construction worker travel as well, in order to reduce the demand on the Riker's Beach Road access point onto Route 1A. Analysis results indicate that the provision of access at Ferguson Beach Road will result in acceptable peak hour operating conditions at both the Ferguson Beach Road and Riker's Beach Road intersection with County Route 1A.

Other mitigation measures include the potential use of police officers or flagmen at locations where construction-related traffic results in a significant change in traffic volume. The use of uniformed police officers or flagmen to control traffic entering and exiting the construction site on an as-needed basis will further minimize impacts to through traffic on Route 1A. This activity would be coordinated with the appropriate town and county officials on an as-needed basis. It is also recommended that construction shift times be monitored to minimize overlap with peak hours observed on study area roadways. Shift times, which are offset from these periods, can be employed as a means of reducing construction traffic impacts.

Finally, at the Route 1/Route 1A/Alcan intersection, the modification of All-Way stop-sign control at this location to two-way stop-sign control would result in a transfer of the existing deficiency reported for traffic on the Route 1 eastbound approach to the northbound approach, with a much lower peak hour volume (248 vph versus 682 vph) affected. However, for reasons mentioned previously in regard to intersection safety, the four-way stop-sign control is the preferred condition. The Project Applicant will work with the County Sheriff's Department if it becomes necessary to provide uniformed officer control at this intersection to address impacts associated with construction traffic.

15.4 Traffic Impacts During Operations

15.4.1 2004 Operations Year Baseline Conditions

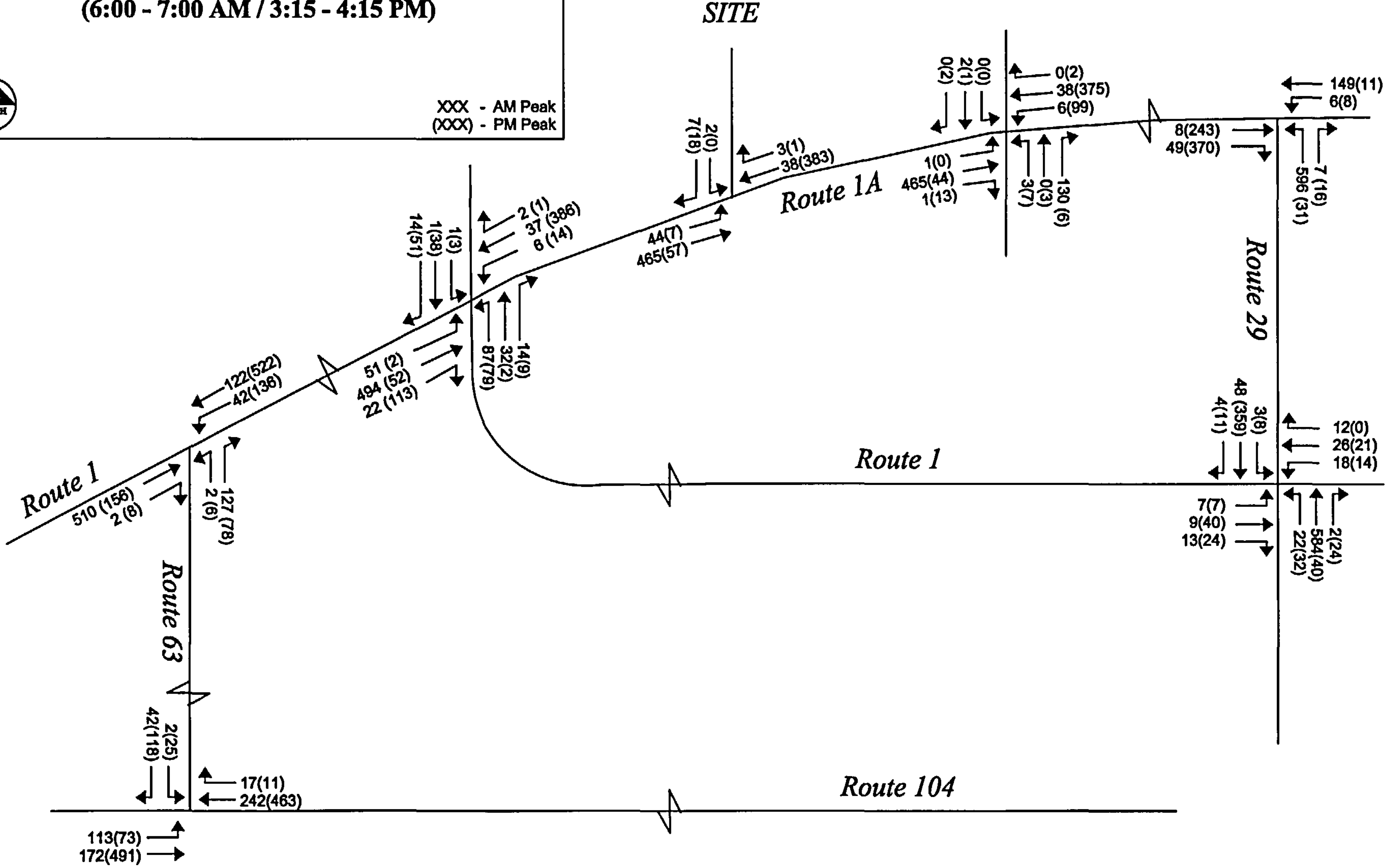
Similar to the methodology conducted to develop the construction year (2001) No-Build analysis volumes, operations year (2004) No-Build analysis volumes were projected using the same 1 percent annual growth rate from 2001 to 2004. These a.m. and p.m. peak hour volumes are illustrated in Figure 15-8.

The results of capacity analyses conducted for the year 2004 operations year No-Build condition are summarized in Table 15-13. The results indicate acceptable operating conditions at each of the study area intersections with the exception of the existing deficiency reported for the Route 1 eastbound approach at Route 1/ Route 1A/Alcan during the a.m. peak hour.

Figure 15-8
Operations Year (2004) No-Build Conditions
Intersection Turning Movement Counts
AM/PM Peak Hour
(6:00 - 7:00 AM / 3:15 - 4:15 PM)

NORTH

XXX - AM Peak
(XXX) - PM Peak



EARTH TECH

Table 15-13: Results of Operations No-Build (2004) Capacity Analyses

Operations Year (2004) No-Build a.m. and p.m. Peak Hour Conditions				
	2004 a.m.	2004 a.m.	2004 p.m.	2004 p.m.
Study Area Intersection	**LOS[1]**	**Delay[2]**	**LOS[1]**	**Delay[2]**
Routes 104/63				
– Left from Route 104 eastbound	A	8.5	A	9.0
– All moves from Route 63 southbound	B	10.9	C	22.9
Routes 1/1A/Alcan				
– All moves from Route 1 northbound	B	11.4	B	10.8
– All moves from Alcan southbound	A	8.9	B	10.2
– All moves from Route 1 eastbound	F	>120	B	10.3
– All moves from Route 1A westbound	A	9.1	C	18.4
Routes 63/1				
– Left from Route 1 westbound	A	9.8	A	8.2
– All moves from Route 63 northbound	C	23.0	B	13.3
Routes 1/29				
– All moves from Route 29 northbound	D	29.9	A	9.1
– All moves from Route 29 southbound	A	8.5	C	22.7
– All moves from Route 1 eastbound	A	8.9	A	9.7
– All moves from Route 1 westbound	A	9.4	A	9.0
Lake Road/29				
– All moves from Lake Road westbound	C	17.6	B	14.2
– Through from Lake Road eastbound	A	8.9	A	7.8
Route 1A/Lakeview Avenue				
– Left from Route 1A eastbound	A	7.3	A	0.0
– Left from Route 1A westbound	A	9.2	A	7.7
– All moves from Lakeview Avenue northbound	C	21.8	C	23.3
– All moves from Lakeview Avenue southbound	C	16.6	C	17.6
Site Drive (Riker's Beach Road)/Route 1A				
– Left from Route 1A eastbound	A	7.4	A	8.5
– All moves from Riker's Beach Road southbound	B	10.3	B	11.6

(1)LOS – Level of Service.

(2)Delay in seconds per vehicle.

15.4.2 *Operations-Related Trip Generation*

Project operation is expected to require 20 new employees. It is expected that 12 of these employees will work a typical 7:00 a.m. to 5:00 p.m. shift. The additional eight employees are expected to be plant operators who will staff two 12-hour shifts from 7:00 a.m. to 7:00 p.m. and 7:00 p.m. to 7:00 a.m. The back end of the 7:00 p.m. to 7:00 a.m. shift will overlap with the primary shift, as will the front end of the 7:00 a.m. to 7:00 p.m. shift. Trip generation during operations will be confined to those trips associated with the 20 anticipated employees and an estimated four to five deliveries per day which will occur during off-peak hours. A summary of the anticipated daily and peak-hour trip generation volumes is provided in Table 15-14.

Employee-related trips will be completed using passenger vehicles. Deliveries will consist of process materials as well as general office supplies, made by vans and panel trucks as well as regular material-hauling trucks.

Table 15-14: Summary of Anticipated Daily and Peak-hour Trip Generation Volumes

Trip Generation Component	Total	Daily Trips	Morning Peak	Evening Peak
Employees	20	50-60 vpd[1]	16 enter/4 exit	0 enter /12 exit
Deliveries	5	10 vpd	0 vph[2]	0 vph
Total Trips		60-70 vpd	20 vph	12 vph

(1) Vehicles per day.
(2) Vehicles per hour.

Operations-related traffic was distributed over the study area roadway network based upon the same journey-to-work data and turning movement distribution indicators referenced previously. Operations-related traffic is illustrated in Figure 15-9. This traffic was added to the Operations Year (2004) No-Build volumes to arrive at the Operations Year (2004) Build Conditions illustrated in Figure 15-10.

15.4.3 *2004 Operations of Study Area Intersections with Operations Traffic*

Intersection capacity analyses were conducted for all study area intersections using the Operations Year (2004) Build Conditions analysis volumes. The results of those analyses are summarized in Table 15-15.

The results of these analyses indicate that there are no changes in LOS on any individual approaches to the study area intersections as a result of the incremental increase in operations-related traffic. All study area intersections exhibit acceptable operating conditions with the exception of the existing deficiency reported for the Route 1 eastbound approach at Route 1/Route 1A/Alcan during the a.m. peak hour.

Figure 15-9
Operations Related Trip Generation
Intersection Turning Movement Counts
AM/PM Peak Hour

NORTH

XXX - AM Peak
(XXX) - PM Peak

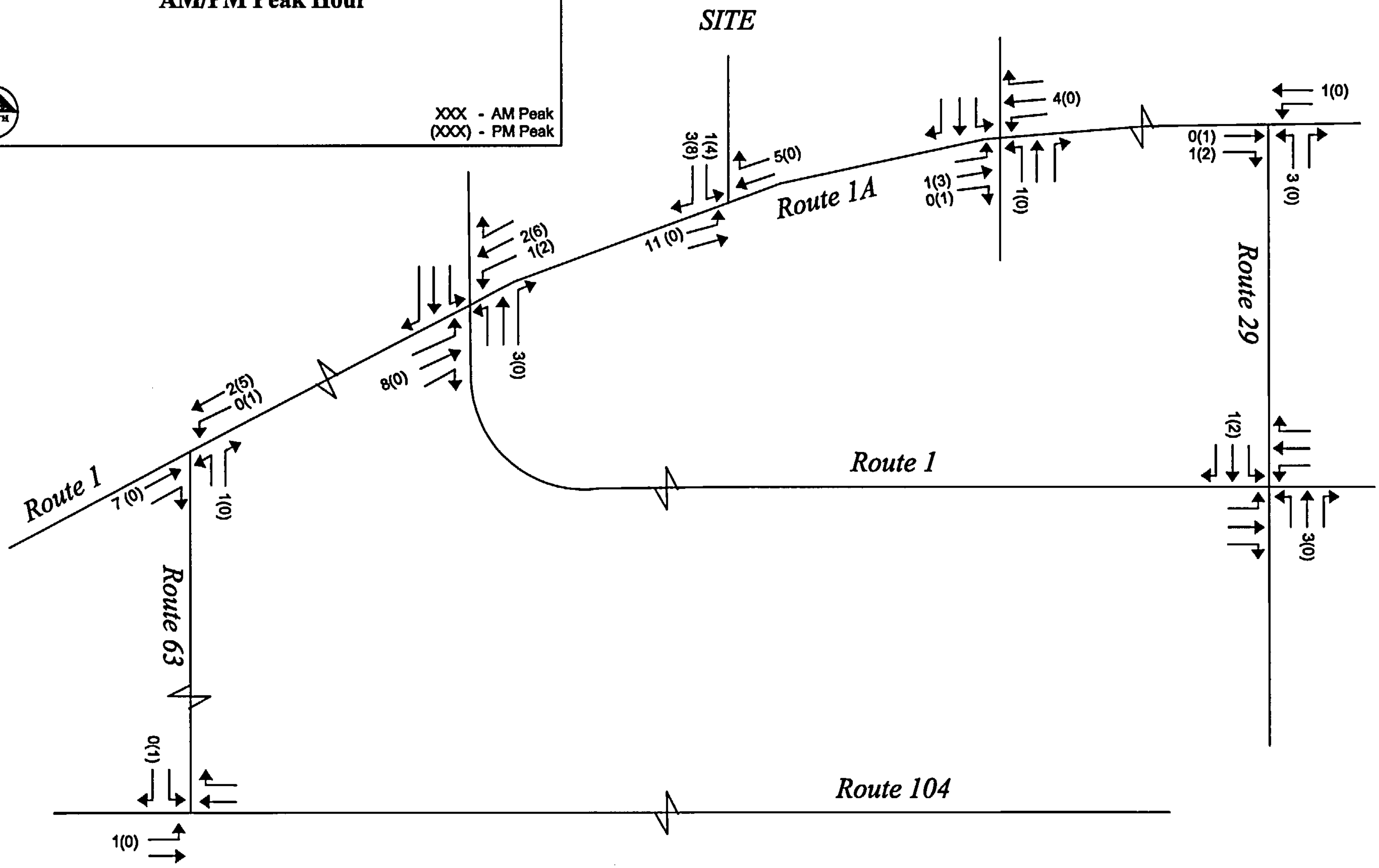


Figure 15-10
Operations Year (2004) Build Conditions
Intersection Turning Movement Counts
AM/PM Peak Hour
(6:00 - 7:00 AM / 3:15 - 4:15 PM)

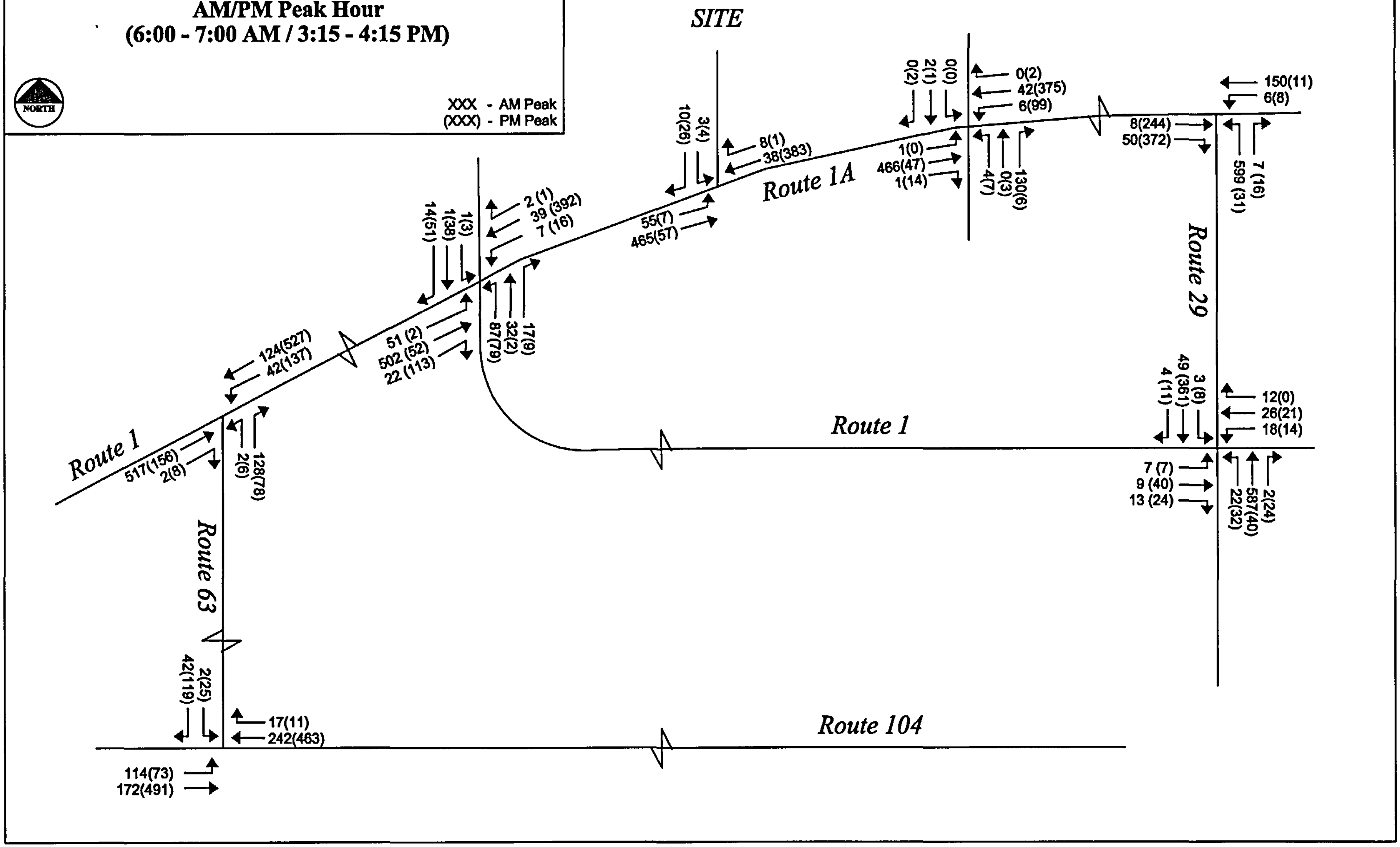


Table 15-15: Results of Operation Build (2004) Capacity Analyses

Operations Year (2004) a.m. and p.m. Peak Hour Comparison	No-Build				Build Operational			
	2004 a.m.	2004 a.m.	2004 p.m.	2004 p.m.	2004 a.m.	2004 a.m.	2004 p.m.	2004 p.m.
	LOS(1)	Delay(2)	LOS(1)	Delay(2)	LOS(1)	Delay(2)	LOS(1)	Delay(2)
Study Area Intersection								
Routes 104/63								
– Left from Route 104 eastbound	A	8.5	A	9.0	A	8.5	A	9.0
– All moves from Route 63 southbound	B	10.9	C	22.9	B	10.9	C	22.9
Routes 1/1A/Alcan								
– All moves from Route 1 northbound	B	11.4	B	10.8	B	11.4	B	10.8
– All moves from Alcan southbound	A	8.9	B	10.2	A	8.9	B	10.3
– All moves from Route 1 eastbound	F	>120	B	10.3	F	106	B	10.3
– All moves from Route 1A westbound	A	9.1	C	18.4	A	9.2	C	18.6
Routes 63/1								
– Left from Route 1 westbound	A	9.8	A	8.2	A	9.9	A	8.2
– All moves from Route 63 northbound	C	23.0	B	13.3	C	23.7	B	13.4
Routes 1/29								
– All moves from Route 29 northbound	D	29.9	A	9.1	D	30.5	A	9.1
– All moves from Route 29 southbound	A	8.5	C	22.7	A	8.5	C	23.1
– All moves from Route 1 eastbound	A	8.9	A	9.7	A	8.9	A	9.7
– All moves from Route 1 westbound	A	9.4	A	9.0	A	9.4	A	9.1
Lake Road/29								
– All moves Lake Road westbound	C	17.6	B	14.2	C	17.7	B	14.2
– Through from Lake Road eastbound	A	8.9	A	7.8	A	8.9	A	7.8
Route 1A/Lakeview Avenue								
– Left from Route 1A eastbound	A	7.3	A	0.0	A	7.3	A	0.0
– Left from Route 1A westbound	A	9.2	A	7.7	A	9.2	A	7.7
– All moves from Lakeview Avenue northbound	C	21.8	C	23.3	C	22.1	C	23.4
– All moves from Lakeview Avenue southbound	C	16.6	C	17.6	C	16.7	C	17.7
Site Drive (Riker's Beach Road)/ Route 1A								
– Left from Route 1A eastbound	A	7.4	A	8.5	A	7.4	A	8.5
– All moves Riker's Beach Road southbound	B	10.3	B	11.6	B	10.6	B	12.1

(1) LOS – Level of Service.

(2) Delay – in seconds of average vehicle delay per approach or movement.

15.4.4 Operations Access Design

As illustrated in the Site Plan, there will be no new curb cut onto a public way that will serve as the access to the proposed Project. Rather, access via the existing Independence Way, which connects to Riker's Beach Road and from there to County Route 1A, is proposed. Figures 15-11 and 15-12 illustrate the design elements of Independence Way and the parallel East-West Road that completes the access loop to

Riker's Beach Road. These design plans and details illustrate how the access to the Project was planned and constructed.

15.4.5 Mitigation Proposal

There is no specific mitigation warranted to address the increase in traffic associated with Project operation. There are no reported changes in LOS at any of the study area intersections or their individual approaches.

The only deficiency noted within the study area is the existing deficiency reported for the Route 1 eastbound approach at Route 1/Route 1A/Alcan during the a.m. peak hour. As mentioned earlier, modification of All-Way stop-sign control at this location to two-way stop-sign control would result in a transfer of the existing deficiency reported for traffic on the Route 1 eastbound approach to the northbound approach, with a much lower peak hour volume (248 vph versus 682 vph) affected. However, for reasons mentioned previously in regard to intersection safety, the four-way stop-sign control is the preferred condition.

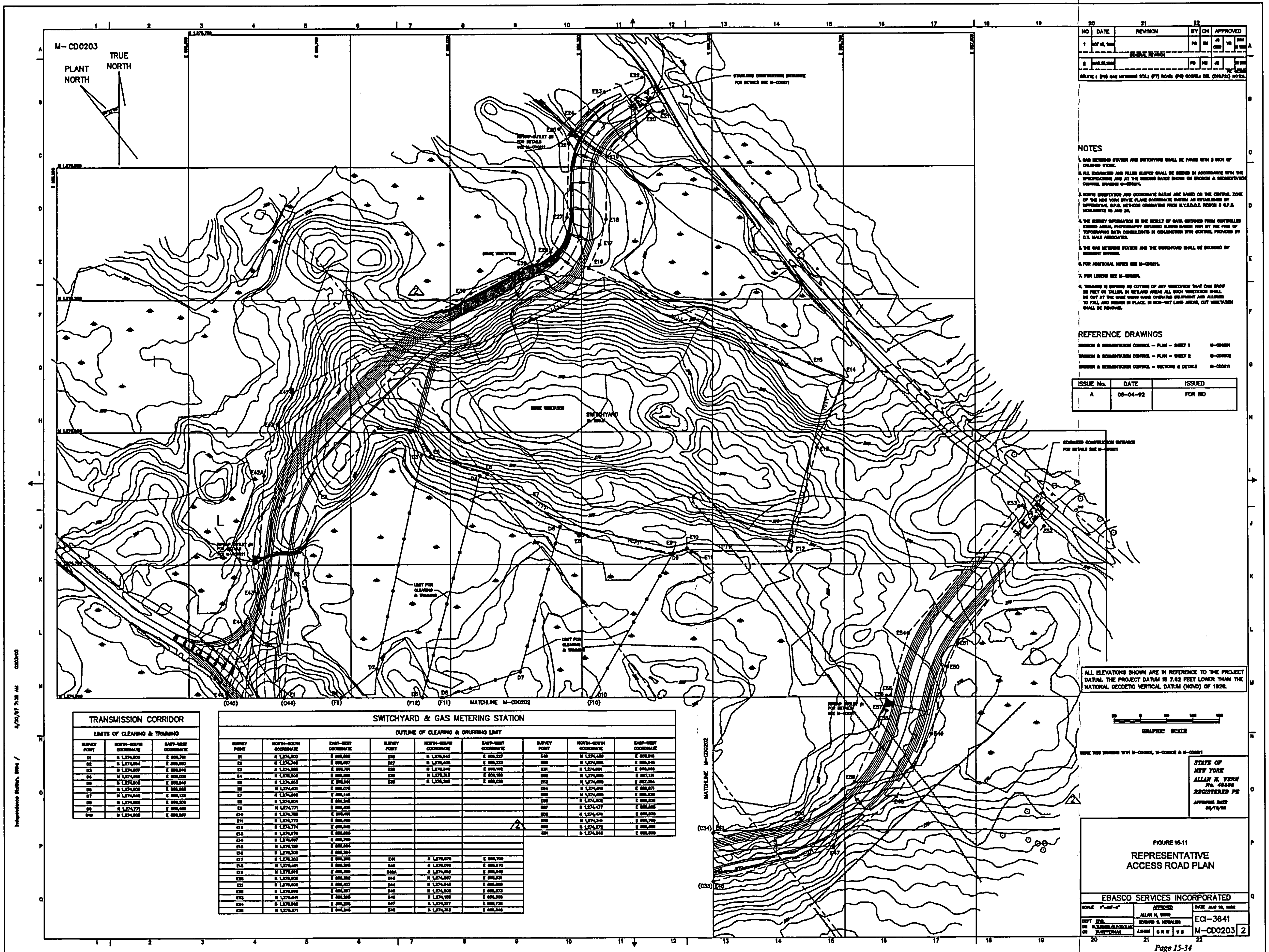
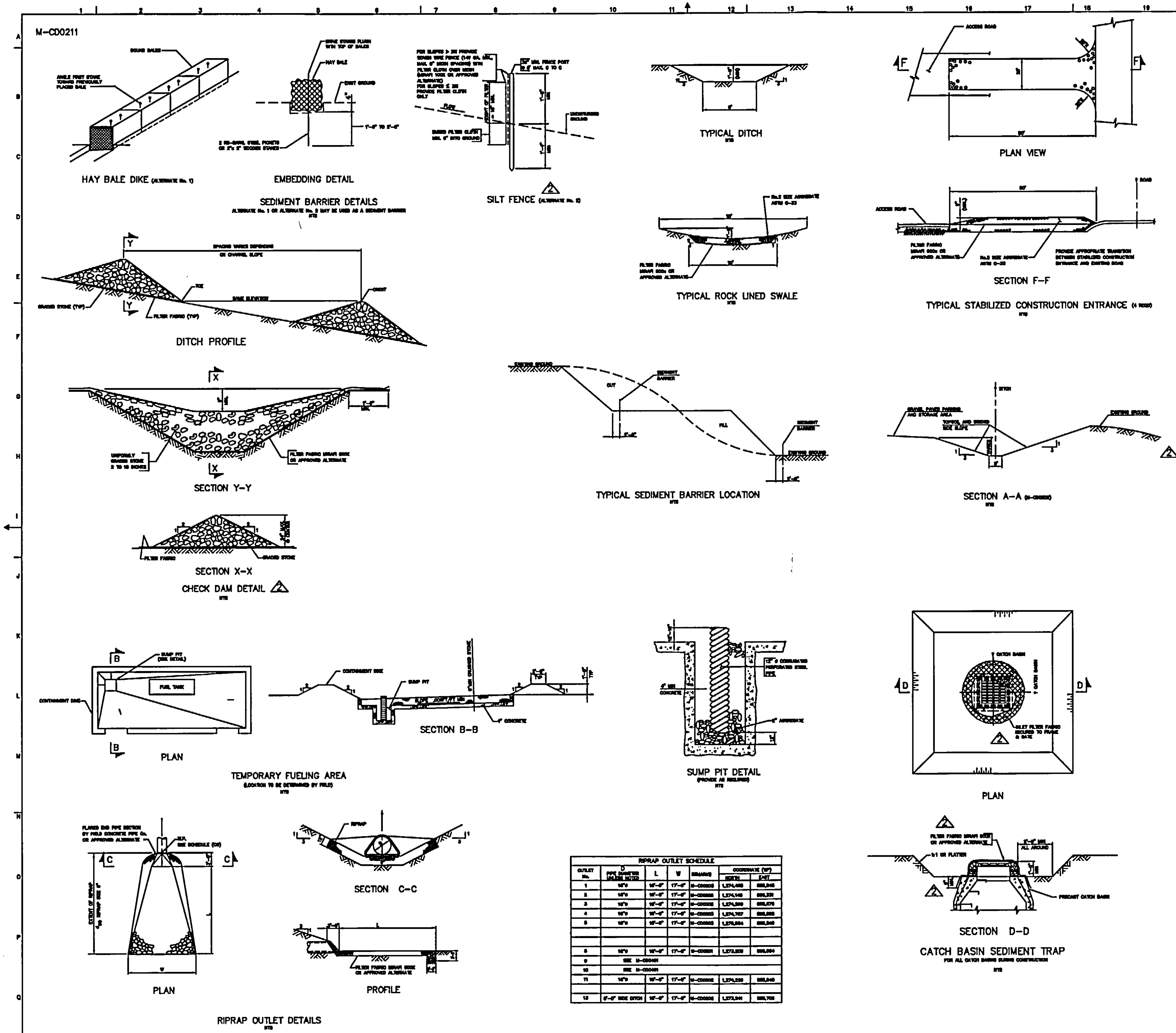


FIGURE 15-11
REPRESENTATIVE ACCESS ROAD PLAN

M-CD0211



RIPRAP OUTLET SCHEDULE						
OUTLET No.	D PIPE DIAMETER UNLESS NOTED	L	W	DRAWING	COORDINATE NORTH	COORDINATE EAST
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
3	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9	SEE M-[illegible]					
10	SEE M-[illegible]					
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
13	[illegible] WIDE DITCH	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

GENERAL NOTES

SOIL EROSION AND SEDIMENT CONTROL NOTES

SEEDING NOTES

REFERENCE DRAWINGS

ISSUE NO	DATE	ISSUED
A	[illegible]	FOR BID

WORK THIS DRAWING WITH M–CD0201, M–CD0202 & M–CD0203

STATE OF NEW YORK
ALLAN H. VERN
REGISTERED PE

FIGURE 15-12
REPRESENTATIVE ACCESS ROAD DETAILS

EBASCO SERVICES INCORPORATED

ECI–3641

M–CD0211 3

16. VISUAL RESOURCES AND AESTHETICS

This section responds to the requirements of Stipulation No. 11, providing an assessment of the visual impact of the Project on the surrounding community. Consistent with Stipulation No. 11, Clause 1, the visual impact assessment relies, as appropriate, upon definitions outlined in:

- NYSDEC Aesthetics Handbook, 1998; and
- U.S. Forest Service Landscape Aesthetics: A Handbook for Scenery Management, Agriculture Handbook Number 701, 1995.

16.1 Applicable Regulatory Requirements

Consistent with the procedures set forth in Stipulation No. 11, visual impact is assessed in terms of the anticipated change in visual resource, including whether there will be a change in character or quality of the view. The NYSDEC visual analysis procedure focuses first on the extent to which a project can be seen from a given location. Once that has been established, the assessment of aesthetic impact is based upon the existing quality of the view. A location that is pristine and visited by recreational users for visual enjoyment is held to a higher standard than a location utilized for other purposes. By evaluating viewsheds within the area, the potential visual impact of the Project has been analyzed.

Design and placement of the Project included significant consideration of community visual impact. On-site structures are proposed to be limited in height and to be generally consistent with the existing on-site structures. The setting of the Project site, with existing industrial uses nearby and the presence of significant visual screening minimizes the Project's visual impact on the community. This section provides a discussion of the detailed visual assessment performed for the Project. Identification of potential vantage points, and viewshed analyses from those locations, are provided.

16.2 Character and Visual Quality of the Existing Landscape

This section addresses the requirements of Stipulation No. 11, Clause 2(a).

Landscape character is largely determined by the topography, land use, vegetation and water features that define and contribute to the available vistas and views. Figure 3-2 presented an aerial view of the area immediately surrounding the Project site. As can be seen from that figure, the existing industrial features associated with Independence Station are located on the Project site. The Alcan industrial facilities are adjacent to the site, with small residential and commercial developments located along Lake Road. Lake Ontario is a dominant element of the setting, located just north of the Project, although views of the lake are generally not possible except directly from the shore. Land uses in the Project vicinity, as discussed in Section 10, are a mosaic of industrial, commercial, and residential land uses interspersed with forests and open areas. The Nine Mile Point Nuclear Power Station and the Fitzpatrick Nuclear Station, also along the shores of Lake Ontario, are located approximately 3 miles to the northeast of the site. The Nine Mile Point cooling tower and associated plume are a dominant focal point for many miles. The Oswego Steam Station is located approximately 5 miles to the east, where its stacks provide a focal point within the city of Oswego.

Topography near the Project site is typical of the Erie-Ontario Lowlands Physiographic Province. The area landscape consists of a broad, relatively flat floodplain on the shores of Lake Ontario (200 to 300 feet msl) which gradually rises landward (300 to 350 feet msl). Farther inland, the land is broken by elongated glacial ridges that are oriented in a northwest-southeast direction. The area of greatest elevation (greater than 450 feet) occurs east of the town of Scriba center (approximately 2 miles south of the Project site) and is primarily an area of level and rolling plains.

Much of the area surrounding the Project site – with the exception of the immediately adjacent industrial uses – is rural and relatively undeveloped. A significant portion of the surrounding area is wooded. The wooded areas are typically dense, mostly mixed-deciduous forests. Wooded areas also exist on the Project site that effectively screen any views of Lake Ontario from Lake Road. These wooded areas also screen views of the existing Independence Station from Lake Road and much of the surrounding area. About 20 seasonal and permanent residences are located along the Lake Ontario shoreline in the vicinity of the Project, in an area known as Riker's Beach. Wooded areas associated with the Independence Park and on the Project site screen views toward the site from that location. The forested areas along the shoreline are fairly contiguous, and extend from the Project site northeastward, between Lake Road and Lake Ontario, to the Nine Mile Point Nuclear Power Station. A few narrow driveways associated with scattered residences along the lake shoreline break up the forest between the Project and the Nuclear Station. No Scenic Areas of Statewide Significance are located along Lake Ontario within New York State nor within the vicinity of the Project (NYSDEC 1993).

The Nine Mile Point Nuclear Power Station is a generating facility about 3 miles northeast of the Project site. The 550-foot high cooling tower, illuminated with flashing white beacons, and its associated plume are visually dominant for many miles surrounding the plant. The Nine Mile Point cooling tower is more than twice as tall as the proposed Project stacks, and significantly larger in diameter. In addition to the physical structure, the plume from this hyperbolic cooling tower is expansive and can be visible from as far away as Syracuse. Nine Mile Point and Fitzpatrick each have stacks, as well. The Nine Mile Point stacks (about 350 and 430 feet tall) have white flashing beacons, while the Fitzpatrick stack (about 385 feet tall) has red flashing beacons.

Independence Station is, as previously discussed, predominantly screened from the surrounding areas. The four 195-foot exhaust stacks associated with the turbines and a smaller diameter stack of the same height associated with the auxiliary boiler are visible from limited locations above the treeline. Lighting at Independence Station consists of ground level illumination, as well as lighting at the level of the CEMS platform on each stack. The CEMS platforms for Independence Station are located just above building height. The four white lights located around this platform for the four main stacks are at approximately elevation 100 feet, while the four lights associated with the auxiliary stack are at about elevation 140 feet. The light from these CEMS platforms is not generally visible, except from near-field locations. None of the other structures associated with Independence Station are visible, except from limited near-field locations. The Independence Station cooling tower, however, does have a variable plume depending on weather conditions. Under most conditions, the plume does not extend far from the cooling tower structure itself. On cold and/or moist days, a water vapor plume is visible above the tree line. Only under cold weather conditions are visible plumes evident from the exhaust stacks associated with Independence Station.

The Alcan production facility, to the southwest of the site, has a lower profile than Independence Station. It provides an industrial element in the Project vicinity. Mixed deciduous forests, including a forested wetland area (Teal Marsh), extend westward from Alcan to the city of Oswego. These forested areas provide additional screening of the Project site.

The city of Oswego, more than 2 miles southwest from the Project site, is an industrial port city with numerous buildings and factories and their associated stacks. The Oswego Steam Station is also located on the Lake Ontario shoreline near the mouth of the Oswego River. The stacks at the electric power station in Oswego are about 750 feet high, and are illuminated with flashing white beacons.

To the south and southeast of the Project site, elevations begin to rise from about 280 feet near the Project site to 450 to 500 feet near the town of Scriba. This area is characterized by dense, deciduous woodlands, some agricultural areas, and small isolated commercial and residential developments. Although residential and commercial developments can be found along Lake Road and North Road, these developments are most dense along the major transportation corridors of Route 104, New York State Route 57, and near the city of Oswego. Significant expanses of woodland and intervening topography obstruct views of the Project site from these areas.

Several recreational areas exist in the vicinity of the site, including Lake Ontario and the adjacent Independence Park. Other recreational facilities are described in Section 10.2.1.4. The lake and Independence Park, the nearest recreational uses, are also discussed below.

Lake Ontario, north of the Project site, is a major recreational resource in the area. The salmonoid-stocking program initiated in 1968 by the NYSDEC has made Lake Ontario an outstanding fishery that provides year-round angling. Fish species available include chinook and coho salmon, lake trout, Atlantic salmon, rainbow/steelhead trout, brown trout, and a variety of other native and exotic species. The lake is also used for a variety of other water recreational activities including boating, swimming and water-skiing. Along the shore, bird watching, photography, and hiking are other popular activities. A large waterfowl population which provides sport hunting opportunities is also associated with Lake Ontario. Viewers from Lake Ontario in the vicinity of the site currently observe a shoreline that is predominantly wooded, with several existing industrial and residential structures visible. The industrial facilities include the Nine Mile Point cooling tower and stacks, the Fitzpatrick stack, the Independence Station stacks, and other industries east to Oswego; residential uses visible are the seasonal and permanent residences along the Lake Ontario shoreline. Viewers from Lake Ontario would also see the stacks associated with the Oswego Steam Station. Other uses, including features associated with other nearby industries, are less visible and represent background elements to the overall viewshed of the immediate Project area.

Independence Park is a 50-acre tract of wooded land that was donated to Oswego County as a part of the Independence Station project. The property has been developed with a walking trail system and an observation platform that allows for views of Lake Ontario. The property, as shown in Figure 3-4, is situated between the site and several lakeshore cottages. Typical usage of this park area consist of walking and hiking activities, photography, observation of wildlife, and viewing of Lake Ontario. A parking area is provided off of Riker's Beach Road. Views toward the site are screened by the woody vegetation that characterizes this parcel of land. However, during leaf-off seasons, some elements of the existing Independence Station can be seen through the vegetation. Even with no leaves on the trees, the vertical elements of the vegetation provide an effective screen to viewers. Many of the users of this area would be focused outwardly, toward Lake Ontario. These views are in the opposite direction from the site, and as such, would not be affected by the Project.

16.3 Appearance of Project upon Completion

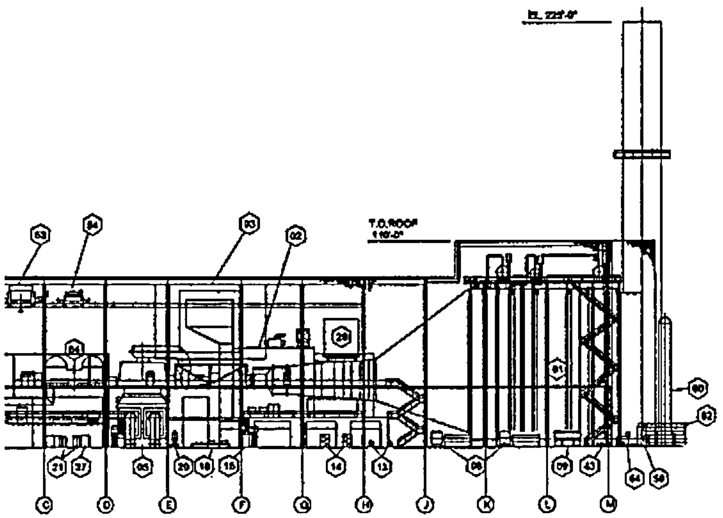
This section addresses the requirements of Stipulation No. 11, Clauses 2(c) and (d).

The Project has the advantage of being visually integrated within an existing industrial setting. As such, it has the ability to blend with like features (as shown in Figure 3-5) and to change the character of the site in a minimal fashion when observed both from a near-field perspective and from further vantage points.

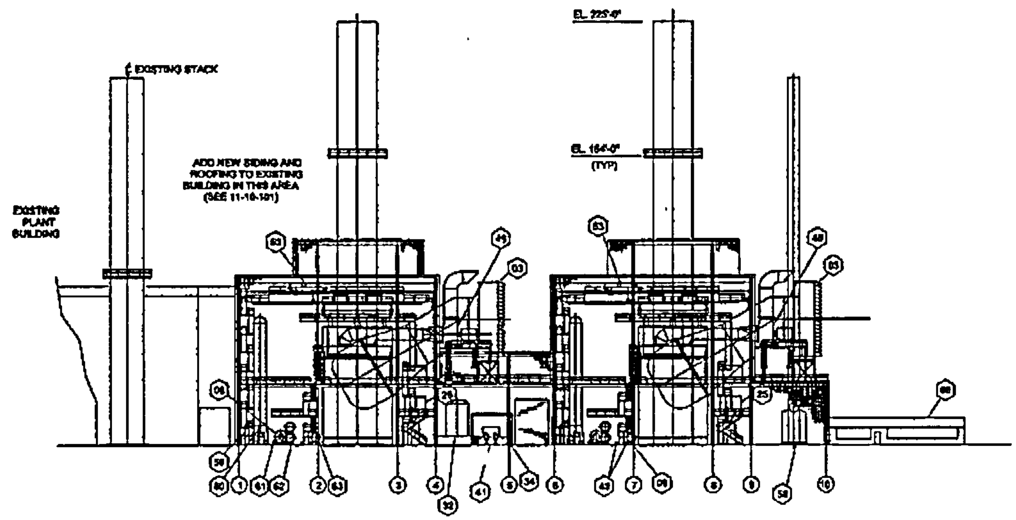
As discussed in Section 3, the largest element of the Project will be the generation building that will house the two turbines. This building will be located immediately adjacent to the Independence Station generation building, and will be constructed with similar materials. The façade of the two facilities will be designed to match, so that the two facilities – although separate and of separate ownership – will be visually integrated. At 110 feet tall (Figure 16-1), the Project's generation building will be slightly taller than that of Independence Station. The Project stacks will also be slightly higher, at 225 feet as compared to Independence Station's 195-foot stacks. As discussed in Section 6, this stack height is required for optimal air emission dispersion. As demonstrated through the visual analysis and computer simulations, this stack height differential is anticipated to be difficult to discern.

The FAA has reviewed the proposed 225-foot stacks, and has determined that lighting is required for navigational safety (see Appendix D). In selecting the lighting to be used for this purpose, the Applicant has focused on providing safe lighting while minimizing visual intrusion to the community. Therefore, a dual lighting system will be utilized on each of the 225-foot stacks. This lighting will be installed within 10 feet of the top of each stack, with approximately 3 lights provided around the circumference of the stack. The lighting system is designed to provide white flashing lights during daylight and dusk, transitioning to a steady red beacon at night. CEMS platform lighting will also be provided, similar to that provided at Independence Station.

The other large element of the Project is the cooling tower bank. Although located in a different part of the site, this feature has been designed to be visually and functionally similar in character to the existing cooling tower. The cooling tower will be approximately 37 feet tall, and will have a variable plume of water vapor the size of which will depend upon weather conditions. The potential impacts associated with this plume are assessed later in this section, although the presence of an existing similar cooling tower provides for a real-world surrogate on the site.



ELEVATION VIEW
LOOKING EAST



ELEVATION VIEW
LOOKING NORTH

- 01 HEAT RECOVERY STEAM GENERATOR
- 02 COMBUSTION TURBINE GENERATOR
- 03 INLET AIR FILTER
- 04 STEAM TURBINE GENERATOR
- 05 STEAM TURBINE CONDENSER
- 06 BOILER FEED PUMPS
- 08 SAMPLE PANEL
- 10 LUBE OIL SYSTEM
- 13 CLOSED LOOP COOLING WATER PUMPS
- 14 AUX. COOLING WATER HEAT EXCHANGERS
- 18 TURBINE DRAIN TANK
- 19 HYDRAULIC SKID
- 20 CONDENSATE PUMPS
- 21 VACUUM PUMPS
- 22 AIR CONDITIONING UNITS
- 24 CO2 STORAGE TANK
- 25 CLEARANCE CONTROL SKID
- 27 ISO PHASE BUS DUCT
- 28 COOLING AIR COOLING SKID
- 32 ACID STORAGE TANK
- 34 CONDENSATE MAKE-UP PUMPS
- 37 COOLING TOWER MAKE-UP PUMPS
- 41 PLANT SUMP/PUMPS
- 43 FUEL GAS HEATING CIRC. PUMPS
- 46 GAS TURBINE ENCLOSURE VENT FAN
- 53 140 TON MAIN TURBINE BAY CRANE
- 54 20 TON AUXILIARY TURBINE BAY CRANE
- 57 AUX. CIRC. WATER BOOSTER PUMPS
- 58 AUX. BOILER
- 59 FUEL GAS SCRUBBER
- 60 SATURATION SKID
- 61 SCRUBBER DRAIN TANK
- 62 FUEL GAS HEATERS
- 63 FUEL GAS FILTER
- 64 START-UP GAS HEATER
- 65 EMERGENCY DIESEL GENERATOR
- 66 ADMINISTRATION BUILDING

REVISIONS | REVISION APPROVAL RECORD | REV P9 | DRAWING RECORD | PRINT DISTRIBUTION RECORD | DRAWING STATUS

CADD FILE DATA
PATH: \POWER\NOEP7H\GA\
FILE: 1110102.DGN
UPDATED: 12/06/99 BY: RKP

ISSUED: PRELIMINARY — REV P9

Figure 16-1
General Arrangement Elevation Views

SCALE: 1"=40'

HERITAGE POWER LLC
H PROJECT

Raytheon Engineers & Constructors

DWG. NO. 11-10-102
ORDER NO. 45000.845
REV P9

A portion of the existing on-site switchyard will be expanded. Two poles are anticipated to provide for the electrical tie-in from the Project to the switchyard. The poles will be approximately 140 feet tall, and similar in character to those supporting electrical wires for Independence Station. The switchyard elements will be approximately 40 to 60 feet tall, and will be similar to the adjacent switchyard facilities.

Smaller facilities, such as storage tanks and a holding basin, will have an industrial appearance, but will be considerably smaller than the main structures. None of these elements are anticipated to affect the potential for visual impact from the Project as proposed.

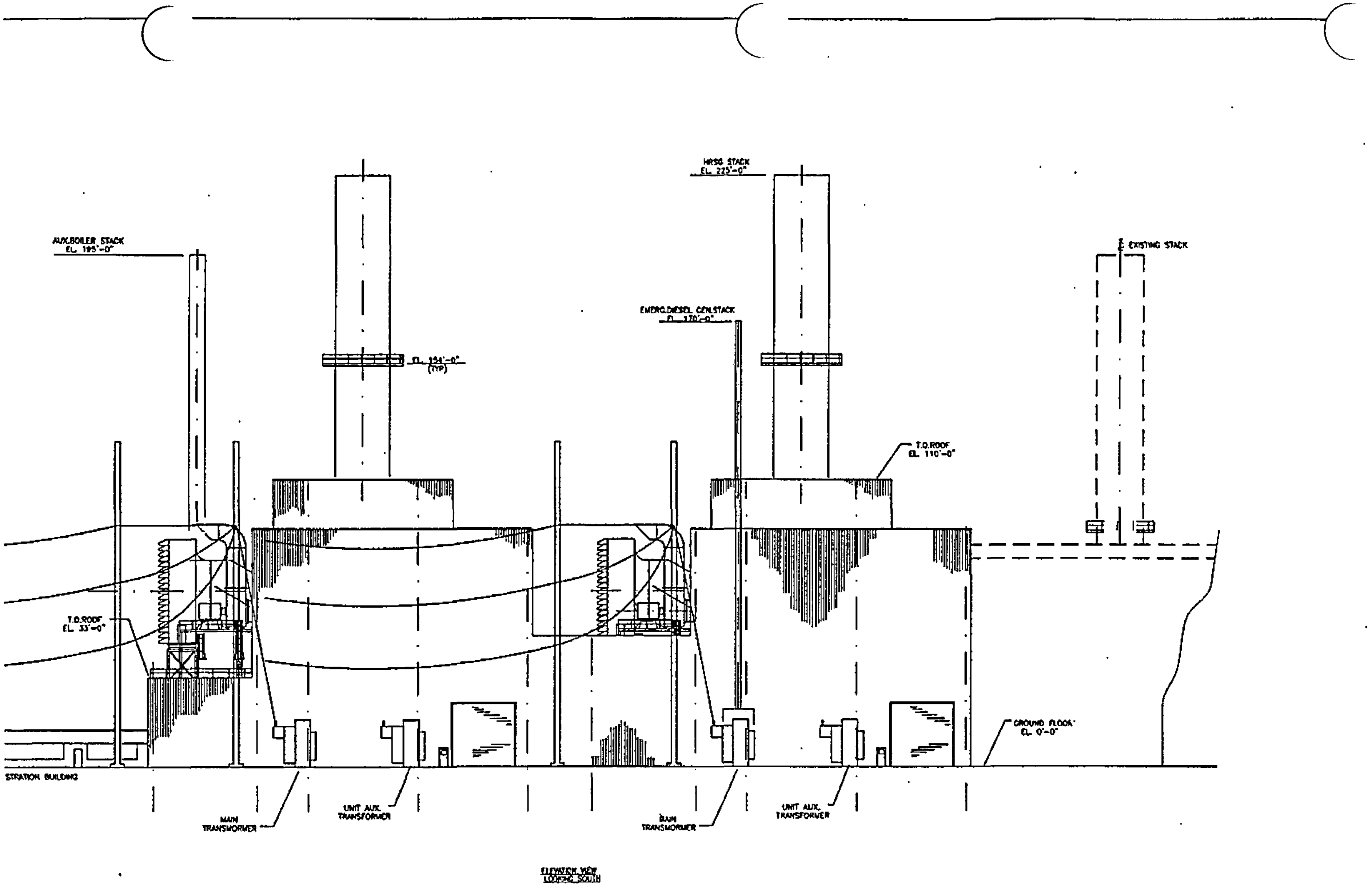
Lighting for the Project, shown on Figure 16-2, will be designed to have a minimal impact on the surrounding community while providing for safe operations. All pole-mounted lighting will be between 30 and 35 feet tall. Lighting requirements for each of the major structures are discussed below. Note that, with the integration of the Project into the Independence Station site, Project lighting that will be added to the site can be limited to the specific needs of the Project elements themselves. Adequate lighting of the entryway and other shared areas already exists.

The amount of interior light from the powerhouse that will be visible externally will be minimized through the use of shades, blinds, louvers, film or similar materials. Interior lighting is not anticipated to add appreciably to any potential off-site lighting impacts. Stack lighting was discussed above. Other exterior lighting for the Project will consist of the following:

- Each personnel and overhead door – two foot-candles.
- Around transformers – two foot-candles.
- Near exterior pumps and maintenance areas – five foot-candles.
- Platforms and elevated work areas – five foot-candles.
- Switchyard – The perimeters of this area will be illuminated by two-foot-candle pole lights spaced 100 feet apart. The switchyard center will be illuminated by one 5-foot candle lighting element.
- Cooling tower – Equally spaced lights will be placed on the sides of the cooling tower. These lights will have an illumination of two foot-candles each.

Representative views of the Project are shown in Figures 3-5, 3-6, 16-1 and 16-3. Figure 3-5 provides an artist's rendering of the Project, illustrating the means through which the primary structures will blend with existing Independence Station facilities. Figure 3-6 shows an isometric view of the Project, illustrating the manner in

Figure 16-2: Lighting Plan



DRAWING STATUS

ISSUED	REV	DATE	SDE	PEM
PRELIMINARY	P			
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

Figure 16-3
General Arrangement Rear Elevation View

SCALE: 1"=20"

HERITAGE POWER LLC
H PROJECT

Raytheon Engineers & Constructors

DWG. NO. 11-10-104

ORDER NO. 45000.845 REV P

DRAWING RECORD: DESIGNER RKP; CADD FILE DATA: TYPE: MS VERS: 95; PATH: POWER/HERITAGE/CA/; UPDATED BY: RKP

REVISION: 01 RAISED EMERG. DIESEL GEN. STACK which Project features have been distributed throughout the site. Figures 16-1 and 16-3 provide a variety of elevation views of the Project. As can be seen, a significant effort has been made to integrate the Project into its on-site surroundings.

16.4 Viewshed Analysis

This section addresses Stipulation No. 11, Clauses 2(b), 2(h), 3, 4, 6 and 7.

A detailed viewshed analysis has been conducted to determine the potential visibility of the Project, as well as the nature and degree of visual change resulting from the Project. Visual impacts have been considered for not only Project construction and operation, but to establish the cumulative impacts associated with the Project with the existing Independence Station and other nearby visual elements. Because no off-site features are considered to be part of the Project, and all required roadways and interconnections are accommodated on the Project site, the visual impact analysis has focused on the larger structures that will be associated with the Project, as well as any anticipated water vapor plumes.

16.4.1 Methodology

Pursuant to Stipulation No. 11, Clause 3(a), in order to assess the potential visual impacts associated with locating the Project at this site, a viewshed analysis was conducted for an area within a 5-mile radius of the Project. Computerized methods were used to identify areas from which the stack or other elements of the facility might be visible. This was done, consistent with Stipulation No. 11, Clause 3(b), by creating a digital elevation model of the area from United States Geological Survey (USGS) terrain data. To account for vegetation, the approximate extent of forested areas was identified from USGS color infrared digital orthophoto quads. These photographs were taken in April 1994. Vegetation was assigned a conservative height (15 meters) based on local assessment, and combined with the digital elevation model to create a model that accounted for both terrain and vegetation. Vegetation areas were identified using Endas Image processing software. All other visibility modeling was performed using ARC/INFO® GIS software.

Using the visibility function within the computer model, the areas from which the top of the stacks (225 feet above ground level) could potentially be seen were identified. Figure 16-4 shows the results of this analysis, as required by Stipulation No. 11, Clause 7. As can be seen from that figure, locations surrounding the site from which viewing potential is indicated are generally those at higher elevations or with views unobstructed by vegetation. Also shown on Figure 16-4 are the 12 receptor locations previously analyzed for the Independence Station project during its licensing process. The presence of Independence Station on the site, and adjacent to the Project's development area, presents a unique opportunity to illustrate potential views through the use of a surrogate. Figure 16-4 also shows the location of the

Figure 16-4: Results of Visibility Assessment Modeling

16 structures within the viewshed area discussed in Section 7.4. Appendix K includes information about these structures, each of which is at least 50 years old and, thus, considered a potential cultural resource.

In selecting visual receptor locations, type of land use, proximity to the site, and potential impact were considered. Each of the formerly analyzed visual receptors was visited to ascertain the degree to which the Independence Station could be seen from that location. The Project's 30-foot higher stacks result in a slightly broader area where viewshed potential exists; in fact, however, an increment that small is unlikely to be noticeable. Based upon the assessment conducted, the Project's stacks would not be likely to be any more visible than are the Independence Station stacks from these former receptor locations.

Of the 12 visual receptor locations previously assessed, the Independence Station stacks could not be seen from 6 receptors. These locations, therefore, were eliminated from additional study. In several other receptor locations, the view was slightly obstructed, but the Independence Station stacks were visible when a slight adjustment to the view was made. These receptors were retained for analysis with the adjustments as appropriate. In addition to the retained former receptor locations, a drive-by survey was conducted of other potential vantage points indicated by the modeling results. The goal for selecting additional visual receptor locations was to ensure representative views from a variety of compass directions and distances.

Based upon this reconnaissance effort, 11 total land-based visual receptor points were selected, as well as 3 receptor locations from Lake Ontario. The viewpoint locations selected are discussed in detail in the following section.

16.4.2 Selected Viewpoint Locations

The selected visual receptor locations are shown on Figure 16-5, pursuant to Stipulation No. 11, Clause 3(d). Prior to proceeding with the visual analysis, consultation was made with a number of agencies. Telephone contact was made with the OPRHP, and preliminary results of the visibility modeling were reviewed. OPRHP has indicated that, from a cultural resources perspective, no locations require special consideration in the visual impact analysis. Of the 16 structures identified on Figure 16-4, the majority are either well represented by the selected views, or are in locations where views of the existing Independence Station are obstructed. No new viewing locations were selected to represent particular cultural resources of concern, particularly given the OPRHP feedback received. In addition, a meeting was held on November 3, 1999 to review Project issues with a number of NYSDEC representatives. Among the issues discussed was the selection of visual receptor points to be utilized in the Project's analysis. No specific locations were suggested

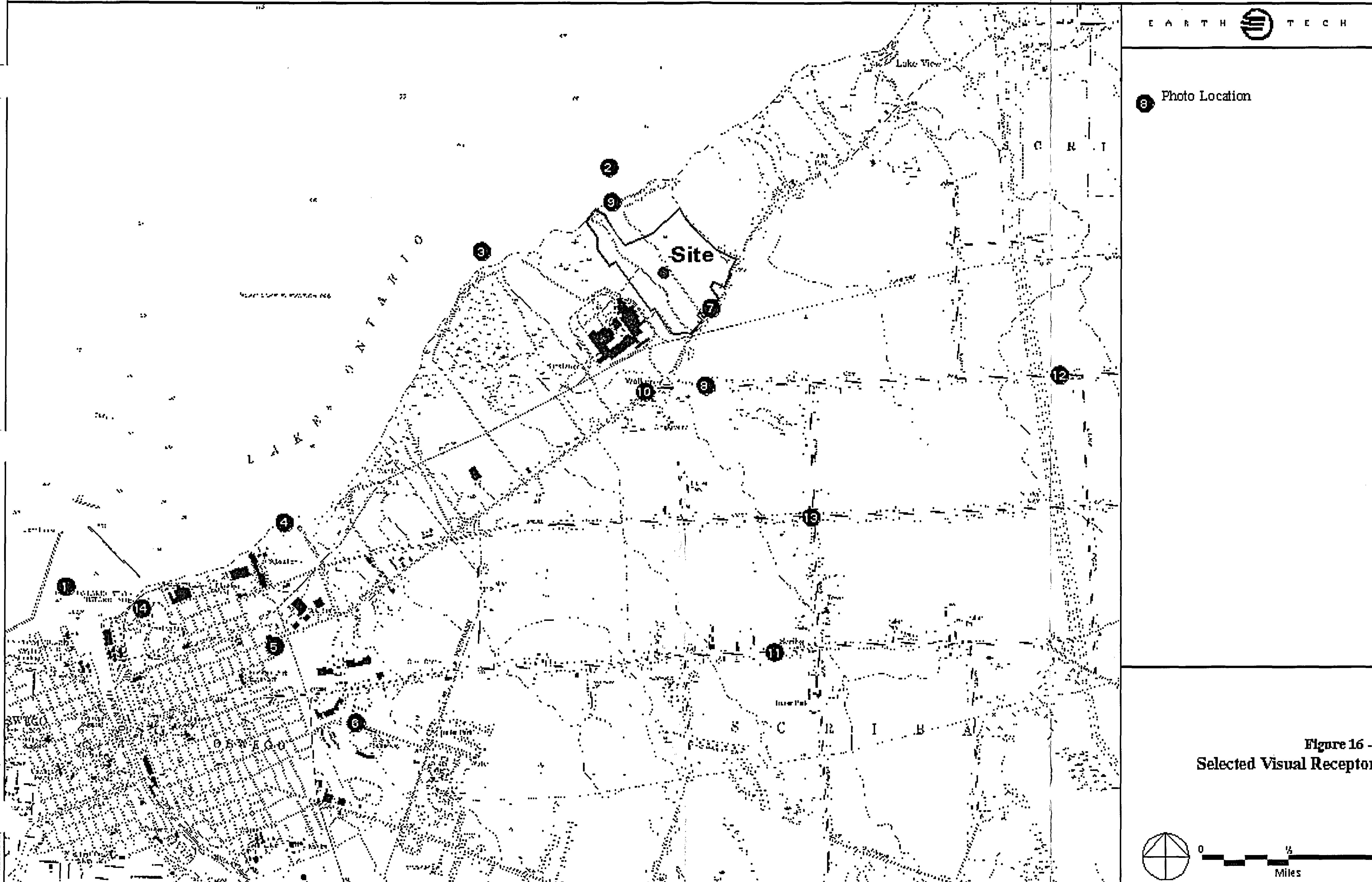


Figure 16 - 5
Selected Visual Receptors

by the NYSDEC at that meeting. Receptor information was also sent to DPS for review and comment; no specific locations were identified in that review process as well. Potential visual concerns were also discussed with local representatives on several occasions, with no specific viewing locations noted for inclusion in the visual assessment.

Figure 16-6 provides an illustration of the same 5-mile radius from which the above views were selected. This figure identifies landscape similarity zones (as discussed in Section 16.4.4). The 14 receptor locations were selected utilizing the agency contact information, the information shown in that figure, and the following:

- Representative or typical views from unobstructed or direct line-of-sight views;
- Significance of viewpoints (for example, historic sites, high public use areas, parks and scenic outlooks would be of particular concern for assessment);
- Level of viewer exposure (that is, frequency of viewers or relative numbers, including residential areas, business centers, or high volume roadways); and
- Existing and proposed land uses.

At each of the selected locations, photographs were taken. The photographs shown in Figures 16-10 through 16-20 were taken using a Nikon 35-mm camera with a standard 50-mm lens. Figures 16-7 through 16-9 were taken with a Sony Mavica digital camera.

Consistent with Stipulation No. 11, Clause 3(c), Figures 16-7 through 16-20 provide the photographs from each of the 14 views selected. Each view is also described below:

- View 1 – View from Lake Ontario outside of Oswego Harbor (Figure 16-7). This view, approximately 4 miles from the Project, represents views by those utilizing the harbor area for fishing or other recreational purposes. From this vantage, the views toward the site are distant, with the existing Independence Station stacks barely visible just above the treeline. Other industrial uses, including the Nine Mile Point cooling tower, are visible from this location as well.
- View 2 – View from Lake Ontario (Figure 16-8). This represents a closer vantage point from Lake Ontario, offshore in a location 0.7 mile from the Project. Again, recreational or commercial users of Lake Ontario would experience this view. The shoreline residences are visible from this location, with the existing Independence Station stacks extending above the treeline.

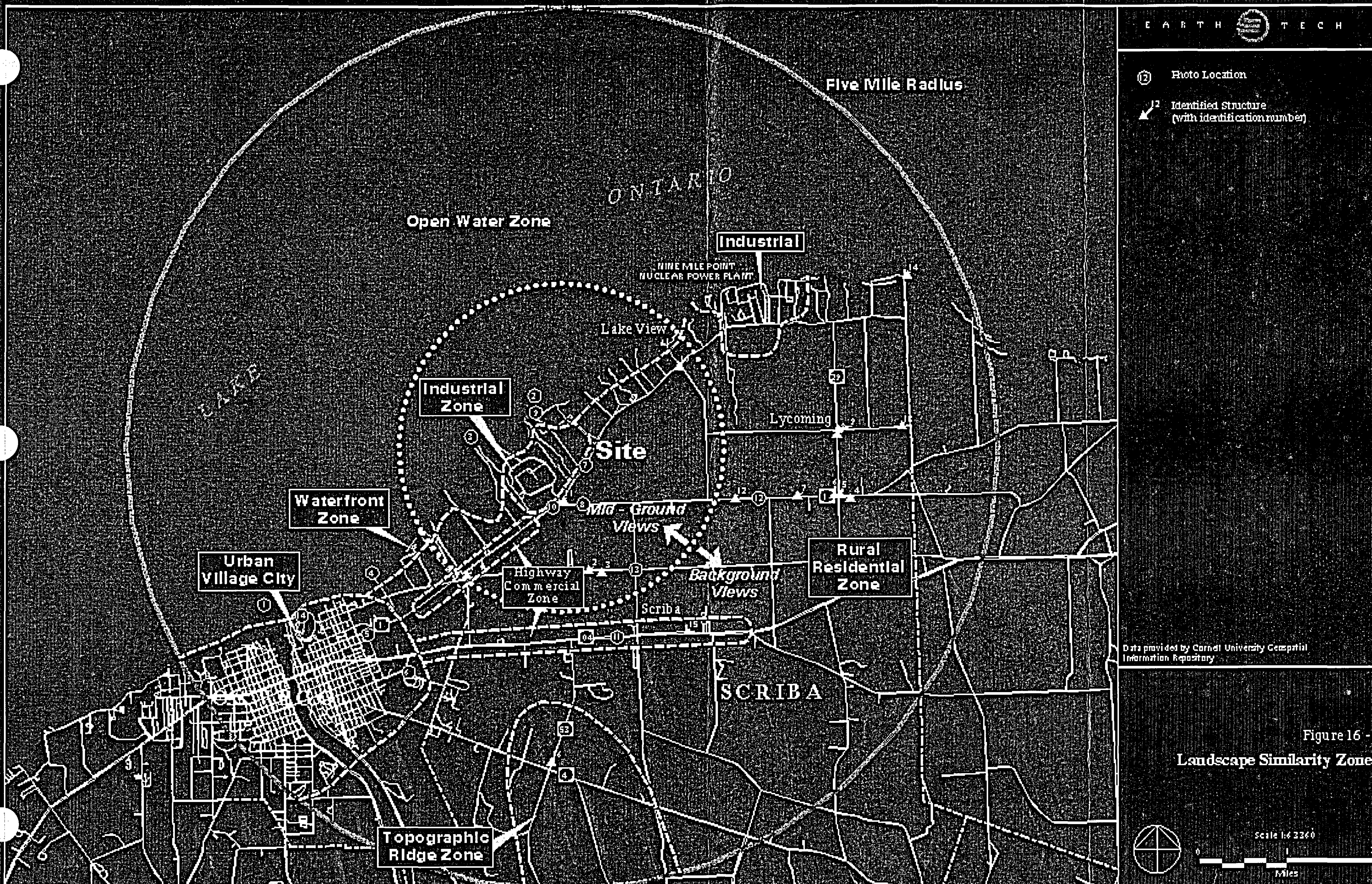
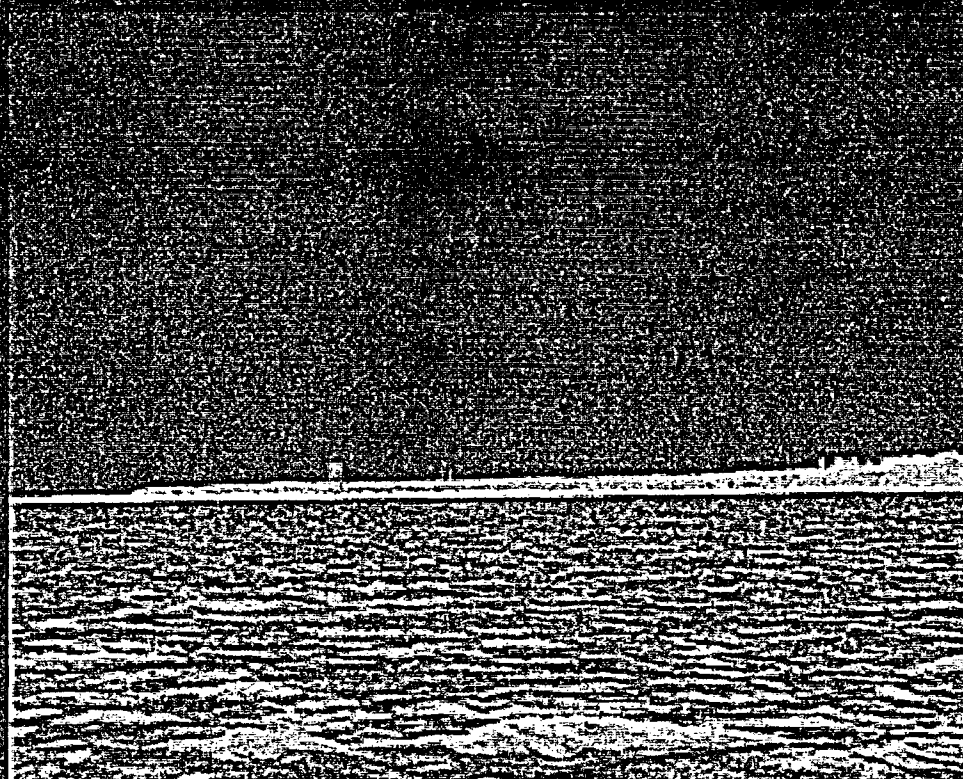


Figure 16 - 6

Landscape Similarity Zones



Existing

Proposed

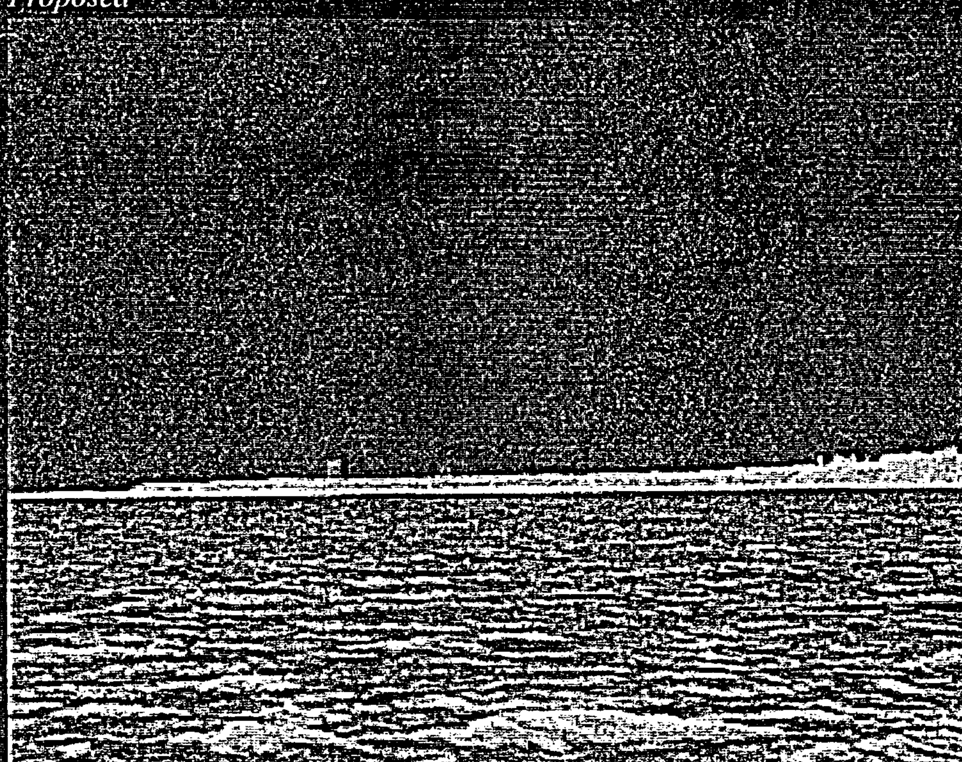
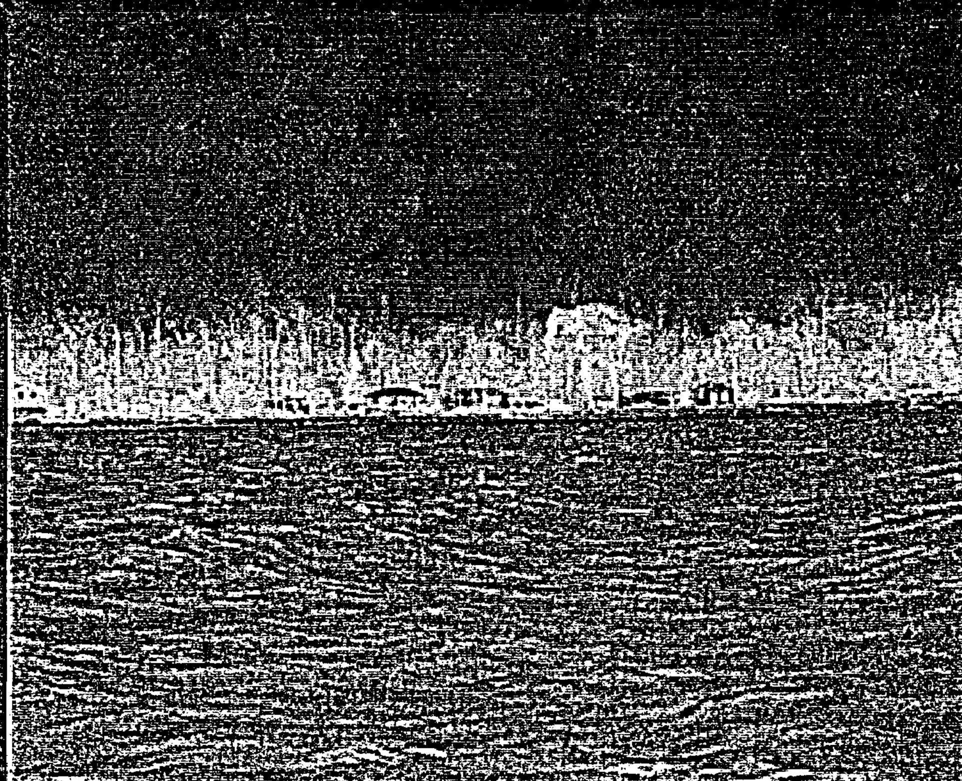


Figure 16-7

View 1

View From Lake Ontario Outside of Oswego Harbor



Existing

Proposed

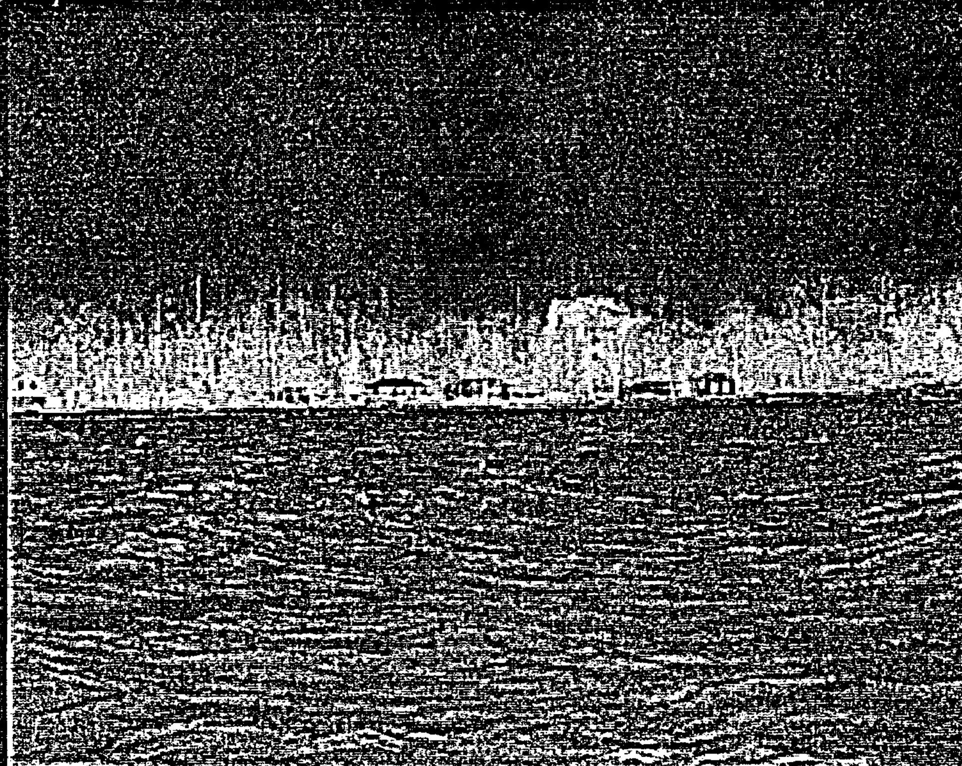
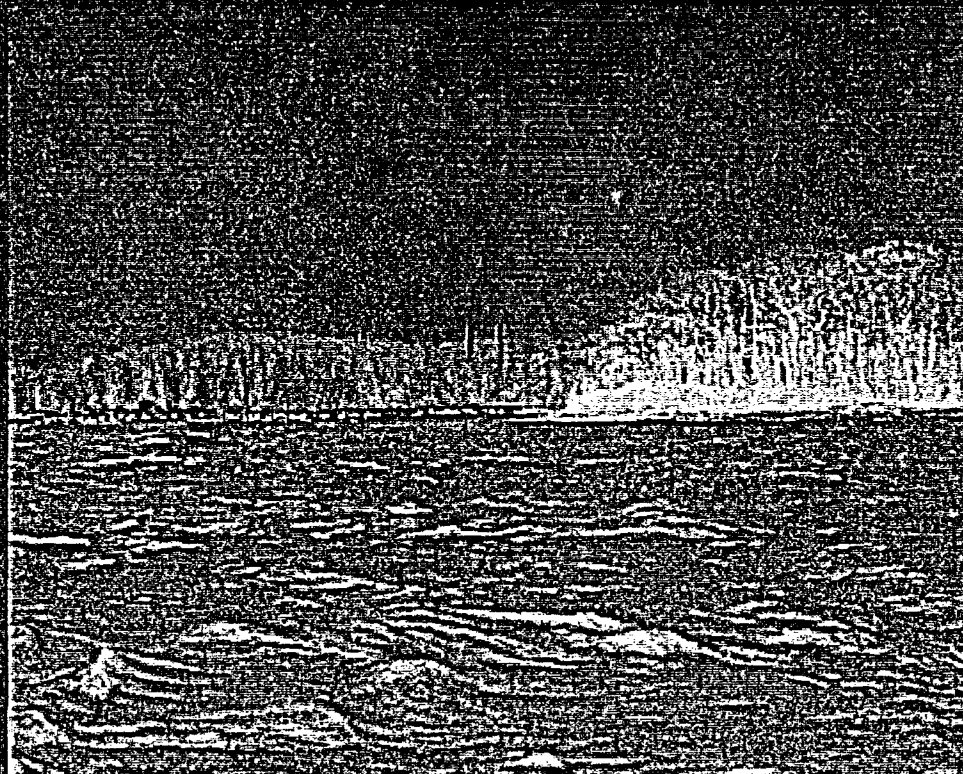


Figure 16-8

View 2

View From Lake Ontario Opposite the Site



Existing

Proposed

Figure 16-9

View 3

Westerly View From Lake Ontario

Existing

Proposed

Figure 16-10
View 4
View From Saint Paul's Cemetery

Existing

Proposed

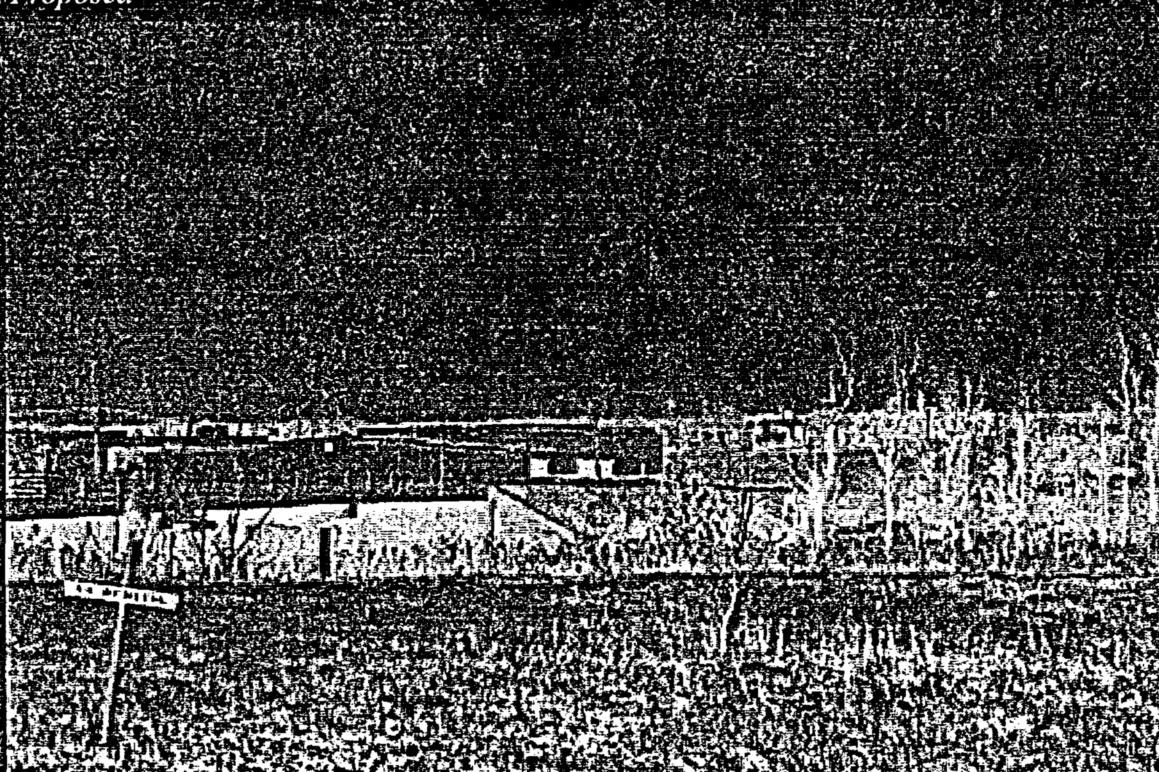


Figure 16-11
View 5
View From Rowe Drive South of E. Seneca Street

Existing

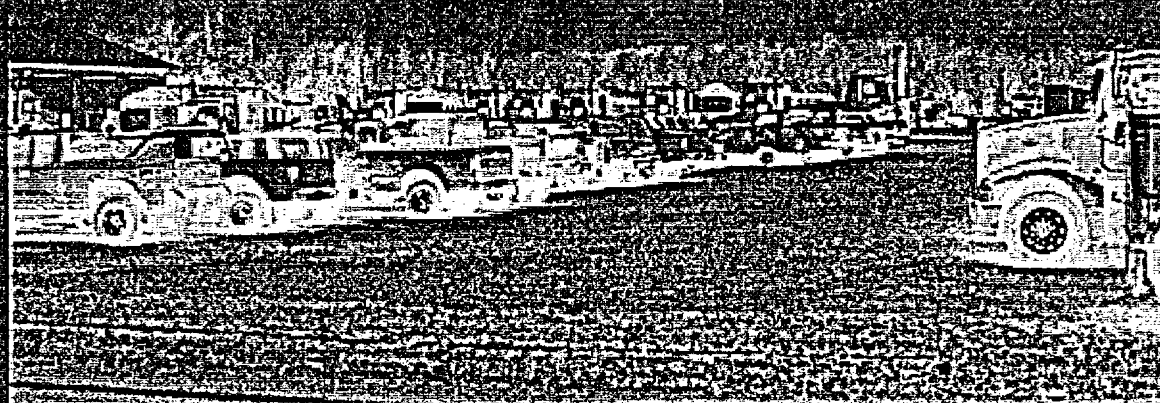
Proposed

Figure 16-12
View 6
View From Oswego Speedway

Existing

Proposed

Figure 16-13
View 7
View From Lake Road (Route 1A) South of Site



Existing

Proposed

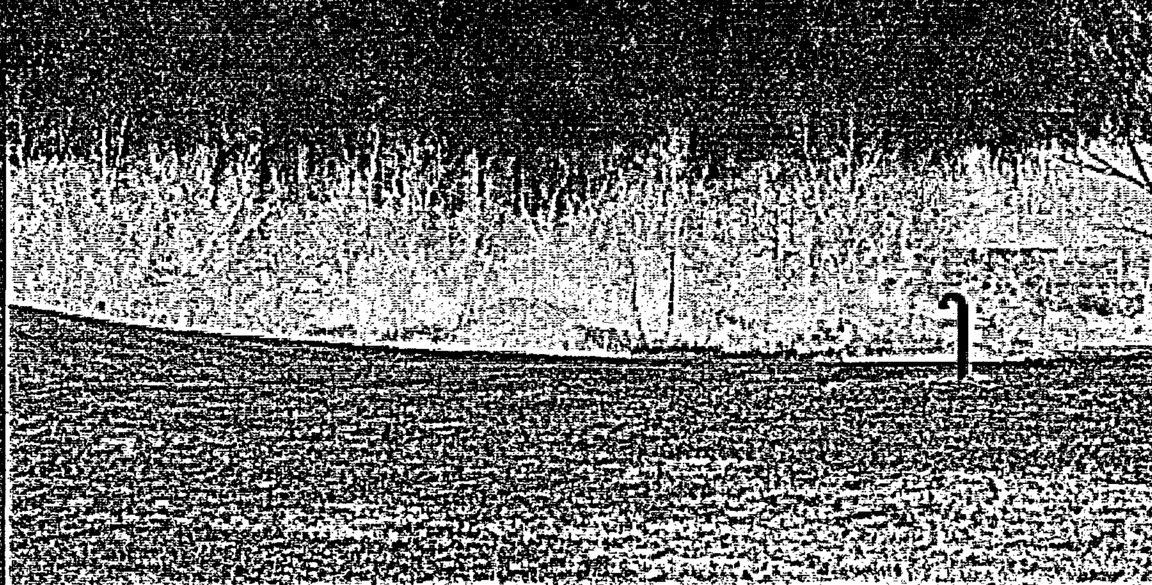
Figure 16-14
View 8
View From Route 1 at Metals Trucking

E A R T H T E C H

Existing

Proposed

Figure 16-15
View 9
View From Independence Park Nature Trail



Existing

Proposed

Figure 16-16

View 10

View From Route 1 West of Lake Road/Route 1 Intersection

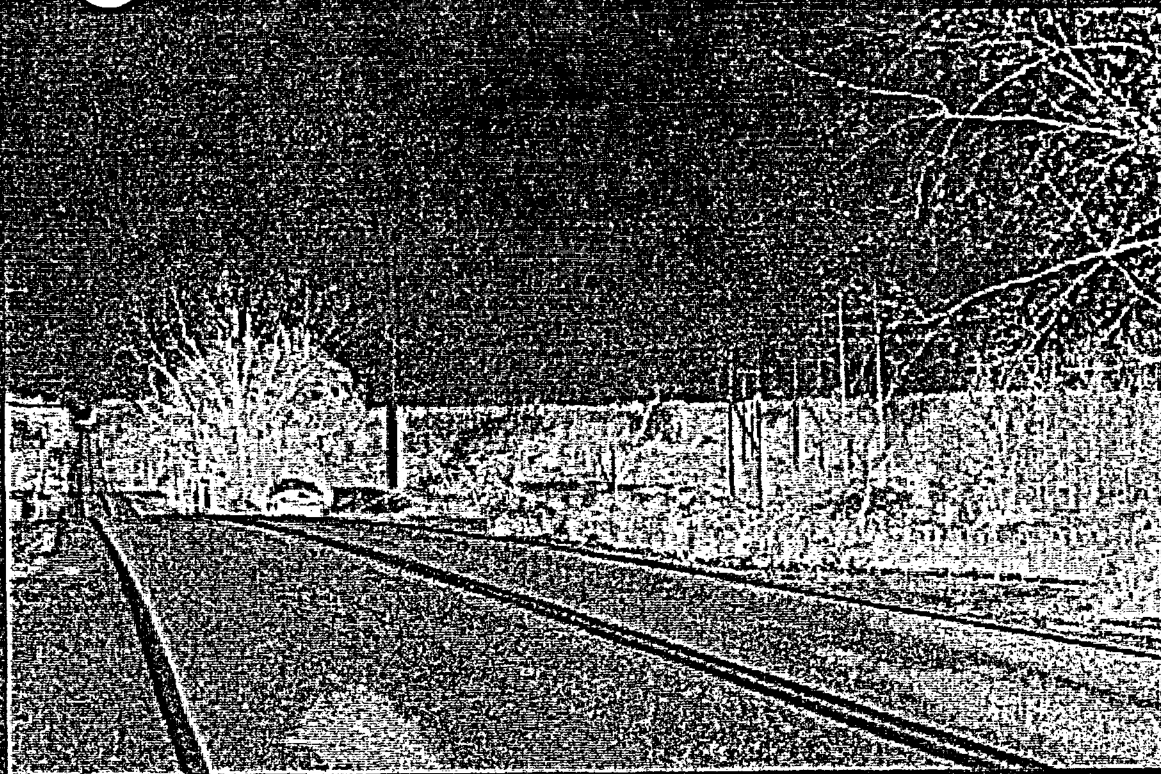
Existing

Proposed

Figure 16-17

View 11

View From Route 104 West of Scriba Center



Existing

Proposed

Figure 16-18

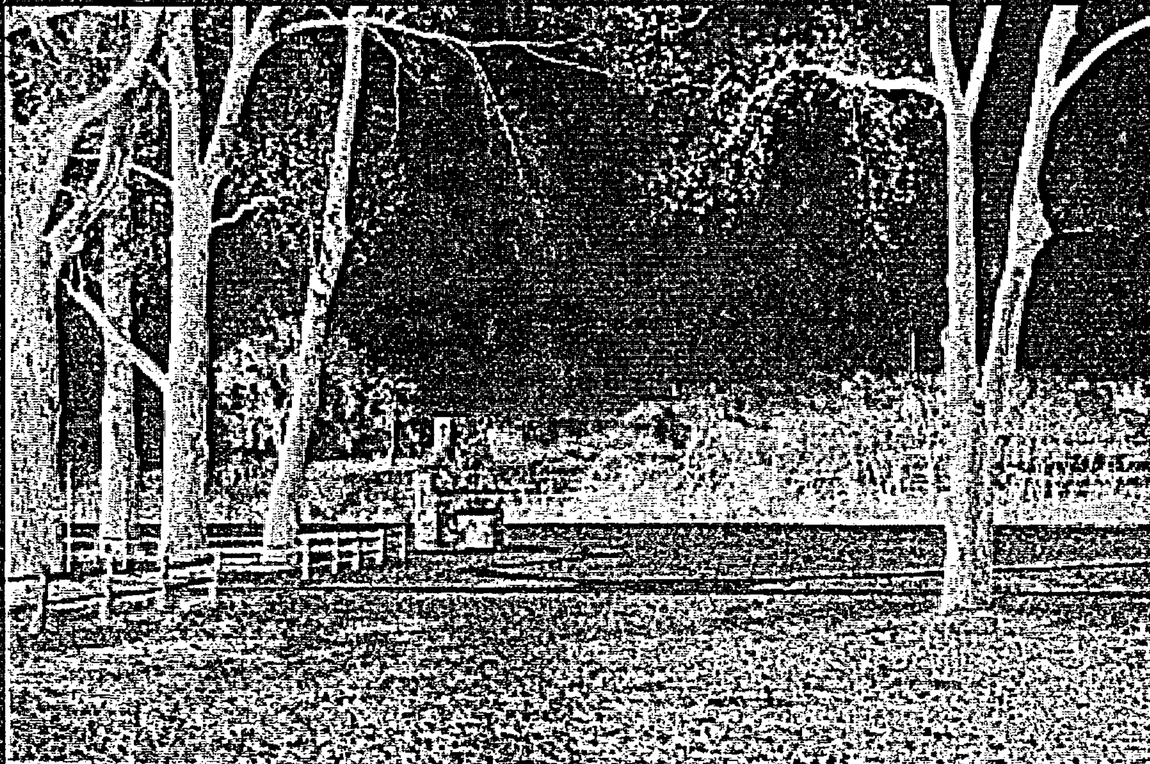
View 12

View From Route 1 West of Duke Road

Existing

Proposed

Figure 16-19
View 13
View From Intersection of Middle Road and Creamery Road



Existing

Proposed

Figure 16-20
View 14
View From Fort Oswego

- View 3 – View from Lake Ontario (Figure 16-9). Also about 1 mile from the Project, this view represents lake views toward the site from a more westerly location. Again, the Independence Station stacks are visible from this location, as are stacks from other nearby industrial uses.

- View 4 – View from St. Paul's Cemetery (Figure 16-10). This view is from a slight promontory 2.6 miles from the Project. As indicated by the visibility assessment modeling, the existing Independence Station stacks are visible from this location. The Nine Mile Point cooling tower, however, represents the more dominant visual element from this vantage point.

- View 5 – View from Rowe Drive South of East Seneca Street (Figure 16-11), just over 3 miles from the Project. The existing Independence Station stacks are visible in the distance, as are other industrial features. The industrial character of the foreground from this vantage point dominates. Note that Views 4 and 5 reflect more distant view surrogates for Structure 1 on Figure 16-4.

- View 6 – View from Oswego Speedway (Figure 16-12). This view represents a public recreational area from which the visibility assessment modeling indicated viewing potential. At 3.1 miles from the Project, views of the Independence Station stacks and cooling tower water vapor are visible but distant. The view from this location also includes a distant view of the Nine Mile Point cooling tower.

- View 7 – View from Lake Road (Route 1A) (Figure 16-13). This view is 0.3 mile south of the site, representing views for residents of the area and for travelers along Route 1A. The existing stacks are clearly visible from this location; vegetation screens any other Independence Station structures from view.

- View 8 – View from Route 1 (Figure 16-14). This view, 0.7 mile from the Project, was selected because it had the clearest vantage towards the site in this general location. Although the existing land use in the foreground is industrial/commercial by nature, homes are located in this vicinity as well. This location represents, therefore, views at this distance experienced by residents and travelers along Route 1.

- View 9 – View from Independence Park (Figure 16-15). This view is from the nature trail at Independence Park with the most direct view of the Independence Station facility. Even from this location, existing vegetation effectively screens the facility buildings, resulting in a view of facility stacks. Although these stacks are quite visible during the leaf-off season, when the photograph was taken, the return of deciduous vegetation would be expected to screen them still further.

- View 10 – View from Route 1 West of Lake Road/Route 1 Intersection (Figure 16-16). This location is 0.7 mile from the Project. During the leaf-off season, a stack-top view of Independence Station is visible. This view would be almost completely obscured with the return of deciduous vegetation. This view is a surrogate for Structure 11 on Figure 16-4.

- View 11 – View from Route 104 West of Scriba Center (Figure 16-17). Route 104 is designated as a scenic road, although the portion of this road that extends through the Project area is not identified as having special visual qualities. This view represents the vantage experienced by homeowners and travelers in this location, 2.2 miles from the Project. This view is a surrogate for Structures 15 and 16 on Figure 16-4.

- View 12 – View from Route 1 West of Duke Road (Figure 16-18). Again, residences and roadway travelers experience distant stacktop views of the Independence Station stacks. This view is 2.3 miles from the Project. View 12 is a surrogate for Structures 4, 5, 6, 7, 8, 9, 12 and 13 on Figure 16-4.

- View 13 – View from the Intersection of Middle Road and Creamery Road (Figure 16-19). Approximately 1.5 miles distant from the site, this view is that experienced by homeowners, roadway travelers and individuals utilizing the Scriba recreational facility. Distant stacktop views of the Independence Station are clearly visible from this location. This view is a surrogate for views from Structures 2 and 3 on Figure 16-4.

- View 14 – View from Fort Oswego (Figure 16-20). This historical recreational facility in Oswego allows for panoramic vantages in many directions, including views of Lake Ontario and the surrounding shoreline. The Project site is 3.5 miles from this location. Views in that direction, are distant, but Independence Station stacks are visible, as is the cooling tower associated with Nine Mile Point and closer industrial uses just to the north.

16.4.3 Identification of Viewer Groups

Based on the field and data review, specific viewer groups within the study area were identified, consistent with Stipulation No. 11, Clause 6. These groups were identified based on the frequency and duration of exposure to views of the Project, the viewer's position in the landscape, and the viewer's activity and presumed sensitivity to alteration of the visual landscape. Viewer groups identified within the study area included:

Local Residents: These individuals live and work locally, and except when involved in local travel, these viewers are likely to be stationary. They have knowledge of the local landscape and may be sensitive to changes in particular views that are important to them. The population density of viewers within the Project's viewshed is quite variable. At the westernmost edge of the Project's viewshed is the city of Oswego. Within this area, 1990 census data indicates a population density of 2,505 people per square mile (U.S. Bureau of the Census 1990). As can be seen on the USGS map that forms the basis of Figure 16-4, the city of Oswego represents the only large population cluster within the viewshed. Other, smaller clusters of population are better represented by the population density of the town of Scriba, at 160 people per square mile (U.S. Bureau of Census 1990).

Through Travelers: These individuals are travelling through the area on local roadways and numbered routes primarily to the south of the site. Detailed information with regard to the volume of travelers on local roadways is provided in Section 15.2.2. These viewers, because they are driving, are typically focused on the route and other travelers and would experience only transitory views of their surroundings. Consequently, their views of the surrounding landscape will generally be peripheral and relatively brief.

Tourists and Seasonal Residents: These individuals come to the area specifically to enjoy the recreational, historic and scenic resources that are associated with Lake Ontario and its vicinity. Most tourists and seasonal residents will have a high sensitivity to a change in visual quality and landscape character, with the exception of those focused on a particular recreational sport (such as attendees of Oswego Speedway events). Note, however, that the region surrounding the Project is home to numerous power generating stations that have long been part of the visual character of the area. The presence of these power generating stations, therefore, is already an integral part of the region's character as experienced by tourists and seasonal residents.

Recreational Users: These individuals include local people also involved in outdoor recreational activities. This group includes boaters, fishermen, hunters, hikers and cyclists. Their sensitivity to visual quality is variable, but to some, visual quality is an important part of the recreational experience they are enjoying.

16.4.4 Landscape Similarity Zones

Within the 5-mile radius, discrete landscape similarity zones were identified (Figure 16-6). These zones were determined based on a review of topography, vegetation, water, land use and user activities. The landscape similarity zones identified are described below, as well as the manner in which visibility assessment was carried forward for each.

Open Water: A significant portion of the 5-mile radius includes Lake Ontario, as it extends to the north of the Project site. This zone would include recreational and commercial viewers. The Open Water zone was considered an important view for assessment. As noted in Section 16.4.2, three representative vantage points were selected to assess the Project's influence on this area (Views 1, 2 and 3).

Urban Village/City: This zone consists of downtown Oswego and its harbor area. No other large population centers exist within the study area. The Urban Village/City zone is represented by two land-based vantage points on the eastern edge of this zone. In addition, View 1 from Lake Ontario could also be said to represent this urban waterfront area as well as representing the Open Water zone.

Waterfront Zone: This zone includes areas dominated by the presence of Lake Ontario, including residences as well as shorefront marshy areas. The Waterfront Zone was also assessed, and is represented by vantages from St. Paul's Cemetery (View 4) and Independence Park (View 9), as well as the Urban receptor at Fort Oswego (View 14).

Industrial Zone: This zone is found in two discrete locations within the study area: the Alcan/Independence Station area which is the immediate Project setting, and the area further east where the existing nuclear power generating stations are located. Not included is the steam station location in downtown Oswego; although an industrial element, it is part of the industrial urban water front area represented by the "Urban Village/City" zone discussed above. Views were selected at the fringe of this zone, representing residences in proximity to industrial uses. Views 5 and 14 reflect this representation.

Topographic Ridge Zone: This zone reflects landforms extending in a generally north-south direction to the south of the Project site. No views were indicated as occurring from the Topographic Ridge Zone based upon visibility assessment modeling. Field reconnaissance confirmed that the existing Independence Station is not visible from that location. Given this lack of view and this zone's distance from the Project (more than 2 miles at its nearest point), no further assessment of this zone was conducted.

Highway Commercial Corridor: Two such corridors exist within the study area, Route 104 as it extends through Scriba, and Route 1/Route 1A as it extends from Oswego past the Project site. Although residences also are located along these corridors, commercial and retail uses predominate. View 11, along Route 104, reflects this zone. Views from Route 1 and 1A are also represented, as are Views 7, 8, 10, and 12.

Rural Residential: The balance of the study area is classified as being in this zone. Residences and other uses occur along local roadways interspersed with open or wooded undeveloped areas. Although some more densely developed residential neighborhoods exist within this area, they are rare. Views from such areas are represented by View 13.

16.4.5 Project Impact on Selected Viewsheds

For each of the 14 selected receptor locations, a computer simulation assessment was undertaken using 3D Studio Viz®. The modeled simulation of the Project with its 225-foot stacks was inserted into the photograph as an overlay. The change in view for each identified vantage point, with the Project in place, is shown in Figures 16-7 through 16-20, designated as the "proposed" view. Through a comparison of the existing viewshed, also shown in those figures, to the view following construction of the Project, the extent of change in that view as a result of the Project can be determined.

Only distant views of the Project stacks are possible from many of the selected viewing receptors (Views 1, 4, 5, 6, 11, 12 and 14). Figure 16-6 illustrates, on that basis, the portion of the study for which the Project is an element of the background. From the selected receptors within this area, none of the Project buildings will be visible. The stacks or stacktops can be seen; however, addition of the Project's stacks within the context of the existing Independence Station stacks results in a minimal change to the existing viewsheds. No adverse visual impact, therefore, will occur to viewers that may see the Project from these locations. Distance is the predominant factor minimizing Project impact from visual receptors at this general location. In addition, the existing character of views currently includes visual elements such as the Independence Station stacks and the Nine Mile Point cooling tower. Even if the Project stacks were to be discernible, they would not represent a change in the character of the view nor would they result in a significantly altered view. The U.S. Forest Service defines background views as occurring at a distance of four miles, while the defined background view for this Project occurs within an area that is just over one mile from the Project. Greater precision in defining the characteristics of this view is possible in this case due to the presence of the existing Independence Station at the site, and the ability to take into account the particular features of the site and its setting in assessing potential visibility.

The balance of the visual receptors (Views 2, 3, 7, 8, 9, 10 and 13) result in mid-ground views of the Project. This mid-ground area is represented in Figure 16-6 as including the balance of the study area, with the exception of the immediate site vicinity. The U.S. Forest Service defines mid-ground views as the area from one half mile to four miles. In this case, this distancing of Project views into the mid-ground area, even for relatively close visual receptors, is the result of two primary factors. First, the 190-acre Project site allows for situating Project features in interior portions of the site; views are, therefore, buffered to some extent by distance. Second, the Project site and much of its immediate surroundings are wooded and will remain so following Project construction; views are further buffered by the presence of this dense vegetation, even without deciduous foliage in place. These factors effectively screen the Project buildings completely from view. Depending upon the specific location of each visual receptor, the extent of stack visibility varies somewhat. In all instances, at least a portion of the stacktop will be visible above or through the treeline. Given the existing views experienced of the Independence Station stacks (only slightly shorter) from each of these locations, the view does change from each of these locations, but the character of the view does not.

During construction, views will not be significantly different. Although tall cranes will be temporarily employed at the site for erection of the stacks, they will again be viewed as linear elements extending above the treeline. The balance of the temporary construction activity will occur interior to the Project site and would be shielded from view. Further assessment of the construction condition was, therefore, not considered warranted.

During the night, Project lighting is an additional visual element. As discussed previously, the FAA has determined that navigational lighting is required on the 225-foot stacks associated with the Project. A dual lighting system will be utilized in order to minimize visual impact on the surrounding community to the extent possible. This lighting system will result in flashing white beacons approximately 10 feet from stacktop during daylight and dusk hours, but will transition after dusk to a steady red beacon. The red beacon, without the intermittent flashing, will provide for a constant visual element just below stacktop. The Oswego Steam Station in Oswego, the 540-foot Nine Mile Point cooling tower, and the Nine Mile Point and Fitzpatrick stacks are all currently lighted. The Oswego Steam Station's use of flashing strobes during both day and night results in a very prominent nighttime visual focus. The addition of lights on the Project stacks would present a new visual element in the vicinity of the site, but one that would be consistent with other elements in the surrounding vista. Further, by employing the steady red beacons at night, the viewer will be less focused on the lighting as compared to a white flashing beacon at nighttime.

16.4.6 Plume Simulations

This section addresses Stipulation No. 11, Clause 4.

In addition to the Project's structural elements, visual potential exists with regard to water vapor plumes generated during Project operation. Two types of plumes were assessed in this regard: water vapor potentially generated from the stacks under certain operating conditions, and water vapor generated from the Project's cooling towers. No other type of visible plume is expected to result from either the stack or the cooling towers.

A visible plume from the stacks themselves was predicted to occur less than half the hours of the year between 6 a.m. and 10 p.m. (discussed in detail in Section 6.11). Any visible water vapor plume from this source would be the result of water vapor condensation forming in the exhaust plume as it exits the stacks, similar to a person's visible breath on a cold winter morning. Like a visible breath, the water vapor plume would be more prevalent during the cooler seasons (late fall, winter, and early spring), when atmospheric conditions are conducive to condensation of the water vapor entrained in the exhaust and during humid conditions. The water vapor released by the cooling towers also results in visible plumes during colder and humid weather, as discussed in Section 6.11. The visible plumes from the cooling towers were predicted to be less than 100 meters long for half the hours of the year between 6 a.m. and 10 p.m.

The frequency, persistence, and size of a potential water vapor plume will depend primarily on meteorological conditions, as well as the temperature and water content of the exhaust. By analyzing ambient conditions and the exhaust parameters of the Project's stack and cooling tower exhaust, it is possible to predict conservatively the frequency of occurrence of a visible water vapor plume as discussed in Section 6.11. There is currently no EPA model or empirical correlation that is recommended to assess the size of the water vapor plume. The photo-renditions provided in Figures 16-21 and 16-22 were generated to represent potential conditions under "typical," "winter normal" and "maximum impact" cases. In actually, the variability of weather conditions make such conditions difficult to define. The vantage point selected for illustration of these conditions is View 7, the closest view of the Project available from off-site locations. Note that the base photo for Figures 16-21 and 16-22 were taken during warmer weather. This allows for an illustration of the Project's plume only, without the Independence Station plume visible. In actuality, the larger plumes illustrated in Figure 16-22 would normally occur in the winter cold weather months, with snow cover or other seasonal ground cover providing the setting. The contrast between the plume and its setting would, therefore, not be as marked as Figure 16-22 would seem to indicate. Figure 16-23 provides a photograph of Independence Station under winter cold weather conditions. The Independence Station plume in Figure 16-23 is very similar to the maximum impact plume for Heritage Station in Figure 16-22. The cumulative effect of the Project with Independence Station will be only incremental, as the plumes extend from different locations on the Project site but will overlap to a great degree. Figure 16-23 is also a more meaningful surrogate for the actual visual impact anticipated; the character of the plume and the quality of its setting result in less visual contrast than is suggested by Figure 16-22.

Typical conditions are shown in Figure 16-21, representing a temperature of 52°F and relative humidity of 72 percent. This condition results in a stack plume length of less than 20 m, so that the height would be close to stack top. Cooling tower plumes under this scenario are also shown by the model to be relatively low, with results indicate a plume with a length less than 100 m and a height less than 25 m. Under

Typical (Temp. = 52°F., Relative Humidity 72%)

Figure 16-21

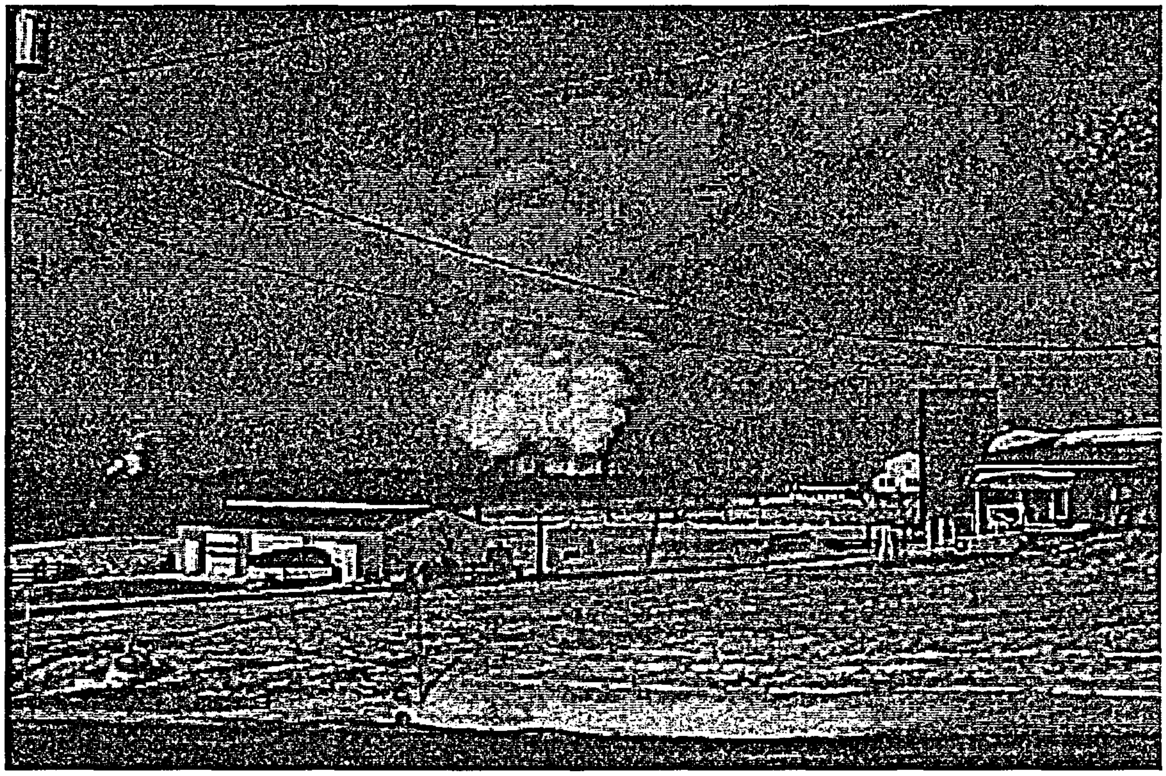
Plume Impacts
View From Intersection of Middle Road and Creamery Road

Winter Normal (Temp. = 20°F., Relative Humidity 65%)

Maximum Impact (Temp. = 5°F., Relative Humidity 88%)

Figure 16-22

Plume Impacts
View From Intersection of Middle Road and Creamery Road



January 19, 2000 (Temp. = 12.5°F., Relative Humidity 88%)

Figure 16-23

Cold-Weather Winter View of Independence Station From Intersection of Middle Road and Creamery Road

such conditions, any plumes generated would be visible only from locations adjacent to the cooling tower; a stack plume would be unlikely to be visible at all. The view shown in Figure 16-21, therefore, represents a view with no plume visibility from the surrounding area.

Winter normal conditions, with colder weather making plume formation more likely, are assumed at 20°F and 65 percent relative humidity. Stack plume lengths under these conditions could extend to a length of 241 m and a height of 392 m. As shown in Figure 16-22, this winter normal condition plume is very similar to the existing plumes generated by Independence Station, and the plumes from the two facilities are difficult to distinguish. Note also that the stack plume is not readily distinguished in the view, as it is obscured by the cooling tower plume.

Maximum impact conditions also would occur in the winter months, and are assumed to be 5°F and 88 percent relative humidity. Under these conditions, the model predicts stack plume lengths that could extend to a length of 843 m and a height of 234 m. The cooling tower plumes are predicted, under this condition, to potentially extend to a length of 944 m and a height of 75 m. Figure 16-22 also presents maximum impact conditions. Again, the stack plume is not visible as a distinct element, and the Project plume only adds incrementally to the existing plumes generated by Independence Station.

During most of any given year, water vapor plumes would not be visible from the Project stacks. This has been confirmed through the actual experience at Independence Station. The annual estimated hours, frequency, height and length of predicted plumes are discussed in Section 6.11.6.

It should be noted that, during much of the year, water vapor plumes will not be visible from the Project. However, especially during colder weather, the Project's plumes will extend in a manner similar to the Independence Station facility, adding an incremental visual element. This cumulative impact with Independence Station does very little to change the character of the view experienced from the surrounding area. The plume visibility associated with the Project does not represent a new visible element, and would only minimally increase the visibility of plumes from the Project site. Also important to note is the presence of another, more substantial visible plume in the general vicinity of the Project. As can be seen in the photographs taken, for example, from View 6, meteorological conditions that result in above-treeline views of the Independence Station plume also result in a large plume at Nine Mile Point. The addition of the Project within this setting is expected, especially within the context of the existing industrial uses in the area, to have a minimal cumulative affect on visual resources.

16.5 Short-term and Long-term Visual Impacts

The Project provides for a minimal visual impact on surrounding viewers, both during construction and during Project operation. During construction, although taller visual elements such as cranes may be utilized at the site, the same factors that reduce visibility impacts of the constructed Project serve to minimize visibility of these tall elements. In addition to the buffering by vegetation and distance, the short duration of the construction period will minimize the period of time over which any visibility of construction elements. Although construction will occur over an approximately 34 month period, much of that time will involve activities or equipment that will be no taller than the Project's buildings and stacks. However, at different times during the construction period, construction cranes ranging from 100 feet to 280 feet in height will be used. It is likely that a single, primary crane will be utilized, but it is possible that multiple cranes could be on-site for completion of construction activities in parallel and for lifting of the HRSG modules. The taller cranes, that could be visible from some locations above the treeline, are likely to be used at the site for no more than 6 to 18 months of the 34 month construction period. During that time, they would not necessarily remain on-site continuously. These will be only a temporary visual element for the surrounding area.

Once the Project is in place, Project buildings will be screened from view from most locations. Project stacks will be visible from some locations, primarily at a distance. View of the Project stacktops will not impose a new visual element, but will add to a similar element which is already visible. The additional of stacktop lighting will provide for additional visual impact, although lighting technology has been selected to minimize the obtrusiveness of this lighting while still providing for navigational safety. Visible plumes from the Project are expected to be like those currently experienced in association with Independence Station, and therefore the cumulative effect will be an incremental visual impact to a setting that currently experiences plumes, both on the site and in the vicinity (such as the plume from the Nine Mile Point cooling tower).

No adverse visual impacts are anticipated to the identified user groups (local residents, through travelers, tourists and seasonal residents, and recreational users). Although tourists and recreational users typically have a greater sensitivity to changes in view, the existing setting is one in which power facilities are common and an integral part of the anticipated landscape. As such, no particular sensitivity is noted for these groups. Through travelers tend to focus on the road and immediate surroundings; because nearfield views are minimized and because the Project's design intends to blend with an existing facility, it is unlikely that a through traveler's vision would be attracted to the Project as an obtrusive visual element. Local residents frequently are in a position to be most readily impacted by a change in an existing viewshed. As more stationary, long term viewers, with expectations with regard to their surroundings, change may be more noticeable to this group of viewers. However, in this instance, the Project's unique ability to be located within the context of an existing power generating facility, and the particular characteristics of its site and setting, result in only an incremental effect on even residential viewers' existing conditions. Although the Project stacks will be visible from some locations, and water vapor plumes will result under certain conditions, in both instances the view is not significantly changed in character by the additional elements contributed by the Project. Of the Project elements proposed, the most visual change is anticipated with the addition of the navigational lighting required by the FAA. In this instance, design choices have been made to allow for safe air traffic while utilizing the least obtrusive form of nighttime lighting possible.

The Project, in summary, is visible from some locations but has a unique opportunity to provide for a substantial addition of electric generating capacity with an extremely minimal change in views experienced.

16.6 Mitigation

This section addresses Stipulation No. 11, Clause 2(i).

The visual impact of the Project will be limited to locations near the site. Even in such locations, the view will be screened by distance and vegetation. No mitigation measures have been identified to further minimize the Project's minor visual impact other than those selected as part of the Project's design. The Project's minimal impact on view has been brought about by the following factors that can be considered to be mitigation inherent in the Project's design:

- Utilizing an existing industrial site;
- Locating the Project as close to the existing units as possible to reduce developed area and consolidating industrial features;
- Keeping the height of proposed structures and stacks similar to that of the existing on-site facilities;
- Selecting a dual lighting system (allowing for a steady red beacon at night) to provide for air traffic safety while minimizing visual impact on the surrounding community;
- Preserving existing vegetation around the perimeter of the Project site; and
- Using neutral colors for the Project's stacks to allow the Project to blend into the surrounding viewscape and using color selections similar to the existing Independence Station to further blend the Project into the site's existing industrial features.

17. WATER RESOURCES

This section addresses the water-related topics outlined in Stipulation No. 12, Clauses 1-44. Included in this section is a discussion with regard to water supply; wastewater; groundwater; surface waters; aquatic ecology; wetlands; and stormwater runoff/erosion control.

17.1 Water Supply

This section addresses requirements of Stipulation No. 12, Clauses 1 through 8. This section also addresses requirements of 16 NYCRR 1001.1(a), and 1001.3(a) and (b).

17.1.1 Applicable Regulatory Requirements

The Project will receive water from an existing, permitted water intake facility; no new withdrawal permit is required by the Applicant. The Project does represent a new user that will require the expansion of the city of Oswego's water treatment plant and increases volumes over those currently permitted. In addition, the town of Scriba and the city of Oswego will be required to modify their respective NYCRR Article 15, Part 15 water supply permits to accommodate the additional demand and the increase in consumptive water use.

17.1.2 Characterization of Project Water Supply Needs

17.1.2.1 Project Water Supply Needs

The Project will require water for a variety of purposes. The major water uses in this Project are for the production of steam and cooling tower makeup. Plant water and wastewater flows are shown on Figures 3-7 and 3-8. As shown, the average Project demand is 2,593 gpm (3.737 mgd), while peak demand is 3,390 gpm (4.9 mgd). Fire suppression average flow rate is 5 gpm (0.007 mgd). As required by Stipulation No. 12, Clause 1, Table 17-1 presents an estimate of the daily peak and the daily average water supply needs and consumptive water losses of the Project, in gallons, for each day of a typical year, broken down by power production, domestic, and fire protection uses, with daily, monthly and annual totals. Table 17-1 also includes an estimate of the daily peak, daily average, and fire suppression peak and average flow rate needs of the Project in gallons per minute.

Table 17-1: Water Supply Summary

17.1.2.2 Project Water Supply Methodology

The information presented in Table 17-1 is based on the following:

- The Project will be a baseload facility and, therefore, constant 100 percent gas turbine load was assumed for all plant operations. Average hourly water usage for power production and domestic use was assumed to be the daily average usage divided by 24 hours.

- Estimates were based on seasonally changing lake water temperature, with the following assumptions: 3 months/year under winter conditions, 6 months/year under spring/fall conditions, and 3 months/year under summer conditions.

- To determine monthly values, each day of a selected month the Project was assumed to operate continuously 24 hours/day at the selected representative operating condition for that month.

- The assumed power production levels, ambient temperature, and relative humidity at each representative operating condition are shown in Table 17-1.

- The average daily water usage rate for each operating condition was the basis for the daily peak rates and average and peak hourly water usage attributable to both power production and domestic consumption.

- Fire protection water usage was based on existing practice at Independence Station where half of the main transformer deluge systems are tested annually during a spring or fall outage (assumed to be spring in Table 17-1).

- Water usage for determining peak daily usage was assumed to be 112 percent of the daily average usage.

- Water usage for determining peak hourly usage is assumed to be 125 percent of the average hourly use.

17.1.2.3 Water Chemistry Requirements

In general, Project water quality requirements are less stringent than New York State standards for potable water. As discussed in Section 3.2.2.3, some additional treatment of cooling water and boiler makeup water will be performed by the Project, including demineralization and degasification. The cycle makeup treatment system will include a four-bed demineralizer with a polishing filter upstream of the ion exchange vessels. The water will pass through primary ion exchangers that accomplish most of the ion exchange. A forced draft degasifier will be provided downstream of the primary exchangers for the removal of dissolved gases. The water will then be pumped to the secondary exchangers for final treatment. The system effluent will be directed to the demineralized water for makeup to the steam cycle.

When the ion exchange resin contained in the primary or secondary exchangers becomes exhausted, the demineralizer train will be regenerated. Sulfuric acid will be used for regenerating the cation resins, and sodium hydroxide will be used for regenerating the anion resins. The regeneration wastewaters will be directed to the chemical waste drainage and treatment system where the waste pH will be adjusted in the neutralization basin before disposal.

The circulating water system for each condenser will use a cooling tower for cycle heat rejection. Makeup to the cooling tower will be Lake Ontario water provided via the city of Oswego's system. The quality of the makeup will be such that the circulating water system will normally operate at six cycles of concentration, with a maximum of 10 cycles. Cooling tower blowdown will flow from the cooling tower basin to the on-site wastewater holding pond prior to discharge to Lake Ontario.

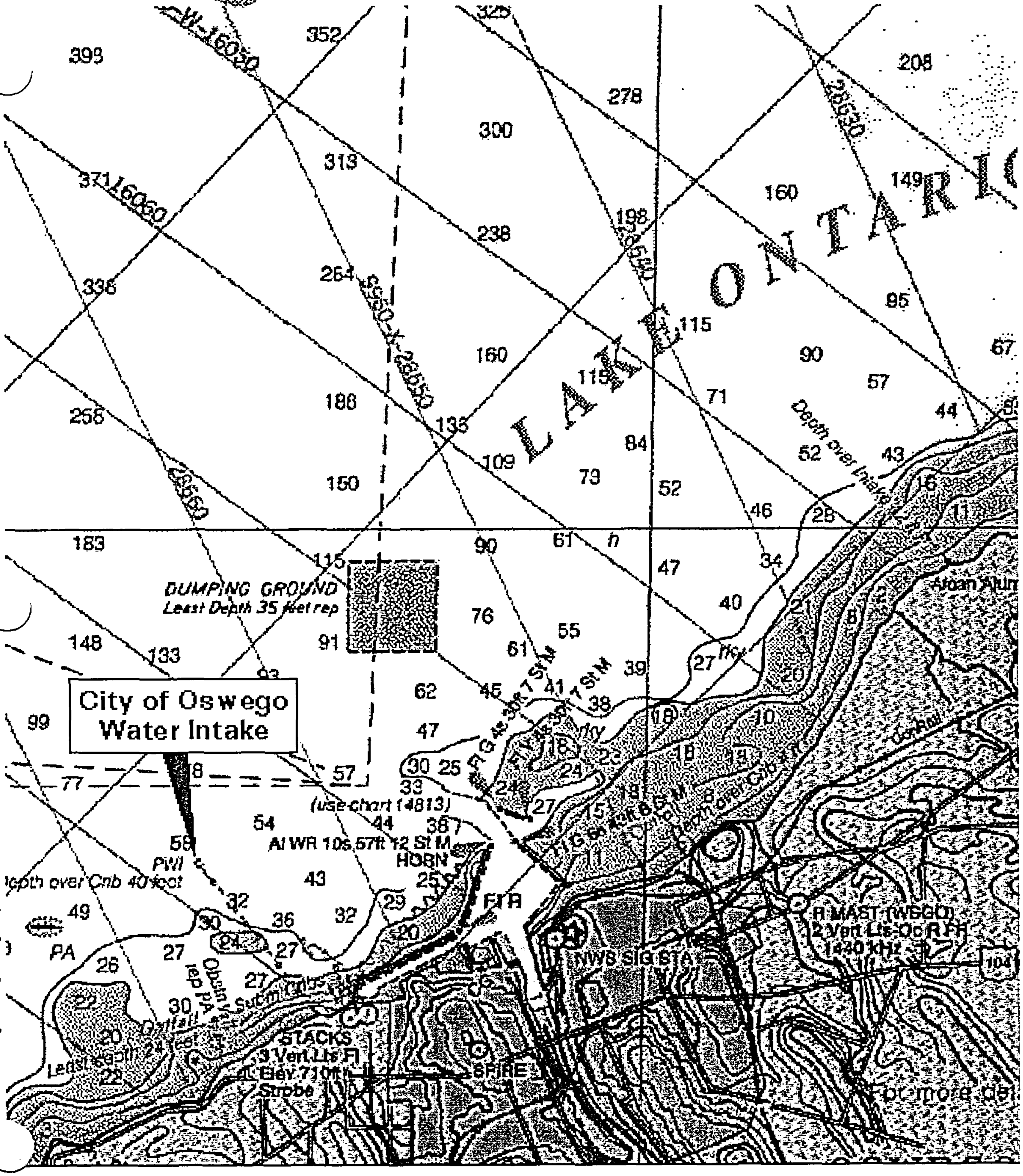
17.1.3 Proposed Water Source

Water will be provided by a connection to the existing Independence Station potable water line which comes to the site adjacent to Route 1A. The water source for this line is Lake Ontario via the city of Oswego Water Treatment Plant, as discussed in Section 3.2.2.7. City water quality is represented by the analyses shown in Table 17-2.

The intake for the city is located in Lake Ontario at a distance of 6,200 feet off the shore, slightly west of the mouth of the Oswego River (Figure 17-1). The intake structure is elevated a total height of 14 feet off the bottom so that water withdrawal occurs at about a 40-foot depth (Figure 3-9). A new water supply pipe was constructed from the existing distribution system to the Project site as part of the Independence Station project. This pipeline is of adequate capacity to meet Project water needs. It will be necessary to modify and upgrade the city of Oswego's water treatment facilities to accommodate the increased demand while maintaining supply and pressures to existing consumers, as discussed in Section 3.2.2.7.

Because Lake Ontario is an extremely large source of water, and the city water intake is located well offshore in 40 feet of water, the water supply parameters of pressure, quantity and quality during normal and drought periods do not vary.

Table 17-2: Preliminary Design Average and Design Maximum Water Quality for Treated City Water



Date: 15 Feb 00 14:40:49 Tuesday

Figure 17 - 1

Bathymetry of Lake Ontario in the Vicini

17.1.3.1 Agreements with Water Provider

The Applicant has had preliminary discussions with both the city of Oswego and town of Scriba, and an engineering assessment of the city water treatment plant has confirmed that water is available for the Project. The Applicant expects to successfully enter into long-term agreements for the supply of up to 4.9 mgd of water from the city of Oswego and the SCWMD. It is expected that these agreements will specify the terms of delivery of water for the anticipated commercial life of the Project as well as terms regarding the sharing of costs for the improvements required at the city's water treatment plant to meet the Project's requirements. A copy of the final agreement will be provided as a Compliance Filing.

17.1.3.2 Impact on Water Supply

Because Lake Ontario is an extremely large source of water, impacts of the Project on water supply during normal and drought periods do not vary. Since the low water elevation is maintained by dams, water withdrawals will not affect water levels or withdrawal availability.

The use of potable water from the city of Oswego by the Project would have a beneficial impact on water supply for the local area. Because the city will expand its water treatment capacity to satisfy Project water requirements, the end result will be an increase in available treated water to the region. The improvements will add flexibility and redundancy under normal conditions. Replacement or upgrade of the low lift pumps will benefit the entire water supply system. Lastly, the city will gain revenue from the increased water sales. With the planned infrastructure improvements, there will be no degradation of the water supply capacity or quality for residents and other users of the city water system.

17.1.3.3 Mitigation Measures

As discussed in Section 17.4, the design of the facility has included consideration of water use minimization, including consideration of alternative technologies. Cooling technology alternatives are discussed in Section 5 and water supply alternatives are discussed in Section 17.1.4. The Project will recycle HRSG blowdown and ultrafilter reject water. Because the water source is Lake Ontario, and the incremental increase in permitted withdrawal in the Oswego area caused by the Project will be relatively small, water use curtailment or drought affects will not be a Project issue. Water storage, wells, and water conservation measures designed to offset the Project withdrawal and water use are, therefore, not warranted. Lastly, it is anticipated that upgrades to the city water treatment plant will be cost-shared with the Applicant.

17.1.4 Water Supply Alternatives

As required by Stipulation No. 12, Clause 8, this section examines alternative water supply sources.

The Project will use a maximum of 4.9 mgd of water for various plant uses, including make-up water to offset usage in the facility's cooling system, steam cycle, demineralizer regeneration, equipment washdowns and potable usage. The Applicant proposes meeting this demand through the use of municipal water from the city of Oswego via the SCWMD.

Potential water sources that have been considered include:

- Use of available capacity from the city of Oswego system;
- Use of available capacity from the nearby Alcan intake structure;
- Development of a new Lake Ontario intake structure; and
- Development of a groundwater supply.

Each of these alternatives is discussed below.

17.1.4.1 Description of Water Supply Alternatives

City of Oswego Municipal Supply

The adjacent Independence Station currently receives municipal water to meet its make-up requirements. This water is drawn by the city of Oswego from Lake Ontario, treated, chlorinated and pumped via a dedicated force main to the SCWMD. The SCWMD extends this force main to Independence Station.

The water intake serving the city and the OCMWB, constructed in 1958, is located at a depth of about 40 feet at a point 6,200 feet off-shore north of the city. The intake water is drawn through an intake crib down a vertical shaft bored in the lake bedrock to an intake tunnel also bored in the rock. This horseshoe shaped tunnel, measuring approximately 7 feet high by 7 feet wide, leads to the shore near the city's treatment plant. A vertical riser well leads from the tunnel to the surface.

Based on hydraulic testing that has been done in the past, the current configuration of this intake can support a total draw of 125 mgd, well in excess of the current usage. Under agreements between the city and the OCMWB, 25 mgd of the intake capacity is currently allocated to the city, with a reserve of 6.5 mgd dedicated to the city and a further reserve of 18.5 mgd available to either party to serve uses within Oswego County.

The current maximum daily demand on the city of Oswego Water Treatment Plant is 17.7 mgd, of which 7.8 mgd is delivered to Independence Station. An additional 0.9 mgd of treated water is required for internal process purposes (filter backwash). An additional 1.2 mgd of capacity is currently committed to customers but is currently unutilized. Adding the 4.9 mgd required by the Project raises the total maximum day treated water capacity requirement for the treatment plant to approximately 25 mgd. This flow would fall within the city's current allocation of the capacity of the lake water intake.

Meeting the additional demand associated with the Project will require some upgrades to the treatment plant, as previously shown in Table 3-2. The total cost for these improvements has been estimated by Barton & Loguidice to be between $3 and $4 million. It is anticipated that the Project would enter into a long-term water supply agreement with the city. All the identified improvements would be conducted within the water treatment plant site.

With the Project use of 4.9 mgd, the total requirement of the SCWMD would rise to 15 mgd. This flow is well within the existing 17 mgd capacity of the dedicated clear well pump station and force main. The additional 4.9 mgd is also well within the 8 mgd additional reserve capacity allowed for within the existing water transportation agreement between Sithe and the town of Scriba. It will be necessary, however, for both the city of Oswego and the SCWMD to apply for modifications to their respective Article 15, Part 15 Water Supply Permits to accommodate the Project's requirements.

Alcan Intake System

The Project is located on a site adjacent to Alcan Rolled Metal Products. Alcan currently draws water from Lake Ontario to use as direct contact cooling water in their aluminum manufacturing process. Alcan has confirmed its ability and willingness to supply water to the Project.

Alcan's water supply is drawn directly from Lake Ontario via a submerged intake and intake tunnel from a point at a depth of about 12 feet located approximately 1,300 feet offshore from the Alcan facility. The main tunnel, bored directly in the lake bedrock and unlined, is horseshoe shaped with a diameter of approximately 8 feet. The riser to the intake is a 6-foot diameter shaft with a 48-inch casing.

The existing intake is a 28-foot by 28-foot crib structure constructed of cypress planking. There are four stone ballast compartments, one at each corner. Each side of the crib has a 28-square foot intake opening, which is protected by cypress planking spaced 9 inches on center. Water is drawn from the main tunnel via a 20-foot diameter, 100-foot deep riser shaft that connects to Alcan's raw water pump station. At the pump station, the raw water is screened by travelling wire screens and is currently pumped through dual mechanical type strainers and a 36-inch force main directly to Alcan's process cooling system. Pumping is done by two 450 horsepower, 7 mgd, and electric motor-driven vertical turbine pumps.

Alcan's use of water from this supply has historically been as high as 31 mgd. However, in recent years, Alcan has reduced its requirement to an average of 10 mgd or less. Alcan's most recent registration documents pursuant to 6NYCRR Part 675 show that its withdrawals have been averaging about 8.8 mgd. Alcan expects, in conjunction with a planned conversion of its cooling system to a recirculating closed-loop system, to further reduce its average requirement to just 1 mgd. Consequently, the supply of the water required by the Project could be readily accommodated by the Alcan system.

The combined capacity requirement of Alcan and the Project is expected to average less than 6 mgd, while the peak requirement would be a maximum of 13 mgd. In order to supply the combined requirements, the Applicant would need to replace the 1 mgd pump with a 7 mgd unit and add a third 7 mgd pump in the space formerly occupied by the relocated fire pump. Under normal conditions, only one pump would be required to operate. Under peak conditions, two pumps would be required, leaving the third unit in reserve. The Project would be fed via a 30-inch branch line off the Alcan make-up line.

In addition to the modifications to the water pumping station, an inspection and repair of the intake tunnel would be necessary. It is anticipated that repairs would include the removal of two restrictions in the intake tunnel. The first is at the base of the intake riser. Debris falling from final excavation at the lake bottom at the time the tunnel was constructed collected at the base of the shaft. This debris has restricted the flow path at that point to what is believed to be a clear area of 20 inches across the tunnel width of 8 feet. The second restriction is located about 130 feet from the lakeshore, where a portion of the tunnel roof fell shortly after construction, leaving a clear area cross section that is believed to be about 3 feet by 9 feet. Depending upon the conditions found, reinforcement or lining of the tunnel might be appropriate to ensure that it is functional throughout the life of the Project. If lining of the tunnel were determined to be necessary, a 6-foot diameter steel liner system would need to be installed.

While the Project does not require water that is treated to a potable water quality level, during certain times of the year the lake water becomes turbid to an unacceptable level for the Project cooling system. The current Alcan strainers will provide some filtering of the higher TSS, yet it may not filter to a suitable level for the Project. Therefore, some additional treatment may be required; for example, slipstream filtering of the cooling water system. If the lake water turbidity is expected to extend for long periods during the year, the Project may need to construct dewatering and sludge removal facilities. Given the lack of historical TSS data at the Alcan water intake, it is uncertain to what extent this equipment would be needed.

Based on preliminary analysis conducted by O'Brien & Gere Engineering, upgrading the Alcan water intake system and constructing a force main pipeline to the Project will cost approximately $1 to $1.5 million. However, to account for uncertainties regarding the need for improvements to the intake tunnel and the possible need for on-site water treatment to handle high lake turbidity events, the cost of the Alcan water supply alternative may ultimately be higher than the city option.

Development of a New Intake System

Given the proximity of the Project site to the shore of Lake Ontario, the Applicant considered constructing a new intake. A new deep-water intake system, similar to the Alcan and municipal systems would be developed offshore. A new pump house with pumps, trash racks and screens would be constructed near the shoreline.

Development of a Groundwater Supply

The Applicant examined the possibility of development of a groundwater supply. This option would entail development of a well field on-site and pumping water to an on-site storage system. Stored water would then be utilized in the plant's water system.

17.1.4.2 Evaluation of Water Supply Alternatives

Oswego Municipal Water Supply

The Applicant proposes to use the existing municipal supply connection to Independence Station. Advantages of this option include:

- Consistent and compatible with Independence Station water supply system;
- No new water pipeline infrastructure required;
- High quality water would minimize on-site treatment requirements;
- Existing intake structure has available capacity;
- Existing intake structure meets BTA requirements and minimizes aquatic ecology impacts;
- Higher certainty of estimated capital investments; and
- Treatment plant upgrades will benefit city and town water districts.

Use of the municipal supply can be accomplished through the existing water supply pipeline to Independence Station. No new off-site water connection would be required.

The supply to Independence Station has proven to be a very reliable source of high quality water. Because the water is already treated by the city, additional on-site treatment requirements would be minimal.

The existing intake structure and associated infrastructure have adequate excess capacity to accommodate the Project's needs. The intake structure is designed to handle 125 mgd, while the current maximum daily use is only approximately 68 mgd. The existing water supply pipeline serving the Project site can also easily accommodate the increased water needs of the Project. The city of Oswego and the town of Scriba would need to modify their respective water supply permits and some additions to the existing treatment plant would be required. However, as discussed in greater detail in Section 3.2.2.7, these modifications would be limited to within the existing city treatment plant site. No new "outside-the-fence" modifications would be required.

The existing intake structure is located 6,200 feet offshore, away from important near-shore fisheries habitat areas. The structure is sized to ensure that at its maximum design capacity, water intake velocity would be low (approximately 0.3 feet per second (fps)). This low intake velocity, along with the behavioral barrier inherent with the vertical shaft design and its offshore location, will minimize aquatic ecological impacts.

The city water treatment plant has been extensively studied in the past, and was further studied to support the modifications done as part of the Independence Station project. Recently, Barton & Loguidice Engineers conducted a preliminary analysis of the required modifications to the city treatment plant on behalf of the town of Scriba and the Applicant. The required modifications were previously summarized in Table 3-2.

On balance, the advantages of using the municipal supply outweigh the advantages of any other option evaluated. Therefore, the Applicant has selected the municipal water supply option.

Alcan Intake System

Compared to the Applicant's preferred alternative of supply from the city of Oswego Water Treatment Plant via the SCWMD, the Alcan intake alternative offers potentially lower capital and operating costs as the primary advantage.

Since the Project does not require a potable level of water quality, the Alcan intake option offers a viable alternative to using municipal treated potable water. Although the capital cost estimate for necessary upgrades to the Alcan intake system contains a great deal of contingency, the initial non-contingent cost estimate ($1 to 1.5 million) is lower than the municipal water supply base option ($3 to 4 million). However, the estimate for the, city water treatment plant modifications is considered conservative and more certain than the estimate for improvements to the Alcan system.

The Alcan intake option will entail lower operating costs. Since the water will need to be pumped a short distance from the Alcan property to the Project site, and since energy costs are lower, the pumping costs will be lower.

The following disadvantages would be associated with use of the Alcan intake system.

- Potential work on the intake tunnel and a new water pipeline would have greater environmental impacts;
- Additional on-site water treatment would be required;
- The intake location would have greater environmental impact potential; and
- Costs for necessary system upgrades are more uncertain.

As discussed above, the Alcan water supply option may require additional work on the intake tunnel and additional water treatment equipment. Although much of the potential additional tunnel work would be underground, it could require a shoreline staging area. Sludge and debris cleared from the tunnel would need to be carefully managed to minimize impact potential. In addition, a new pipeline connection would need to be installed between the existing 36-inch Alcan water main and the Project site. The most likely routing would require a wetland crossing and, therefore, result in temporary wetland impact.

Under the Alcan option, additional water treatment equipment would likely be required to treat periodic high lake TSS conditions. Additional land disturbance would be necessary to accommodate an on-site treatment system. Additional on-site water treatment would generate a solid waste stream (sludge) which would need to be disposed of off-site.

Because of the avoidance of construction of a new intake structure, as well as the low intake velocity and its vertical shaft design, aquatic ecology impacts would be expected to be minimal. However, the withdrawal point for the Alcan intake system is closer to the shoreline (1,300 feet) and in shallower water than the city intake. Therefore, the potential for entrainment impacts would be expected to be greater since aquatic organism density would be expected to be higher in near-shore waters.

As discussed above, the capital cost estimate for the Alcan intake to provide water for the Project contains a higher degree of uncertainty than the city water option. Cost contingency has been added to account for potential upgrades to the intake tunnel, and additional on-site water treatment equipment.

The Alcan option offers a viable water supply with the potential for capital and operating cost savings. However, the degree of cost uncertainty, potential need for additional on-site water treatment and the potential for greater impact to wetlands and aquatic ecology make the city supply option more attractive. Therefore, the Alcan option was not selected.

Development of a New Intake Structure

Since the Project site is directly adjacent to Lake Ontario, an option to develop a new intake structure was considered viable. It would have the advantage of complete control by the Applicant. However, this option would have significantly greater environmental impact than either the city or Alcan options. Construction of a new intake facility would entail temporary disturbance to the lake shoreline and offshore habitats associated with drilling a new tunnel and constructing a new intake structure. Since the environmental impacts associated with use of an existing intake structure would be considerably less than new intake construction, the disadvantages of this option clearly outweigh any advantages. Therefore, this option was eliminated from consideration.

Development of a Groundwater Supply

As discussed in greater detail in Section 17.3, there are no sand-and gravel aquifers within 1 mile of the site. Sand-and-gravel aquifers consist of loosely stratified soils that can yield several hundred gpm of groundwater. The site is underlain by glacial till. Wells dug into till typically only yield 1 to 5 gpm and are usually suitable only for domestic uses. Therefore, a surficial well field was deemed to be infeasible for the Project.

The bedrock beneath the till is Oswego Sandstone and can be expected to yield up to 125 gpm, although typical yields are closer to 10 gpm. Further, groundwater below 100 feet would be expected to be brackish and may contain high mineral concentrations. Project water demands could not be met through bedrock wells; therefore, this option was eliminated from consideration.

17.2 Wastewater

This section addresses the requirements of Stipulation No. 12, Clauses 9 through 18; Clause 19, regarding alternatives, is addressed in Section 5. This section discusses potential construction and operation impacts to water resources from Project wastewater, and proposed mitigation measures for these impacts. This section also addresses the requirements of 16 NYCRR 1001.1(a) and 1001.3(a) and (b).

17.2.1 Applicable Regulatory Requirements

Project construction and operation will fall under the jurisdiction of a number of state and federal statutes and regulations that provide protection of surface water resources in New York State. The federal Clean Water Act has a number of sections that are intended to regulate activities that have the potential to impact surface waters of the United States (including wetlands). NPDES authority has been delegated by the EPA to NYSDEC through the SPDES regulatory process. The Section 401 Water Quality Certification of the Clean Water Act has also been delegated to the state of New York through implementation of 6 NYCRR 608.9. Water quality standards and thermal criteria for discharges under NYSDEC Water Quality Regulations are found in 6 NYCRR 701, 702, 703, 704.2(a) and (b), and 704.3. Discharge effluent limitations are regulated under 6 NYCRR 754.1. The Project will demonstrate compliance with each of these regulatory program requirements.

17.2.2 Characterization of Project Wastewater

As required by Stipulation No. 12, Clause 9, Figures 3-7 and 3-8 provide water balance diagrams for average and maximum water use operating conditions for the Project, respectively, that show in detail all water sources, plant water uses, water treatment facilities, wastewater treatment facilities, and wastewater discharges. As required by Stipulation No. 12, Clause 10, estimated discharge water quality is presented in Tables 17-3 and 17-4 for average and peak wastewater volumes.

Wastewater characterization was based on incoming water quality, water uses on-site, wastewater treatment on-site, and disposal processes. As shown in Tables 17-3 and 17-4 for average and peak flows, respectively, effluent characteristics are presented for each process wastewater stream entering the wastewater pond (Outfalls 003A, 003B, 003D and 003E), as well as the wastewater holding pond discharge (Outfall 003). The information presented in Tables 17-3 and 17-4 assumes 6 cycles of concentration with average cooling tower evaporation used for the average wastewater values and maximum cooling tower evaporation used for the maximum wastewater values. The majority of constituents found in the wastewater result from their presence in the incoming city water.

Table 17-3: Effluent Characteristics – Average Flow

Table 17-4: Effluent Characteristics – Peak Flow

17.2.3 Description of Proposed Wastewater Disposal Methods

Project wastewater (as shown in Figures 3-7 and 3-8) is divided into two waste streams, stormwater runoff and process wastewater. All wastewater discharges will be required to meet the standards for discharge as defined by SPDES requirements and in federal regulations (40 CFR 423.17). A SPDES permit application is included as Appendix C. Section 3.2.2.8 discusses individual wastewater sources and disposal methods. Stormwater is addressed in greater detail in Section 17.7.

17.2.4 Wastewater Disposal Agreement

The design of the Project includes the use of several components of the wastewater system associated with the adjacent Independence Station. Sanitary wastes from the Project will be piped into the Independence Station sanitary waste treatment system. The additional sanitary waste stream created by the Project will require that the SPDES Permit for Independence Station be modified to include the anticipated Project sanitary wastewater volumes. Additionally, the Project will be using the outfall pipe from Independence Station for discharges from the Project's wastewater holding pond. Separate monitoring points will be available at the downstream side of each wastewater pond at locations allowing for adequate mixing and sampling. The Independence Station SPDES permit currently provides for sampling at the downstream side of its wastewater pond (and prior to the outfall pipe to the Lake) and, therefore, needs no permit modification to accommodate the addition of wastewater from the Project. After wastewater has passed through the Project wastewater pond and monitoring point it will be discharged through the outfall pipe constructed for Independence Station to Lake Ontario thus avoiding any environmental impacts associated with construction of a new outfall pipe. The Independence Station SPDES will be modified to include the physical connection of an additional waste stream with a separate monitoring point; Independence Station will submit an application to NYSDEC shortly. An agreement between Independence Station and the Project will be prepared to clearly delineate contractual responsibilities for wastewater management between the two parties.

17.2.5 Wastewater Treatment

Chemicals will be added to the incoming water during various processes at the plant, as discussed in the following paragraphs.

17.2.5.1 Chlorination

Continuous chlorination is necessary to control biological growth in the cooling water system. Effective biological control will be maintained by the continuous feed for a mix of sodium hypochlorite and sodium bromide to the cooling tower basin to maintain a low level of free available chlorine. The level of free available chlorine will be monitored continuously and will control the rate of chemical feed. This allows the system to respond to changing conditions which in turn provides for effective biological control with lower levels of chlorination than systems that rely on batch treatment or periodic dosing. To prevent the release of biocides to the environment, the wastewater stream from the cooling tower (blowdown) will be continuously dechlorinated through the addition of sodium bisulfite to the blowdown stream prior to entering the Project's wastewater holding pond. This ensures that the total residual chlorine (TRC) discharged to Lake Ontario will be negligible and that all state and federal standards on TRC discharge will be met.

Water to the facility will be treated Lake Ontario water from the city of Oswego. The water will be filtered and chlorinated; therefore, no zebra mussel problems are expected in the power plant systems. However, if problems involving zebra mussels are encountered during operation, other methods will be considered, such as the use of commercial biocides (for example, Betz "Clamtrol") or periodic physical removal of mussels from affected surfaces. Applicable regulatory requirements will be followed.

17.2.5.2 pH Adjustment

Demineralization wastes and chemical area drains will be directed to a tank for batch neutralization and pH adjustment prior to discharge to the wastewater holding pond. This will maintain the pH of the wastewater discharge within the 6.5 to 8.5 range, which will satisfy both state water quality standards for Class A waters (6.5 to 8.5) and federal New Source Performance Standards (6.0 to 9.0).

17.2.5.3 Oil and Grease

Oil and grease concentrations in the wastewater discharge will be maintained at or below the federal New Source Performance Standards of 15 mg/l[1] through the use of oil/water separators in Project areas subject to oil contamination. The separators will be sized to provide low velocities and adequate retention times to allow any oil and grease to separate from the water. The oil and grease will rise to the top while the water remains at the bottom. Oil/water separators consist of several chambers: an inlet stilling chamber, a separator chamber, and an outlet chamber. Water enters the stilling chamber, where flows are slowed and admitted to the separation chamber. In the separation chamber, the oil, grease, and water separate. The clean water remains at the bottom where it passes under an inverted weir into the outlet chamber for release. The inverted weir prevents passage of the oil and grease which floats on top of the water.

---

1 There is no numeric state standard for Class A surface waters. The narrative standard is no visible oil film or globules of grease. Toxic and deleterious substances are not allowed "in amounts that will impair the waters for their best usage."

Oil trapped in the oil/water separators will be collected and tested as described in the Spill Prevention Control and Countermeasure (SPCC) Plan that will be prepared prior to Project operation and submitted to NYSDEC, and in the compliance filing to the Siting Board. If the oil is determined to be hazardous, it will be temporarily stored pursuant to NYSDEC regulations prior to transportation off-site and disposal by a licensed contractor.

17.2.6 Water Quality Standards and Effluent Limitations

State water quality standards have been established to protect human health, protect aquatic life, promote fish propagation and survival, and preserve aesthetic values of surface water resources. New York State surface water quality standards are defined in NYCRR, Title 6, Chapter X, Part 701. Those standards applicable to Class A surface waters are summarized in narrative form in Table 17-5.

Table 17-5: Quality Standards for Class A Fresh Surface Waters

Parameter	Standard
Taste-, color-, and odor-producing toxic and other deleterious substances	None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages.
Turbidity	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal, and settleable solids	None from sewage, industrial wastes, or other wastes that will cause deposition or impair the waters for their best usage.
Oil and floating substances	No residue attributable to sewage, industrial wastes, or other wastes, nor visible oil film nor globules of grease.
Phosphorus and nitrogen	None in amounts that will result in growths of algae, weeds, and slimes that will impair the waters for their best usages.
pH	Shall not be less than 6.5 nor more than 8.5.
Dissolved oxygen (DO)	For cold waters suitable for trout spawning, the DO concentrations shall not be less than 7.0 mg/l from other than natural conditions. For trout waters, the minimum daily average shall not be less than 6.0 mg/l and at no time shall the DO concentration be less than 5.0 mg/l. For nontrout waters, the minimum daily average shall not be less than 5.0 mg/l and at no time shall the DO concentration be less than 4.0 mg/l.
Total dissolved solids	Shall be kept as low as practicable to maintain the best usage of waters, but in no case shall it exceed 500 mg/l.
Total coliforms (number per 100 milliliter [ml])	The monthly median and more than 20 percent of the samples, from a minimum of five examinations, shall not exceed 2,400 and 5,000, respectively.
Fecal coliform (number per 100 ml)	The monthly geometric mean, from a minimum of five examinations, shall not exceed 200.

Source: NYCRR, Title 6, Chapter X, Parts 700-705. Revised New York State surface water standards effective April 1998.

Additional criteria governing thermal discharges are found in NYCRR, Title 6, Chapter X, Part 704. Thermal discharge criteria applicable to all waters are as follows:

- The natural seasonal cycle shall be retained.
- Annual spring and fall temperature changes shall be gradual.
- Large day-to-day temperature fluctuations due to heat of artificial origin shall be avoided.
- Development or growth of nuisance organisms shall not occur in contravention of water quality standards.
- Discharges which would lower receiving water temperature shall not cause a violation of water quality standards and Section 704.3.
- For the protection of the aquatic biota from severe temperature changes, routine shutdown of an entire thermal discharge at any site shall not be scheduled during the period from December through March.

Additionally, for non-trout waters, Section 704.3 establishes the following special criteria:

- The water temperature of the surface of a stream shall not be raised to more than 90°F at any point.
- At least 50 percent of the cross sectional area and/or volume of flow of the stream including a minimum of one-third of the surface as measured from shore to shore shall not be raised more than 5°F over the temperature that existed before the addition of the heat of artificial origin or to a maximum of 86°F, whichever is less.

These regulations also specify that the water temperature at the surface of a lake shall not be raised more than 3°F over the ambient temperature, and that in lakes subject to stratification, discharges which will raise the temperature of the receiving waters shall be confined to the epilimnion, or upper waters.

For various specific substances and groups of substances, numeric standards have been established to maintain or attain the narrative water quality conditions described in Table 17-5 (Table 1 of NYCRR, Title 6, Chapter X, Part 703).

17.2.7 Impact Evaluation

In accordance with Stipulation No. 12, Clause 16, the mixing and dispersion of the Project wastewater discharge with Lake Ontario waters was modeled using the Cornell Mixing Zone Expert System (CORMIX) computer model. CORMIX is a software system for the analysis of toxic or conventional pollutant discharges into waterbodies. CORMIX predicts the jet trajectory and dilution characteristics of plumes under a variety of discharge and ambient conditions, including buoyant discharges as proposed by the Project. Both near-field dilution and far-field dispersion can be modeled. CORMIX is a recommended analysis tool in key EPA guidance documents on the permitting of industrial, municipal, thermal, and other point source discharges to receiving waters.

CORMIX modeling was performed for both thermal and chemical discharge parameters. These model runs provide an estimate of the mixing zone for discharge of Project wastewater. The objectives of the modeling are:

- To evaluate the impact of thermal loading within the regulated mixing zone.
- To evaluate the impact of chemical loading within the regulated mixing zone.
- To provide preliminary analysis of the outfall to support SPDES permitting.

The State of New York Water Quality Regulations Part 704, provide thermal standards for discharge to stream, lakes, estuaries and coastal waters. The NYSDEC does provide for a variance to the thermal regulations if the owner demonstrates that there is no adverse impact to aquatic life. In addition, the NYSDEC may establish a mixing zone for the thermal discharge, defined as that portion of a waterbody where a point source mixes with surface waters. The extent of a mixing zone is limited so that there are no deleterious effects to populations of aquatic life or wildlife, especially fisheries and spawning grounds.

The modeling effort evaluates the diffuser configuration relative to physical features of the receiving water to determine the temperature profile at various locations in the discharge plume. Temperatures are reduced through mixing and dilution of the discharge plume. The region of interest includes:

- The water surface at the location of the outfall diffusers;
- Location of the 10:1 dilution mixing zone; and
- The shoreline.

17.2.7.1 CORMIX Input

Model input parameters may be divided into two categories: ambient parameters and discharge parameters. Ambient parameters are the characteristics of the receiving waterbody. Discharge parameters are the outfall configuration and the effluent characteristics. The input parameters are summarized in Table 17-6. Independence Station discharges a peak flow of 0.870 mgd at a temperature of 89°F. The Project peak discharge will be 0.884 mgd at 90°F. Water quality data input for the Heritage and Independence Projects and combined discharge are shown in Table 17-7. In

Table 17-6: Input Parameters

Parameter	Parameter Value: Existing Discharge Condition *Independence Station Flow only*	Parameter Value: Proposed Discharge Condition *Independence and Heritage Stations Flows*	Units
Ambient Parameters			
General	Unbounded Cross-Section, Nontidal, Fresh water, Nonstratified		-
Ambient Current Velocity	0.03 (0.10)		m/s (ft/s)
Average Depth (low water level)	1.8 (6.0)		m (ft)
Manning's Roughness Coefficient	0.02		-
Wind Velocity	2 (6.6)		m/s (ft/s)
Water Temperature (Summer)	25 (77)		°C (°F)
Discharge Parameters			
Location	300 feet (91 m) offshore 2,700 feet (823 m) from intake	300 feet (91 m) offshore 2,700 feet (823 m) from intake	-
Discharge Flow Rate	Independence Station: 0.0381 (0.870) Heritage Station : 0.0 (0.0) Total 0.0381 (0.870)	Independence Station: 0.0381 (0.870) Heritage Station : 0.0387 (0.884) Total 0.0768 (1.754)	m^3/s (mgd)
Discharge Temperature	Independence Station: 32 (89)	Independence Station: 32 (89) Heritage Station : 32 (90) Combined : 32 (90)	°C (°F)
Length of Diffuser	15 (50)	15 (50)	m (ft)
Number of Ports	24	24	-
Diameter of Ports	0.051 (2)	0.051 (2)	m (in)
Port Spacing	0.61 (2)	0.61 (2)	m (ft)
Discharge Port Height	0.30 (1.0)		m (ft)
Discharge Angle	90 deg (vertical)		-

Table 17-7: Water Quality Data and Standards (Page 1 of 2)

Maximum Flow Conditions					
Parameter	Heritage Station Effluent (mg/l)	Independence Station Effluent (mg/l)	Combined Effluent (mg/l)	Receiving Water (mg/l)	NYDEC Water Quality Criteria (mg/l)
Total Suspended Solids	30	30	30	0.04	Narrative
Oil and Grease	<15	<15	<15	<1	Narrative
pH	6.1-8.6	6.1-8.6	6.1-8.6	7.0-8.5	6.5-8.5
Total Dissolved Solids	2739	--	--	187	500
Total Residual Chlorine	<0.2	<0.2	<0.2	0	0.005
Ammonia (as N)	2.52	0.56	1.55	0.3	1.2 (@pH=6.75 and 0°C)
Chloride	496.4	--	--	25.6	250
Fluoride	7.1	7.1	7.1	0.212	1.5
Magnesium	78.5	210	143.74	9.48	35
Nitrate (as N)	2.24	4.5	3.36	0.27	10
Phosphorus (as P)	3.96	4.2	4.09	0.46	Narrative
Sulfate	1267	1250	1259	32.6	250
Aluminum	0.3	0.3	0.3	<0.04	0.1
Antimony, Total	0.018	0.018	0.018	<0.006	0.003
Arsenic, Total	0.011	0.011	0.011	0.0013	0.05
Arsenic, Total (first year)	0.05	0.011	0.03	0.0013	0.05
Arsenic, Total (first flush)	0.12	0.011	0.07	0.0013	0.34
Boron, Total	0.17	0.17	0.17	0.105	10
Cadmium, Total	<0.01	<0.01	<0.01	<0.0005	0.005
Copper, Total	<0.04	0.2	<0.11	<0.0005	0.025
Copper, Total (first year)	0.05	0.2	0.12	<0.0005	0.025
Copper, Total (first flush)	0.12	0.2	0.16	<0.0005	0.041

Table 17-7: Water Quality Data and Standards (Page 2 of 2)

Maximum Flow Conditions					
Parameter	**Heritage Station Effluent (mg/l)**	**Independence Station Effluent (mg/l)**	**Combined Effluent (mg/l)**	**Receiving Water (mg/l)**	**NYDEC Water Quality Criteria (mg/l)**
Chromium, Total	<0.1	<0.1	<0.1	<0.0005	0.19
Chromium, Total (first year)	0.05	<0.1	0.05	<0.0005	0.19
Chromium, Total (first flush)	0.12	<0.1	0.09	<0.0005	1.50
Iron, Total	1.757	2.5	2.13	0.031	0.30
Manganese, Total	0.083	0.1	0.09	0.01	0.30
Mercury, Total	<0.0002	<0.0002	<0.0002	<0.00004	<0.0000007
Nickel, Total	<0.02	0.1	0.05	<0.005	0.14
Selenium, Total	0.042	0.042	0.042	<0.0005	0.0046
Silver, Total	<0.05	<0.05	<0.05	<0.002	0.0001
Zinc, Total	0.12	0.12	0.12	0.003	0.23
Cyanide, Total	<0.01	<0.01	<0.01	0.002	0.0052

many instances the individual inputs are fairly similar, indicating the similarity in operating conditions for both facilities. In a few instances, operational differences result in wastewater parameter differences.

The low water datum in Lake Ontario is 243.3 feet msl, corresponding to an approximate worst-case water depth of 6 feet (1.8 m) in the area of the existing diffuser. This represents a worst-case water level for evaluating thermal impacts. The mean water level is 245.3 feet msl. Average lake depth at the diffuser is approximately 8 feet (2.4 m). The lake is assumed to have a smooth, flat bottom with a Manning's roughness coefficient of 0.02. As described in Section 17.4, offshore lake currents average approximately 3.1 miles per day (0.058 m/s) in a northeasterly direction. Lake currents tend to improve dispersion of the thermal plume. The plume simulation was run considering an ambient velocity of half the average value or 1.5 miles per day (0.03 m/s) to reflect a conservative estimate of thermal impacts. Similarly, low wind velocities were chosen for the worst-case scenario since high winds improve the thermal dispersion. As described in Section 6.2, the average wind speed is approximately 14 miles per hour (6.4 m/s) and is predominantly out of the west and south. In the model, wind velocity was set at 2 m/s to reflect a conservative estimate of thermal impacts. As described in Section 17.4, Lake Ontario is subject to thermal stratification during the summer months with spring and fall turnovers.

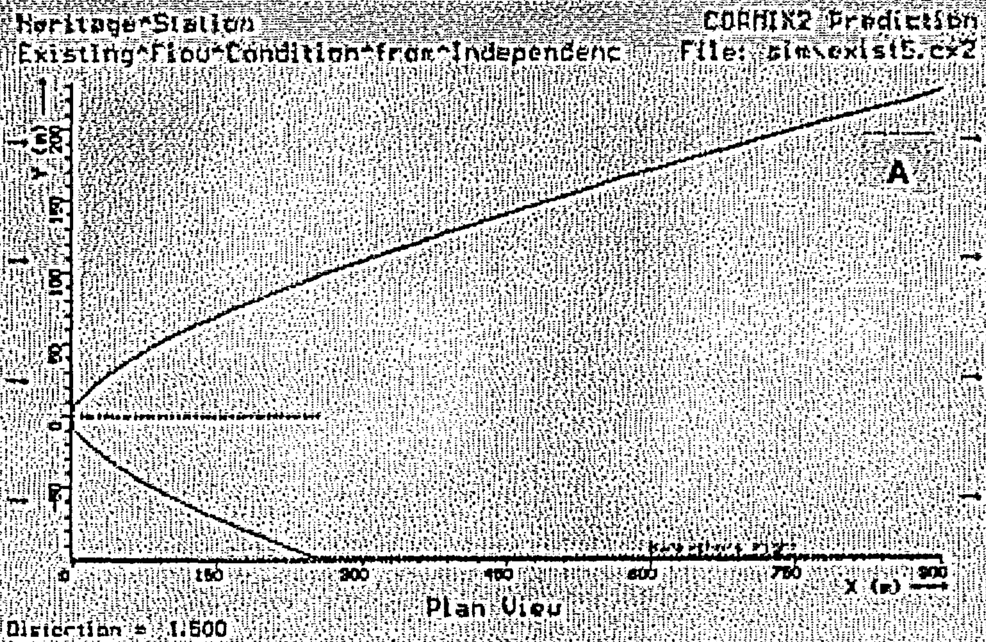
However, shallow waters nearer the shore, remain well mixed with little vertical stratification. Water temperatures at the intake vary between winter lows of 33°F (1°C) to summer highs of 77°F (25°C). Ambient water temperature was set at 77°F based on maximum summer temperatures measured at the nearby Alcan water intake (shown in Figure 17-1). Stratification is assumed to be insignificant based on the proximity to the shore and relatively shallow depth of the waters.

The existing outfall diffuser is approximately 50 feet long and is attached to the end of 300 feet of buried 12-inch diameter pipeline extending perpendicularly offshore. On the last 50 feet of pipe, there are 24 2-inch diameter ports located 2 feet on center along the top of the pipe. The existing Independence Station diffuser is approximately 2,700 feet easterly of the nearby Alcan water intake.

17.2.7.2 CORMIX Results

Two flow conditions were modeled. The first flow condition includes only the wastewater discharge from Independence Station, which represents background conditions. The second flow condition represents the proposed discharge condition and includes the combined discharge of Independence Station and the Project. Results of the CORMIX simulations for these two flow conditions are presented in Appendix U. Graphic output for the Independence Station discharge conditions are presented in Figure 17-2a-d. Graphic output for the combined discharge is presented in Figure 17-3a-d. Graphs on those figures designated with an "a" show plan views of the plume, those designated with a "b" are side views of the plume, and those designated with a "c" are a profile of near field condition, and "d" represent a temperature profile in the near field.

Figures 17-2a through c present graphic output from the CORMIX model for the existing conditions where only Independence Station is discharging wastewater. Figure 17-2a and b presents a plan and profile view of the plume. As shown, the plume spreads as it travels down current, encountering the shoreline after approximately 250 meters (800 feet). The profile of the plume is characteristic of buoyant plumes. Initial rapid mixing occurs in the near field and the plume "floats" on the surface of the water and gradually disperses into the cooler water below. Figure 17-2c presents a profile view of the plume near the discharge location. As shown, the plume is well mixed over the entire water column at the discharge location. Figure 17-2d presents a temperature profile near the discharge location. As shown, following the region of initial dilution at the discharge location, the temperature of the plume quickly approaches ambient temperatures. Similarly, chemical constituents in the discharge will also undergo rapid mixing and dilution. Note that the vertical scale for the temperature profile is measured as temperature above ambient. For example, 32°C discharge temperature is expressed as 7°C above the ambient temperature of 25°C.



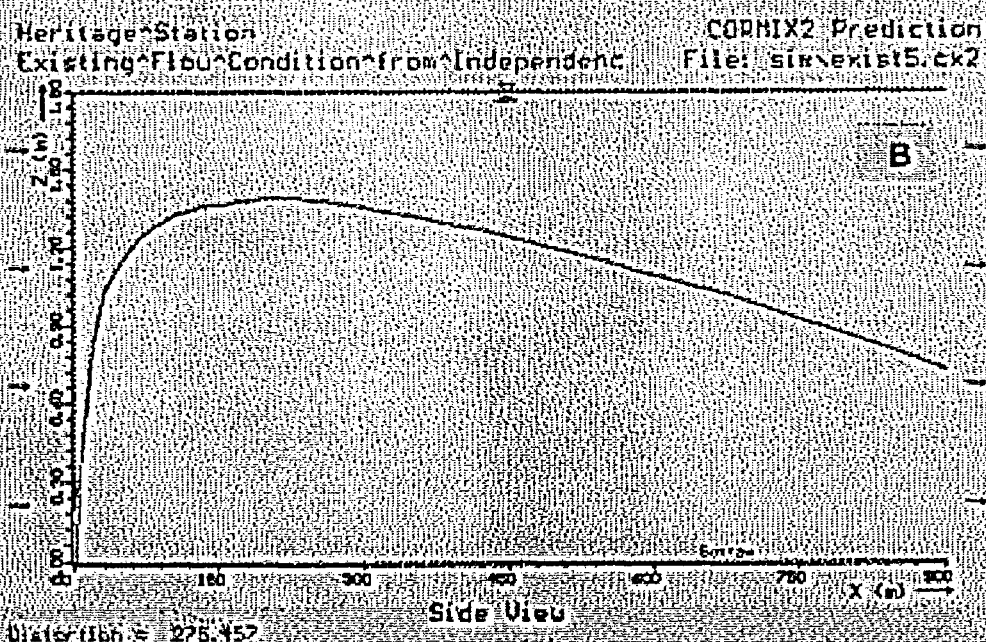
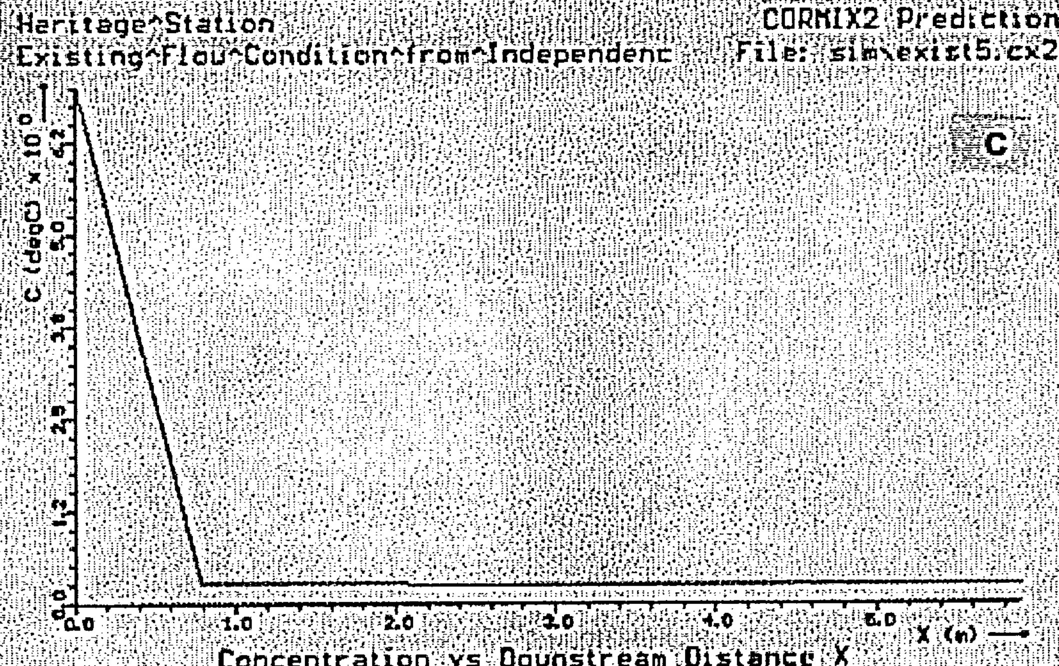


Figure 17-2 a,b
Plan, Side View, and Profiles of Plume for Existing Multi-port Diffuser Under Existing Flow Conditions



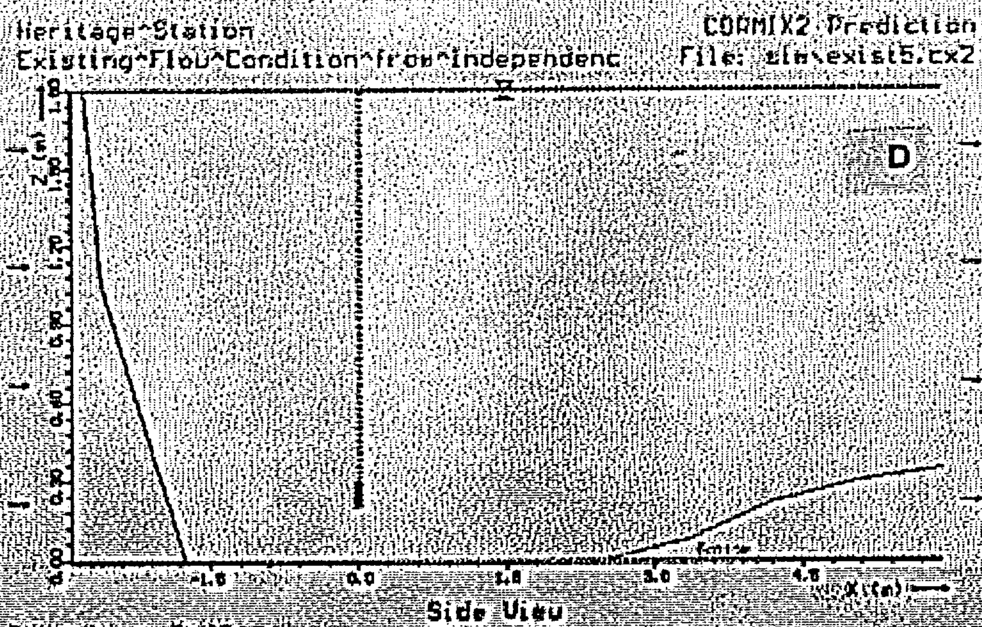
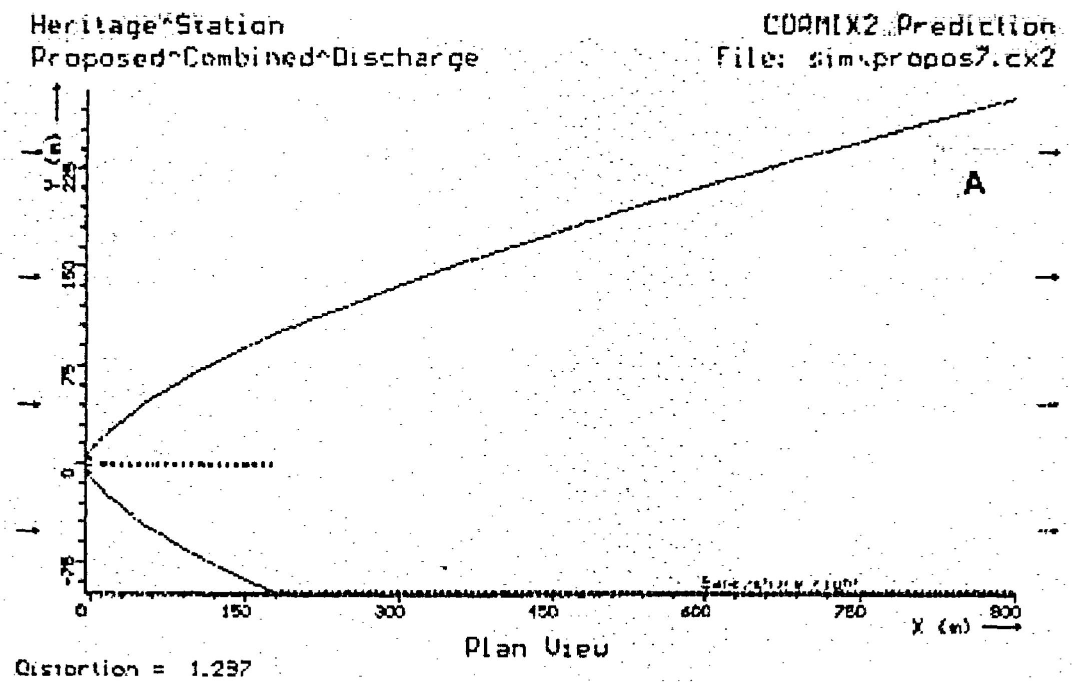


Figure 17-2 c,d
Plan, Side View, and Profiles of Plume for Existing Multi-port Diffuser Under Existing Flow Conditions



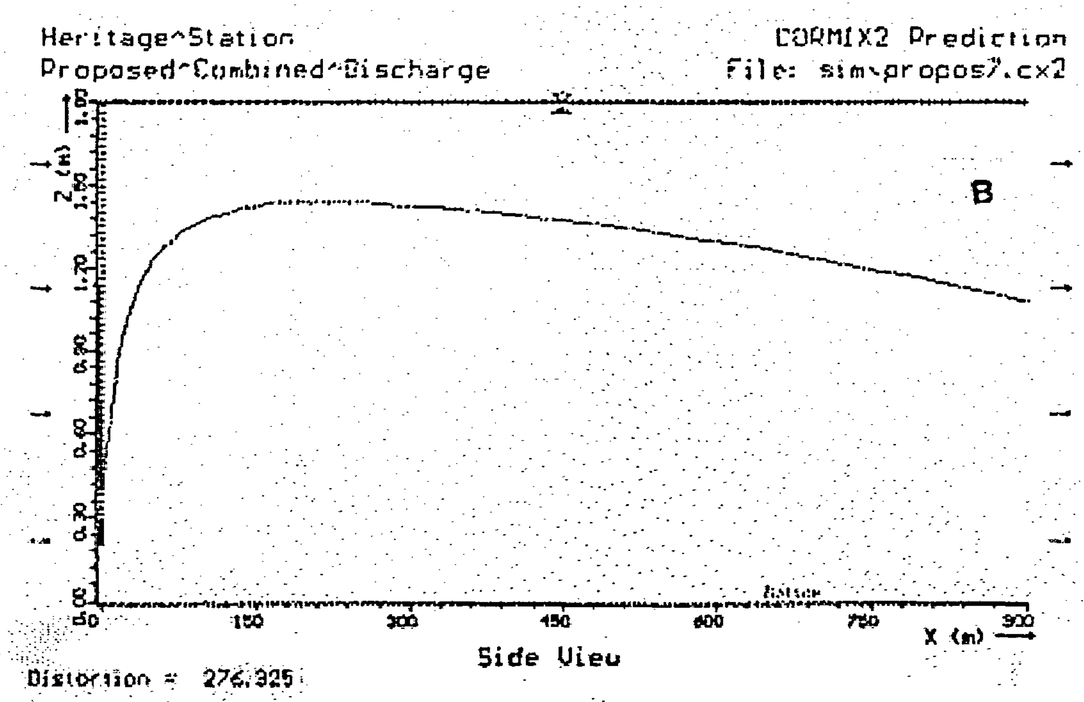
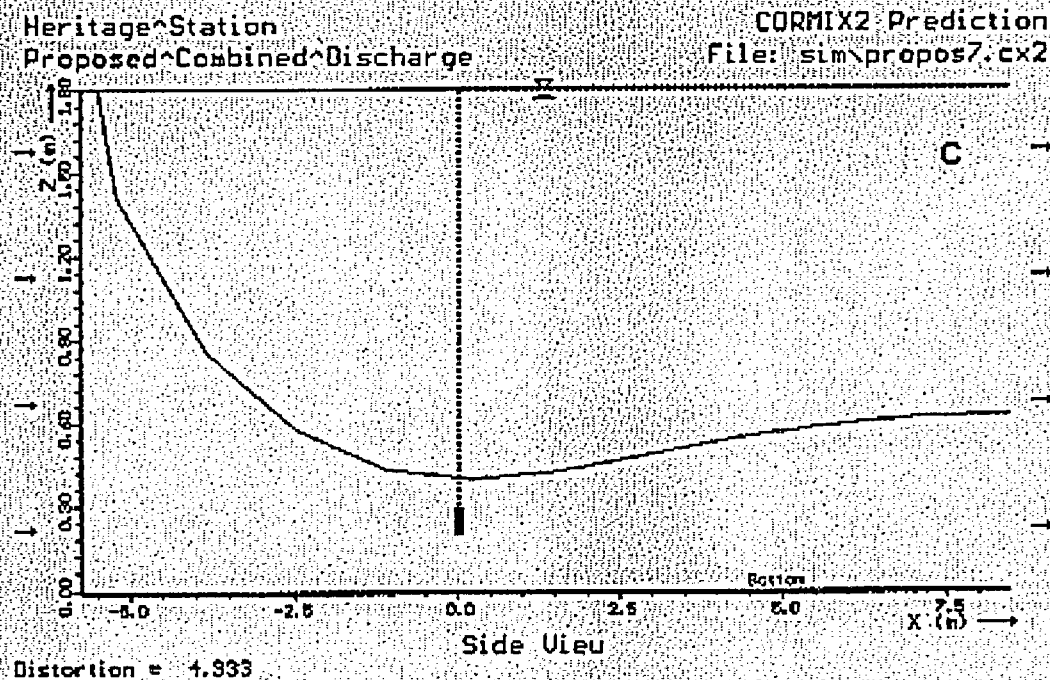


Figure 17-3 a,b
Plan, Side View, and Profiles of Plume for Existing Multi-port Diffuser Under Proposed Flow Conditions



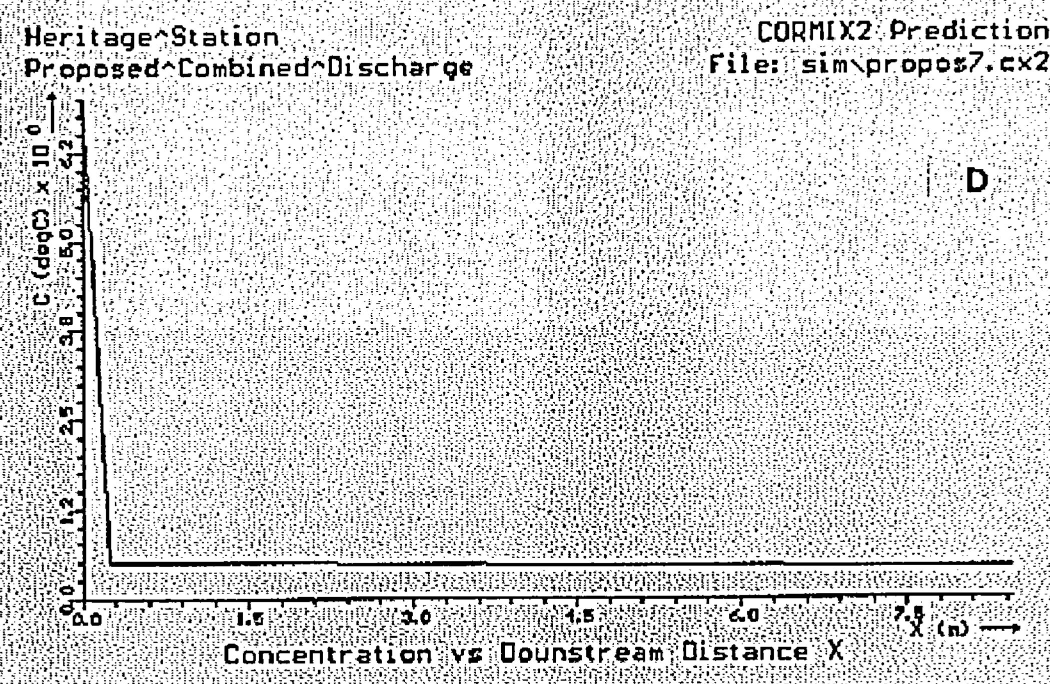


Figure 17-3 c,d
Plan, Side View, and Profiles of Plume for Existing Multi-port Diffuser Under Proposed Flow Conditions

Figures 17-3a through d present graphic output from the CORMIX model for the proposed conditions where both Independence Station and Heritage Station are discharging wastewater. Figure 17-3a and b presents a plan and profile view of the plume. As shown, the plume spreads as it travels down current, encountering the shoreline after approximately 180 meters (600 feet), or approximately 200 feet sooner than the current discharge with only Independence Station. The profile of the plume is again characteristic of buoyant plumes. Initial rapid mixing occurs in the near field and the plume "floats" on the surface of the water and gradually disperses into the cooler water below. Figure 17-3c presents a profile view of the plume near the discharge location. As shown, the plume is well mixed over nearly the entire water column at the discharge location. Figure 17-3d presents a temperature profile near the discharge location. Similar to the existing condition, following the region of initial dilution at the discharge location, the temperature of the plume quickly approaches ambient temperatures.

Note that the vertical scale for the temperature profile (designated in Figures 17-2 and 17-3 as "d") is measured as temperature above ambient. For example, a 32°C discharge temperature is expressed as 7°C above the ambient temperature of 25°C. The horizontal scale is in meters. Surface water temperatures at various locations are summarized in Table 17-8.

The extent of the mixing zone and resulting dilutions are presented in the detailed CORMIX printouts in Appendix U. The near field plume is well mixed with the receiving water in the vicinity of the diffuser. CORMIX predicts this region of rapid mixing to extend approximately 8 meters upstream and downstream of the diffuser at the current discharge conditions. The region of rapid mixing extends approximately 16 meters upstream and downstream of the diffuser at the proposed discharge conditions. The dilution factor at the edge of this region of initial dilution is approximately 25:1 under the current conditions and approximately 13.4:1 under the proposed conditions.

Table 17-8: CORMIX Predicted Surface Water Temperature at Various Locations

Location	Existing Discharge Condition: Flow from Independence Station Only 0.870 mgd at 32°C (89°F)	Proposed Discharge Condition Flow from Independence Station and the Project 1.732 mgd at 32°C (90°F)
Ambient	25.0°C (77°F)	25.0°C (77°F)
Lake Surface at Discharge Location	25.3°C (77.5°F)	25.5°C (77.9°F)
Shoreline	25.1°C (77.2°F)	25.3°C (77.5°F)

A summary of the distances from the outfall where the most stringent water quality criteria are achieved during maximum discharge conditions is presented in Table 17-9. As shown, all parameters achieve compliance with the water quality standard within a 10:1 dilution. The rapid initial dilution zone is small and the dilution very rapid such that the sensitivity of the CORMIX model does not allow for actual determination of the distance to the 10:1 dilution zone boundary. The closest the model came to predicting the dilution zone was 13:1 that was at 16 meters. To be conservative, we have used this distance as the closest surrogate for the 10:1 zone, although in reality the zone would be slightly smaller, more on the order of 11 meters.

Table 17-9: Required Dilution Factors and Location of Plume for Compliance with Water Quality Criteria (Page 1 of 2)

Parameter	Combined Effluent (mg/l)	Receiving Water (mg/l)	NYDEC Water Quality Criteria (mg/l)	Meets 10:1 Mixing Zone Criteria	Distance from Outfall where Criteria is Achieved (meters)
Total Suspended Solids	30	0.04	Narrative	–	–
Oil and Grease	<15	<1	Narrative	–	–
pH	6.1-8.6	7.0-8.5	6.5-8.5	–	–
Total Dissolved Solids	–	187	500	–	–
Total Residual Chlorine	<0.2	0	0.005	See Note 1	–
Ammonia (as N)	1.55	0.3	1.2 (@pH=6.75 and 0°C)	Yes	<16 See Note 3
Chloride	–	25.6	250	–	–
Fluoride	7.1	0.212	1.5	Yes	<16 See Note 3
Magnesium	144	9.48	35	Yes	<16 See Note 3
Nitrate (as N)	3.36	0.27	10	Yes	Immediate
Phosphorus (as P)	4.09	0.46	Narrative	–	–
Sulfate	1,259	32.6	250	Yes	<16 See Note 3
Aluminum	0.3	<0.04	0.1	Yes	<16 See Note 3
Antimony, Total	0.018	<0.006	0.003	Yes See Note 2	<16 See Note 3
Arsenic, Total	0.011	0.0013	0.05	Yes	Immediate
Arsenic, Total (first year)	0.03	0.0013	0.05	Yes	Immediate
Arsenic, Total (first flush)	0.07	0.0013	0.34	Yes	Immediate
Boron, Total	0.17	0.105	10	Yes	Immediate
Cadmium, Total	<0.01	<0.0005	0.005	See Note 1	
Copper, Total	<0.11	<0.0005	0.025	See Note 1	

Table 17-9: Required Dilution Factors and Location of Plume for Compliance with Water Quality Criteria (Page 2 of 2)

Parameter	Combined Effluent (mg/l)	Receiving Water (mg/l)	NYDEC Water Quality Criteria (mg/l)	Meets 10:1 Mixing Zone Criteria	Distance from Outfall where Criteria is Achieved (meters)
Copper, Total (first year)	0.12	<0.0005	0.025	Yes See Note 2	<16 See Note 3
Copper, Total (first flush)	0.16	<0.0005	0.041	Yes (See Note 2)	<16 See Note 3
Chromium, Total	<0.1	<0.0005	0.19	See Note 1	
Chromium, Total (first year)	0.05	<0.0005	0.19	Yes	Immediate
Chromium, Total (first flush)	0.09	<0.0005	1.50	Yes	Immediate
Iron, Total	2.13	0.031	0.30	Yes	<16 See Note 3
Manganese, Total	0.09	0.01	0.30	Yes	Immediate
Mercury, Total	<0.0002	<0.00004	<0.0000007	See Note 1	
Nickel, Total	0.05	<0.005	0.14	Yes	Immediate
Selenium, Total	0.042	<0.0005	0.0046	Yes (See Note 2)	<16 See Note 3
Silver, Total	<0.05	<0.002	0.0001	See Note 1	
Zinc, Total	0.12	0.003	0.23	Yes	Immediate
Cyanide, Total	<0.01	0.002	0.0052	See Note 1	

Note 1: Discharge concentration is below detection limit. There is no evidence of water quality impact.

Note 2: Background concentration is below detection limit and is taken to be zero for dilution calculations.

Note 3: CORMIX calculated a bulk dilution zone with a radius of 15.7 meters surrounding the discharge location. A dilution of 13:1 occurs in the bulk dilution zone. The sensitivity of CORMIX does not allow the determination of the extent of a 10:1 dilution zone.

17.2.7.3 Conclusions

Based on the CORMIX modeling, the following conclusions have been drawn:

- The existing outfall diffuser can accommodate the new proposed discharge of wastewater from the Project. The proposed combined discharge will have an insignificant impact to the surrounding waters.
- Surface water temperature at the existing outfall diffuser is not expected to exceed the ambient by more than 0.5°C (0.9°F) outside a small zone of rapid initial dilution, thereby meeting the temperature standard of a not more than 3.0°C (5.4°F) increase above ambient.

- Surface water temperature at the location of the closest water intake (the non-potable Alcan intake) is not expected to be higher than 0.08°C (0.1°F) above ambient temperatures. No impact on the Alcan cooling system will, therefore, result.

- The extent of a mixing zone that provides a 10:1 dilution is predicted to be well within 16 meters of the outfall diffuser. All chemical parameters will be diluted to background levels or achieve compliance with water quality standards within this mixing zone.

- The water temperatures and quality at the nearest potable water intake, city of Oswego, will remain unaffected by the Project wastewater discharge.

Impacts of wastewater discharges to Lake Ontario are discussed further in Section 17.4.3.

17.2.8 Wastewater Discharge Permitting

The Project will require a SPDES permit. A completed application is provided in Appendix C.

17.2.9 Mitigation Measures

As identified by the CORMIX modeling, additional mitigation for thermal and chemical impacts to Lake Ontario is unnecessary because of the very small mixing zone and rapid return to ambient water quality conditions. Alternative cooling technologies are discussed in Section 5. Additional discussion of mitigation for wastewater discharges is presented in Section 17.4.4.

17.2.10 Wastewater Discharge Alternatives

This section addresses Stipulation No. 12, Clause 11. The Project will discharge an average of approximately 663,000 gpd as wastewater, while peak discharge is expected to be 883,000 gpd. As described above, the Project wastewater effluent will consist primarily of blowdown water from the wastewater system and the HRSGs, backflushes and regeneration rinses from the Project demineralization water treatment system, as well as other miscellaneous equipment and floor drains, process drains, and discharges. The Applicant proposes to discharge the Project effluent to a new on-site holding pond and then to Lake Ontario. Other alternatives that the Applicant reviewed include ground subsurface discharge and discharge to a municipal sewer. The proposed holding pond and lake discharge design is consistent with the existing Independence Station discharge system and provides the least impact to the environment and community and, therefore, was selected. The basis for this decision is presented below.

17.2.10.1 On-Site Wastewater Holding Pond and Discharge to Lake Ontario

The Project will include an integrated wastewater discharge system that will collect various wastewater streams and direct to a new holding pond prior to discharge to the lake. The pond will collect all site wastewater except site precipitation runoff. The wastewater holding pond will be a below-grade earthen pond sealed with a synthetic liner material, which includes an inlet and outlet structure sized for 24-hour water retention. Discharge from the pond will be directed to an existing discharge pipe outfall to the lake.

The Project wastewater design is similar to and consistent with the existing Independence Station design. Many of the processes and chemicals used by the Project are similar to those at the existing plant. The Project holding pond is based on similar design criteria and is located near the existing holding pond. Because of this consistency with the existing site design, and because of the extensive environmental review that was conducted on the existing discharge system and the operating history of the Independence Station pond, the new Project impacts can be more confidently minimized.

The Project wastewater discharge system and holding pond will be separate from the existing plant. The new holding pond will allow separate and distinct control and monitoring of the Project wastewater prior to joining the existing Independence wastewater outfall pipe. By using the existing outfall pipe, the Project can avoid any environmental disturbances that may be associated with constructing a new outfall pipe.

17.2.10.2 Subsurface Disposal

The Applicant considered a subsurface ground discharge for the Project wastewater. This design would include a network of underground diffuser piping which would inject the wastewater at some depth below the ground surface. Subsurface ground disposal of wastewater is normally considered in areas that rely heavily on underground aquifers. It is also considered as a mitigation measure when a project draws makeup water from the aquifer.

A subsurface disposal design is not considered feasible for the Project due to the relatively shallow bedrock and near surface groundwater flow. The wastewater flow rates from the Project, although not significant for lake surface water discharge, would significantly impact the site groundwater pattern and wetland characteristics.

17.2.10.3 Municipal Sewer System

The Applicant has also considered discharging the Project wastewater to a municipal sewer. Compared to the proposed discharge using the existing outfall pipe, using the municipal sewer plant to treat Project effluent is not preferred. The Project wastewater does not require treatment prior to discharge and, therefore, would merely take up valuable capacity in the municipal treatment plant. There is also no sewer line near the site and, therefore, a new sewer line would be required. The site is approximately 2 miles from the nearest city sewer connection. The line would require multiple wetland crossings. The Applicant is aware that the town of Scriba is in the early planning stages of development of a new sewer district that would include a new sewer line from the city system to near the Project site. That district, however, has not yet been established. Therefore, for the Project, a sewer discharge alternative is not considered appropriate.

17.3 Groundwater

This section addresses the requirements of Stipulation No. 17, Clauses 20 through 22.

17.3.1 Applicable Regulatory Requirements

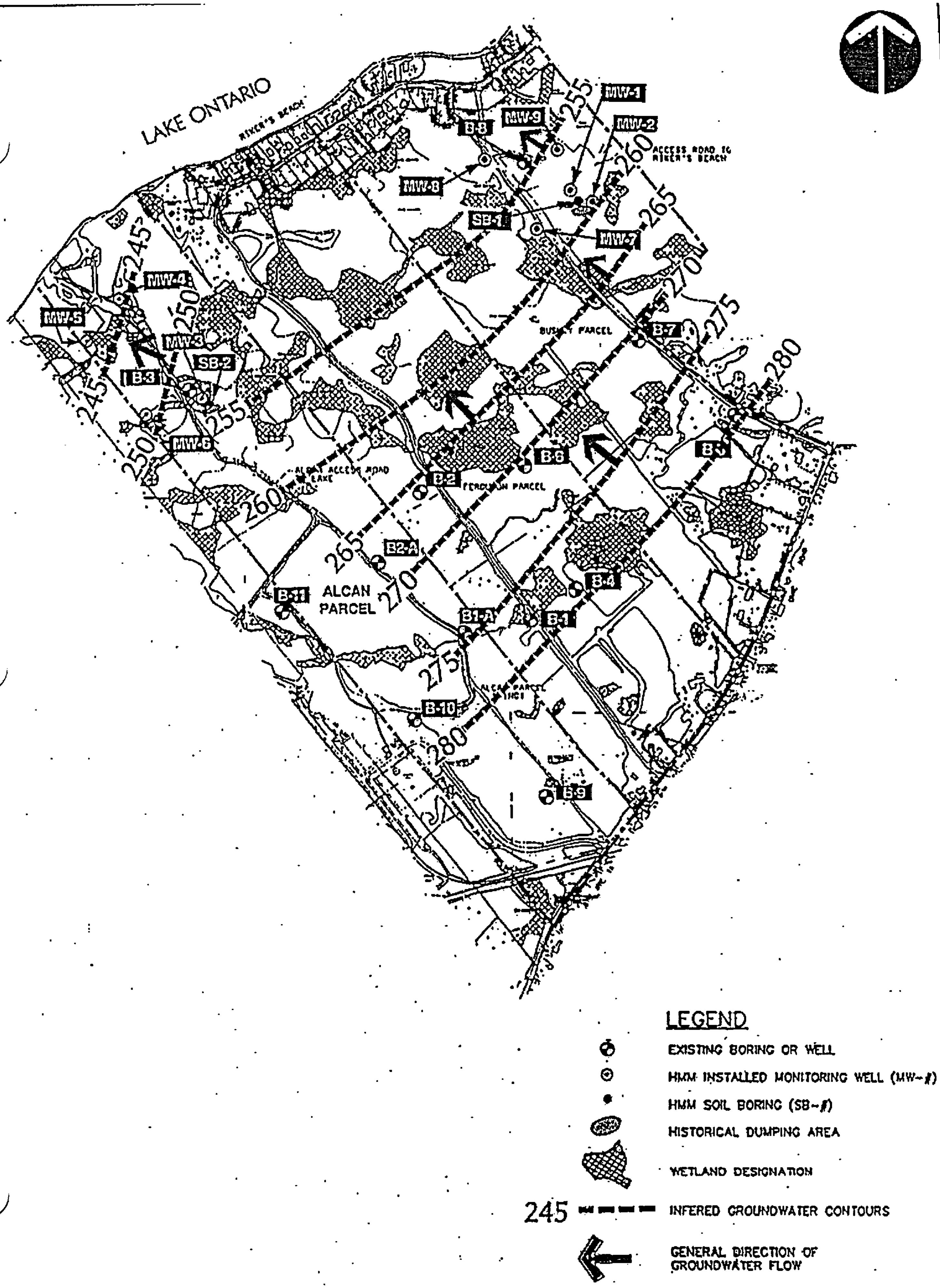
Because the Project will not utilize groundwater for either a water supply or for the discharge of wastewaters, no specific regulatory standards apply.

17.3.2 Characterization of Existing Groundwater Resources

17.3.2.1 Depth to Seasonal High Groundwater

The depth to groundwater varies across the site from under 1 foot to greater than 12.5 feet (HMM 1992 and Ebasco 1992); however, adequate data from high groundwater seasons was not available to allow development of a seasonal high groundwater map. In addition, water levels fluctuate seasonally and yearly, and depend on precipitation and other atmospheric conditions. Water levels are normally highest in the spring after snowmelt (March through April) and lowest in the fall (September through November). Subsurface work at the site (Ebasco 1992) was completed in June 1992, 2 to 3 months after the normal, seasonal-high groundwater levels. Additional subsurface work (HMM 1992) was completed in November, when groundwater may have been at the lowest annual level. To provide a point of reference, a map of groundwater contours is provided as Figure 17-4 even though it may only represent low groundwater levels. Seasonal high water levels are expected to be less than 1 foot in areas mapped as wetlands (discussed in Section 17.6).

Due to the geologic conditions, two groundwater flow regimes appear to exist. One is a perched groundwater system, the other a deeper system in the bedrock. The perched system appears to be present in the soils, which consist almost exclusively of glacial till. Till is a mixture of gravel, sand, silt, clay, cobbles and boulders. The till appears to range from about 2 to more than 14 feet in thickness. Table 17-10 provides a summary of groundwater elevations from some of the observation wells shown on Figure 17-4,



LAKE ONTARIO
RIKER'S BEACH
ACCESS ROAD TO RIKER'S BEACH
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
SB-1
SB-2
B-1
B1-A
B-2
B2-A
B-3
B-4
B-6
B-7
B-8
B-9
B-10
B-11
ALCAN PARCEL
FERGUSON PARCEL
245
250
255
260
265
270
275
280
LEGEND
EXISTING BORING OR WELL
HMM INSTALLED MONITORING WELL (MW-#)
HMM SOIL BORING (SB-#)
HISTORICAL DUMPING AREA
WETLAND DESIGNATION
245 INFERED GROUNDWATER CONTOURS
GENERAL DIRECTION OF GROUNDWATER FLOW

Table 17-10: Boring and Groundwater Elevation Summary Table

Boring Number	Relative Ground Elevation[1]	Depth to Groundwater[2]	Relative Groundwater Elevation
MW-1	263.1	4.5	258.6
MW-2	264.6	4.7	259.9
MW-3	253.2	0.65	252.55
MW-4	247.5	1.9	245.6
MW-5	246.0	2.7	243.3
MW-6	248.5	0.9	247.6
MW-7	258.9	3.05	255.85
MW-8	265.9	4.9	261.0
MW-9	259.2	4.3	254.9
B-1	277.8	1.1	276.7
B-2	254.8	2.45	252.35
B-5	284.6	4.95	279.65
B-8	264.5	6.7	257.8
B-9	291.7	2.95	288.75

(1) Elevation of MW-1, MW-2, MW-7, MW-8 and MW-9 are relative to Boring B-8; and MW-3, MW-4, MW-5 and MW-6 are relative to B-3.

(2) Depth in feet below the land surface.

Source: HMM 1992.

(HMM 1992), revealing that groundwater ranged from 0.970 to 4.95 feet below the ground surface at the time of those measurements. Perched conditions occur where downward-percolating water (rain or snowmelt) meets a relatively impermeable stratum. In glacial till soils, the perched groundwater can be discontinuous. In addition, perched conditions may only exist seasonally or during particularly wet years. A deeper groundwater flow system exists in the Oswego Sandstone, which underlies the till.

17.3.2.2 Aquifers and Supply Wells

Based on United States Geological Survey Water Resources Investigation Report 87-4122 (Miller 1987), there are no sand-and-gravel aquifers present within 1 mile of the site. Sand-and-gravel aquifers consist of loosely stratified soils that can yield several hundred gpm to individual wells. Rather, as mentioned above, the on-site soils consist of glacial till. Wells dug into till typically yield from 1 to 5 gpm (Miller 1987) and are only suitable for domestic use. According to HMM (1992), groundwater across the site flows northwesterly to Lake Ontario.

The bedrock beneath the till is Oswego Sandstone (Miller 1982; Ebasco 1992). According to Miller (1982), bedrock wells in Oswego County can yield 1 to 125 gpm, with a median yield of 10 gpm. Groundwater below 100 feet is brackish (saline). In addition, the bedrock may contain iron, hydrogen sulfide and natural gas. Groundwater less than 100 feet deep tends to be less mineralized. It is estimated that the depth to bedrock near the site may range from 2 to perhaps 20 feet (based on Ebasco 1992). Regionally, groundwater in the bedrock flows northerly toward Lake Ontario (Miller 1982).

Recharge to the soils and shallow bedrock occurs locally from infiltration of rainwater and snowmelt. Miller (1982) has inferred that bedrock recharge may also come from as far away as the Finger Lakes region in the upper reaches of the watershed, many miles to the south.

Based on contacts made with the Oswego County Health and Planning Departments, there are few public/community water supply wells within 1 mile of the site. Rather, most water is supplied either through the Scriba Water District, which receives its water from the city of Oswego, or from private wells. Oswego's source of water is Lake Ontario.

The County Health Department does not maintain records of public water supply wells (locations, depths or yields) because, as yet, this has not been required by law. The Health Department does test for certain contaminants in well water, but this is normally limited to bacteria, and records are sparse.

According to a water system map obtained from the Scriba Water Department (as shown in Figure 17-5), many homes within 1 mile of the site have access to town water supplied through Oswego from Lake Ontario. There is no town water main from Lake View Road southeasterly along Lake Road (County Route 1A) for a distance of about 1.25 miles, or along North Road (County Route 1). However, there is a pipeline supplying the Nine Mile Point Station (also from the city of Oswego) along North Road. Those who are not tied into these two water systems, which includes homes along the lakeshore, are presumed to have private well water. The Ponderosa Trailer Park, about 1 mile northeast of the Project, operates a public/community system. According to the Scriba Water Department, the trailer park supplies water to about 12 mobile homes from an on-site well. No records of the well depth and yield were available, since well registration is not required.

17.3.3 Description of Potential Impacts to Groundwater

Because the Project will not obtain its water supply from wells, the supply of groundwater available to local wells will not be affected by the Project.

During construction, dewatering may take place to allow proper installation of building foundations. Dewatering, which involves local lowering of the water table, normally lasts a period of weeks or months.

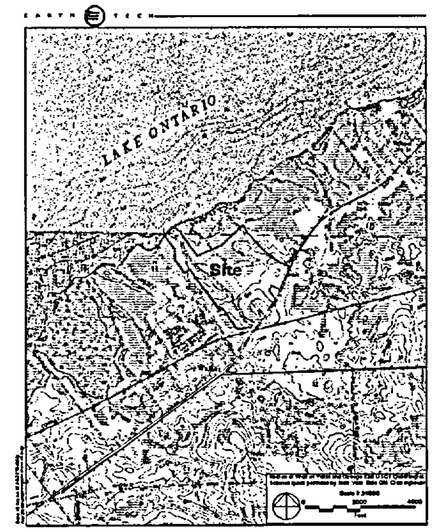


Figure 17 - 5
Available Public Water Supply
Scriba, New York

Chemicals stored on-site during construction (listed in Table 3-3) will be provided with secondary containment to minimize the potential for groundwater discharge. During operation, the potential for spills will also be minimized. All chemicals (listed in Table 3-4) will be delivered in closed containers and stored inside buildings. Curbs and drains will be installed in all chemical treatment and storage areas; these will route any spills along underground gravity feed lines to a chemical sump. All transport piping will be compatible with the liquid to be conveyed and constructed of material designed to resist corrosion.

Aqueous ammonia will be stored on-site in a 60,000-gallon welded steel tank with a double wall design per API specifications. Measures will be taken to minimize the risk of spills. Ammonia will be transferred from delivery vehicles within a diked concrete containment area. Interconnecting piping will be provided to route spills to a chemical sump. Ammonia storage and handling is described in more detail in Section 3.2.2.12.

An emergency response and SPCC plan (including employee training programs) will be submitted in the Compliance Filing and in place prior to delivery of potentially hazardous materials to the site. Section 12.8 provides additional detail with regard to material handling.

17.3.4 Mitigation Measures

No withdrawal from or discharge to groundwater resources is proposed for the Project. No direct impact to groundwater resources will, therefore, occur and no mitigation measures are required in that regard. To safeguard against potential indirect impact to groundwater, the Project will ensure that the storage of potentially hazardous materials will be within contained areas and that management plans will be in place to respond in the event of an accidental spill that would minimize potential impact to water resources. With these measures in place, the potential for impact to groundwater is considered to be minimal, and no further mitigation measures are proposed.

17.4 Surface Water Resources

This section addresses the requirements of Stipulation No. 12, Clauses 23 through 28. Characterization of surface water resources on and adjacent to the site is provided, including information on physical and chemical parameters. This section also discusses potential construction and operation impacts to water resources, and proposed mitigation measures for these impacts are identified.

The Applicant has made a significant effort to avoid impacts to surface water resources to the extent practicable. This approach has involved identification of sensitive resources and examination of various operational and water-use control methods to reduce impacts to these resources.

Within Section 17.4, subsections have been organized to ensure that Items 23-28 of Stipulation 12 have been fully addressed and are clearly presented. Information included in this section is based on literature review, agency consultation, prior field surveys, and scientific modeling and analyses. Site reconnaissance was performed in late September and early October 1999. In addition, information from previous field efforts performed by others was used, such as an underwater diver survey of the existing Independence Station discharge. Due to the breadth of the existing information, no new field sampling efforts were undertaken specifically for the Project to obtain water quality, sediment, or aquatic biological resource information.

17.4.1 Applicable Regulatory Requirements

Project construction and operation is within the jurisdiction of state and federal statutes and regulations that provide protection of surface water resources. Work impacting water resources must comply with specific federal regulations: the Federal Water Pollution Control Act of 1972, the Clean Water Act of 1977, and the Water Quality Act of 1987. The Safe Drinking Water Act of 1974 and the Safe Drinking Water Act Amendments of 1986 provide water quality standards for discharges.

The Clean Water Act regulates activities with the potential to impact surface waters of the United States, including wetlands. A major Clean Water Act program is the NPDES, which regulates wastewater discharges. NPDES authority has been delegated by the EPA to the NYSDEC through the SPDES regulatory process.

A Clean Water Act Section 401 Water Quality Certification must also be obtained for any proposed work that may indirectly affect the quality of a surface waterbody. This certification will be required for work expected in federal wetlands. The Water Quality Certification requires that discharge standards be met to ensure that water quality conditions are not adversely impacted. Section 401 Water Quality Certification of the Clean Water Act was delegated to New York State through implementation of 6 NYCRR 608.9. Water quality standards and thermal criteria for discharges under NYSDEC Water Quality Regulations are found in 6 NYCRR 701, 702, 703, 704.2(a) and (b), and 704.3. Discharge effluent limitations are regulated under 6 NYCRR 754.1.

As discussed in Section 17.6, a Clean Water Act Section 404 permit will be required from the ACOE for the excavation or placement of fill into any wetland or waterway, and a state wetland permit needed for work within or near state-regulated wetlands.

17.4.2 Characterization of Existing Surface Water Resources

Surface water resources discussed in Section 17.4 include lakes, rivers, streams, and ponds. Intermittent streams associated with wetland areas on the site are discussed along with wetlands in Section 17.6. The existing Independence Station stormwater and wastewater ponds are manmade structures and, as such, are not regulated as surface waters. No perennial streams or natural ponds exist on the site. No construction activity is proposed off-site and, therefore, no off-site surface water resources have been evaluated or described in this document. Lake Ontario, which abuts the northeastern side of the site, represents the only surface water resource associated with the site. The following discussion, therefore, is focused on this resource.

17.4.2.1 Lake Ontario Water Quantity

Physiography

Lake Ontario is approximately 186 miles long, with a maximum width of approximately 53 miles. The maximum depth is approximately 802 feet, with an average depth of 283 feet. Lake Ontario has a surface area of 7,340 square miles and a volume of 390 cubic miles (TI 1979 in Independence 1992; The Four Parties 1998). Three basins (Niagara, Mississauga, and Rochester) are recognized in the main portion of the lake with a distinct separation from a fourth basin (Kingston), at the far eastern end of the lake. Sediment deposits in the basins consist of fine silty clays and clays which have accumulated for the past 11,600 years. A wide variety of sediment types (gravel, sand, silty sand, and silts) and bedrock exposures are evident in the inshore zone (LOTC 1989).

The Lake Ontario basin reflects the influence of the ice age when it and the other Great Lakes were formed. Areas near the lake were covered with water following the glaciation period, resulting in beaches, wave-cut cliffs, and deltas. At higher elevations, the relief reflects the action of the ice, and the landforms are typical of a glaciated area, with moraines, drumlins, eskers, and till plains. The northeast portion of the basin is interlaced with lakes and frequent outcrops of the Precambrian Shield. This extends eastward to the Adirondack Plateau as an outlier of the Precambrian Shield. South from the lake, lowlands occur near the shore rising to the glaciated upland with its moraines and drumlins. Behind this is the Allegheny Plateau, which forms the northern edge of the Appalachian formation. This plateau is deeply indented by the Finger Lakes of New York State (LOTC 1989). Drainage of the basin is primarily characterized by small streams draining the lowland areas that have their sources in the steeper slopes of the moraines. Drainage of the uplands is by the larger river systems, for example, the Trent River on the north shore and the Genesee and Oswego Rivers on the south shore.

Basin Description

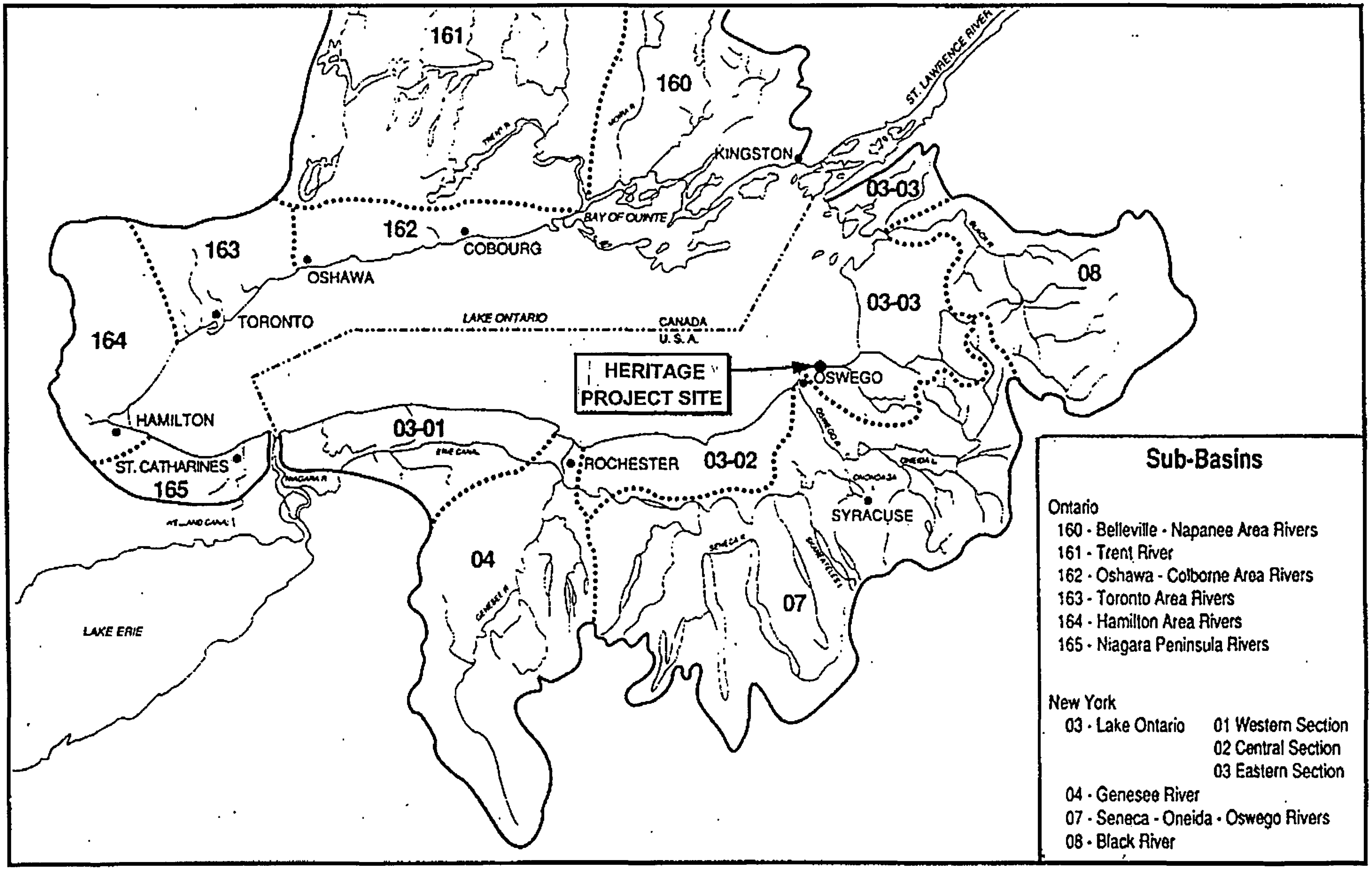
The most important source of water to Lake Ontario is inflow from Lake Erie via the Niagara River. The inflow averages approximately 201,300 cubic feet per second (cfs), or 130,104 mgd, and accounts for approximately 80 percent of the water entering the lake. The remaining inflow comes from basin tributaries (14%) and from precipitation (7%). The annual average runoff into Lake Ontario is approximately 33,000 cfs (or 21,328 mgd) from all sources other than Lake Erie via the Niagara River. The Oswego River and the Trent River in Ontario are the largest tributaries to Lake Ontario, and account for 41 percent of the total lake drainage basin of 24,700 square miles. Approximately 93 percent of the water in Lake Ontario flows out via the St. Lawrence River, and the remaining 7 percent evaporates (NYSEG 1980 in Independence 1992; EPA et al. 1987 in The Four Parties 1998; The Four Parties, 1998). Figure 17-6 identifies the location of the main subbasins and tributaries to Lake Ontario. Table 17-11 names the major tributaries and gives the subbasin location and average flow for each tributary (LOTC 1989). The Project site is in the Lake Ontario-Eastern Section subbasin.

The levels and outflows of Lake Ontario are regulated by dams on the St. Lawrence River under the supervision of the St. Lawrence River Board of Control. This regulation minimizes potentially hazardous extremes in flow and water level, while maintaining adequate dependable levels for hydroelectric power and navigation. The mean monthly water levels of the lake are maintained between a minimum elevation of 244 feet msl and a maximum elevation of 248 feet msl. The average elevation of Lake Ontario from 1900 to 1977 was 244 feet msl (TI 1979 in Independence 1992). Annual average evaporation from Lake Ontario is estimated to be equivalent to 28 inches of lake elevation (NYSEG 1980 in Independence 1992).

Project Site Area

Lake Ontario within the Project vicinity consists of relatively uniform substrates and bathymetry. The lake bottom is covered with gravel, cobble, larger slabs of bedrock, and exposed bedrock. In the higher energy environment within about ¼ mile of the shore, silt and sand deposition is minimal. Starting at the shoreline, the bottom has a gentle and fairly uniform slope, with water depths at ¼ mile from the shoreline averaging 20 feet (see Figure 17-1).

The shoreline habitat of the lake generally consists of a cobble and boulder beach 20 to 50 feet wide, revealing a water level fluctuation and wave zone height of about 4 feet. On the Project site there is a minimal bluff or bank with a height of about 4 feet. Further south, by the Alcan intake screen house, the bluff is about 25 feet high, while further north of the site the bluff height appears to be about 6 to 8 feet. There is essentially no vegetated wetland associated with the shoreline at the existing Independence Station discharge location.



SOURCE: Lake Ontario Toxics Commission 1989.

Figure 17-6
Lake Ontario Basin and Major Subbasins

Table 17-11: Major Tributaries to Lake Ontario

Subbasin	Tributary	Flow ft³/sec	Flow m³/sec
Ontario			
	Niagara River	201,267	5,700
160	Moira River	1,342	38
	Salmon River	459	13
	Napanee River	282	8
161	Trent River	6,991	198
163	Humber River	318	9
	Don River	176	5
	Duffin Creek	106	3
164	Hamilton Harbour	1,377	39
	Oakville Creek	71	2
165	Twelve Mile Creek[1]	6,320	179
	Welland Canal[2]	353-1,095	10-31
New York State			
03	Oak Orchard Creek	353	10
	Johnson Creek	141	4
	Irondequoit Creek	106	3
	Eighteenmile Creek	106	3
	Sandy Creek	106	3
	Northrup Creek	35	1
04	Genesee River	2,789	79
07	Oswego River	6,673	189
08	Black River	4,131	117

[1] Flow from this tributary is almost entirely composed of water discharged from the De Cew Falls hydroelectric power plant which withdraws water from the Welland Canal.

[2] The Welland Canal is not a natural tributary but it does divert water from Lake Erie to Lake Ontario. In recent years, approximately 8,474 ft^3/sec (240 m^3/sec) enters the canal at Port Colborne; most of the volume is withdrawn for power generation, water quality enhancement, and domestic and industrial consumption and is not returned to the canal. The range of values shown represents canal flows entering Lake Ontario during typical nonnavigational and navigational seasons. The Welland Canal does receive discharges from municipal and industrial facilities.

Source: Modified from Appendix I of LOTC 1989.

17.4.2.2 Lake Ontario Water Quality

A detailed review of Lake Ontario water chemistry for major ions, specific conductance and total dissolved solids can be found in Stevens (1987 in LOTC 1989). The intent here is to describe some of the major features, particularly those water quality characteristics that are influenced by human activity.

Beeton (1969 in LOTC 1989) and Dobson (1967 in LOTC 1989) noted the increase in total dissolved solids, calcium, chloride, sodium, potassium and sulfate in Lake Ontario, which Beeton believed started around 1910 and continued through 1965, largely as a result of human activity. During the period 1972 to 1983 major ion characteristics were considerably different with decreases noted for specific conductance, calcium, chloride, and sodium (Stevens 1987 in LOTC 1989)

The accelerated cultural eutrophication of Lakes Erie and Ontario led to the introduction of a phosphorus control program in the 1970s which was primarily directed to the removal of phosphorus at sewage treatment plants. Phosphorus was seen to be the principal nutrient driving the eutrophication process. Total phosphorus in the surface waters of Lake Ontario peaked in 1973 and all measured forms of phosphorus have declined since that time consistent with phosphorus loading reductions to the lake (Water Quality Board 1987 in LOTC 1989). Relative stability in water transparency and summer oxygen depletion rates in Lake Ontario have been attributed to phosphorus control (Dobson 1985).

Increases in nitrate and nitrite concentrations have been noted throughout the Great Lakes Basin and this has been raised as a concern by the Water Quality Board in its 1985 report to the International Joint Commission. Nitrate is a plant nutrient that can influence algal growth and community structure and thereby impact on food web dynamics in the lake ecosystem. Increased nitrogen loading to Lake Ontario can be attributed to a complex mixture of atmospheric, agricultural, urban, and upstream sources.

Data is presented in Dobson (1985) on historical water quality data for the period from the late 1960s to the early 1980s. This data is primarily recorded from mid-lake areas and may or may not be representative in shallow inshore areas. During this period, general lake water quality showed some improvements in certain constituents and declines in others. Total phosphorous declined from an average of about 20 micrograms/l to 13 micrograms/l. Nitrate + nitrite increase from summertime highs of about 200 micrograms/l to 350 micrograms/l. Ammonia declined from an average of about 20 micrograms/l to 2 micrograms/l. Alkalinity remained fairly constant for summertime values at about 85 mg $CaCO_3$/l. Trends in seven major ions for a longer period of record (1910 to 1980) show increases except for magnesium, potassium, and bicarbonate that remained constant at 8 mg/l, 1.4 mg/l, and 114 mg/l, respectively. Calcium and sodium showed moderate increases from 30 mg/l to 40 mg/l and 6 mg/l to 12 mg/l, respectively. The greatest increases occurred with chloride and sulphate that went from 8 to 27 mg/l and 12 mg/l to 27 mg/l, respectively.

Data presented by the Great Lakes Water Quality Board (GLWQB 1983) focus on information collected as part of the Great Lakes International Surveillance Plan (GLISP) cycle of intensive surveys that included Lake Ontario during the timeframe of 1981-1982. Only spring data were used in the trend analyses. During this time the lake is still isothermal, vertical gradients are minimal, and surface conditions are representative of those found throughout the water column. Data indicated that whole lake spring total phosphorous concentrations had declined since about 1973. A median concentration of 13.5 micrograms/l that was noted in 1982 was the lowest reported in 13 years. The annual decrease was not, however, constant from year to year. Data for whole lake spring filtered nitrate + nitrite indicated that median concentrations, except for 1980, have increased every year since 1975. The median value was approximately 250 micrograms/l in 1970 and 359 micrograms/l in 1982. Trace metal data was collected during 1979. Water quality objectives were exceeded for cadmium, iron, lead, selenium and silver. Concentrations were greater at the western end of the lake and in areas influenced by tributaries (Credit, Humber, Etobicoke, Don, Genesee, and Black Rivers) and in the Hamilton Harbor area.

Water quality parameters are discussed by topic in the following sections.

Temperature and Stratification

The temperature of Lake Ontario varies between 32°F and 75°F (0°C to 24°C) (TI 1979 in Independence 1992). The highest temperatures are generally reached in late July or early August, when the mean surface temperature of the lake is 68°F (20°C). The lowest temperatures occur in late February or March, when the mean surface temperature reaches 34°F (1°C) (NYSEG 1980 in Independence 1992). Normally, the lake freezes only along the shore and in sheltered bays; the center of the lake remains open and maintains a temperature near 39°F (4°C) (TI 1979 in Independence 1992; The Four Parties, 1998).

Temperatures in the water column vary seasonally and play an important role in stratification and vertical mixing. The following discussion of factors influencing stratification and mixing in Lake Ontario is taken from NYSEG (1980 in Independence 1992):

> *Spring is a period of high vertical mixing, as warming of the cold 32°F to 34°F (0°C to 1°C) surface water to temperatures in the vicinity of 39°F (4°C) (the temperature of maximum density of fresh water) causes it to sink. In large lakes such as Lake Ontario, warming occurs more quickly in the shallow, near-shore areas than in the center of the lake. This results, sometime in late April or early May, in the formation of a "thermal bar," a zone of convergence of the relatively warm (temperatures greater than 39°F (4°C)) water along the shore and the relatively cold (temperatures less than 39°F (4°C)) water in the center of the lake. At the thermal bar, the cold water and the warm mix and form water that is close to 39°F (4°C), which causes it to sink. Another feature of the spring thermal structure is an inclined thermocline located in the warm near-shore water usually coincident with the location of the 44°F or 46°F (7°C*

or 8°C) isotherm. As spring progresses, the thermocline becomes better defined and moves further out from shore.

During the summer, beginning in middle or late June, a continuous thermocline is established at a depth between approximately 33 and 66 feet (10 and 20 m). The water above the thermocline is warm 64°F to 68°F (18°C to 20°C), while the water below the thermocline is quite cold, approximately 39°F (4°C). During the summer, upwellings are common. These events are caused by offshore or westerly (for the south shore) winds that displace the warm surface water from the shore region. This brings the colder thermocline and bottom water into the shallow shore area, thus reducing the temperature of the water.

In autumn, beginning in late September, cooling and subsequent sinking of surface water causes the thermocline to become less defined. Cooling along the shore proceeds more quickly than in midlake, which results in a reversed thermal bar, with temperatures of less than 39°F (4°C) near the shore and warmer temperatures in midlake. The autumn thermal bar moves offshore and dissipates in January.

During the winter, the lake is nearly isothermal (of constant temperature). However, some stratification may develop during the winter with cold 32°F to 34°F (0°C to 1°C), relatively less dense water at the surface and warmer 39°F (4°C), denser water at the bottom.

Circulation

The following discussion on circulation patterns in Lake Ontario is taken from the Lake Ontario Toxics Commission report (LOTC 1989):

Water circulation patterns are highly variable, being influenced by wind stress on surface waters, hydraulic flows from discharging tributaries, water stratification and mixing and upwelling phenomena. Circulation patterns for Lake Ontario are described in greater detail in Simons and Schertzer (1985) and Simons et al. (1985). The generalized circulation pattern shows the flow from the Niagara River moving predominantly eastward along the south shore of the lake. This is balanced by a westward flow in mid-lake, thus setting up a lake-wide counterclockwise circulation pattern. Net flow along the north shore is negligible with both eastward and westward components.

Simons et al. *(1985) computed net water transport in Lake Ontario to show that the eastward flow along the south shore to be 2.5 million feet^3/second (70,000 m^3/second). Comparing this to the outflow to the St. Lawrence River and observations of periodic westward flows from the Niagara River, they concluded that more than 90 percent of the inflowing water must be* *recirculated. With a mean speed of 3.1 miles/day (5 km/day) in the belt of the eastward flow and the length of the lake being approximately 186 miles (300 km), it was suggested that the time scale for recirculation is a few months.*

Nutrients

In natural freshwater systems, nitrogen and phosphorus are typically the limiting nutrients for plant growth. Because phosphorus levels are generally lower than those of nitrogen, phosphorus is the more critical of the two nutrients. Therefore, nutrient reduction plans, such as the New York State plan established for Lake Ontario, focus primarily on phosphorus reduction. In addition, the nitrogen fixing ability of many species of blue-green algae offsets the results of nitrate removal scenarios.

Since 1978, when specific reduction goals for phosphorus were adopted in an International Water Quality Agreement for the Great Lakes, the NYSDEC has made considerable progress in reducing phosphorus loading to Lake Ontario from the New York side. A New York Phosphorus Load Reduction Program, initiated in 1985, established a target load reduction of 235 metric tons for Lake Ontario. By the end of the program period (1990), this target load was surpassed by about 170 metric tons, or approximately 70 percent. The largest reductions were due to controlling phosphorus concentrations in the effluent of various public water treatment facilities, and applying agricultural conservation and management practices to reduce input from nonpoint sources. Phosphorus levels were over 20 micrograms per liter (µg/l) in the 1970s. Today, phosphorus concentrations of 10 µg/l or less are reported in Lake Ontario. This, combined with the described achievements in load reduction, indicates that the water quality objective for Lake Ontario relative to phosphorus is currently being met (New York State Great Lakes Phosphorus Reduction Task Force 1991 in Independence 1992; The Four Parties 1998).

Contaminants

The following discussion of toxics and contaminants in Lake Ontario is taken from the Lake Ontario Toxics Management Plan: 1991 Update (LOS 1991):

Although toxic chemicals have not been found in Lake Ontario drinking water at levels above standards designed to protect human health, toxics in Lake Ontario biota are a human health concern and pose a tangible human health risk.

Humans are positioned at the top of both the terrestrial and aquatic food webs, and, as such, they risk being exposed to persistent toxic substances that build up in food resources. In the process known as biomagnification, toxics are concentrated by the organisms consuming them and are magnified many times as they pass along the food chain. It is through this process that compounds such as mirex and dioxin, which are detected in low parts per *trillion or parts per quadrillion in open lake waters, can appear in the flesh of lake trout and some other species in amounts above standards.*

Fishing advisories began on Lake Ontario in 1970 with the discovery of bioaccumulated mercury and DDT. Later (in the mid-1970s) more advisories were imposed with the discovery of bioaccumulated PCBs and mirex. The advisories were revised in the early 1980s to reflect improvements in fish flesh contaminant levels and to permit the monthly consumption of some Lake Ontario fishes. Levels of PCBs and mirex have declined in salmon and rainbow trout, to the point where consumption advisories have now been lifted for Lake Ontario. However, the continued presence of dioxin in fish ranging from 0.002 to 0.162 mg/g remains a source of concern.

The source of toxics to the lake is largely industrial discharges and municipal treatment plants that receive industrial wastes (LOS 1991). Additional smaller sources include air and non-point sources, such as agriculture. To address the need for toxics management on an ecosystem-wide basis, Canada and the United States joined forces in 1987 to begin development of a Toxics Management Plan for Lake Ontario. The objective of the plan is a lake that provides drinking water and fish that are safe for unlimited human consumption, and that allows natural reproduction of the ecosystem's most sensitive species such as bald eagles and river otters. In response to the plan, the United States has achieved significant reductions in toxic loading to the lake as the result of enforcing industrial discharge compliance demonstration requirements, requiring pretreatment, and enforcing BTA limitations for toxic pollutants. In addition, standards and criteria are being reviewed and may be revised to address better potential human health impacts; for example, new criteria for DDT and PCBs may be developed based on the human health impacts of fish consumption.

The Great Lakes Binational Toxics Strategy (BNS) was developed in keeping with the objective of the Great Lakes Water Quality Agreement to restore and protect the Great Lakes basin. Signed on April 7, 1997 by the United States and Canada, the Strategy targets persistent, toxic and bioaccumulative substances in the Great Lakes for designated reductions within a 10-year time frame. The BNS was developed cooperatively by the United States and Canada, with input from states, provinces, industry, environmental groups and other stakeholders. These groups are working together to identify ways to virtually eliminate the targeted substances from the Great Lakes. The level one substances of most concern (i.e., those previously identified by governments) are dioxins/furans, mercury, PCBs, hexachlorobenzene, benzo(a)pyrene, alkyl lead, octachlorostyrene, and certain canceled or restricted pesticides (aldrin/dieldrin, chlordane, DDT, mirex and toxaphene) (The Four Parties 1999).

Water Quality Classification

Surface water quality assessment is based on data in three categories: physical, chemical, and biological. Physical attributes include temperature, color, and turbidity.

Chemical properties include pH, conductivity, and the concentration of various chemical constituents such as cations, anions, organic compounds, and dissolved gases. Biological properties include coliform levels as well as the suitability of the water for specific organism activities, such as fish survival and propagation.

New York State has assessed water quality throughout the state and has classified surface waters according to their potential best use. Such usages range from a source of water supply for drinking with minimal treatment to waters suitable for fishing and secondary contact recreation. Much of Lake Ontario, including that portion of the lake in the vicinity of the Project site, consists of Class A waters (6 NYCRR, Part 847.5).

Class A waters are defined in the New York State Water Quality Regulations (6 NYCRR, Chapter X, Part 701 1998) as waters suitable as a source of water supply for drinking, culinary, or food processing purposes including waters suitable for these usages with pretreatment. The city of Oswego uses Lake Ontario as its drinking water supply and also supplies potable water to some parts of the town of Scriba. Primary and secondary contact recreation and fishing are also best usages of Class A waters. Class A waters are suitable for fish propagation and survival.

Based on recent water quality data collected by the city of Oswego at its water intake about 5 miles west of the Project site, mean ambient water quality in this portion of Lake Ontario meets or exceeds applicable state ambient water quality standards for Class A waters. These ambient water quality data and the applicable standards are summarized in Table 17-12.

Table 17-12: Existing Water Quality in Lake Ontario Near the Heritage Station Site, 1998-1999

	Concentrations				Water Quality Standards	
Parameter	**No. of Samples**	**Minimum**	**Maximum**	**Mean**	**NSPS(1)**	**NYSDEC(2)**
Turbidity, NTU	55	0.18	2.4	0.50		
Color, Units	55	0	10	5		
pH	55	7.03	8.44	7.96	6.0-9.0	6.5-8.5
Specific Conductance, µmho	55	248	433	306		
Chloride, ppm	23	18.3	50.9	24.1		250 (WS)(3)
Hardness, ppm	23	118	152	127		
Calcium, ppm	23	32.3	47.1	36.2		
Sulfate, ppm	27	22.5	48.0	27.7		250 (WS)
Iron, ppm	23	<0.02	0.08	0.03	1.0	0.3 (WS) (A)(4)
Aluminum, ppm	55	<0.01	<0.01	<0.01		
Total Alkalinity, ppm	55	87	101	92		
Flouride, ppm	55	0.11	0.16	0.13		1.5 (WS) 2.8 (A)

(1) New Source Performance Standards.
(2) New York State Water Quality Standards.
(3) WS = Water Supply
(4) A = Aquatic Life.
Source: City of Oswego, Department of Water, 1999.

17.4.2.3 Lake Ontario Water Uses

The following discussion of Lake Ontario water uses and accompanying tables were taken from a report by the Lake Ontario Toxics Committee (LOTC 1989):

> *Lake Ontario is of considerable socio-economic value, providing water for human consumption, manufacturing, transportation, power, recreation, and a variety of other uses. Withdrawals by municipalities for public water supplies constitute the major consumptive use. Approximately 686.7 million gallons or 2.6 million cubic meters are withdrawn daily to serve a combined Ontario and New York State population of 4.6 million. Withdrawals are predominantly by Ontario where the population distribution is heavily oriented along the shoreline* [Table 17-13]. *Use for power generation, essentially for cooling purposes in thermally generated power, is also substantial (more that 9.5 billion gallons or 36 million cubic meters withdrawn per day) but little of this water is actually consumed* [Table 17-14].

Table 17-13: Average Daily Volumes, Flows and Population Served by Waterworks Using Lake Ontario as a Source* (Page 1 of 2)

	Volume	Flow		Population
	(mgd)	(ft/sec)	(1,000 m^3/day)	(× 1,000)
Ontario				
Grimsby	1.8	2.86	(7.0)	14.7
Hamilton (and area)	73.4	113.53	(277.8)	308.1
Lincoln	0.5	0.86	(2.1)	5.2
Burlington	15.4	23.83	(58.3)	111.5
Cobourg	2.4	3.72	(9.1)	13.3
Toronto (and area)	357.2	552.54	(1,352.0)	2,360.0
Mississauga (and area)	75.5	116.80	(285.8)	545.0
Newcastle	2.1	3.23	(7.9)	13.2
Oakville	11.5	17.82	(43.6)	82.8
Oshawa (and area)	22.0	33.96	(83.1)	211.6
Port Hope	2.5	3.88	(9.5)	10.3
Bath	0.4	0.57	(1.4)	1.5
Belleville	7.1	10.91	(26.7)	35.5
Deseronto	0.3	0.49	(1.2)	1.8
Ernestown	0.7	1.06	(2.6)	6.8
Kingston	13.0	20.07	(49.1)	78.4
Kingston Township	3.3	5.11	(12.5)	19.7
Napanee	1.7	2.57	(6.3)	7.5
Picton	1.0	1.47	(3.6)	6.0
Thurlow	0.03	0.04	(0.1)	0.1
Subtotal	591.7	914.91	(2,238.7)	3,833.0
New York State				
Chaumont	0.05	0.08	(0.2est)	0.6
Sackets Harbor	0.08	0.12	(03)	1.2
Metropolitan Water Board (Onandaga County)	25.8	39.93	(97.7)	314.2

Table 17-13: Average Daily Volumes, Flows and Population Served by Waterworks Using Lake Ontario as a Source* (Page 2 of 2)

	Volume	Flow		Population
	(mgd)	(ft/sec)	(1,000 m³/day)	(× 1,000)
New York State (Cont'd)				
Oswego	6.3	9.77	(23.9)	28.8
Brockport	3.2	4.95	(12.1)	27.5
Monroe County Water Authority	55.0	85.05	(208.2)	387.5
Ontario W.D.	1.8	2.78	(6.8)	20.7
Sodus Point	0.2	0.33	(0.8)	1.4
Sodus	0.7	1.06	(2.6)	4.3
Williamson W. D.	1.5	2.33	(5.7)	5.5
Wolcott	0.2	0.33	(0.8)	1.7
Albion	1.2	1.84	(4.5)	10.2
Lyndonville	0.2	0.25	(0.6)	1.1
Subtotal	96.2	148.84	(364.2)	804.7
Total	**687.9**	**1,063.75**	**(2,603.9)**	**4,637.7**

*Ontario and New York State data based on 1986/1987 and 1984, respectively.

Source: Appendix I of LOTC 1989.

Table 17-14: Water Withdrawal Volume and Rate by Power Generating Facilities on Lake Ontario

			Withdrawal	
Plant	Fuel	Volume (mgd)	(ft³/sec)	(1,000 m³/day)
Ontario[1]				
Lakeview	Coal	1,666	2,577	6,307
Pickering	Nuclear	5,159	7,978	19,526
Total		**6,825**	**10,555**	**25,833**
New York State				
Somerset	Coal	342	529	1,296
Nine Mile Point	Nuclear	466	721	1,765
James A. Fitzpatrick	Nuclear	578	894	2,188[2]
Independence	Natural Gas	8	112	29
Oswego	Oil and Coal	1,164	1,800'	4,405
R.E. Ginna	Nuclear	576	891	2,180
Russell	Coal	167	258	632
Total		**3,301**	**5,205**	**12,495**

(1) Darlington, Hearn, and Lennox plants are not operating; design flows of these plants are approximately 9,002 ft/sec (22,032 × 1,000/day). Design withdrawal volume is 5,821 mgd.

(2) Source: Operating Conditions Data, EA Engineering, Science and Technology 1999b.

Source: Appendix I of LOTC 1989.

17.4.2.4 Lake Ontario Flood Plain

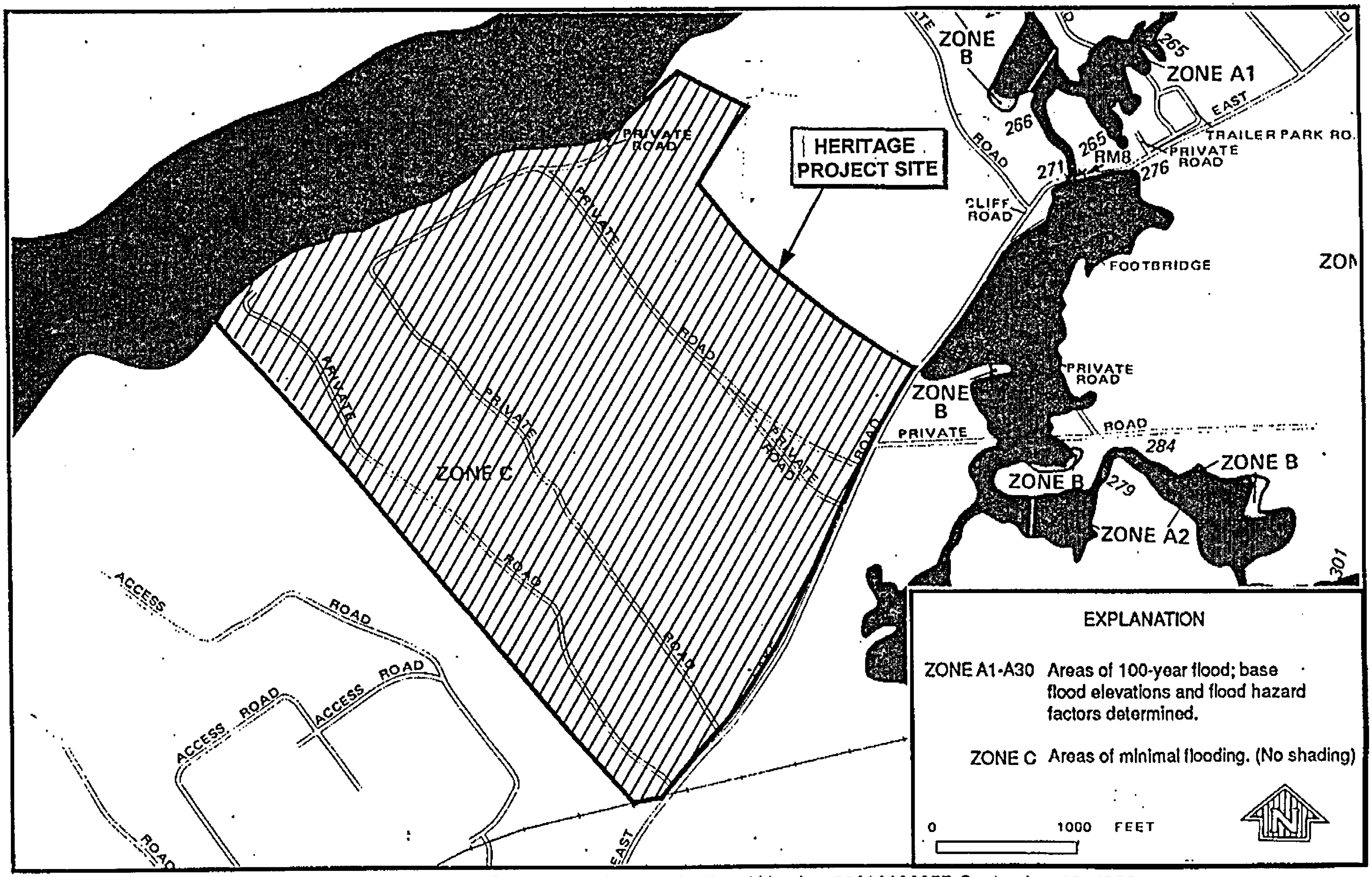
The existing flood plain at the Project site is associated with the lateral extent of flooding associated with Lake Ontario. Flood profile data compiled by the Federal Emergency Management Agency (FEMA) indicate that the 100-year flood elevation in this area of Lake Ontario is 249 feet national geodetic vertical datum (NGVD), or 249 feet msl. The Lower Water Datum (LWD) for Lake Ontario is 244 feet msl. LWD is the datum plane typically used for bathymetric purposes (NYSEG 1980 in Independence 1992). This shows that the 100-year flood elevation is only 5 feet above the LWD. The area of the Project site subject to 100-year flooding as mapped by FEMA is that edge immediately adjacent to Lake Ontario (Figure 17-7). The remainder of the site is mapped by FEMA as Zone C – an area of minimal flooding.

The wastewater treatment pond is the Project component to be constructed closest to the shoreline of Lake Ontario. The current plan calls for this pond to be located 380 feet horizontally from the edge of the mapped floodplain and approximately 5 feet vertically above the 100-year flood elevation. The generation building will be further on-shore, adjacent to Independence Station, and the Project's cooling towers will be further to the east of the power plants.

17.4.3 Description of Potential Impacts

Potential operational impacts to surface water will be primarily associated with withdrawal of wastewater and discharge to Lake Ontario of the Project's various wastewater streams. Impacts to surface waters will be minimal from the construction and operation of the Project since the withdrawal and discharge of water for cooling and other purposes are relatively small. The withdrawal represents a negligible volume relative to the huge volume of water in Lake Ontario. Aquatic habitats, chemical and physical characteristics of Lake Ontario water, navigation, recreation, and other water uses will be unaffected by the Project withdrawals.

Similarly, the wastewater discharge will have a very minimal and localized affect on surface water quality parameters isolated to the immediate mixing zone. Plant wastewater will consist of cooling tower blowdown, sanitary wastes, steam cycle wastes, plant drains, chemical drains, and demineralization wastes. Stormwater will consist of runoff from the site and runoff from structures. The volumes of these waste streams, and proposed pretreatment and discharge procedures for each stream, were presented in Tables 17-3 and 17-4 for average and peak discharge conditions, respectively.



SOURCE: FEMA Flood Insurance Rate Map - Town of Scriba, NY - Community Panel Number 3606630005B September 16, 1982

Figure 17-7
Location of 100 – year Flood Plain

Based on the large volume of the receiving water (Lake Ontario), any localized changes in the vicinity of the discharge structure will rapidly be diminished to background (ambient) conditions. Based on the plant design and anticipated SPDES discharge requirements, the discharge water will not have any chemical or physical parameters that are harmful to aquatic habitats or resources except as allowed within the immediate mixing zone. A detailed discussion of potential impacts to surface water resulting from withdrawals and discharges is provided in the following sections.

17.4.3.1 Water Use/Withdrawal Impacts

Treated Lake Ontario water will be used for Project water needs. Lake Ontario water will be supplied to the Project via an interconnect to the existing water line servicing Independence Station. Water for both stations would then be provided from the city of Oswego intake. Withdrawal of water is regulated by two factors, the NYSDEC treatment plant permit and the water authority allocation. The NYSDEC permit limits the city's withdrawal to 13.4 mgd annual daily average and 21.4 mgd daily maximum. The allocations are presented in Table 17-15.

Table 17-15: City of Oswego Water Intake System Allocation

Volume (mgd)	Allottee
75	Metropolitan Water Board
25	City of Oswego
6.5	City of Oswego Reserve
81.5	Unallotted

The two city allocations total 31.5 mgd. The city has contractual obligations for 1.2 mgd to other users. With these obligations, the city's current maximum use is 18.6 mgd. If 2 mgd are needed for additional backwash water at an expanded treatment system, the city's permitted daily maximum limit of 21.4 mgd would be exceeded (21.8 mgd) even without the Project's additional demand. Subtracting city allocations (31.5 mgd) from current or anticipated use (21.8 mgd) leaves 9.7 mgd of the city's allocation to satisfy Project water needs.

Withdrawals of more than 5 mgd and consumptive uses (e.g., evaporation) of more than 2 mgd must be registered with the NYSDEC and reviewed by the governors of the Great Lake States and premiers of the Canadian provinces on Lake Ontario. This is to ensure that such withdrawals will not adversely impact Lake Ontario water levels and navigation interests. Since the existing intake is already permitted to withdraw 120 mgd, the city is not expected to need this approval. In addition, the Project use represents less than 0.0001 percent of the average inflow of 131,100 mgd to the lake. Therefore, the Project should have a negligible impact on water levels in

Lake Ontario and will not affect navigation or recreation. The withdrawals will not result in a measurable alteration of water levels or lake volume, which precludes the potential for adverse effects on aquatic habitats, water chemistry, or physical characteristics. The withdrawals will not result in the concentration of contaminants nor will they affect other water users.

Compared to other large power generating facilities on Lake Ontario near the site, the Project will withdraw relatively little water from Lake Ontario (see Table 17-12). The net consumption of water by the Project will be relatively low as well. For example, the June and July design intake flow for the 1,100 MW Nine Mile Point Unit 2 is 54,709 gpm (78.8 mgd). This is about 50 gpm per MW. Of this amount, approximately 13,800 gpm (19.9 mgd), or 12.6 gpm per MW, is a consumptive use due to evaporation from the cooling tower. Cooling tower blowdown and service water discharge returned to Lake Ontario amount to 34,200 gpm (49.25 mgd).

Because the Project is a combined-cycle generation facility with natural gas-fired turbines, approximately 60 percent (480 MW) of the station's output will be generated by combustion turbines that do not require cooling. The remaining 40 percent (320 MW) will be generated by a steam turbine coupled with a heat recovery steam generator. Consequently, only 40 percent of the 800 MW station capacity will require water for condenser cooling purposes, thereby minimizing water consumption.

The 800 MW Heritage Project will withdraw approximately 2,595 gpm (3.74 mgd), or 3.24 gpm per MW. Consumptive use, or cooling tower evaporation, amounts to 2,153 gpm (3.1 mgd), or 2.69 gpm per MW. Cooling tower blowdown and other wastewater average discharges to Lake Ontario total 0.663 mgd. Overall, the Project will withdraw only about 6.5 percent as much water per MW as the Nine Mile Point and consumptively use only 19 percent as much per MW. These general relationships are shown in Table 17-16.

Table 17-16: Water Withdrawal Comparison Between the Project and Nine Mile Point

	Nine Mile Point Unit 2(1)	Heritage Station(2)
Generating Capacity, total MW	1,100	800
Generating Capacity, steam turbine	1,100	320
Water Intake, gpm	54,709	2,595
Wastewater Discharge, gpm	34,200	460
Evaporation, gpm	13,800	2,153
Evaporation/MW, gpm/MW	12.6	2.69

(1)Based on design data for Nine Mile Point Unit 2 – June/July conditions.
(2)Based on annual average – water mass balance.

17.4.3.2 Wastewater Discharge Impacts

The average discharge of wastewater is anticipated to be 0.66 mgd, a minimal volume relative to that of Lake Ontario. With the large assimilative capacity of the lake, the small mixing zone, the lack of sensitive resources in the plume area, and the relatively benign chemical constituents in wastewater, the proposed discharge of wastewaters to Lake Ontario is expected to have minimal impacts on surface water quality. Section 17.2.6 presents results of thermal and chemical constituent modeling that demonstrates no significant impact from the Project.

17.4.4 Mitigation Measures

The proposed use of an existing intake and outfall minimizes in-lake construction and avoids the introduction of a new source location for entrainment, impingement, and thermal and chemical discharges within Lake Ontario. These and other mitigation measures that are being proposed are more fully described below.

17.4.4.1 Existing Intake

The proposed use of the city of Oswego water system intake avoids the construction of a new intake within Lake Ontario. Avoiding construction of a new intake avoids construction impacts associated with increased turbidity resulting from sediment and shoreline disturbance and small accidental releases of oils, greases, and fluids associated with construction equipment. A new intake has the potential to have slight affects on localized water circulation patterns, including the entrainment of surface waters into deeper waters. Alternative sources of water are discussed in Section 17.1.4.

17.4.4.2 Existing Discharge

The proposed use of the existing discharge avoids water quality impacts associated with in-lake construction such as increased turbidity resulting from sediment and shoreline disturbance and small accidental releases of oils, greases, and fluids associated with construction equipment. A new discharge has the potential to have slight affects on localized water circulation patterns, including more turbulent mixing of surface and subsurface waters. In addition, a new discharge would result in a separate thermal and chemical plume from the existing discharge, which is likely to result in greater cumulative impacts than the slightly expanded plume resulting from the combined Independence Station and Project discharges. Alternative discharge options are evaluated in Section 17.2.10.

17.4.4.3 Cooling Tower/Water Use Minimization

The Project is proposing the use of evaporative mechanical draft cooling towers to avoid the use of large volumes of wastewater associated with once-through cooling.

The cooling process has been designed with 6-9 cycles, depending upon incoming water quality, to further reduce water usage. Several other mechanisms have been included for water conservation, including recycling of the HRSG blowdown to the cooling tower and recycling of the ultrafilter reject back to the cooling tower. Section 5 presents a review of alternative cooling technologies, demonstrating that water use has been minimized as appropriate through cooling technology selection.

17.5 Aquatic Resources

Within Section 17.5, subsections have been organized to ensure that Clauses 29-32 of Stipulation 12 have been fully addressed and are clearly presented. Information included in this section is based on literature review, agency consultation, field surveys, and scientific modeling and analyses. A site field reconnaissance was performed in late September and early October 1999. In addition, information from previous field efforts performed by others was used, such as underwater diver surveys of the city of Oswego Water Supply intake and of the existing Independence Station discharge. No new field sampling efforts were undertaken specifically for the Project to obtain fisheries, benthos, plankton or biological resource information.

17.5.1 Applicable Regulatory Requirements

The material presented in this section addresses requirements of Stipulation No. 12, Clauses 29 through 32, and the requirements of 16 NYCRR 1001.1(a) and 1001.3(a) and (b). In addition, this section has been developed within the framework of topics typical of the Clean Water Act, including but not limited to 401 Water Quality Certification. Section 401 of the Clean Water Act delegates water quality certification authority to the states. The New York State Protection of Waters regulations (6 NYCRR 608) contain guidelines for water quality certification.

The presence of threatened or endangered species on a site would require special consideration under both the federal Endangered Species Act and state endangered species regulations. If no such species are known to occur on the site (as is the case), the assessment of impact is related to the significance and diversity of the site ecosystem, as well as the availability of similar or suitable habitat elsewhere in the vicinity. Aquatic species are addressed in this section, while terrestrial species were discussed in Section 14.

The New York State Planning Office regulates coastal resources and is responsible for performing a coastal zone consistency review for any project that may affect coastal resources. Significant coastal resources are designated and protected by this office. Section 10.4.2 provides a review of the Project's consistency with policies related to the coastal zone.

17.5.2 Characterization of Existing Resources

Aquatic ecology baseline conditions for Lake Ontario were based on a literature search, personal communications with governmental and scientific personnel knowledgeable in aquatic resources issues, and discussions with personnel from electric utilities operating power plants with ongoing monitoring studies on Lake Ontario near the Project site.

Major biotic components in the lake in the vicinity of the proposed Project include the lower trophic levels (phytoplankton, zooplankton, and benthic macroinvertebrates), ichthyoplankton, and juvenile and adult fish. Phytoplankton and zooplankton communities were not considered for further discussion in this report since an extensive review of the literature (LMS 1979 in Independence 1992) has shown that the withdrawal (entrainment) of phytoplankton and zooplankton by power plants, including open-cycle plants with considerably larger water body-to-plant flow ratios than the Project, had no significant adverse impacts on these plankton communities. This report will focus upon the fishes of Lake Ontario. Lesser detail will be accorded to the nearshore benthic macroinvertebrate community.

Since 1969, aquatic ecological studies have been conducted on Lake Ontario in the Project vicinity at Nine Mile Point, a promontory located approximately 3 miles to the northeast of the Project site. Nine Mile Point is the site of NMPC's 610 MW Nine Mile Point Unit 1 (NMPC Unit 1) and NYPA's 821 MW James A. Fitzpatrick (JAF) nuclear power stations.

Most of the sampling for the Nine Mile Point aquatic ecology studies (TI 1979 in Independence 1992) was conducted along four transects extending offshore from the Lake Ontario shoreline (Figure 17-8). The transects – NMP (Nine Mile Point Plant) and FITZ (J.A. Fitzpatrick Plant) – represent a zone in the lake near the two plants' submerged intake and discharge structures. This zone can be influenced by the removal of cooling water and by subsequent thermal discharges and has been referred to as the "experimental area." In addition, data are presented that were obtained from fish impingement studies conducted at the Oswego Steam Station just east of the city of Oswego water supply intake.

17.5.2.1 Benthic Fauna

Benthic macroinvertebrates live in association with the bottom sediments of waterbodies. Some, such as oligochaetes and freshwater clams, live their entire lives in the sediments. Others, such as aquatic insects from the order Ephemeroptera and the dipteran family Chironomidae, spend only the early stages of their life in the aquatic system. Many invertebrate organisms living in the bottom sediments are slow moving or stationary; thus, the health of this ecosystem component often reflects local environmental conditions, and benthos may be used as a monitor of environmental change when evaluated within the context of the unique properties of the ecosystem.

Visual observations of bottom sediments in the vicinity of Nine Mile Point indicate that the area is primarily bedrock, which is covered in some areas with boulders and rubble (TI 1978, 1979 in Independence 1992). Composition of the bottom sediment observed at benthic sampling stations in 1977 and 1978 in the Nine Mile Point vicinity is provided in Table 17-17. The Project site is located within a 3-mile radius of the Nine Mile Point study area (Figure 17-8).

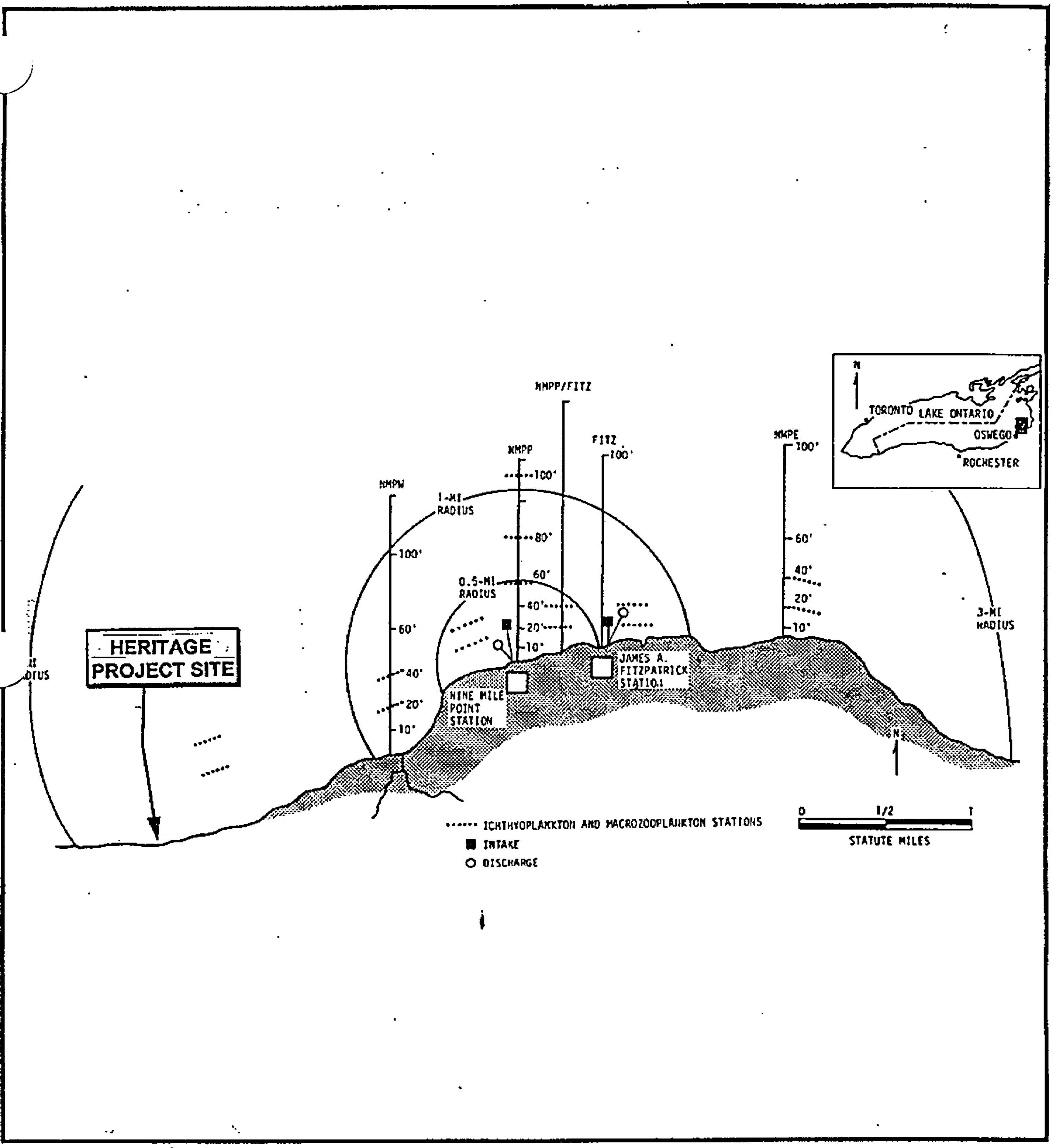
The shoreline along the Project site is rocky with a very narrow (20- to 40-foot wide) band of unconsolidated shore in the northwestern portion of the site. It is primarily rock of cobble size with boulders up to 3 to 4 feet across.

Table 17-17: Composition of Bottom Sediment Determined by Visual Examination at Benthic Sampling Stations in the Vicinity of Nine Mile Point

Depth Contour (feet)	Transect	Description*	Comments
10	NMPW	100% bedrock	
	NMP	70% boulders, 20% rubble, 10% gravel	Some algae on rocks
	FITZ	80% boulders, 10% rubble, 10% sand	Some algae
	NMPE	70% boulders, 20% rubble, 10% sand	Some algae
20	NMPW	50% bedrock, 50% rubble	All lying on bedrock
	NMP	50% boulders, 30% rubble, 20% gravel	
	FITZ	50% boulders, 20% gravel, 20% rubble, 10% sand	
	NMPE	40% bedrock, 30% boulders, 25% gravel, 5% sand	
30	NMPW	100% bedrock	Some rubble
	NMP	100% bedrock	Some boulders
	FITZ	80% bedrock, 20% rubble	Some sand
	NMPE	100% bedrock	Some rubble and sand
40	NMPW	50% bedrock, 30% rubble, 20% sand	
	NMP	80% boulders, 20% bedrock	
	FITZ	50% bedrock, 20% boulders, 50% rubble	
	NMPE	100% bedrock	Some scattered sand
60	NMPW	100% bedrock	
	NMP	80% boulders, 10% rubble, 10% gravel	
	FITZ	80% bedrock, 20% boulders	Some rubble
	NMPE	80% bedrock, 20% rubble	Some sand

*Description based on EPA 1973 field evaluation method for categorizing soils.

Sources: TI 1978, 1979 in Independence 1992.



SOURCE: TI 1979 in Independence 1992

Figure 17-8
Sampling Area for Nine Mile Point Aquatic Ecology Studies Showing Location of Sampling Transects and Intake and Discharge Structures

Although specific benthic fauna data in the vicinity of the Project are limited, studies of the benthic organisms in Lake Ontario as a whole have been conducted since the preparation of the Lakewide Management Plan for Lake Ontario, Stage 1 (Lake Ontario Stage 1 Lamp 1998). Contaminants, declining nutrient levels, changes in fish populations and introduction of exotic species have affected the benthic populations. The invasion of the zebra mussel (*Dreissena polymorpha*) in the late 1980s has caused major population changes in the naturally occurring benthic organisms (The Four Parties 1999). Zebra mussels colonized western Lake Ontario and the south shore in 1991 and 1992, and the Eastern Outlet Basin by 1993 (Stewart et al. 1999). Zebra mussels generate byssal threads that attach to hard surfaces with an adhesive secretion. Any firm surface that is not toxic can be colonized by zebra mussels. Beds of mussels in some areas of Lake Erie have been reported to have up to 70,000 organisms per square meter (Snyder 1990). Another introduced mussel species, the Quagga mussel (*Dreissena bugensis*) is capable of living in water of greater depth than zebra mussels. Both types of mussels are efficient filter feeders. This efficiency has led to dramatic improvements in water clarity; however, most Lake Ontario fish cannot eat these mussels. Thus, nutrients captured by the mussels do not contribute to production of healthy fish populations (The Four Parties 1999). These mussels have caused changes in how nutrients are cycled through the food webs (Stewart et al. 1999).

Some shallow water (<10 m) indigenous benthic organisms that are suited to living on a lake bottom covered with zebra mussels can feed on the mussel's waste products and have had population increases. Fish that feed on these organisms are benefiting from the population increases. Generally, impacts of the zebra mussel filtering effects have been most pronounced in the near shore waters less than 100 m in depth (The Four Parties 1999).

Soft sediment organisms are largely absent in the Project area because of lack of suitable habitat. The relatively high-energy environment in waters less than 25 feet deep precludes the establishment of mud and silt deposits. It is assumed that epifauna adapted to hard substrates dominate the benthic community. Some soft sediment exists in the interstices of cobbles and boulders and provides some habitat for burrowing infauna such as tube dwelling amphipods and oligochaetes. The good water quality and suitable substrate probably provide for populations of aquatic insect larvae such as mayfly, cranefly, midges, and beetles.

Based on relatively recent underwater video footage from the city of Oswego water system intake, zebra mussels are largely absent from hard substrates in the intake vicinity. Empty shells of zebra mussels are evident along the shoreline beaches, presumably from shallower populations. City of Oswego Water Department operations staff have indicated that zebra mussels are not a problem and that no special measures are used to maintain the intake system free of zebra mussels.

In closer proximity to the Project discharge, benthic macroinvertebrate samples collected in 1978 in the Nine Mile Point study area were numerically dominated by amphipods and oligochaetes. The amphipod *Gammarus fasciatus* comprised 40 percent of the total number of benthic organisms collected and was most numerous at the experimental transects. Total annual biomass appeared to be dominated by bryozoa; however, this resulted from collection of a large mass of colonies in a single June sample. Without the influence of this single sample, amphipods represented the greatest biomass.

In general, numbers and biomass per sample increased from May through September and decreased with increasing water depth. Experimental and control areas showed no real differences in total benthic densities. Taxonomic composition differences between transects apparently resulted from differences in substrate type.

In the overview of year-to-year results of the 1973-1978 investigations (TI 1979 in Independence 1992), differences in species composition and density were noted to be generally related to substrate differences: on the NMPW and NMP transects, substrates are primarily bedrock and rubble; at NMPE and FITZ, they are bedrock and rubble inshore, and sand and silt offshore. Maximum abundances were observed in mid-summer, with densities increasing from west to east (i.e., NMPW and NMPE). Annually, *Gammarus fasciatus* was the dominant organism collected. The control and experimental areas exhibited no differences that could be attributed to operation of the NMP-Unit 1 and JAF power plants (TI 1979 in Independence 1992).

Although no benthic data are available from the Independence Station discharge location, similarity of substrate and water conditions suggest similar findings to the NMP-Unit 1 and JAF studies. In proximity to the city of Oswego Water System intake, the following information on benthos was presented in the NMPC Oswego Unit 6 §316(a) Demonstration Submission (NMPC 1975):

> *QLM (1972) sampled the benthic community in the lake at the Oswego Steam Station at 10-, 20-, 30-, and 40-foot depths during 1972. A general distribution pattern of decreased abundance and biomass with increasing depth was observed. In the spring collections, high organism concentrations were observed in the shallow water Cladophora growth. Amphipods, dipterans and oligochaetes were dominant in this benthic community.*
>
> *Sampling in Lake Ontario in the vicinity of the Oswego Steam Station during 1973 was expanded to include a second transect west of the plant. The second transect permitted comparison of the benthic communities at the Oswego plant with zones outside the area which would be influenced by the thermal discharge from the Oswego Steam Station Units 5 and 6.*

The plant transect was directly lakeward from the Oswego Steam Station; the west transect was approximately 3 miles to the west of the plant. The two shallower water stations at the west transect were mainly bedrock[2] and rubble[3], with a small amount of sand and silt[4], at the 20-foot station. The 30- and 40-foot stations at the west transect were mainly rubble with sand and silt.

The 10-foot and 20-foot stations at OSWP were similar; however, there was less rubble and more sand and silt at OSWP 20-foot site. The substrate at the 30-foot and 40-foot stations was rubble with a small percentage of sand and silt. The absence of sand and silt from the 10-foot stations is the result of wave action and shore currents.

A total of five phyla were represented in benthic collections from the vicinity of the Oswego Steam Station during 1973; 59 genera were identified (LMS 1974). The majority of the organisms collected represent species associated primarily with the surface of the substrate, i.e., epi-benthic species, such as Gammarus fasciatus. However, several infaunal forms, including members of the class Nemata, were also collected.

Seasonal trends in benthic invertebrate abundance in temperate zones usually follow this pattern; reproduction during the spring; growth through the summer and fall; decreased numbers and activity with the onset of cold water temperature (Ruttner 1963; Odum 1971; Fretwell 1972). This general trend was observed at the Oswego Steam Station transects during 1973.

Segmented worm abundance was found to be different by date and transect. A significantly greater number was collected at OSWP during October and June, which were similar; and both were significantly different from the August abundance. The greater abundance found at the plant transect could be the result of influence from the Oswego River (QLM 1972), and the smaller numbers in August due to avoidance (burrowing) and formation of protective cocoons (Pennak 1953; Brinkhurst 1969).

Arthropoda (except for Acarina) were collected intermittently during the survey. The analysis included all three groups but the results basically reflect the distribution pattern of the aquatic mites. A significantly greater number was collected during August and October than during June as a result of the spring period of reproduction.

---

2 Unbroken solid rock.

3 Rocks 2 to 64 mm in diameter (Weber 1973).

4 Particles smaller than 2 mm in diameter (Weber 1973).

The small crustaceans of the order Podocopa are important links in the cycling of energy through the ecosystem. Abundance and biomass exhibited a seasonal cycle. A significantly greater number was collected in June than August, and the August abundance was significantly greater than October abundance (LMS 1974). Biomass followed the same trend; however, August and October had similar biomass values. Insects (primarily the order Diptera) did not exhibit any significant differences for date, depth and transect (LMS 1974).

The benthos in the vicinity of Oswego are similar to populations and associations found in Lake Ontario in general.

17.5.2.2 Fish

Species Composition and Abundance

The Great Lakes contain an extensive fish fauna that includes representatives of most of the important families of North American freshwater fishes. Hubbs and Lagler (1958) list 173 species of native and introduced fish in 28 families for the Great Lakes and their tributaries. Lake Ontario had one of the most diverse fish communities of the five Laurentian Great Lakes consisting of 112 species in 25 families (Ryder, 1972; cited in TI 1979 in Independence 1992). The common and scientific names of fishes used in the report, based on the study results discussed in this section, are provided in Table 17-18.

The Lake Ontario fish community has changed extensively over the past century. Historically, the offshore fish community in Lake Ontario was composed principally of oligotrophic or coldwater fish such as *Coregonus* spp. (whitefish, ciscos, and chubs), lake trout, and burbot, while the nearshore waters contained a more diverse fish fauna composed of many varieties of basically warmwater fish (Christie 1974; cited in TI 1979 in Independence 1992). A long period of habitat loss and degradation, and invasion by exotic species, such as alewife, rainbow smelt and sea lamprey, followed human colonization. By the 1960s there was virtual elimination of large fish predators, reduced abundance and extinction of many native fish species, an abundance of the introduced alewife and rainbow smelt, and spread of the control program, have resulted in improved conditions in much of the Lake Ontario ecosystem (Stewart et al., 1999). Associated with this shift in species composition is a corresponding change in the use of Lake Ontario by the present fish community.

Lake Ontario can be divided into two overlapping and interacting habitat areas – the nearshore and the offshore. The nearshore area includes the shallower coastal waters (approximately <15 m) that are adjacent to the shoreline and embayments. Most Lake Ontario fish spend part of their life-cycle in the nearshore. The resident fish

Table 17-18: Scientific and Common Names of Fishes Collected in the Vicinity of the Project Site within the Oswego – Nine Mile Point Area in Lake Ontario, 1977-1997 (Page 1 of 4)

Family and Scientific Name	Common Name	Nine Mile Point(1) 1978	NMP Unit 1(2) 1978	JAF(2) 1978	OSS Unit 6(3) 1982-1983	NMP Unit 1(4) 1990	JAF(5) 1990	NMP Unit 1(6) 1997	JAF(7) 1997
Petromyzontidae – Lampreys									
Petromyzon marinus	Sea Lamprey	X	X	X	X	X	X		X
Lepisosteidae – Gars									
Lepisosteus osseus	Longnose Gar		X	X					
Amiidae – Bowfins									
Amia calva	Bowfin			X	X				
Anguillidae – Freshwater Eels									
Anguilla rostrata	American Eel	X	X	X	X	X	X	X	
Clupeidae – Herrings									
Alosa pseudoharengus	Alewife	X	X	X	X	X	X	X	X
Dorosoma cepedianum	Gizzard Shad	X	X	X	X	X	X	X	X
Salmonidae – Trouts									
Coregonus artedii	Lake Herring		X	X		X	X		
Oncorhynchus kisutch	Coho Salmon	X							
O. tshawytscha	Chinook Salmon	X			X	X			X
O. mykiss	Rainbow Trout	X	X		X		X		X
Salmo salar	Atlantic Salmon					X	X		
S. trutta	Brown Trout	X	X	X	X	X	X	X	
Salvelinus namaycush	Lake Trout	X	X	X	X	X	X	X	X
Osmeridae – Smelts									
Osmerus mordax	Rainbow Smelt	X	X	X	X	X	X	X	X
Umbridae – Mudminnows									
Umbra limi	Central Mudminnow		X	X	X	X	X	X	X
Esocidae									
Esox lucius	Northern Pike	X		X					

Table 17-18: Scientific and Common Names of Fishes Collected in the Vicinity of the Project Site within the Oswego – Nine Mile Point Area in Lake Ontario, 1977-1997 (Page 2 of 4)

Family and Scientific Name	Common Name	Nine Mile Point(1) 1978	NMP Unit 1(2) 1978	JAF(2) 1978	OSS Unit 6(3) 1982-1983	NMP Unit 1(4) 1990	JAF(5) 1990	NMP Unit 1(6) 1997	JAF(7) 1997
Cyprinidae – Minnows and Carps									
Carassius auratus	Goldfish		X	X	X				
Cyprinus carpio	Carp	X		X		X			
Couesius plumbea	Lake Chub	X	X	X	X	X	X	X	X
Notemigonus crysoleucas	Golden Shiner	X	X	X		X	X		X
Notropis atherinoides	Emerald Shiner	X	X	X	X	X	X	X	X
N. cornutus	Common Shiner				X		X		
N. hudsonius	Spottail Shiner	X	X	X	X	X	X	X	X
Pimephales notatus	Bluntnose Minnow								X
P. promelas	Fathead Minnow		X	X					X
Rhinichthys atratulus	Blacknose Dace								X
R. cataractae	Longnose Dace	X	X	X	X	X	X		
Semotilus atromaculatus	Creek Chub				X	X	X		
Catostomidae – Suckers									
Catostomus commersoni	White Sucker	X	X	X	X	X	X	X	X
Erimyzon sucetta	Lake Chubsucker			X					
Hypentelium nigricans	Northern Hog Sucker	X					X		
Moxostoma macrolepidotum	Shorthead Redhorse	X					X		
Ictaluridae – Freshwater Catfishes									
Ictalurus melas	Black Bullhead	X			X				
I. punctatus	Channel Catfish			X			X		X
I. nebulosus	Brown Bullhead	X	X	X	X		X	X	X
Noturus flavus	Stonecat	X	X	X	X	X	X	X	X
N. gyrinus	Tadpole Madtom			X	X				
Aphredoderidae – Priate Perches									
Aphredoderus sayanus	Pirate Perch			X					

Table 17-18: Scientific and Common Names of Fishes Collected in the Vicinity of the Project Site within the Oswego – Nine Mile Point Area in Lake Ontario, 1977-1997 (Page 3 of 4)

Family and Scientific Name	Common Name	Nine Mile Point(1) 1978	NMP Unit 1(2) 1978	JAF(2) 1978	OSS Unit 6(3) 1982-1983	NMP Unit 1(4) 1990	JAF(5) 1990	NMP Unit 1(6) 1997	JAF(7) 1997
Percopsidae – Trout Perches									
Percopsis omiscomaycus	Trout-perch	X	X	X	X	X	X	X	X
Gadidae – Codfishes									
Lota lota	Burbot	X	X	X	X	X	X		X
Cyprinodontidae – Killifishes									
Fundulus diaphanus	Banded Killifish	X							
Atherinidae									
Labidesthes sicculus	Brook Silverside				X		X		
Gasterosteidae – Sticklebacks									
Culaea inconstans	Brook Stickleback	X	X	X	X	X	X		X
Gasterosteus aculeatus	Threespine Stickleback	X	X	X	X	X	X	X	X
Percichthyidae – Temperate Basses									
Morone americana	White Perch	X	X	X	X	X	X	X	X
M. chrysops	White Bass	X	X	X	X	X	X		
Centrarchidae – Sunfishes									
Ambloplites rupestris	Rock Bass	X	X	X	X	X	X	X	X
Lepomis gibbosus	Pumpkinseed	X	X	X	X	X	X	X	X
L. macrochirus	Bluegill		X	X	X	X	X	X	X
Micropterus dolomieui	Smallmouth Bass	X	X	X	X	X	X	X	X
M. salmoides	Largemouth Bass	X	X		X	X			
Pomoxis nigromaculatus	Black Crappie		X	X		X			

Table 17-18: Scientific and Common Names of Fishes Collected in the Vicinity of the Project Site within the Oswego – Nine Mile Point Area in Lake Ontario, 1977-1997 (Page 4 of 4)

Family and Scientific Name	Common Name	Nine Mile Point[1] 1978	NMP Unit 1[2] 1978	JAF[2] 1978	OSS Unit 6[3] 1982-1983	NMP Unit 1[4] 1990	JAF[5] 1990	NMP Unit 1[6] 1997	JAF[7] 1997
Percidae – Perches									
Etheostoma flabellare	Fantail Darter						X		
E. olmstedi	Tessellated Darter	X	X	X	X	X	X	X	X
Perca flavescens	Yellow Perch	X	X	X	X	X	X	X	X
Percina caprodes	Logperch			X	X				
Stizostedion vitreum	Walleye	X	X	X		X	X	X	X
Sciaenidae – Drums									
Aplodinotus grunniens	Freshwater Drum		X	X		X	X	X	
Cottidae – Sculpins									
*Cottus spp.**		X	X	X		X	X	X	X
Cottus bairdi	Mottled Sculpin				X				
Total Taxa		**37**	**38**	**44**	**39**	**37**	**40**	**25**	**32**

Sources:

(1) Nine Mile Point fisheries studies, TI,1979 in Independence 1992.
(2) Impingement studies at Nine Mile Point Unit 1 and James A. Fitzpatrick power plants, TI,1979 in Independence 1992.
(3) Impingement studies at Oswego Steam Station, LMS, 1983 in Independence 1992.
(4) Impingement studies at Nine Mile Point Unit 1, EA 1991a in Independence 1992.
(5) Impingement studies at James A. Fitzpatrick, EA 1991b in Independence 1992.
(6) Impingement studies at Nine Mile Point Unit 1, EA, 1998b.
(7) Impingement studies at James A. Fitzpatrick, EA, 1998a.

*Primarily mottled scuplin (*C. bairdi*) versus slimy sculpin (*C. cognatus*).

community in the nearshore area varies with the season, the degree of nutrient enrichment, the temperature, and available habitat. Dominant fish species that spend most of their life-cycle in the nearshore area include walleye, smallmouth and largemouth bass, freshwater drum, yellow perch, white perch, gizzard shad, various minnows and sunfish species. The offshore area of Lake Ontario can be described as water beyond the approximately 15 m depth contour. Most of the fish species associated with the offshore area depend on the nearshore area or tributaries for spawning and nursery habitat. The important prey fish in the offshore area are alewife and rainbow smelt. Chinook salmon, coho salmon, rainbow trout, brown trout, and adult lake trout are pelagic predators. These predators have abundances that are maintained by stocking (Stewart et al. 1999).

The historically prominent fish species are wide-ranging piscivores (feed on fish) and pelagic (open water) plankton feeders that utilize the entire area of the lake. The present fish community has definite patterns of movement that vacate areas of the lake during certain seasons. During spring, alewife and rainbow smelt migrate extensively from the depths of the lake to spawn in nearshore areas or in tributaries and small streams. After spawning, these species migrate out into the lake and occupy varying strata of water during summer. During summer thermal stratification, alewives are confined largely to the epilimnion, whereas rainbow smelt are found beneath the epilimnion (Olson et al. 1988 in Independence 1992). During fall, alewives migrate to the deeper waters to overwinter while rainbow smelt migrate to and overwinter in nearshore areas (TI 1979 in Independence 1992).

Long-term fisheries investigations have been conducted for power generating facilities in the Project area near the Nine Mile Point and Fitzpatrick nuclear power plants to the east, and at the Oswego Steam Station to the west. The following sections summarize results of these nearby studies. No studies have been performed at the city intake or the Independence Station discharge. However, uniform habitat conditions exist between the nuclear plant sites and the Project site.

The fish community in the Nine Mile Point area of Lake Ontario was intensively sampled from March 1973 through December 1978 by trawling, gill netting, and seining (TI 1979 in Independence 1992). Prior to 1973, fish were collected intermittently using gill nets and trap nets. Approximately 50 species were identified in samples taken during this period (1969-1978), and alewife was the dominant species collected (TI 1979 in Independence 1992). Other abundant species were rainbow smelt, spottail shiner, yellow perch, and white perch.

Seasonal abundance of fish in the Nine Mile Point vicinity was typical of that observed for the Lake Ontario fish community (TI 1979 in Independence 1992). The greatest abundance of fish was usually observed during the spring months, corresponding with the spawning of rainbow smelt and the shoreward spawning migration of alewives. Abundance and diversity were lowest during the warm summer months with an increase, especially in diversity, observed during the fall. Lower abundance and diversity during summer are due, in part, to post-spawning migrations from the area by adults and selectivity of the sampling gear in relation to collecting the smaller juvenile fish (TI 1979 in Independence 1992).

Fisheries studies within 3 miles of the Project vicinity were conducted as part of the 1978 Nine Mile Point Aquatic Ecology Studies (TI 1979 in Independence 1992). Results of these studies are discussed in the text that follows. Sampling stations are illustrated on Figure 17-8.

Thirty-seven taxa were identified from the approximately 45,700 fish collected in the Nine Mile Point vicinity during 1978 (Table 17-19). The highest number and diversity of fish were collected by beach seine and gill net, respectively; box traps collected the least number of species and individuals. Alewives dominated beach seine collections and were second most abundant in gill net and trawl catches. Spottail shiners and alewives accounted for 50 percent of gill net collections, while rainbow smelt and alewives accounted for 56 percent of gill net collections. Rainbow smelt and alewives comprised almost 70 percent of trawl catches. The five most abundant species in the Nine Mile Point area, ranked in decreasing order of abundance based on the combined data from all gear, were alewife, spottail shiner, rainbow smelt, white perch, and yellow perch. Ten taxa – alewife, brown trout, gizzard shad, lake chub, rainbow smelt, *Salvelinus* spp. (primarily lake trout), spottail shiner, white perch, white sucker, and yellow perch – were collected during each month of the study and five other species were collected during at least 7 of the 9 months (Table 17-20).

Temporal/Spatial Distribution

Gill net, trawl, beach seine, and box trap caught 37 species in the Nine Mile Point vicinity during the 1978 study. Relative to frequency of occurrence, 10 species were present in the area during every month of sampling, and five other species occurred during at least 7 of the 9 months. The species that dominated were alewife, spottail shiner, rainbow smelt, white perch, and yellow perch.

Temporal distribution varied according to gear. Gill net catches, dominated by alewives, rainbow smelt, spottail shiners, white perch, and yellow perch, were largest during May-July and October-November, and were significantly larger at night than during the day. Largest trawl catches were in May, when threespine stickleback comprised the majority of the catch, and in August and September, when young-of-the-year (YOY) alewives and rainbow smelt dominated; night catches were usually larger than day catches. Beach seine catches were small from April through July and increased markedly in August and September as YOY alewives became vulnerable to the gear. YOY and adult spottail shiners were abundant in seine hauls during August and September, and threespine stickleback and brown trout were

Table 17-19: Numbers of Fish Collected by Each Sampling Gear and Total Percent Composition Nine Mile Point Vicinity, 1978 (Independence 1992)

Species	Gill Net Number	Trawl Number	Beach Seine Number	Box Trap Number	Number	Percent
Alewife	4,216	1,172	22,578		27,966	61.1
American Eel	8	1			9	T[1]
Banded Killifish			3		3	T
Black Bullhead	1				1	T
Brook Stickleback			1		1	T
Brown Bullhead	67				67	0.1
Brown Trout	117	1	11		129	0.3
Burbot	12				12	T
Carp	4				4	T
Chinook Salmon	11		3		14	T
Coho Salmon	4		2		6	T
Emerald Shiner		1	12		13	T
Gizzard Shad	258	4	10		272	0.6
Golden Shiner			3		3	T
Lake Chub	123				123	0.3
Largemouth Bass			3		3	T
Longnose Dace			1		1	T
Northern Pike	2				2	T
Pumpkinseed	6				6	T
Rainbow Smelt	2,031	2,246	1		4,278	9.4
Rainbow Trout	13		3		16	T
Rock Bass	154			112	266	0.6
Sculpin	11	95		1	107	0.2
Salvelinus spp.	189				189	0.4
Sea Lamprey	3				3	T
Shorthead Redhorse	1				1	T
Smallmouth Bass	126		3	1	130	0.3
Spottail Shiner	5,777	12	192	7	5,988	13.1
Stonecat	96				96	0.2
Tessellated Darter[2]		242			242	0.5
Threespine Stickleback	3	894	72	3	972	2.1
Trout-perch	657	226			883	1.9
Walleye	8		1		9	T
White Bass	18		1		19	T
White Perch	1,757	4	16	2	1,779	1.0
White Sucker	473		2	2	477	1.0
Yellow Perch	1,636		21	1	1,658	3.6
Total	**17,782**	**4,898**	**22,939**	**129**	**45,748**	

(1) T = <0.1 percent.

(2) Includes tessellated and johnny darters, previously considered

Table 17-20: Monthly Occurrence of Fish Collected by All Gear, Nine Mile Point Vicinity, 1978 (Independence 1992)

Species	April	May	June	July	August	September	October	November	December
Alewife	■	■	■	■	■	■	■	■	■
American Eel		■	■	■	■				
Banded Killifish			■	■	■				
Black Bullhead					■				
Brook Stickleback		■							
Brown Bullhead			■	■	■	■			
Brown Trout	■	■	■	■	■	■	■	■	■
Burbot			■	■		■	■	■	
Carp	■	■			■				■
Chinook Salmon	■	■	■	■		■			
Coho Salmon	■	■							
Emerald Shiner	■	■			■		■	■	
Gizzard Shad	■	■	■	■	■	■	■	■	■
Golden Shiner		■							
Lake Chub	■	■	■	■	■	■	■	■	■
Largemouth Bass					■				
Longnose Dace					■				
Northern Pike					■				
Pumpkinseed					■				
Rainbow Smelt	■	■	■	■	■	■	■	■	■
Rainbow Trout		■				■	■	■	
Rock Bass	■	■	■	■	■	■	■	■	
Sculpin	■	■	■	■		■		■	■
Salvelinus spp.	■	■	■	■	■	■	■	■	■
Sea Lamprey									
Shorthead Redhorse							■		
Smallmouth Bass		■	■	■	■	■	■	■	■
Spottail Shiner	■	■	■	■	■	■	■	■	■
Stonecat		■	■	■	■	■	■	■	■
Tessellated Darter			■	■	■	■			
Threespine Stickleback	■	■	■	■			■		
Trout-Perch	■	■	■	■	■	■	■	■	
Walleye				■		■	■	■	■
White Bass	■	■						■	■
White Perch	■	■	■	■	■	■	■	■	■
White Sucker	■	■	■	■	■	■	■	■	■
Yellow Perch	■	■	■	■	■	■	■	■	■

relatively abundant in May and June. The temporal distribution patterns were typical for fish populations in eastern Lake Ontario: large catches during spring and the first part of summer, small catches during mid-summer, and secondary peaks in abundance during late summer and fall when YOY grew to catchable size.

Spatial distribution based on gill net catches indicated that fish were most abundant along the 15-foot depth contour and least abundant along the 60-foot contour. Catches along the 15-foot depth contour were usually smallest at the westernmost station (NMPW). Catches at the four stations along the 30- and 40-foot contours displayed no distinct abundance trends during spring and summer, although catches were usually larger at the easternmost stations (FITZ and NMPE) during fall. Catches along the 60-foot depth contour were largest at FITZ during 8 of the 9 months of the study but varied from month to month, displaying no consistent temporal trend. Overall, spatial distribution of gill-netted fish displayed no consistent trends with respect to the experimental and control areas. Trawl catches along the 20-foot contour were generally larger at stations NMPW and NMP/FITZ during May-August and at stations NMPW/FITZ and NMPE during September. Along the 40-foot contour, abundances were greater at stations NMPW and NMP/FITZ during April-September; along the 60-foot contour, they were largest at experimental transect NMP/FITZ during May-July and September and were equally large at control transects NMPW and NMPE in August. After September, trawl catches at all depth contours were small and sporadic. Beach seine annual mean catch rates were highest at experimental station NMP, primarily because of an extremely large catch of alewife during September. During May, June, and August when seine catches were also relatively large, the catch was larger at control transect NMPE than at the other three seining locations.

Overview of Year-to-Year Fisheries Results

TI (1979 in Independence 1992) provided the following summary of long-term results obtained during the 10-year (1969-1978) fisheries study period.

The temporal and spatial distribution of fishes in the vicinity of Nine Mile Point in Lake Ontario was monitored at varying levels of effort from 1969 through 1978. Preoperational and early postoperational studies (1969-1972) used bathymetric techniques, gill nets, and traps. Subsequent higher-intensity post-operational surveys (1973-1978) employed a combination of gear (gill nets, trawls, seines, and traps), depending on sample location and desired information. These studies examined data from a thermally influenced area and control regions to the east and west of the discharge area.

Fish community structure in the Nine Mile Point vicinity varied seasonally during any given year, changing from a simple system in winter and early spring to a more complex community in late spring, summer, and fall. Data provided by preoperational and postoperational studies indicated that the fish community in this area of Lake

Ontario is not very diverse; rather, for most of the year, it is dominated by one or two species and has a small number of other species in low and intermediate numbers. Seasonally, fish were collected in greatest numbers during the spring coinciding with the shoreward migration of the two most abundant species, alewife and rainbow smelt. Abundances typically decline during the warmer summer months and rise during the fall, corresponding to increased catches of YOY fish. During months in which alewives are most abundant, typically June through August, diversity values remain low. Diversity usually rebounded in the fall, coinciding with the offshore movement of alewives. During the 10-year study period, sampling in the vicinity of Nine Mile Point collected 72 fish species. During a typical sampling year, alewives comprised a majority of the total catch at lake stations, with rainbow smelt, spottail shiners, yellow perch, and white perch accounting for the majority of the remaining catch.

During the period from 1973 through 1978, the shore-zone fish community typically remained low in abundance and was dominated by YOY alewives. Cyprinids, primarily forage species such as spottail and emerald shiners, centrarchids, and white perch, comprised the other major community constituents. In the lake, fish concentrations were highest at the two easternmost transects and control transect NMPE and experimental transect FITZ, and lowest at control transect NMPW; typically, abundances at experimental transect NMP were intermediate between these high and low values.

Yearly gill net catch data for rainbow smelt, white perch, and smallmouth bass in the Nine Mile Point vicinity displayed no significant changes among years 1969-1978. Alewife abundances oscillated, displaying highest numbers in 1974 and 1976 and declining through 1977 and 1978; abundance trends based on gill net data generally mimicked the patterns displayed for impingement catches at the Nine Mile Point and Fitzpatrick plants. The yellow perch population declined from 1969 through 1974 but rebounded threefold in 1975, then declined slightly from 1977 through 1978. Data on gizzard shad indicated a generally increasing population in the Nine Mile Point vicinity through 1975 and a decline during 1977 and 1978; greatest concentrations were at the NMP and FITZ transects (in the vicinity of plant thermal discharges) during the fall. Salmonids such as brown trout, chinook, and coho salmon appeared infrequently in gill net catches through the years and typically reflected stocking intensity for any given year.

From 1969 to 1978, no incidents of cold-shock fish mortality due to plant shutdown at either the Nine Mile Point or the James A. Fitzpatrick stations were reported; nor have rare, endangered, or threatened fish species been collected in the Nine Mile Point area during the studies. In summary, comparisons by TI (1979 in Independence 1992) of temporal and spatial abundances based on catch-per-effort data as well as length-frequency distribution, age and growth, fecundity, gonad maturity, and diet analysis among experimental and control areas in the Nine Mile Point vicinity for 1969-1978 have revealed no distinct or consistent alterations to the normal seasonal life-cycle patterns of the fish community directly attributable to operations at the Nine Mile Point or James A. Fitzpatrick nuclear stations (TI 1979 in Independence 1992).

Impingement Studies

Impingement is the inadvertent trapping of juvenile and adult fish on the exterior face of intake water traveling screens. Samples are typically obtained from collection baskets installed to collect all the debris and fish when the traveling screens are washed. Impingement monitoring has been conducted annually at NMP Unit 1 since 1972, at JAF since 1975, and at the Oswego Steam Station (Units 1-6) during 1973-1976 and 1981-1984. This section provides information on the existing fisheries community in the Project area by presenting a historical impingement comparison for the 1976-1997 period at NMP Unit 1 and JAF in the Nine Mile Point vicinity based on biological monitoring reports prepared by EA (1991a, b in Independence 1992, 1992b, 1993b, 1994b, 1995b, 1996b, 1998a,c), and summary results of the intermittent Oswego Steam Station intake monitoring reported by LMS (1991 in Independence 1992).

Impingement Comparisons at NMP Unit 1 and JAF

Impinged fish have been collected annually at NMP Unit 1 since 1972 and at JAF since 1975. Impingement abundance (data from 1976-1997) is highest in the spring and peaks in May when about 37 and 35 percent of the impingement occurs at NMP Unit 1 and JAF, respectively (Table 17-21). The high abundance in spring coincides with the movement of fish (particularly alewife and rainbow smelt) to the shallow inshore areas to spawn. Migration inshore occurs when lake temperatures warm in spring to preferred species-specific temperature ranges; the timing may vary slightly every year. Impingement abundance decreases starting in June as adult fish move offshore after spawning. Impingement abundance then increases slightly in the fall (October, November, and December) as YOY fish (particularly alewife and rainbow smelt) attain a size more susceptible to impingement. Associated with the increase in impingement of fish in the fall and winter are specific meteorological conditions to which YOY seem particularly susceptible. Historically, strong winds from the west or northwest that cause strong wave action have resulted in short-term increases in impingement abundance at NMP Unit 1 and JAF.

Two additional factors affected impingement results in 1996 and 1997. First, the abundance of threespine sticklebacks began to increase during the fall and winter of 1996 (EA 1997a). The presence of threespine sticklebacks in the impingement samples continued to be high for the first 6 months of 1997, with the highest abundances noted in February (EA 1998a, 1998c). Threespine sticklebacks deterrence device was installed for testing on the intake structure at JAF and was operational from April 1 to July 15, 1997 when eight of nine sound projectors were operating (Dunning and Ross 1998 in EA 1998a).

Table 17-21: Total Monthly Impingement Estimates at Nine Mile Point Unit 1 and James A. Fitzpatrick Nuclear Stations, 1976-1997* (All Years Combined)

	NMP–Unit 1		JAF	
Month	Number	Percent	Number	Percent
January	402,792	4.8	440,873	3.5
February	795,856	9.5	1,071,403	8.5
March	287,417	3.4	327,810	2.6
April	1,893,283	22.5	1,237,965	9.9
May	3,081,685	36.6	4,450,413	35.2
June	350,920	4.2	1,198,906	9.5
July	151,799	1.8	636,166	5.0
August	88,547	1.1	381,085	3.0
September	88,954	1.1	240,313	1.9
October	326,706	3.9	425,222	3.4
November	549,403	7.1	509,209	4.0
December	397,359	4.7	1,724,417	13.6
Total	**8,414,721**		**12,643,782**	

Note: Extended plant outages occurred intermittently from 1976-1997, which influenced impingement.

*Impingement data from NMP – Unit 1 in 1996 were not obtained so they are not included in the monthly totals. All the JAF data and NMP – Unit 1 data from 1976-1990 are based on flow. NMP– Unit 1 data from 1991-1997 (excluding 1996) are based on average daily rate. SPDES Annual Biological Monitoring Reports for NMP-Unit 1 stated that estimated numbers of organisms impinged based on average daily impingement rate and on the rate of impingement adjusted for flow are similar for both methods of data expansion.

Sources: EA 1991a, b in Independence, 1992.
EA 1992b, 1993b, 1994b, 1995b, 1996b, 1998a, c.

Lifton and Storr (1977; cited in EA 1991a, b in Independence 1992) found statistically significant correlations between environmental factors (wave height, water temperature, and wind action) and impingement at power plants on Lake Erie and Lake Ontario. Wave height had a higher correlation than either of the other factors. They hypothesized that wave-induced turbulence and turbidity interfere with a fish's normal ability to detect and avoid an intake structure.

The total estimated impingement for 1976 at NMP Unit 1 and JAF (Table 17-22) accounted for 40 and 34 percent, respectively, of the total impingement over 22 years (1976-1997). The estimated alewife impinged at NMP Unit 1 in 1976 (3,060,589) comprised 53 percent of the total estimated impingement of alewife through 1997 (5,755,609) (Table 17-23). The estimated alewife impinged at JAF in 1976 (3,877,550) accounted for 51 percent of the total estimate alewife impingement through 1990 (6,847,736) (Figure 17-9) and from 1991 through 1997 (611,541) (Table 17-24) for a total from 1976-1997 of 7,459,277.

Table 17-22: Estimated Annual Impingement (Based on Flow) at Nine Mile Point Unit 1 and James A. Fitzpatrick Nuclear Stations, 1976-1997*

	NMP–Unit 1		JAF	
Year	**No.**	**Percent**	**No.**	**Percent**
1976	3,343,085	40.0	4,313,562	34.1
1977	134,247	1.6	333,343	2.6
1978	267,336	3.2	424,193	3.4
1979	244,229	2.9	244,229	1.9
1980	410,996	4.9	296,267	2.3
1981	162,563	1.9	527,260	4.2
1982	89,513	1.1	603,252	4.8
1983	140,923	1.7	115,994	0.9
1984	122,500	1.5	372,584	2.9
1985	1,132,485	13.6	595,969	4.7
1986	160,874	1.9	260,284	2.1
1987	189,215	2.3	164,382	1.3
1988	3,686	<0.1	167,069	1.3
1989	25,963	0.3	515,036	4.1
1990	240,272	2.9	157,916	1.2
1991	256,457	3.1	133,294	1.1
1992	46,215	0.6	7,025	0.06
1993	115,884	1.4	41,089	0.32
1994	82,358	1.0	194,393	1.5
1995	106,501	1.3	157,952	1.2
1996	Not obtained*	Not obtained*	1,787,800	14.1
1997	1,079,525	12.9	1,230,069	9.7
Totals	**8,354,827**		**12,642,962**	

Note: Extended plant outages occurred intermittently from 1976-1997 which influenced impingement.

*Impingement data from NMP – Unit 1 in 1996 were not obtained.

Sources: EA 1991a, b in Independence, 1992.
EA 1992b, 1993b, 1994b, 1995b, 1996b, 1998a, c.

Table 17-23: Estimated Impingement Abundance (by flow) for the Representative Important Species at Nine Mile Point Nuclear Station Unit 1–1976-1997[1]

Year	Alewife	Rainbow Smelt	White Perch	Yellow Perch	Smallmouth Bass	Salmonids	Totals
1976	3,060,589	136,151	5,522	3,346	272	188	3,206,068
1977	65,187	36,653	8,596	1,137	296	86	111,955
1978	67,311	74,962	8,830	8,951	320	102	160,476
1979	82,238	120,434	9,601	4,290	239	201	217,003
1980	306,615	61,865	6,203	1,789	118	8	376,598
1981	99,247	40,306	573	261	44	0	140,431
1982	11,271	59,921	1,209	305	21	8	72,735
1983	113,526	16,352	1,873	261	169	44	132,225
1984	51,504	52,764	2,609	217	184	13	107,291
1985	1,031,489	72,709	4,402	662	73	52	1,109,387
1986	108,309	39,517	1,025	179	369	97	149,496
1987	89,553	89,234	972	168	62	63	180,052
1988	1,054	1,009	46	9	32	0	2,150
1989	6,415	11,351	828	99	103	7	18,803
1990	159,364	41,989	1,599	178	532	60	203,722
1991	215,091	25,934	1,250	294	188	120	242,877
1992	28,099	9,016	218	868	97	17	38,315
1993	105,146	4,607	675	170	285	62	110,945
1994	60,973	5,796	315	270	289	175	67,818
1995	62,852	7,859	269	120	157	155	71,412
1996	Not obtained	Not obtained	Not obtained	Not obtained	Not obtained	Not obtained	Not obtained
1997	29,776	7,134	752	83	907	57	38,709
Totals	**5,755,609**	**915,563**	**57,367**	**23,657**	**4,757**	**1,515**	**6,758,468**
Percent[2]	**68.9**	**11.0**	**0.7**	**0.3**	**<0.1**	**<0.1**	

[1] Impingement data from NMP – Unit 1 in 1996 were not obtained.

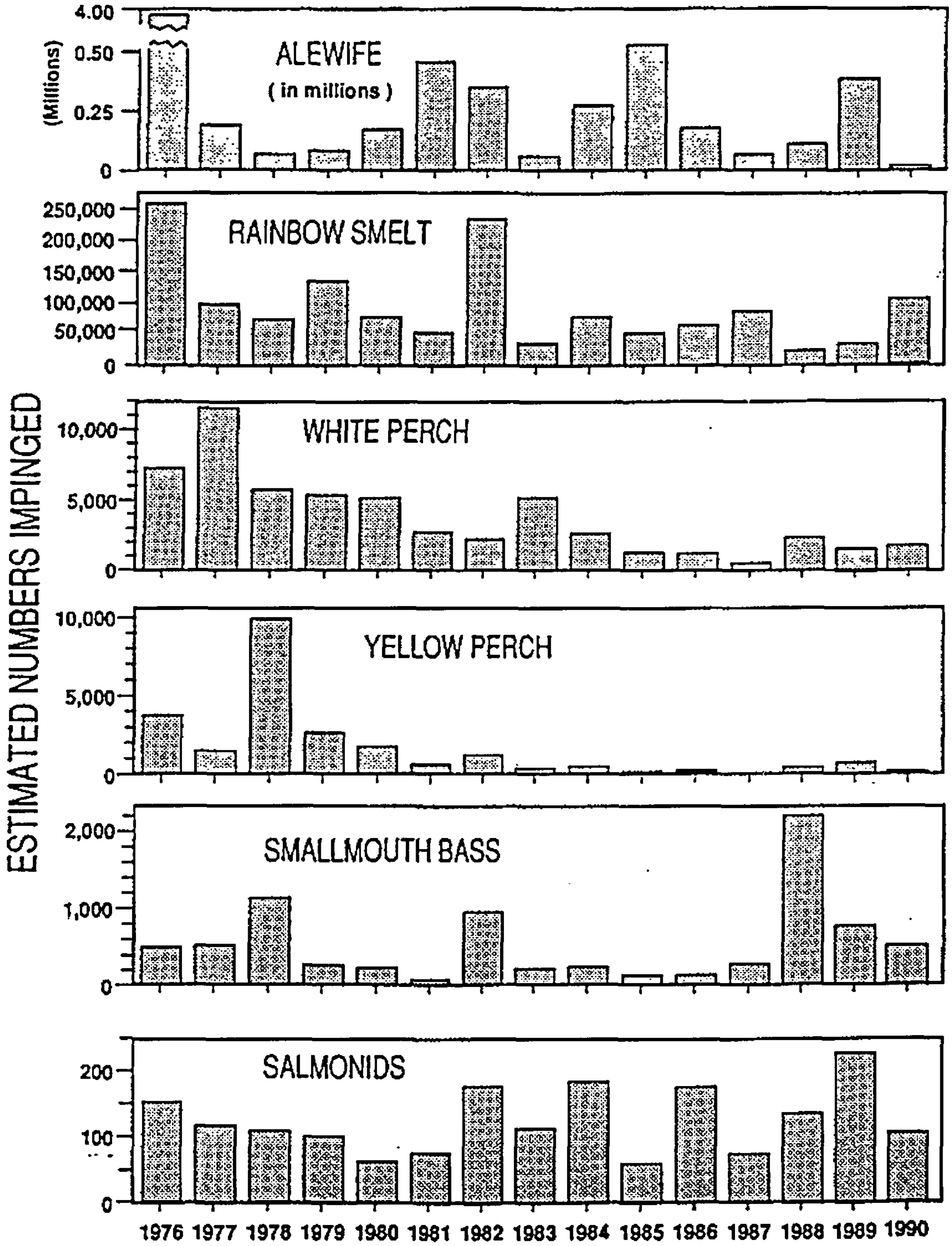
[2] Percent of total estimated impingement abundance (8,354,827) for 1976-1997.

Sources: EA 1991a in Independence 1992.
EA 1992b, 1993b, 1994b, 1995b, 1996b, 1998c.

Table 17-24: Estimated Impingement Abundance (by flow) for the Representative Important Species at James A. Fitzpatrick Nuclear Station – 1991-1997

Year	Alewife	Rainbow Smelt	White Perch	Yellow Perch	Smallmouth Bass	Salmonids	Totals
1991	75,734	37,105	1,320	588	266	155	115,168
1992	1,312	2,165	51	198	64	14	3,804
1993	21,423	7,562	274	354	608	123	30,344
1994	74,544	97,019	508	192	1,201	79	173,543
1995	83,558	29,012	243	103	630	252	113,798
1996	346,558	29,248	549	436	358	224	377,373
1997	8,412	4,452	143	124	119	15	13,265
Totals	**611,541**	**206,563**	**3,088**	**1,995**	**3,246**	**862**	**827,295**

Sources: EA 1992a, 1993a, 1994a, 1995a, 1996a, 1997a, 1998a.



SOURCE: EA 1991 B in Independence 1992

Figure 17-9
Estimated Impingement (Base Flow) for Selected Species, 1976-1990 at James A. Fitzpatrick Nuclear Power Plant (Independence 1992)

Since 1976-1977, Lake Ontario winters have been milder than normal and no catastrophic die-offs of alewives of the magnitude of 1976 have been recorded. Several smaller die-offs have been noted, e.g., 1983 and 1986 (O'Gorman et al. 1988 unpublished in Independence 1992). A large impingement of alewife at NMP Unit 1 (approximately 1 million) and JAF (approximately ½ million) occurred in the spring of 1985 just prior to the winter die-offs of 1986. Additionally, the annual salmonid stocking program, begun in 1978, may have contributed to a lakewide reduction in abundance of alewife due to increased predation by the salmonids.

The severe winter of 1976-1977 also affected the rainbow smelt populations as is evident in 1976 and 1977 impingement estimates shown in Table 17-19 and Figure 17-11. In addition, rainbow smelt are subject to lakewide population fluctuations that appear to be caused in part by cannibalism of young by adult smelt and by predation on adult smelt by stocked salmonids (O'Gorman et al., 1990 unpublished; cited in EA 1991a, b, in Independence 1992). When interpreting impingement data on rainbow smelt, lakewide patterns in population fluctuations are difficult to ascertain due to the strong influence of meteorological conditions that occur during sample collections. As previously discussed, strong west or northwest winds with a continued increase in wave action results in short-term increases in impingement abundance with wave height correlated at a higher level (Lifton and Storr 1977 cited in EA 1991a, b in Independence 1992). These conditions occur on Lake Ontario particularly in January, November, and December and could cause an increase in the impingement abundance of YOY rainbow smelt at a time prior to their recruitment into the lake population (i.e., late summer and fall of the year spawned). The abundance of rainbow smelt in the impingement collections may then appear high at a time when the lakewide population of rainbow smelt is exhibiting a reduction in overall population size.

The estimated impingement of white perch, yellow perch, smallmouth bass, and salmonids (Tables 17-22, 17-23 and Figure 17-9), species of interest due to their significance as forage or sport fish, are shown for 1976-1997. Fluctuations in their abundances appear to be attributable primarily to natural fluctuations of individual populations and localized meteorological occurrences influencing the impingement process.

Timing and duration of station outages for refueling and maintenance also influenced impingement abundance and species composition. During extended maintenance and/or refueling outages, the operation of the main circulating water pumps is generally reduced to one or two of the three existing pumps. The concurrent reduction in flow through the intake generally results in a reduction in impingement abundance and species diversity during the outage.

Overall, alewife has been the most abundant species in impingement collections (Tables 17-22, 17-23 and Figure 17-9). Alewife and rainbow smelt combined have accounted for 80 percent of all fish estimated impinged from 1976 to 1997 at NMP Unit 1. Other species that have been dominant include threespine stickleback, white perch, spottail shiner, gizzard shad, trout-perch, and sculpin.

Natural biological factors such as population size, migration patterns, schooling, and spawning behaviors, in conjunction with external environmental factors such as water temperatures, currents, and localized meteorological conditions, can play an important role in seasonal variations in species occurrence or absence. It appears that changes in relative abundance of fish populations in the vicinity of NMP Unit 1 and JAF are the result of natural fluctuations in abundance. When these fluctuations are larger, they can be detected in the annual estimates of fish impinged. Most often, the impingement abundance numbers are influenced by station operation conditions and localized short-term meteorological conditions. No long-term trends in fish population abundance due to impingement have been apparent.

In conclusion, the species impinged at NMP Unit 1 and JAF have remained similar from year to year. The number of fish impinged is strongly related to water temperature, schooling and spawning behavior, and seasonal variations. Fluctuations in fish abundance in impingement samples reflects the biology of the species and their interactions with variable meteorological conditions and the operations schedule of the power plant. Impingement of fish at NMP Unit 1 and JAF appears to have little effect on species composition or the size of fish populations in the vicinity of the NMP Unit 1 and JAF power plants (EA 1991a, b in Independence 1992, EA 1992a,b, 1994a,b, 1995a,b, 1996a,b, 1997a, 1998a,c). No rare, endangered, or threatened fish species were collected during 1976 to 1997.

Impingement Studies at Oswego Steam Station

An annual impingement monitoring program was conducted at the Oswego Steam Station Unit 5 intake from September 1975 through August 1976, and a 4-month study was conducted from November 1982 through February 1983 (LMS 1991 in Independence 1992). Considering only the 1975-1976 program, which covered 12 months, the dominant species impinged was alewife with 38,733 specimens (75.8% of the total fish impingement of 51,089). Threespine stickleback was the second most abundant, with 7,444 specimens (14.6% of the total); rainbow smelt was the third, accounting for 2,369 individuals (4.6% of the total). During the 4 months (November-February) in common between the 1975-1976 and 1982-1983 studies, the dominant species collected was rainbow smelt (31.7% of the 1975-1976 estimated total of 14,047 and 96.3% of the 1982-1983 estimated total of 35,224). Overall, with the exception of the rainbow smelt, estimated impingement was greater during 1975-1976 compared to 1982-1983.

Unit 6 of the Oswego Steam Station had impingement and diversion flow sampling programs conducted from April 1981 through March 1982, and April 1982 through March 1983 (LMS 1991 in Independence 1992). Studies were also conducted from April 1983 through March 1984 and January through December 1991 (LMS 1992). Two taxa, alewife and rainbow smelt, dominated the total estimated fish entrapped at the Oswego Steam Station Unit 6 intake (Table 17-25). The remaining major species of the studies were gizzard shad, emerald shiner, white perch, spottail shiner, and mottled sculpin.

During the first year of monitoring (April 1981 – March 1982) rainbow smelt was the dominant species entrapped, accounting for 45.5 percent of the total; alewife (40.9% of the total) ranked second. Alewife was the dominant species entrapped during the next two annual monitoring periods, accounting for 52.7 percent and 41.2 percent of the annual totals, respectively. Rainbow smelt ranked second in total annual abundance during 1982-1983 and 1983-1984, representing 31.9 percent and 39.0 percent of the two annual totals, respectively.

With a nonoperational bypass system, angled-screen impingement from 1991 is equivalent to total unit entrapment from the 1981-1984 studies. Alewife was the dominant species impinged during 1991 (69,470 individuals), representing 87.8 percent of the total; rainbow smelt ranked second (7,766 individuals), accounting for 9.8 percent of the total.

Results of the impingement monitoring programs at the Oswego Steam Station indicate that alewife is the dominant species potentially impacted by cooling water withdrawal from Lake Ontario, followed by rainbow smelt. Overall, the two top species account for 70 to 90 percent of the annual total plant impingement. Impingement for both species is greatest in spring, when the populations that overwinter in deep, offshore waters migrate to the warmer, nearshore zone to feed and spawn.

Impingement Summary

Fisheries and impingement studies on Lake Ontario in the vicinity of the Project site within the Oswego-Nine Mile Point area have quantified the abundance, distribution, and composition of the fish community. Most of the fish collected in these surveys are prey species, particularly alewife and rainbow smelt. Adult and juvenile representatives of important salmonid, centrarchid, esocid, percid, and ictalurid sport fishes are far less abundant, usually averaging less than 0.1 percent of total community abundance. Table 17-18 provides a summary of the existing fish community by listing the species of fish collected during the sampling efforts discussed in the vicinity of the Project site within the Oswego-Nine Mile Point area of Lake Ontario.

Table 17-25: Oswego Steam Station Unit 6 Estimated Entrapment

	April 1981 – March 1982		April 1982 – March 1983		April 1983 – March 1984		January-December 1991[a]	
Species	Total Unit Entrapment	Entrapment % of Total	Total Unit Entrapment	Entrapment % of Total	Total Unit Entrapment	Entrapment % of Total	Total Unit Entrapment	Entrapment % of Total
Alewife	320,574	40.9	128,198	52.7	54,609	41.2	69,470	87.8
Rainbow smelt	356,272	45.5	77,626	31.9	51,751	39.0	7,766	9.8
Mottled sculpin	8,599	1.1	3,177	1.3	6,127	4.6	356	0.4
Spottail shiner	8,583	1.1	4,088	1.7	12,738	9.6	562	0.7
Gizzard shad	24,271	3.1	1,917	0.8	628	0.5	56	0.1
White perch	12,752	1.6	6,029	2.5	625	0.5	239	0.3
Emerald shiner	19,495	2.5	3,016	1.2	125	0.1	194	0.2
Total	**783,716**		**243,110**		**132,593**		**79,129**	

[a]Diversion bypass system not operating: impingement equals total entrapment.
IMP = Impingement.
ENT. = Entrapment.
Source: LMS, 1992.

Representative Important Species

Contact was made with the NYSDEC Steam-Electric Unit (Calaban 1999) to determine the Representative Important Species (RIS) for preparation of fisheries evaluations for the proposed Project. As used for Nine Mile Point and Fitzpatrick nuclear plants, the following species were agreed upon: alewife, rainbow smelt, white perch, yellow perch, smallmouth bass, and salmonids. Descriptive and life history information (Hubbs and Lagler 1958; Smith 1985; Willers 1991) on these RIS is presented below.

Alewife

Alewife are an anadromous species with landlocked populations. Alewife have a compressed body and wedge-shaped cross-section with a deeply forked caudal fin. Landlocked populations average 5 inches in length while sea-run individuals attain 15 inches. The alewife is a schooling fish that lives in open water and moves into the shallows to spawn. Landlocked populations tend to move inshore during the night and offshore during the day. In addition, in Lake Ontario, alewife move into water 150 to 300 feet deep in the fall and early winter and remain there until March. Spawning along Lake Ontario occurs in late June to early July over sand, gravel and stones in tributary streams. Lake Ontario fish had egg counts of 11,147 to 22,407. The eggs are semidemersal and slightly adhesive, hatching in about 4 days. Peak spawning activity appears to occur between water temperatures of 52 to 70°F. Males mature at 1 year and a little under 4 inches and females at 2 years and slightly over 4 inches in length. Alewife are opportunistic planktivores and feed on fish eggs, microcrustaceans, gammarids, and insects, particularly midges.

Rainbow Smelt

Rainbow smelt are a pale, slender and elongate fish often initially confused with some kind of minnow. Adults attain lengths averaging 7 to 8 inches. Smelts are anadromous, and populations in the Great Lakes are landlocked, with spawning occurring in tributary streams. Smelt live near the thermocline during summer and rarely venture below 200 feet. Spawning occurs in February or March at water temperatures about 48°F. Fish move into streams at night and return to the lake by day. Number of eggs produced varies with size, with a 9-inch female found to have 43,125 eggs and a 4.5-inch female having 5,893 eggs. Eggs are adhesive and hatching occurs in 7 to 9 days at waters 55 to 64°F. Adults eat amphipods, oligochaetes, insect larvae, and *Mysis* sp. The smelt lifespan is typically no more than 4 years.

White Perch

White perch are a deep bodied, compressed, and tapered temperate bass without longitudinal stripes. White bass average about 1 pound in weight and are generally less than 12 inches long. White perch can tolerate a range of salinity and turbidity and have been known to have daily movements onshore at night and offshore during the day. It is likely the species was introduced or invaded Lake Ontario in the mid 1900s. Spawning occurs in May and June and peaks at water temperatures between 64 and 68°F. Preferred spawning habitat is sand and gravel. Ovarian egg counts have ranged from 15,740 to 247,681 according to female size. Eggs are small, demersal and adhesive and hatch in 4 days at 59°F. Average life span is about 6 years but individuals living to 16 years have been reported. Small white perch feed predominantly on copepods as well as midge larvae, *Gammarus*, and *Cyathura*. Fish eggs are an important food item from May through July. White perch larger than 7 inches feed mainly on fish.

Yellow Perch

The yellow perch is an elongate, slightly laterally compressed fish with a pattern of dark vertical bars on a yellow or greenish-yellow background. Adults generally run 10 to 12 inches and 1 to 2 pounds. Yellow perch often travel and live in small schools where they are most commonly found near vegetation in lakes and occasionally in streams. They are found throughout New York State. Spawning takes place in the spring, typically when water temperatures reach 45 to 52°F. Males move into shallow water prior to females and then spawning occurs in water 5 to 10 feet deep over sand, gravel, rubble or vegetation. The eggs are laid in zig-zag rows cemented together with a gelatinous material. An egg mass can be as long as 7 feet and 2 to 4 inches wide containing 2,000 to 90,000 eggs (a mean of 23,000). Hatching takes 8 to 10 days and individuals can live to 9 years. Juvenile and small adults feed on cladocerans, ostracods, and midge larvae while older fish shift to insects, crustaceans, and other fish. Feeding occurs on the bottom as well as midwater.

Smallmouth Bass

Smallmouth bass are rather elongate with robust bodies, being less compressed than other sunfishes of New York. Smallmouth bass have 8 to 11 vertical bars against a greenish bronze to brown background with dirty white underbellies. Bass typically grow to 3 to 5 pounds, although the state record is 9 pounds. In lakes, smallmouth bass tend to inhabit shorelines with rocky substrates and considerable shelter. Smallmouth spawn in the spring when water temperatures reach 62 to 66°F, typically constructing a nest in gravelly substrates in waters 2 to 20 feet deep but averaging 3 feet deep. Males construct and guard the nest, often spawning with more than one female. Hatching takes 7 to 16 days, and for a short period after hatching the male continues to guard the nest and herd the larvae. Smallmouth are voracious predators and feed on tadpoles, frogs, insects, and fish. Small individuals feed on plankton and invertebrates and switch to larger prey as they grow. As predators, bass compete with salmonid species for forage as well as consuming salmonids.

Salmonids

The two most common salmonids in the waters near the Project site, as reported from impingement studies at Nine Mile Point and Fitzpatrick, are lake trout and brown trout. Lake trout have a streamlined body with a deeply forked tail and color pattern of white spots on a silvery-gray background. Lake trout are usually found at or near the bottom of well-oxygenated lakes where water temperatures seldom exceed 50°F. Excursions above the thermocline are rare and brief. Lake trout spawn between September and early December, usually in water between 15 and 100 feet. Spawning takes place over rock and rubble 2 to 4 inches in diameter with no fine sediments. Rocky reefs in lakes are preferred locations. The eggs are broadcast and hatching takes 4 months, with the young remaining on the spawning beds for another month before moving into deeper water in mid-May. Females produce 400 to 1,200 eggs per pound of body weight, with a 32-inch fish laying about 18,000 eggs. Maturity is reached at age 6, or when fish are about 14 to 17 inches in length. Newly hatched lake trout feed on zooplankton and then switch to insects, opposum shrimps, scuds and small fish in young trout. Adults feed predominantly on fish with ciscoes and whitefish favorite prey, but smelt, alewife, perch, and minnows are also consumed.

Brown trout have a moderately forked tail, dark spots on a light background, and unlike Pacific salmon, have fewer than 13 anal fin rays. Typical brown trout weigh up to 2 pounds, although the New York record is 22 pounds. Although primarily a stream fish, brown trout live in lakes where water temperatures do not exceed 68°F. An introduced species in New York and many other parts of the world, brown trout are common throughout much of the state. Brown trout spawn in fall and early winter, with the female creating a nest by fanning the silt out of gravel beds. Spawning occurs repeatedly over several days. The eggs are small for salmonids and numbers produced vary widely depending on female size, condition, and location. Typical range for egg production is 200 to 1,800 for females in their first through seventh sexually mature years. Hatching takes 148 days at 36°F and 33 days at 52°F. Young fish emerge from the gravel in the spring and are about 4 inches by the end of the first summer. Maturity is reached at age 2 to 4 for males and 3 to 5 for females. Life span does not typically exceed 18 years. Larvae and fry feed on small bottom organisms such as insect larvae, amphipods, and crustaceans. Larger fish eat larger prey, such as tadpoles and other fish.

Threespine Stickleback

Although not a RIS, threespine stickleback have recently been reported in abundance from impingement sampling at Nine Mile Point nuclear plant. The causative factors and meaning of this finding remain unclear. The threespine stickleback is a small fish, seldom reaching more than 50 millimeters (mm) in length. The body is rather stubby, deep and compressed with a narrow caudal peduncle with lateral keels. Three isolated spines are associated with the dorsal fin. The threespine stickleback occurs over a range of salinities and is common in Lake Ontario, preferring weedy areas over sand or flocculent bottoms in shoreline areas. The male builds an elaborate barrel-shaped nest and a courtship ritual ensues, often with several females. Females usually produce fewer than 100 eggs, which are jealously guarded by the male. Straying fry are brought back to the nest. Sexual maturity is reached in the first summer and they spawn at age 1+. Few fish live past the third summer. The stickleback is a pipette feeder and eats a variety of small prey including zooplankton, insects, and fish eggs and fry.

Commercial/Recreational Species

Populations of several valuable commercial species have declined to insignificant levels or have become extinct in Lake Ontario. Abundant native stocks of Atlantic salmon declined rapidly during the late 1800s and were last recorded in a tributary of Lake Ontario in 1896. Lake sturgeon declined to commercially insignificant levels by the turn of the century. The commercial fisheries for lake trout and burbot virtually disappeared by 1950, and populations of commercially important blue pike and walleye also collapsed. Other commercially valuable species such as lake whitefish and lake herring declined in abundance, eliminating them from United States commercial catches.

The present commercial fishery in the New York waters of Lake Ontario continues to consist of a relatively small inshore fishery confined primarily to the Chaumont Bay area (northeastern Lake Ontario) and the adjacent waters of the open lake in southeastern Lake Ontario. In 1996, the harvest of 69,837 pounds (31,744 kilograms) valued at $69,994 was near the record low level of 1995. Less than 8 percent of the total harvest was caught outside Chaumont Bay district. Species included yellow perch, brown bullhead, freshwater drum, white perch, sunfish, rock bass, catfish, crappie, and whitefish (Cluett 1996).

More important than the commercial fishery is the Lake Ontario sport fishery. The recreational fishery, mainly for salmon and trout, consists of boat, shore and tributary angling fisheries in both New York and Ontario (Stewart et al. 1999). Through the cooperative stocking and management efforts between the NYSDEC, the USFWS, and the Ontario Ministry of Natural Resources (OMNR), a popular and economically valuable salmonid sport fishery has developed in Lake Ontario. Nearly 3.6 million salmon and trout are scheduled for stocking by New York State into Lake Ontario each year (Eckert 1999). Since 1970, Lake Ontario has been stocked primarily with five salmonid species. Coho salmon, chinook salmon, brown trout, and rainbow/steelhead are stocked to provide put-grow-and-take fisheries. Lake trout are stocked to rehabilitate a formerly important Lake Ontario predator in a continuing effort to redevelop a self-sustaining population. In addition to the five primary salmonid species, Atlantic salmon are also stocked to provide a reduced fishery and presence since preliminary studies have shown that the goal of self-sustained stocks of landlocked strain Atlantic salmon cannot be maintained (LeTendre 1991). In 1993, after extensive public consultation, NYSDEC and OMNR reduced salmon and trout stocking levels in order to try to balance the demands that these predator species place on the lake's observed reduced biomass of pelagic prey fish (Stewart, et al. 1999). Stocking levels were then moderately increased in 1997 following further extensive public consultation (Schaner and Lantry 1999). Total annual expenditures of anglers participating in Lake Ontario recreational fisheries were estimated at $71 million for the New York waters in 1996 (Connelly et al. 1997 in Stewart, et al. 1999).

17.5.2.3 Plankton

Ichthyoplankton

Year-class strength is considered to be established through spawning success and survival of fishes during the first year. Determining the effects of environmental changes on ichthyoplankton populations is, therefore, of primary importance in assessing potential changes in fish populations. Information on ichthyoplankton populations is particularly important in assessing potential effects of Project water use and discharge because these early life stages are susceptible to entrainment and thermal stress.

The distribution of ichthyoplankton in a lake varies with spawning success, horizontal and vertical movements of organisms, currents, wind and wave action, and contributions of specimens from tributaries. This variability, coupled with the patchy distribution and rapid development of individual species, gave direction to the intensive sampling programs in the Oswego-Nine Mile Point study area to develop baseline information on the ichthyoplankton populations.

Ichthyoplankton studies in the Project vicinity were conducted as part of the 1978 Nine Mile Point Aquatic Ecology Studies (TI 1979 in Independence 1992). Ichthyoplankton samples were collected by horizontally towing a 3.2-foot (1 m) Hensen net with 571 micrometer (μm) mesh at subsurface mid-depth, and off-bottom strata at sampling locations illustrated on Figure 17-8. Summaries of the studies are presented below.

Species Composition

Samples from Lake Ontario in the vicinity of Nine Mile Point in 1978 yielded five taxa of eggs and 20 taxa of larvae (prolarvae [yolk-sac stage] and postlarvae [post yolk-sac stage] combined) (Table 17-26). The highest diversity (number of taxa) of ichthyoplankton occurred during June and July when 15 taxa were present. After mid-September, only alewife larvae were captured in the study area; no eggs or larvae were observed in December samples.

Temporal Distribution

Fish eggs of five taxa were collected in the study area from May 2 through August 14, 1978. Rainbow smelt eggs, which are adhesive and demersal, were collected only during May; average site densities were always less than one egg per 35,000 cubic feet (1,000 cubic meters) of water sampled. Similarly, very few eggs of *Morone* spp. and carp were collected, the former being captured in late May and early June and the latter observed in June and late July.

Alewife eggs were present from mid-June through mid-August, accounting for 99 percent of the fish eggs collected in 1978. Egg densities peaked during night sampling on July 24-25 when average site density for alewife eggs was slightly more than 160 eggs per cubic meter (35 cubic feet). Alewife egg densities were usually higher in night than in day samples, perhaps the result of greater spawning activity during the night. The low catches for the other species exhibited no day/night trends.

Larvae were present in ichthyoplankton samples from early April through late November 1978. Only prolarvae were collected during April, but both prolarvae and postlarvae were common from May through mid-August. After mid-August, alewife postlarvae dominated ichthyoplankton samples.

Highest densities of larvae (all species of prolarvae and postlarvae combined) were observed during July and August; however, two minor peaks occurred prior to July (Figure 17-10) as a result of the sequential spawning of several species. The first minor peak was due primarily to yellow perch, which accounted for 99 percent of the postlarvae collected on May 22. The second minor peak occurred in mid-June when rainbow smelt and *Morone* spp. larvae densities were at their highest. After June, alewife larvae completely dominated the ichthyoplankton population, accounting for most of the prolarvae and almost all of the postlarvae collected from July through November. Larvae densities decreased rapidly during late August, and no larvae were collected (Figure 17-10) after November.

Table 17-26: Seasonal Occurrence of Fish Eggs and Larvae Collected in Vicinity of Nine Mile Point, Lake Ontario, April-December* 1978

	April				May					June				July				August					September				October				November				
Species	**1[1]**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**5**
Alewife											E[2]	E	E	E	E	E	E	E	E	E															
											L[2]	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	
Bluegill																						L													
Burbot		L	L	L	L																														
Carp										E	E		E				E																		
										L	L	L	L	L	L	L	L	L	L	L															
Clupeidae[3]														L	L	L	L	L	L	L	L	L	L	L											
Freshwater Drum											L				E									L											
Goldfish										L	L	L		L		L	L		L																
Gizzard Shad											L					L	L																		
Lake Herring		L	L	L				L																											
Minnows[4]										L	L	L	L	L	L	L	L	L	L																
Morone spp.[5]								E		E																									
								L		L	L	L	L	L	L	L	L	L	L	L															
Rainbow Smelt					E		E	E																											
					L		L	L	L	L	L	L	L	L	L	L			L		L	L		L	L										
Sculpins[6]											L	L	L	L	L	L	L	L	L	L															
Spottail Shiner																	L																		
Sunfishes											L	L		L	L		L	L																	
Tessellated Darter[7]											L		L	L	L	L	L	L	L																
Threespine Stickleback													L	L	L																				
Trout-Perch											L	L	L	L	L																				
White Perch											L	L																							
Yellow Perch							L	L	L	L	L	L																							

*No ichthyoplankton caught during December.

(1) Weeks of the month.

(2) E = eggs, L = larvae (prolarvae and postlarvae combined).

(3) Most Clupeidae are probably alewife.

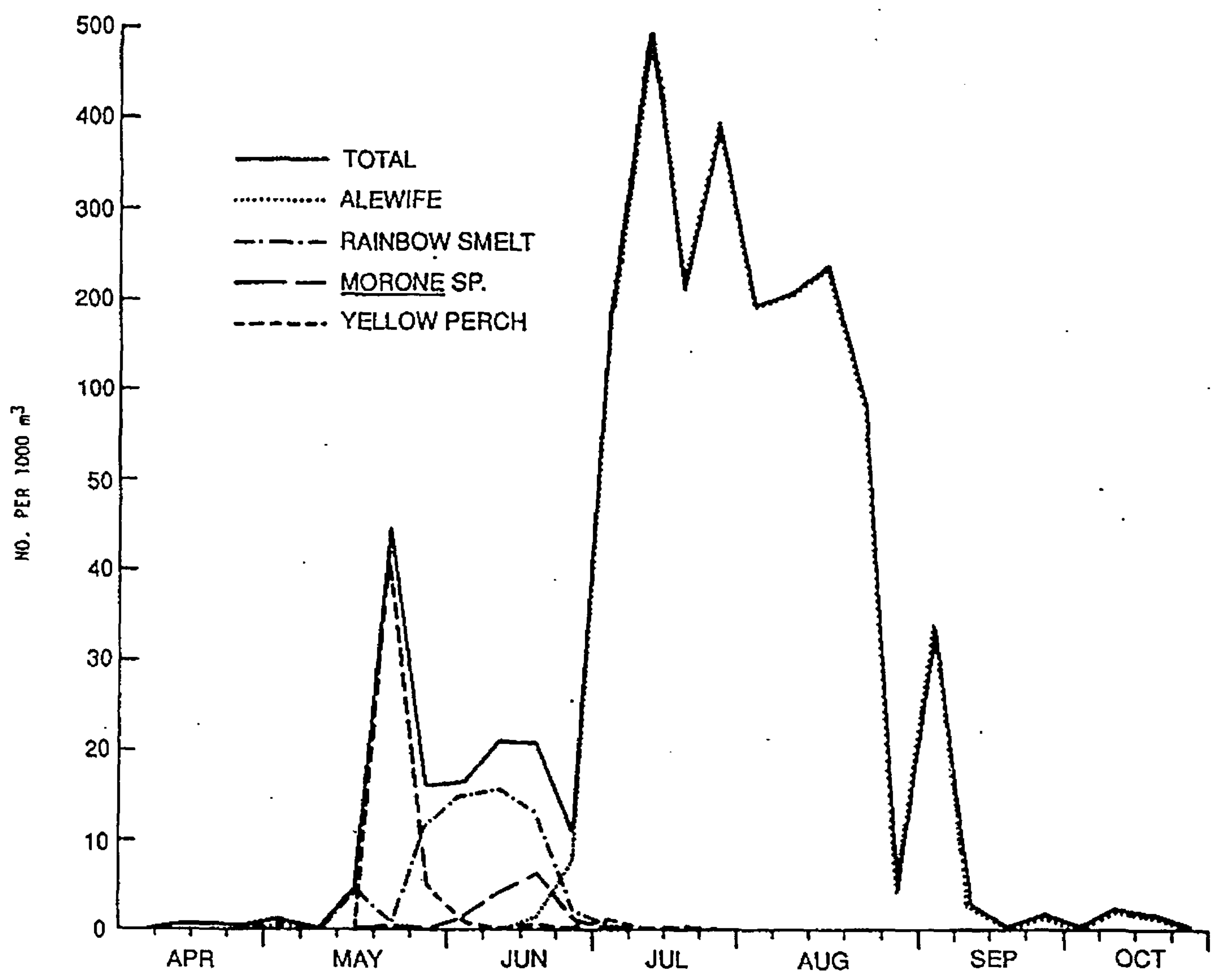
(4) Includes species of Cyprinidae, except carp and goldfish.

(5) Most *Morone* spp. are probably white perch.

(6) Includes the mottled sculpin and a few slimy sculpins.

(7) Includes tessellated and johnny darters, previously considered as subspecies and reported under the name of johnny darter in earlier Nine Mile Point studies.

Source: TI 1979 in Independence 1992.



SOURCE: TI 1979 in Independence 1992

Figure 17-10
Daytime Temporal Distribution of Larvae in Vicinity of Nine Mile Point, Lake Ontario, April-September

Day/night sampling indicated that larvae densities were generally higher at night based on total catch (all species combined) and on catches of alewife larvae, the most abundant taxa during the summer months. There was also a distinct day/night difference in the catches of several species that were not very abundant in the area; these species, including sculpin, tessellated darter, and trout-perch, were frequently present in night collections but often were not found in day samples. These day/night differences reflect both diel movement or behavior patterns and daytime gear avoidance.

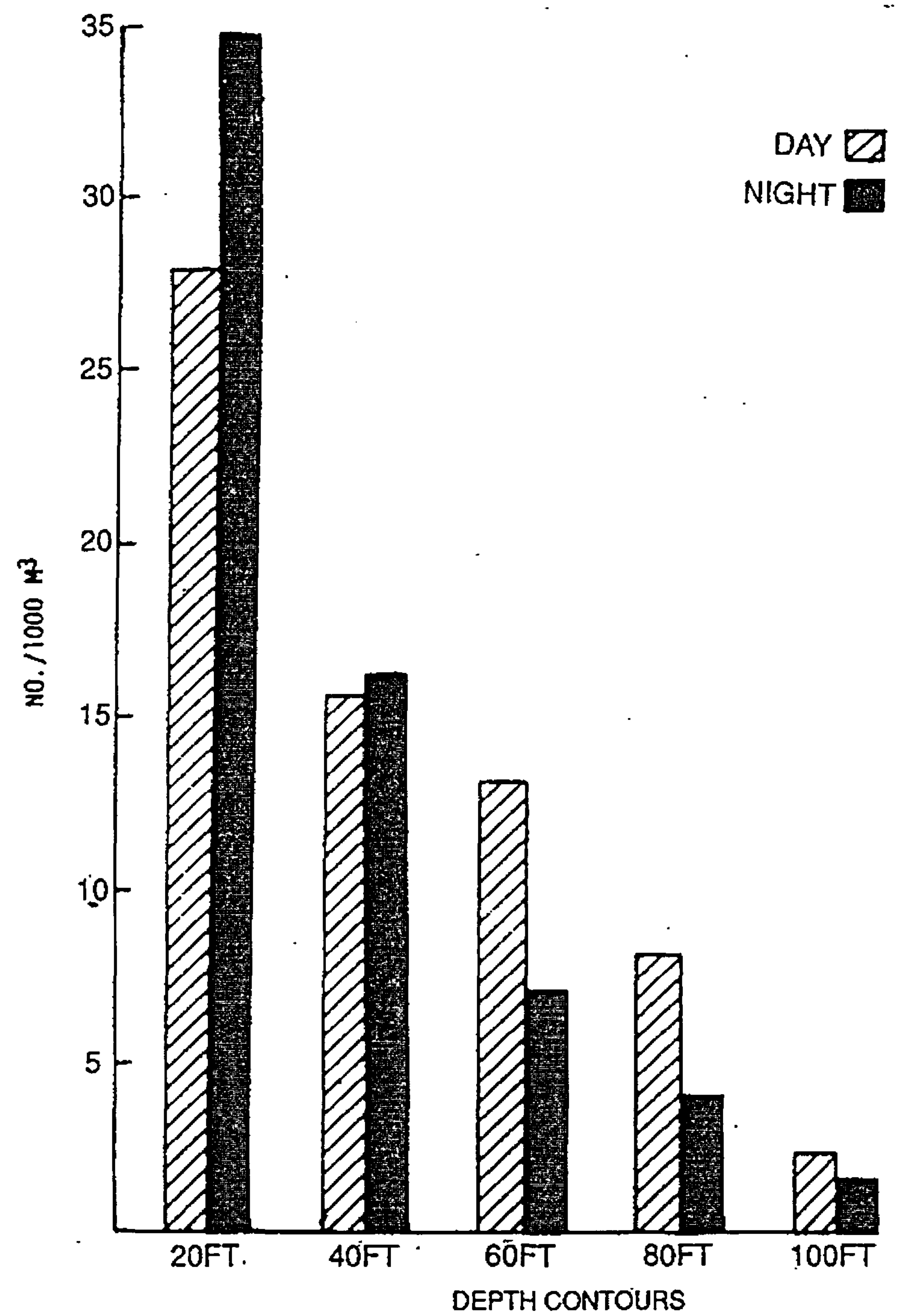
Spatial Distribution

The small catches of eggs prevented analysis by TI (1979 in Independence 1992) of spatial distribution except for alewife. Alewife eggs were consistently more abundant along the 20-foot than the 40-foot depth contour during night sampling; also, egg densities were highest at the stations to the west of the power plants (upcurrent of the intake and discharge structures) along both the 20-foot and 40-foot depth contours. Alewife egg distribution exhibited no consistent trend with respect to the 3-depth (surface, mid-depth, and bottom) strata.

Data collected from June through mid-September 1978 were used by TI (1979 in Independence 1992) to illustrate the spatial distribution of fish larvae within the study area, because both day and night data were available and total larvae densities were highest during this period. Prolarvae are purely planktonic while postlarvae attain the ability to maintain or change their position in a moving water medium as they develop.

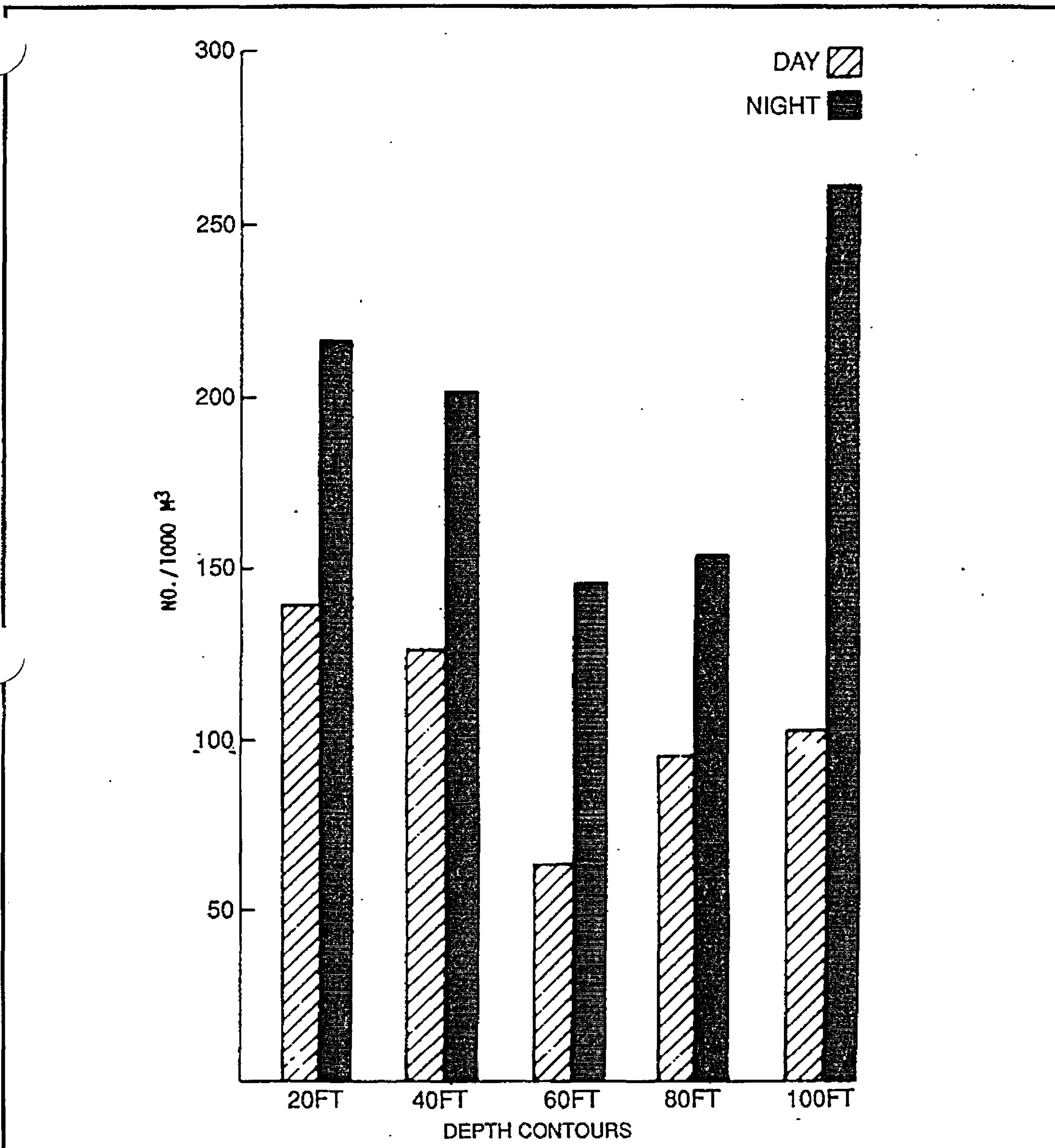
Densities of prolarvae (all species combined) decreased from the 20-foot to the 100-foot contour (Figure 17-11). This trend was uniform both day and night. Although postlarvae catches were somewhat greater at the 100-foot contour during night sampling, postlarvae densities overall were relatively equal at all contours during both day and night sampling (Figure 17-12). The lowest postlarvae densities were observed at the 60-foot contour during both day and night. As observed during earlier studies in the area, the larvae of species common in the study area, including rainbow smelt and alewife, move farther offshore as they mature.

From June through August, when larvae were most abundant, both prolarvae and postlarvae were usually more abundant in surface than in mid-depth and bottom samples. Alewives usually accounted for more than 90 percent of the catches during this period. Prior to the influx of the alewives, rainbow smelt larvae were usually most abundant, their densities being generally highest in the bottom or mid-depth water strata. No pattern was observed in the vertical distribution of yellow perch larvae.



SOURCE: TI 1979 in Independence 1992

Figure 17-11
Distribution of Total Prolarvae Densities in Vicinity of Nine Mile Point, June through Mid-September 1978



SOURCE: TI 1979 in Independence 1992

Figure 17-12
Distribution of Total Postlarvae Densities in Vicinity of Nine Mile Point, June through Mid-September 1978

Overview of Year-to-Year Ichthyoplankton Results

TI (1979 in Independence 1992) provided the following summary of long-term results obtained during the 6-year, 1973-1978, ichthyoplankton study period.

Egg collections, which included up to six species during any 1 year, were consistently dominated by alewife and rainbow smelt; the eggs of other species were collected infrequently and/or in relatively low numbers. Larval samples, also dominated by alewife, included up to 22 species in a given year. Although yellow perch and *Morone* spp. (white bass and white perch) larvae were consistently present over the years, they and other species generally occurred either in low numbers or were collected infrequently during each year. These data indicate that significant spawning in the study area is limited to the two introduced species, alewife and rainbow smelt, and that the Nine Mile Point area is not a major spawning habitat for the majority of the Lake Ontario fish community.

Two major periods of egg and larval occurrence and abundance were observed in the Nine Mile Point vicinity during each of the 6 years studied: a spring peak in late April or early May and a summer peak during July-August. This temporal pattern, reflecting the seasonal abundance of dominant species, was similar to patterns observed at other southeastern Lake Ontario locations and could not be directly attributed to plant operations. Late fall and early spring spawners, including burbot, yellow perch, and rainbow smelt, comprised the majority of catches during the spring peak, while alewife, *Morone* spp., and sometimes rainbow smelt accounted for the greatest portion of the summer spawning peak.

Eggs and larvae were generally more abundant along the 20-foot than 40-foot depth contour during the 6-year study period. Additionally, egg and larvae densities were usually lowest at the deeper (60-foot, 80-foot, and 100-foot) stations. Older larvae consistently displayed a pattern of offshore migration to deeper waters; during the spawning season, however, no consistent spatial distribution patterns attributable to plant operation were discerned.

In the Nine Mile Point vicinity, alewife eggs were more abundant in night samples (generally near the bottom) during the 6-year study. Alewife larvae also were more abundant during the night (generally near the surface). These findings were consistent with data from studies performed in other Great Lakes areas. Although the vertical distribution of rainbow smelt eggs was not consistent from year to year, smelt larvae proved more abundant more often near the bottom, especially at night.

In conclusion, analyses of egg and larval catches in the thermally influenced and control areas along the 20-foot and 40-foot depth contours uncovered no consistent temporal or spatial patterns that indicate plant-induced alterations of normal spawning patterns or egg and larval abundance and distribution in the vicinity of the Nine Mile Point study area over the 6-year, 1973-1978 study period (TI 1979 in Independence 1992).

In-plant Ichthyoplankton Entrainment

Entrainment is the passage of planktonic organisms through the intake screening devices and cooling water system. Ichthyoplankton entrainment abundance studies have been conducted at NMP Unit 1 from 1973 to 1978 (TI 1979 in Independence 1992) and 1997 (EA 1998b), at JAF from 1976 to 1978 (TI 1979 in Independence 1992), and at the Oswego Steam Station during 1974 to 1976 and 1983 (LMS 1991 in Independence 1992). The following sections present results from the most recent studies conducted at each power plant followed by their overview of year-to-year results for the aforementioned study periods.

Nine Mile Point Unit 1

The cooling water system at the Nine Mile Point power station was sampled at the intake forebay with 1.6-foot (0.5 m) diameter plankton nets with 571 µm mesh from April through October 1978 to determine the abundance and composition of entrained fish eggs and larvae (TI 1979 in Independence 1992). Eggs, mostly those of alewife, occurred only during June and August (Table 17-27). Larvae were collected from early May through late August, with peak abundance occurring in early August. Except for some tessellated darters in early July, alewives comprised the entire July and August catches. The entire early June catch was rainbow smelt and the May catch was yellow perch. Except for some prolarval tessellated darters, postlarvae predominated larval catches.

Table 17-27: Densities of Eggs and Larvae (No./1,000 m^3) Entrained at the Nine Mile Point[(1)] and James A. Fitzpatrick[(2)] Nuclear Stations, Lake Ontario, 1978[(3)]

Life Stage	May		June		July		August	
	9	23	16	27	11	25	8	22
Nine Mile Point								
Eggs	0	0	0	87	0	0	47	0
Larvae	10	26	132	0	16	11	383	140
James A. Fitzpatrick								
Eggs	0	0	0	0	5	87	11	0
Larvae	0	10	79	4	90	34	54	159

(1) Mean density of two daytime samples per sampling date.

(2) Mean density of two daytime and two nighttime samples per sampling date.

(3) No fish eggs or larvae were collected in entrainment samples at NMP Unit 1 during April and September through October and at JAF during January through April and September through December.

Source: Modified from TI 1979 in Independence 1992.

Entrainment of ichthyoplankton at the Nine Mile Point Unit 1 plant was monitored either weekly or twice per month from 1973 to 1978. Generally, the species in entrainment samples reflected the lake's species composition, except that species occurring infrequently or in low numbers often were not observed in entrainment samples. The temporal abundance of eggs and larvae in intake samples was generally similar to temporal patterns observed in Lake Ontario samples. However, densities in entrainment samples were sometimes lower than corresponding densities in lake samples, particularly larval densities in 1977 and 1978. Also, the diversity (number of species) of eggs and larvae was frequently lower in entrainment than in Lake Ontario samples.

During 1997, the discharge canal at NMP Unit 1 was sampled for abundance of entrained organisms during the day and at night, 1 day (24 hours) per week during the principal entrainment period from April through August to determine the abundance and composition of entrained fish eggs and larvae (EA 1998b). A total of 88 samples were collected. Sampling at the discharge canal was described as improving accuracy of entrainment abundance estimates since potential sampling bias introduced at the intake by temporal and spatial patchiness of organisms is minimized at the discharge resulting from mixing during passage through the cooling water system.

A total of nine distinct taxonomic groups of fish were collected during this entrainment sampling. The most abundant taxon in the collection was alewife. Densities of entrained ichthyoplankton during the 1997 monitoring program collected from organism counts in samples and sample volumes are presented in Table 17-28. Eggs, mostly those of alewife, occurred during all 5 months. Alewife eggs and the highest egg densities occurred during June through August. Larvae were collected from May through August, with peak abundance occurring in July. Except for some tessellated darters, threespine sticklebacks and members of the minnow family, alewife larvae comprised the majority of the July and August catches.

More than 35 percent of the alewife collected were eggs; most of the remaining were yolk-sac larvae and post yolk-sac larvae (24% and 40%, respectively). Eggs and yolk-sac larvae were more abundant in night samples than daylight samples. Strong nocturnal distribution of eggs may reflect spawning in shallower waters during adult movement inshore at night. Tessellated darter collected were primarily as yolk-sac (32%) and post yolk-sac larvae (54%) during June and July. Threespine stickleback were collected almost exclusively as eggs during April-June 1997 (EA 1998b).

Estimates of total numbers entrained were extrapolated from sample densities, scaled up using cooling water volumes recorded during the 1997 monitoring program

Table 17-28: Monthly Average Density (Number/1,000 m³) by Life Stage/Taxon in Samples Collected During Entrainment Monitoring Program at Nine Mile Point Nuclear Station Unit 1, 1997

		Density (Number per 1,000 m³)				
Life Stage	**Taxon**	**April**	**May**	**June**	**July**	**August**
Eggs	Alewife			47.5	469.0	45.0
	Carp		20.0			
	Minnow family			5.0	3.3	
	Rainbow smelt	10.0				
	Sunfish family		10.0	10.0		
	Tessellated darter			12.0		
	Threespine stickleback	20.0	45.0	86.7		
Yolk-sac Larvae	Alewife				246.0	128.8
	Minnow family			5.0	3.3	
	Tessellated darter			10.0	40.0	
	Yellow perch		6.7			
Post Yolk-sac Larvae	Alewife		10.0	22.5	378.5	260.0
	Minnow family			5.0	3.3	
	Mottled sculpin			23.3		
	Tessellated darter		15.0	14.0	62.5	
	Threespine stickleback					10.0
	Unidentifiable				10.0	
	Yellow perch		13.3			
Juveniles	Alewife				1.5	15.6
	Mottled sculpin			3.3		
	Rainbow smelt					10.0
Unidentified	Tessellated darter				7.5	

Source: Adapted from EA 1998b.

(Table 17-29). Eggs, yolk-sac, and post yolk-sac larvae accounted for 35, 23, and 40 percent, respectively. Alewife entrainment accounted for 91 percent of the ichthyoplankton, with tessellated darter and threespine stickleback accounting for 4 and 3 percent of the entrainment, respectively.

James A. Fitzpatrick Power Station

To monitor entrainment of fish eggs and larvae in the cooling-water system at the James A. Fitzpatrick power station day and night, samples were collected from the intake forebay with 1.6-foot (0.5 m) diameter plankton net with 571 µm mesh, twice monthly throughout 1978 (TI 1979 in Independence 1992). Alewife and unidentified eggs occurred in entrainment samples from early July through early August. Egg densities were highest in late July (Table 17-27).

Table 17-29: Estimated Total Number and Percent by Species of Organisms Entrained Based on Cooling Water Flow Rates Recorded During Entrainment Monitoring Program at Nine Mile Point Nuclear Station Unit 1, April-August 1997

	Eggs		Yolk-sac Larvae		Post Yolk-sac Larvae		Juveniles		Unidentified		Total	
Taxon	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Alewife	27,364,227	34.8	18,630,207	23.7	31,939,794	40.6	753,701	1.0			76,687,929	90.7
Carp	201,812	100.0									201,812	0.2
Minnow family	208,991	33.3	206,723	32.9	212,290	33.8					628,004	0.7
Rainbow smelt	3,922	3.5					107,600	96.4			111,522	0.1
Sunfish family	239,803	100.0									239,803	0.3
Tessellated darter	202,897	5.6	1,224,501	33.7	2,050,431	56.4			157,913	4.3	3,635,742	4.2
Threespine stickleback	2,283,189	95.5			108,150	4.5					2,391,339	2.8
Yellow perch			100,906	35.2	185,366	64.7					286,272	0.3
Mottled sculpin					416,215	88.8	52,445	11.2			468,660	0.5
Unidentifiable					105,275	99.9					105,275	0.1
Total	30,504,841	35.2	20,162,337	23.2	35,017,521	40.4	913,746	1.1	157,913	0.2	86,756,358	100

Source: Adapted from EA 1998b.

Larvae occurred in entrainment samples from late May through August with nine taxa identified. Alewives dominated entrainment collections, especially in July and August. Larval density peaked in late August and was made up entirely of alewives.

Rainbow smelt larvae made up the entire catch during the first half of June and were present also in early July. Yellow perch comprised the smaller May catch. Carp, sculpin, some unidentifiable minnows, tessellated darter, goldfish, and trout-perch larvae were collected in small numbers in late June and early July.

Entrainment of ichthyoplankton at the James A. Fitzpatrick plant has been monitored from 1976 to 1978. The number of species observed in entrainment samples in 1976 was similar to the diversity reported in Lake Ontario ichthyoplankton samples; also, peak densities of eggs and larvae in entrainment samples corresponded closely with those in lake samples. During 1977 and 1978, the temporal distribution of eggs and larvae in entrainment samples continued to reflect the temporal abundance in Lake Ontario, but the entrainment samples generally had fewer species. A comparison of egg and larval densities in entrainment and lake samples during 1976-1978 indicated that egg concentrations within the intake were similar to or higher than those in the lake but that larval densities within the intake were frequently lower than in the lake.

Oswego Steam Station

Ten species of fish eggs and 13 species of fish larvae were identified from entrainment collections conducted with plankton nets at Units 1-4 during 1974 and 1975-1976 (LMS 1992). Alewife was the most abundant species. Eggs of two species (alewife and rainbow smelt) and five species of larvae (alewife, rainbow smelt, carp, white perch, and tessellated darter) were common to both 1974 and 1975 collections. These represent the more abundant inshore lake species. Entrainment of fish eggs at Units 1-4 was greatest during June (1974) and July (1975) and greater at night than during the day. Fish larvae were entrained in greatest numbers during July and August of 1974 and 1975. Rainbow smelt (spring 1975) and alewife (July through October) contributed to the entrainment.

Additional entrainment samples were collected using a 10.2-centimeter (4.0-inch) pump drawing water from the Unit 6 intake screenwell between February 6 and September 29, 1983 (LMS 1992). Total ichthyoplankton abundance and the percent representation of the major species (alewife and rainbow smelt) for each sampling date are presented in Table 17-30. The greatest concentration of fish larvae was recorded from mid-June through early August; alewife constituted more than 90 percent of the seasonal total.

Table 17-30: Ichthyoplankton Entrainment Abundances and Percent Composition at the Oswego Steam Station 6, February to September 1983

		Percent of Date Mean		
Sample Date(1)	Total Entrainment Mean Abundance(2) (No./1,000m^3)	Alewife	Smelt	Others(3)
April 5-6	2	0	0	100
April 11-12	0	0	0	0
April 18-19	0	0	0	0
May 19-20	3	0	100	0
May 24-25	14	0	100	0
June 1 – May 31	3	0	100	0
June 7-8	2	0	100	0
June 16-17	218	93.6	0.9	5.5
June 22-23	298	97.3	0	2.7
June 27	196(4)	100	0	0
July 5-6	116	59.5	3.4	37.1
July 8-9	64	90.6	6.2	3.2
July 12-13	683	89.6	6.4	4.0
July 20-21	172	99.4	0	0.6
July 27-28	418	95.9	3.8	0.3
August 1-2	670	100	0	0.05
August 10-11	101	100	0	0
August 18-19	51	31.0	69.0	0
August 24-25	36	88.9	11.1	0
August 31 – September 1	21	90.5	9.5	0
September 7-8	24	100	0	0
September 22-23	15	16.7	83.3	0
September 24-25	10	100	0	0
September 28-29	8	100	0	>0.05

(1) No fish larvae were collected in entrainment samples during weekly sampling in February and March.

(2) Proportioned by diel cycle (February: 9.5-hour day, 14.5-hour night; March, April, September: 12-hour day, 12-hour night; May-August: 14.5-hour day, 9.5-hour night); 1,000 cubic meters equals 35,310 cubic feet.

(3) Small numbers of others include: white sucker, mottled sculpin, yellow perch, johnny or tessellated darters, and carp.

(4) Night samples not collected due to equipment malfunction.

Source: Modified from LMS 1992.

In summary, entrainment sampling conducted at the intakes to Units 1-4 and Unit 6 indicates a seasonal presence of fish larvae that extends from early spring through early fall. Alewife is the dominant species entrained, followed by rainbow smelt.

Entrainment samples were collected using a 10.2-centimeter (4.0 inch) pump drawing water from the Unit 5 intake forebay from April 1 through September 12, 1991. Samples were not collected from May 22 through June 26 due to a unit outage (LMS 1992).

One species of fish eggs and seven species of fish larvae were identified from the entrainment collections conducted at Unit 5 (Table 17-31). Alewife eggs were the only ichthyoplankton eggs collected. They were collected from late June to early August. It should be noted that the egg species and abundances may have been affected by the unit outage.

Table 17-31: Entrainment Species List (Oswego Steam Station Unit 5 – April-September 1991)

		Larvae				
Common Name	**Scientific Name**	**Eggs**	**YS**	**PYS**	**JUV**	**DAM**
Alewife	*Alosa pseudoharengus*	X	X	X		X
Darter sp.	*Etheostoma* sp.		X	X		
Rainbow smelt	*Osmerus mordax*			X		
Shiner sp.	*Cyprinidae* sp.			X		
Spottail shiner	*Notropis hudsonius*				X	
Trout-perch	*Percopis omiscomaycus*			X		
Yellow perch	*Perca flavescens*		X			
Unidentified sp.				X		

YS = Yolk-sac
PYS = Post-yolk-sac
JUV = Juvenile
DAM = Damaged – life stage not available.
Source: LMS, 1992.

Larval rainbow smelt caught during the mid-May survey were the first larval fish collected. No other species were collected from any of the April or May samples. An estimated total of 52,214 rainbow smelt larvae were collected from only the one sample period and represented 0.2 percent of the total entrainment (Table 17-32). Past peak entrainment for rainbow smelt has occurred from May through June. The unit outage at Unit 5 during most of this period in 1991 likely resulted in reduced rainbow smelt entrainment.

Alewife was the dominant species collected during the entrainment study, representing 95.1 percent of all larvae entrained (Table 17-32). The maximum larval entrainment abundance was recorded in mid-July. Entrainment remained high for the next several weeks, then declined from mid-August through September. Over 20 million alewife were entrained during this study (LMS 1992)

With the exception of larval darters (*Etheostoma* sp.), the remaining larvae entrained (spottail shiner, trout-perch, unidentified shiners [*Cyprinidae* sp.], and unidentified species) combined represented 1.0 percent of the total entrained. Darters were collected from late June (week 4) through mid-July (week 3). An estimated 720,000 darters (3.4% of the total entrainment) were entrained during the study (Table 17-32) (LMS 1992).

Table 17-32: Estimated Entrainment (Oswego Steam Station Unit 5 – April-September 1991

Species	Yolk-sac	Post Yolk-sac	YOY	IUD	Total	% of Grand Total
Alewife	240,547	18,556,652		1,320,015	20,117,214	95.1
Cyprinidae		7,513			7,513	0.03
Etheostoma	327,944	394,320			722,264	3.4
Rainbow smelt		52,214			52,214	0.2
Spottail shiner			153,281		153,281	0.7
Trout-perch		23,504			23,504	0.1
Unidentified		48,745			48,745	0.2
Yellow perch	24,489				24,489	0.1
Total	**592,980**	**19,082,948**	**153,281**	**1,320,015**	**21,149,224**	

Source: LMS 1992.

17.5.2.4 Aquatic Vegetation

No aquatic macrophytes (vegetation beds) are present within the Project area, although *Cladophora* (a periphytic filementous green alga) was observed along the nearshore area (Independence 1992) and during fieldwork in September and October 1999 by Earth Tech biologists. *Cladophora* is considered an important species because of its nuisance potential and as a habitat for other aquatic organisms.

17.5.2.5 Rare, Threatened or Endangered Species

Contact was made with the USFWS (Stilwell 1999) and the NYSDEC New York Natural Heritage Program (NYNHP) (Ketcham 1999) regarding protected species at the Project area. USFWS indicated that no federally listed or proposed endangered or threatened species are known in the proposed Project impact area. NYNHP indicated that there are no records of known occurrence of rare or state-listed animals and plants, of significant natural communities, or of other significant habitats, on or in the immediate vicinity of the proposed Project site.

17.5.2.6 Significant Aquatic Habitats

New York State's Coastal Management Program, which is administered by the New York State Department of State, was contacted concerning a designated Significant Coastal Fish and Wildlife Habitat in proximity to the proposed Heritage Station (Niedowski 1999). This Significant Coastal Fish and Wildlife Habitat is the Teal Marsh, designated October 15, 1987, which is approximately 3,000 feet to the west of the western boundary of the proposed Project.

The Coastal Management Program (DOS-CMP undated) describes the Teal Marsh fish and wildlife habitat as being located just east of the city of Oswego in the town of Scriba and encompassing an approximate 250-acre wetland, separated from Lake Ontario by a narrow barrier beach. The scrub-shrub and forested wetland is hydrologically connected to the lake by underground seepage through the beach. Two unnamed intermittent streams flow into the wetland.

The fish and wildlife values have been described by the Coastal Management Program. Teal Marsh is the largest area of predominantly scrub-shrub wetland in the Oswego County coastal area. A high degree of interspersion with wooded uplands creates a valuable habitat for various fish and wildlife species. Studies of Teal Marsh have documented presence of at least 50 species of breeding birds, 15 species of mammals, 3 species of reptiles, 4 species of amphibians, and 7 species of fish in the wetland and fringe areas. The diversity and abundance of wildlife species in the marsh are unusual in Oswego County (DOS-CMP undated).

Rating information for Teal Marsh is described by the Coastal Management Program for five criteria. The criteria, numerical score and description are shown in Table 17-33. The marsh area is relatively inaccessible and privately owned, thus limiting human use of the resources.

A habitat impairment test must be met for any activity that is subject to consistency review under federal and state laws, or under applicable local laws contained in an approved local waterfront revitalization program. The specific habitat impairment test that must be met is as follows: in order to protect and preserve a significant habitat, land and water uses or development shall not be undertaken if such actions would destroy the habitat or significantly impair the viability of a habitat (DOS-CMP undated).

Table 17-33: Coastal Fish & Wildlife Habitat Rating and Descriptions for Teal Marsh

Score	Criterion
9	Ecosystem Rarity (ER) Relatively large, diverse scrub-shrub and emergent wetland; unusual in Oswego County.
16	Species Vulnerability (SV) Least bittern (SC) nesting.
0	Human Use (HU) No significant fish or wildlife related human uses of the area.
4	Population Level (PL) Concentrations of many wetland wildlife species are unusual in Oswego.
1.2	Replaceability (R) Irreplaceable.

Significance Value = $[(ER + SV + HU + PL) \times R] = 35$

Source: DOS-CMP, undated.

17.5.3 Description of Potential Impacts to Aquatic Resources

The Project has been designed to reduce and minimize potential impacts to aquatic resources in comparison to many other power plants of comparable generation capacity. The Project does not involve the construction and operation of new intake or discharge systems, thereby avoiding the alteration of aquatic resources that typically occurs with the construction of these facilities. The city of Oswego intake to be used as the point of water withdrawal has been in operation for many years with no documented evidence of causing adverse impacts to the aquatic resources of Lake Ontario. The intake is designed such that, at anticipated maximum withdrawal rates, there will be a very low approach velocity, about 0.22 fps. According to discussions with water department operation staff, the intake as currently operated results in minimal entrainment and subsequent impingement of fish.

Impacts to surface waters will be minimal from Project construction and operation since the withdrawal and discharge of water for cooling and other purposes are relatively small. The average Project withdrawal of slightly less than 4 mgd represents a negligible volume relative to the huge volume of water present in Lake Ontario. Aquatic habitats, chemical and physical characteristics of Lake Ontario water, navigation, recreation, and other water uses will remain unaffected by the Project withdrawals. Similarly, the wastewater discharge will have a very minimal and localized affect on surface water quality parameters at non-injurious levels. Based on the large volume of the receiving water (Lake Ontario), any localized changes in the vicinity of the discharge structure will rapidly be diminished to background (ambient) conditions in less than 40-50 feet. Based on the Project design and anticipated SPDES discharge requirements, the discharge water will not have any chemical or physical parameters that are harmful to aquatic habitats or resources except as allowed within the immediate mixing zone.

An analysis of cumulative impacts reveals that the percentage change in impacts resulting from water withdrawals and wastewater discharges arising from the Project is minimal, if even measurable. As indicated in Section 17.2 on Table 17-12, there are a total of 10,126 mgd of power plant water withdrawals on Lake Ontario. The maximum Project withdrawal represents an insignificant a 0.05 percent increase in power plant withdrawals. More specific to the Project vicinity, the four nearby power plants have a combined withdrawal of 2,216 mgd. The Project withdrawal represents a 0.2 percent increase in power plant water withdrawals in the Oswego area.

Although aquatic resource impacts are not entirely and solely a reflection of water volumes, the percentage change is so small that, by any measure, the additional impacts that may result from the Project are negligible.

17.5.3.1 Water Withdrawals

The potential impacts to the aquatic community from Project operation are expected to be minimal because the withdrawal required for plant operation and subsequent discharge to Lake Ontario is extremely small relative to the available lake volume.

A closed-cycle evaporative cooling system, rather than once-through cooling, will be used. This will reduce the volume of water required for cooling and substantially reduce the potential impact to the aquatic biota from entrainment and impingement. The closed-cycle evaporative cooling will also minimize the quantity of waste heat rejected to Lake Ontario (compared to an open-cycle system) because the bulk of the heat is rejected to the atmosphere. At maximum water use, and cooling capacity, no more than 4.9 mgd would be withdrawn from Lake Ontario and less than 0.884 mgd discharged.

The potential effects of Project operation on the lake biota would be fish impingement (the inadvertent trapping of juvenile and adult fish on the exterior screening of the water intake); ichthyoplankton entrainment (the passage of planktonic organisms through the cooling system); and exposure to the heat and chemical constituents of the wastewater (discharge) stream. Each of these components of Project operations is described below, with an assessment of its potential impact on fisheries resources, including relationships to Sections 316(a) and (b) of the Clean Water Act. Measures proposed to mitigate these impacts are discussed in Section 17.5.4.

Impact assessments of phytoplankton, zooplankton, and benthic macroinvertebrates are not provided because they are not considered to be significantly impacted due to Project operations. An extensive review of the literature (LMS 1979 in Independence 1992) has shown that the withdrawal of phytoplankton and zooplankton by power plants, including open-cycle plants with considerably larger waterbody to plant flow ratios than the Project, had no significant adverse impacts on these plankton communities. LMS (1979 in Independence 1992) reviewed data collected at 73 power plants, including 15 located on the Great Lakes, and determined that, for the most part, no observable area-wide changes in species composition, seasonal succession, productivity, abundance, and/or spatial distribution could be attributed to power plant operation. More recently, results of an aquatic monitoring program conducted at New York State Electric and Gas's (NYSEG) Somerset Station with open-cycle cooling on Lake Ontario detected no significant adverse impacts on zooplankton that could be attributed to plant operation (NYSEG 1986 in Independence 1992). The study design for the Somerset Aquatic Monitoring Program, approved by DPS and NYSDEC, did not require assessments of phytoplankton and benthic invertebrates because they were not considered to be adversely impacted by plant operations (NYSEG 1981, 1986 in Independence 1992).

Entrainment

Given the relatively small volume of water to be withdrawn, entrainment of aquatic organisms, such as various plankton species, fish eggs and larvae, and aquatic invertebrates, is unlikely to result in measurable reductions in the populations of any species in Lake Ontario.

Based on entrainment rates from the nearby NMPC's Nine Mile Point nuclear plant, and scaling to the water withdrawal rates proposed for the Project, an estimate of entrainment rates has been developed. Using the entrainment and water withdrawal data from the 1997 Entrainment Abundance Report (EA 1998b) for the April through August sampling period and scaling the data to proposed average withdrawal rates for the Project (3.8 mgd), an estimated 245,277 organisms would be entrained compared to 86,756,458 at Nine Mile Point for the same time period. As a percentage, the Project would entrain 0.28 percent of the number of organisms entrained by Nine Mile Point. This type of simple analysis assumes that planktonic and larval distribution and densities are comparable between the city of Oswego intake and the Nine Mile Point intake. Given the relatively close proximity and similar lake conditions, this assumption is reasonable. Species composition of the entrainment samples were heavily skewed towards alewife (91%), with tessellated darter (4.2%) and threespine stickleback (2.8%) making up the next greatest percentage. Six species or species groups made up the remaining 2 percent of the organisms entrained (see Table 17-34 for list of entrained species). By lifestage, post yolk-sac, eggs, yolk-sac, and juveniles were the dominant groups in descending order.

Table 17-34: Common and Scientific Names of Ichthyoplankton Entrained at Nine Mile Point Station During 1997

Common Name	Scientific Name
Alewife	*Alosa pseudoharengus*
Carp	*Cyprinus carpio*
Minnow Family	*Cyprinidae*
Rainbow Smelt	*Osmerus mordax*
Threespine Stickleback	*Gasterosteus aculeatus*
Sunfish Family	Centrarchidae
Tesselated Darter	*Etheostoma olmstedi*
Yellow Perch	*Perca flavescens*
Mottled Sculpin	*Cottus bairdi*

Source: Adapted from EA 1998b.

Equivalent Adult Analysis

Although six RIS species or groups are used by NMPC and NYPA for their nuclear plants near Oswego, review of the 1997 NMPC entrainment study reveals that 98 percent of the entrainment is due to three species, of which only alewife is a corresponding RIS. In order to provide an alternative impact analysis to the scaling approach already presented, an equivalent adult analysis was performed on alewife and threespine stickleback.

The equivalent adult approach to assessing power plant entrainment impacts has been variably addressed by Horst (1975 in Goodyear 1978) and Goodyear (1978). In the Horst model, larval survival is assumed to be constant between egg and entrained larvae. However, this assumption is not entirely correct and can result in bias underestimating the impact (Saunders 1977 and Dahlberg 1977 in Goodyear 1978). However, since the data available from the 1997 NMPC entrainment report are not presented in larval lengths (corresponding to age) the Horst equation has been used.

The Horst model is:

$$N_a = S_l \times N_e$$

Where:

$S_l = S/S_e$

S_l = survivorship from larvae to adulthood

and

$S = 2/F_a$

F_a = average female fecundity,

S_e = survivorship from egg to larvae

N_e = number of entrained larvae killed

N_a = number of adults killed

For alewife, in this model, a 14.4 percent survivorship from eggs to larvae was used. This value was derived from Hewett and Stewart (1989) by taking their 38 percent for egg to pro-larvae and multiplying this again by 38 percent to get to post-larvae. Average female fecundity was calculated by taking the average annual egg production per female (16,000 eggs) times the 4 years of typical high egg production during the female lifespan (years 3-6) or 64,000 eggs. From Table 17-29, the annual numbers of larvae (pro- and post-larvae combined) entrained from Nine Mile Point was 50,570,001 for the 1997 sampling event. To provide the most conservative analysis, all entrained larvae are assumed to be killed in the cooling process, which yields an equivalent adult estimate of 10,954. Because the Project will be using far less water than Nine Mile Point a conservative per volume scaling factor was determined by calculating the average daily volume withdrawn at Nine Mile Point (900,533 m^3) during the year and dividing that into the maximum daily withdrawal proposed for the Project (18,112 m^3) to get a 2 percent scaling factor. By multiplying the 10,954 equivalent adults from Nine Mile Point by the scaling factor, an estimated 219 equivalent adults would be annually lost to the alewife population of Lake Ontario because of the Project withdrawal. Using average daily volumes, the scaling factor drops to 1.5 percent, and adult equivalents to 164 for the Project. Given the

Lake Ontario alewife population numbering in the many millions, the loss of 164 to 219 adults is insignificant and would have negligible, if even measurable, effects on the alewife population or predator community.

For threespine stickleback, in the model, given the nest building and guarding by the male, a higher S_e was assumed at 65 percent since no value was available in the literature. Based on Table 17-29, 2,283,189 eggs were entrained in 1997. Based on life history information, typical females produce less than 100 eggs and are reproductive for only 2 years, therefore S = 0.01. The equivalent adult losses at Nine Mile Point are estimated at 35,126, which equates to 527 for the Project. The loss of 527 adults from the Lake Ontario threespine stickleback population as a result of the Project water withdrawals represents an insignificant number.

Because the Project will be using city of Oswego water which is withdrawn at a depth of about 45 feet and 7,200 feet from shore, there will be an even lower entrainment affect than the adult equivalent estimate because the nearshore spawning waters are avoided. Review of the nautical chart for the intake area (Figure 17-1) reveals a bottom contour at about 25 feet that follows the lake shoreline and defines the nearshore habitat. The Nine Mile Point intake is within this shoreline habitat zone, and the city's intake is not. As described in Section 17.5.2.3, sampling in the Nine Mile Point vicinity in the early 70s revealed generally lower abundance of eggs and larvae at the 40 foot contour than the 20-foot contour. In addition, densities further decreased at 60, 80, and 100 foot contours. An estimate of the percent reduction in larval densities is provided by reviewing Figures 17-11 and 17-12. With prolarvae, densities in 40 feet of water are half those in 20 feet of water. With postlarvae, densities are higher overall than prolarvae, but the 60-foot contour represents the lowest densities between 20 and 100 feet of water depth, again with nearly half the levels as at 20 feet. At 40 feet, densities are slightly less than at 20 feet. Thus, a general percent estimate is that an intake at 40-foot water depth may only entrain 65 to 70 percent of the fish larvae compared to an intake in 20 feet of water.

Summary of Entrainment Impacts to Representative Important Species

Entrainment mortalities are likely to occur to fish eggs and larvae during passage through the Project's condensers and cooling tower. Potential entrainment impacts to ichthyoplankton are predicted for alewife and threespine stickleback. Based on the relatively low densities of eggs and of larval fish in the intake area, losses to entrainment are expected to be negligible for all of the RIS. The numbers of equivalent adults that would correspond to the potential egg and larval entrainment, in all cases, that would be an extremely small percent of the commercial harvests or production estimates for these species in Lake Ontario.

Therefore, with respect to decision criteria typically applied to entrainment at power plants, the entrainment impacts resulting from the operations of the Project are considered to be insignificant with respect to the balanced, indigenous community.

Impingement

Impingement at the city of Oswego water supply intake is perhaps even less of an issue than entrainment since several features of the intake system function to minimize the likelihood of impinging juvenile and adult fish. Even with the Project, the estimated approach velocity of 0.22 fps will be less than the EPA recommended BTA of 0.5 fps. At velocities below 0.5 fps, most fish species can maintain orientation and position in the flow for extended durations with minimal energetic harm. All fish species present in the Project vicinity have escape swimming speeds well in excess of 0.5 fps. Second, after the water passes through the intake crib it enters a vertical shaft and then a roughly 7,200-foot long horizontal shaft prior to entering the pump well. Because many of the fish species present in the Project vicinity are pelagic, the enclosed space of the vertical shaft and tunnel likely represent a behavioral barrier to these species that would inhibit their movement into the shaft and tunnel. Further, given the lack of optimum habitat conditions in the intake vicinity for the demersal species common to Lake Ontario, such as weed beds, three-dimensional structure, or abundant food source, it is unlikely that large numbers of demersal species are present near the intake. Lastly, the intake is 7,200 feet offshore in relatively deep water, outside of depths and locations (shorelines) where large impingement numbers usually occur.

Although impingement data are available for the nearby NMPC Nine Mile Point nuclear generating station (see Table 17-22), there is considerable difference in the design and operation of this plant from that proposed for the Project. Nonetheless, theoretical estimates of impingement scaling down the data from Nine Mile Point have been developed for the Project. The most recent year of available data, 1997, has been used for comparative purposes. Assuming an average daily Project withdrawal of 3.8 mgd and that impingement conditions are similar, an estimated 49 fish/day would be impinged because of the Project. For Nine Mile Point, 234,006 fish were impinged while screening 68.44 million cubic meters of water during the 78 days of sampling over the 1997 year. Seasonal and monthly changes in water withdrawal will vary the daily rate.

Species composition of fish impinged in 1997 was skewed because of a possible episodic event involving threespine stickleback. Because of high rates of impingement for this species in 1997, the overall impingement for 1997 is elevated compared to most prior years (third highest level in 22 years), thus use of these numbers provides conservative estimate of impingement for the Project. In 1997, 91 percent (214,100 of 234,006) of impinged fish were threespine stickleback. In comparison, the 6 RIS species combined comprised only 7.8 percent (18,292 of 234,006) of the total impingement. In comparing a more typical year such as 1993 (abundance ranks 13th out of the 21 years of sampling), the RIS made up 95 percent of the total impinged and threespine stickleback made up 0.3 percent (EA 1994b). Overall comparison of the estimated impingement based on flow between 1997 and 1993 shows an order of magnitude difference between the 2 years. Applying the same order of magnitude reduction to the Project would result in an estimated 4.9 fish/day impinged as a rate more typical of most years.

Another means of assessing impingement impacts on Lake Ontario fisheries is to compare cropping rates resulting from the Project water withdrawals relative to other cropping mechanisms, such as commercial harvest, recreational and sportfishing, and other water withdrawals. However, given the small volume of water withdrawn for the Project relative to the other large water withdrawals, the percent cropping is likely to be very small. For example, in the 1977 Fitzpatrick 316(b) Demonstration report, LMS presents cropping estimates for nine electric generating stations on Lake Ontario. For alewife, the combined cropping from impingement was 0.04 percent. Using Nine Mile Point only results in a 0.000115 percent cropping. Scaling the Nine Mile Point cropping estimate by the average Project water withdrawal factor of 1.5 percent results in a 0.0000017 percent cropping of alewives by the Project water withdrawal. The 1977 estimated cropping rates adjusted using only Nine Mile Point data were 0.000065 percent for rainbow smelt, 0.00011 for brown trout, and higher for yellow perch, 0.27 percent. Using the Project scaling factor applied to Nine Mile Point data, cropping estimates are 0.000001 percent for rainbow smelt, 0.000016 percent for brown trout, and 0.0042 percent for yellow perch for the Heritage Project. No population estimates are available for threespine stickleback, but increasing numbers impinged suggests the population is increasing in the lake and that impingement losses are not harming the population.

To put these cropping rates in perspective, it is useful to compare the rate of "take" due to Project water withdrawals to other estimates of take or exploitation. As shown in Table 17-35, instead of the small fractions of percents estimated for losses due to the Project, typical exploitation rates for many species are in the 5 to 30 percent range.

Project losses to impingement will not cause harm to the overall balanced, indigenous community. None of the species impinged are designated as rare or endangered. The average annual losses to impingement represent only very small (generally fractional) percentages of the annual impingement at the three nearby power plants. RIS losses are sufficiently small in relation to regional populations. Using data in Table 17-20 as a surrogate for regional population size estimate, the average annual Nine Mile Point impingement over the 22-year period (1976-1997) was 321,819 fish. In comparison, the estimated annual impingement at the city of Oswego Water Supply intake due to the Project withdrawal would be, at most, on the order of 0.56 to 5.5 percent of the Nine Mile Point impingement. However, actual impingement would likely be even lower, given the design and location of the city of Oswego intake structure.

Table 17-35: Summary of Published Estimates of Exploitation of Fish Populations

Exploitation Rates (%)	Scientific	Common	Location	Reference
25	*Lepomis macrochirus*	Bluegill	Sugar Loaf, Lake, MI	Cooper and Latta 1954
36			Spear Lake, IN	Ricker 1955
35			Gordy Lake, IN	Gerking 1953
15-20			Muskellunge Lake, IN	Ricker 1945
29	*Lepomis microlophus*	Redear sunfish	Gordy Lake, IN	Gerking 1953
23			Muskellunge Lake, IN	Ricker 1945
11	*Pomoxis nigromaculatus*	Black crappie	Oliver Lake, IN	Gerking 1953
36	*Micropterus salmoides*	Largemouth bass	Gordy Lake, IN	Gerking 1953
12			Shoe Lake, IN	Ricker 1945
17			Oliver Lake, IN	Gerking 1950
20-48			Southerland Reservation, CA	LaFaunce et al. 1964
20			Clear Lake, CA	Kimsey 1957
14			Gladstone Lake, MN	Maloney et al. 1962
22	*Micropterus dolomieui*	Smallmouth bass	Waugoshance Point, Lake Michigan	Latta 1963
5-18			Oneida Lake, NY	Forney 1961
16	*Ambloplites rupestris*	Rock bass	Oliver Lake, IN	Gerking 1950
5	*Stizostedion vitreum*	Walleye	Fife Lake, MI	Schneider 1969
15-28			Spirit Lake, IA	Rose 1947, 1955
20-40			Escanaba Lake, WI	Patterson 1953; Niemuth et al. 1959
27			Many Point Lake, MN	Olson 1957
40	*Coregonus clupeaformis*	Lake whitefish	Georgian Bay, Lake Huron	Cucin and Regier 1965
21			Lake Superior	Dryer 1964
13-17	*Salmo gairdneri*	Rainbow trout	New York streams	Hartman 1959
20-26			New York lakes	Hartman 1959
19-75	*Salvelinus fontinalis*	Brook trout	Lawrence Creek, WI	McFadden 1961
25	*Alosa sapidissima*	American shad	Connecticut River, CT	Walburg 1960
47	*Aplodinotus grunniens*	Freshwater drum	Upper Mississippi River	Butler 1965
58			Impoundments,	
31			1944-1948	
23	*Salmo trutta*	Brown trout	Sydenham River, Ontario, 1966-1967	Marshall and MacCrimmon 1970
7	*Stizostedion vitreum*	Walleye	Nipigon Bay, Lake Superior 1955	Ryder 1968
13			Lake Superior 1956	
34			Lake Superior 1957	

Source: Modified from McFadden (1977, in JAF 1976 316b study report).

17.5.3.2 Water Discharges

Thermal Effects

Results of engineering analysis of the capacity of the existing Independence Station wastewater discharge system reveal that sufficient capacity is present to accommodate the proposed Project wastewater discharge through the existing pipeline and subsurface diffuser. Although the Project will increase the total volume of wastewater discharged, including additional thermal loading and some chemical constituents, results of the CORMIX modeling reveal that the existing SPDES discharge conditions for the Independence Station will be met with the combined outfall (see Section 17.2.7). Since the volume of water discharged is relatively small, has been cooled by passage through the cooling tower and wastewater holding pond, and the receiving water volume is immense, adverse impacts to aquatic resources will be negligible. The Project has been designed based on the assumption that the same SPDES discharge requirements as those imposed on Independence Station will be required for the new facility. Operation of the Independence Station has not resulted in any reported fish kills or other documented impacts on aquatic resources. With rapid dispersion and mixing of the thermal plume and the relatively low permitted temperature (many other power plants in the northeast United States typically have upper maximum discharge temperature limits over 100°F), the thermal discharge is highly unlikely to have deleterious impacts on aquatic organism survival or reproductive capacity. In fact, the temperatures in a very short distance from the discharge return to near ambient.

Based on EPA (1977), typical §316 Decision Criteria for adult finfish are:

- There will be no significant direct or indirect mortality from cold shock.
- There will be no significant direct or indirect mortality from excess heat.
- There will be no unacceptably large exclusion area created.
- There will be no blockage of migration.
- The balanced indigenous population of fish will be maintained.

Using typical Decision Criteria to assess impacts on adult fish populations resulting from the Project's heated discharge, the following conclusions were made:

- Mortalities of adult finfish species from excess heat are not expected, because the heated water will either be within their tolerance ranges or the species are known to exhibit avoidance behavior.
- Because the affected area represents an almost incalculably small percent of Lake Ontario, no unacceptably large exclusion area will be created.

- Any minor blockage from the heated discharge will not coincide with locations or timing of fish migrations or movements within the lake, based on collections made in the Nine Mile Point area.
- Because impacts on the fish population from the heated discharge will be negligible, the balanced indigenous population of fish will be maintained.
- In winter months, cold shock effects, if the plant discharge ceased abruptly, would likely be insignificant given the very small area of thermal influence. Nevertheless, to avoid this effect, regularly scheduled outages will be coordinated with the Independence Station to minimize shutdown of both plants concurrently between December 1 and March 1.

The Decision Criteria for adult fish are addressed in the same manner as for ichthyoplankton. The impact of heated discharge was evaluated by using thermal tolerance information from the literature.

Numerous literature reviews of thermal effects on fish have been compiled, including work by Coutant and Goodyear (1972 in Narragansett Electric 1990, EA 1978), and Coutant (1977). Most of the research on the thermal effects on fish associated with thermal discharges from electric power plants was conducted during the 1960s and 1970s. The literature on thermal effects on fishes is extensive, and the following discussion emphasizes the effects that are considered to be most relevant to the Project.

Temperature effects on fish cover a wide range of categories, including lethal and sublethal effects, behavioral responses, physiological effects, and indirect effects. The interpretations of all temperature reactions are complicated by a number of factors including previous thermal acclimation of the fish, diet, length of photoperiod, water quality, and factors related to the physiology of the fish.

A summary of the available optimum, upper lethal, and avoidance temperature data for the two most abundant fish species that occur in the study area is provided below.

Alewife

Most of the published temperature data for alewife were based on studies in freshwater environments. The upper lethal temperature for alewife in freshwater was reported to be 95°F (Dorfman and Westman 1970 in Narragansett Electric 1990). Meldrim et al. (1974 in Narragansett Electric 1990) mean avoidance temperatures for juveniles of 79°F and 86°F at acclimation temperatures of 63°F and 77°F, respectively. An upper avoidance temperature of 71.6°F in Lake Michigan was reported for alewife (Wells 1968 in Narragansett Electric 1990). Cooper (1961 in Narragansett Electric 1990) noted that upstream migration of adult alewife ceased when water temperatures exceeded 70°F. Otto et al. (1976 in Narragansett Electric 1990) concluded that YOY alewives were more tolerant of high temperatures than were the adults. Critical thermal maximum (CT_M) values for YOY alewives ranged from 83°F (at acclimation temperatures of 50°F to 54°F) to 93°F (at acclimation temperatures of 75°F to 79°F). CT_M is the temperature that results in distortion of metabolic or activity patterns (Kinne 1970 in Narragansett Electric 1990). Alewives spawn at temperatures ranging from 48°F to 68°F, and the number of recruits per spawner is directly related to temperature (Henderson and Brown 1985 in Narragansett Electric 1990).

Adult alewives occur in the nearshore area Lake Ontario during the spring. The effects of the predicted temperatures resulting from heated discharge on adults would be minor, since their lethal limit of 90°F at acclimation temperatures of 64°F to 68°F (spring conditions) would not be reached. Also, spawning migration during the spring would not be blocked, because maximum predicted temperatures would not exceed the avoidance temperatures for adult alewife.

Rainbow Smelt

According to DeSylva (in Narragansett Electric 1990), the upper lethal temperature for adult rainbow smelt acclimated to 59°F is 83.3°F. Because smelt prefer cooler water, it is expected that smelt will avoid the warmest area of the discharge. Adult rainbow smelt occur in the study area during the spring and winter.

17.5.3.3 Summary and Ecological Implications

Several important points must be considered when evaluating the overall ecological implications of the impacts from Project withdrawals and discharges on the aquatic communities in Lake Ontario. These points are summarized in Table 17-36, and include the following:

- The overall existing habitat quality for aquatic organisms is considered to be moderate because of a shortage of diverse habitat features (i.e., substrate and cover).
- Freshwater inflows from the Oswego River and Lake Ontario circulation continually recruit organisms into the Project area, thereby replenishing populations that may be potentially affected by the Project withdrawals and discharges.
- Most species potentially affected by the thermal discharges show high reproductive rates, and therefore, are capable of maintaining adequate population numbers.
- The existing intake represents BTA in terms of low approach velocities, thereby minimizing impingement losses.

Table 17-36: Summary of Impacts and Determination of Significance for the Proposed Heritage Station (Page 1 of 2)

		Significant Impacts		
Community	**Decision Criteria**	**Existing**	**With Heritage Station**	**Reasons**
Phytoplankton	• No shift towards nuisance species. • No appreciable harm to indigenous population.	No No	No No	• Trophic level dynamics would not be altered. • No unique or critical species affected. • Continual recruitment of organisms from incoming freshwater sources. • High reproductive rates. • Very small region affected in relation to Lake Ontario.
Periphyton	• No shift towards nuisance species. • No appreciable harm to indigenous population.	No No	No No	• Species shifts would not alter trophic level dynamics. • High reproductive rates. • No unique or critical species affected.
Zooplankton	• No appreciable harm to indigenous population.	No	No	• Continual recruitment of organisms with lake circulation. • High reproductive rates. • Very small region affected in relation to Lake Ontario.
	• No alteration in standing crop or relative abundance of population in far-field areas.	No	No	• No significant shift in reproductive cycle of cladoceran species. • Affected area small, ample replenishment from lake sources, high reproductive rate and low exposure time.
	• Thermal plume will not be a lethal barrier to drift.	No	No	• Maximum critical temperatures would not create a lethal barrier to drift.
Macroinvertebrates	• No appreciable harm to indigenous population.	No	No	• High reproductive rates. • No unique or critical species affected. • No unique spawning or nursery areas in the Project region. • Very small region affected in relation to Lake Ontario.

Table 17-36: Summary of Impacts and Determination of Significance for the Proposed Heritage Station (Page 2 of 2)

Community	Decision Criteria	Significant Impacts: Existing	Significant Impacts: With Heritage Station	Reasons
Ichthyoplankton	• No significant reduction in reproductive success.	No	No	• High reproductive rates.
	• No significant reduction in survival of eggs and larvae.	No	No	• No unique or critical species affected. • Very small region affected in relation to Lake Ontario.
Adult Fish	• No significant mortality from cold shock.	No	No	• Small plume affecting low numbers of fish.
	• No significant mortality from excess heat.	No	No	• High reproductive rates. • Habitat does not provide major spawning, rearing or feeding areas. • Very small region affected in relation to Lake Ontario.
	• No large exclusion area created.	No	No	• Avoidance temperatures limited temporarily.
	• No blockage of migration.	No	No	• No major migratory pathway associated with Project area. • Lethal temperatures not exceeded. • Periods of maximum spawning activity do not coincide with periods of high temperatures.
	• No appreciable harm to indigenous population.	No	No	• No unique or critical species affected.

- No unique or critical species of phytoplankton, periphyton, zooplankton, shellfish, macroinvertebrates, ichthyoplankton, or adult fish are reported to exist in the southeastern Lake Ontario area. No major fish spawning or nursery areas exist in the zones of influence from the intake or discharge.
- Temperature increases in the area will not adversely affect dissolved oxygen levels in the water column, because the mixing and destratifying effects will more than offset any reduction in the DO levels that would be associated with increased temperatures in the discharge area.
- The area of potential thermal impact for some aquatic organisms is very small in comparison to the lake. The area encompassed by the plume is less than ¼ square mile versus the lake surface area of 7,340 square miles, or about 0.0034 percent. For some taxa, the impact would be limited to an even smaller region within the immediate mixing zone. Thus, the impacts resulting from the thermal discharges are considered to be limited to a small, localized area.
- Given the potential impacts discussed, the effects from withdrawals and discharges during Project operation will not alter the fundamental structure or function of aquatic communities in Lake Ontario.
- Losses to entrainment and impingement would be sufficiently small so as to not adversely affect the balanced, indigenous community.

17.5.4 Mitigation Measures

The proposed use of an existing intake and outfall minimizes in-lake construction and avoids the introduction of a new source of entrainment, impingement, and thermal and chemical discharges within Lake Ontario. These, and other mitigation measures that are being proposed, are more fully described below.

17.5.4.1 Existing Intake Use

The proposed use of the city of Oswego water supply intake avoids the construction of a new intake within Lake Ontario. The city of Oswego water supply intake will, at maximum withdrawal rates, have approach velocity not exceeding 0.30 fps, well below the EPA's recommended BTA flow of 0.5 fps which will minimize the entrainment and subsequent impingement of fish.

17.5.4.2 Existing Discharge Use

The proposed use of the existing discharge avoids water quality impacts associated with in-lake construction such as increased turbidity resulting from sediment and shoreline disturbance and small accidental releases of oils, greases, and fluids associated with construction equipment. A new discharge has the potential to have slight effects on localized water circulation patterns, including more turbulent mixing of surface and subsurface waters. In addition, a new discharge would result in a separate thermal and chemical plume from the existing discharge, which could result in greater cumulative impacts than the slightly expanded plume resulting from the combined Independence Station and Project discharges.

17.5.4.3 Cooling Tower/Water Use Minimization

The Applicant is proposing the use of evaporative mechanical draft cooling towers to avoid the use of large volumes of cooling water. The cooling process has been designed with 6-9 cycles depending upon incoming water quality to further reduce water usage.

Several other mechanisms have been included for water conservation, including recycling of the HRSG blowdown to the cooling tower and recycling of the ultrafilter reject back to the cooling tower. Use of less water will benefit aquatic resources since less heat and chemical constituents will be discharged to Lake Ontario. Although the levels of heat and chemical constituents should rapidly return to ambient levels within short distance from the outfall and, therefore, do not represent a significant impact on aquatic resources, the less water used for cooling the smaller the plume size.

17.6 Wetlands

This section addresses requirements of Stipulation No. 12, Clauses 33 through 41. It includes a description of wetland resources present at the Project site with specific focus on those wetland areas which could be affected as a result of the construction of the proposed facilities. The section discusses the anticipated wetland impacts associated with Project construction and operation, and the proposed mitigation for these wetland impacts.

17.6.1 Applicable Regulatory Requirements

17.6.1.1 Environmental Conservation Law, Article 24

Article 24 of the Environmental Conservation Act (also referred to as the Freshwater Wetlands Act) regulates activities in and around jurisdictional wetlands. In general, freshwater wetlands are regulated by the state if they are 12.4 acres or larger in size. Smaller wetland areas can also be regulated if they are considered to be of unusual local importance. To implement the policy established by this Act, regulations were promulgated by the state under 6 NYCRR Parts 663 and 664. Part 664 of the regulations designates wetlands according to four class ratings, with Class I being the highest, or best quality, wetland and Class IV the lowest. Article 24 of the Environmental Conservation Law also regulates activities within the 100-foot adjacent areas to these wetlands. Project construction will include disturbances to wetlands and/or the 100-foot adjacent areas to wetlands regulated under Article 24 of the Environmental Conservation Law.

17.6.1.2 Clean Water Act, Section 404

Section 404 of the Clean Water Act requires authorization from the ACOE for work in waters of the United States, which includes wetlands. Because the Project involves some limited work in wetland areas, the Project will require a Section 404 Permit from the ACOE. Given the extent of the wetlands alteration involved, and the nature of the wetlands affected, it is believed that the Project can be authorized under Nationwide Permit Number 26 (Headwaters and Isolated Waters Discharge).

17.6.1.3 New York Water Quality Certification

Section 401 of the Clean Water Act requires that an applicant obtain state water quality certification for any federal permit or license to conduct activities that may result in any discharge into waters of the United States, which includes wetlands. Since the Project includes some excavation and fill in wetland areas, a Section 401 Certification is requested herein from the Siting Board.

17.6.2 Delineation of Wetland Resources

Detailed data collection and flagging of wetland boundaries were performed by Earth Tech in October 1999. The boundaries were delineated using the federal criteria (ACOE Wetlands Delineation Manual 1987) and state criteria (NYSDEC Freshwater Wetlands Delineation Manual 1995) for vegetation, soils, and hydrology.

Prior to the commencement of the field survey of the wetland resource areas, prior site documentation and published wetlands and soils maps were consulted. These included a Wetlands Delineation Report completed by TES in 1991 and submitted to and approved by both the NYSDEC and the ACOE on the same property; NYSDEC Freshwater Wetland maps (Oswego East and West of Texas); National Wetlands Inventory (NWI) maps; New York State topographic maps; and Oswego County Soil Survey soil maps. In addition, 1994 aerial photographs and the TES wetland delineation on a large-scale topographic map were available during the delineation effort.

As part of the field effort, data on vegetation, soils, and hydrology were collected in 77 documentation points with a documentation pair associated with each wetland. Each wetland area was documented with at least one pair of upland and wetland data points associated with a specific wetland boundary flag (provided in Appendix Q). Sample plots within each pair were generally located 10 to 20 feet apart on either side of the wetland boundary. These documentation points serve to confirm each wetland boundary location.

Vegetation data were collected in each wetland and upland plot. Sample plots were evaluated using an approximately 5-foot radius for herbaceous and vine species, a

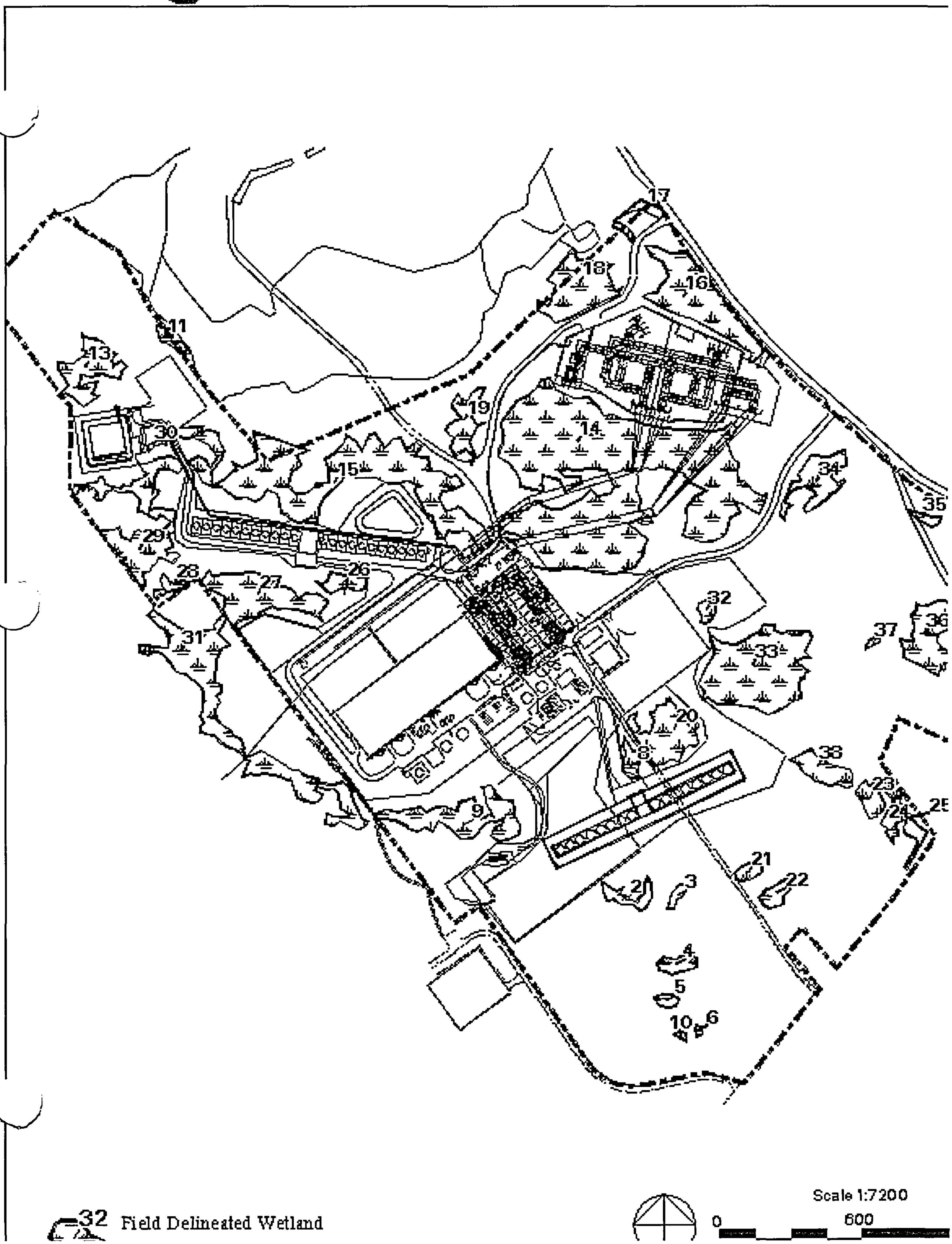
15-foot radius for shrubs and saplings, and a 30-foot radius for trees. Ocular estimates of the percent areal cover by plant species for each vegetation layer were made, and dominant (i.e., 20% or more areal cover in a community) species were recorded. Scientific nomenclature for plant species followed "National List of Plant Species that Occur in Wetlands: Northeast (Region 1)," (U.S. Fish and Wildlife Service, Reed May 1988). In addition, Reed 1988 provided indicator status (i.e., estimated probability of a species occurring in a wetland versus non-wetland across the entire distribution of the species) for each plant species to help determine dominance of plant species.

Soils information was collected in 18-inch deep soil excavations in both the wetland and upland sample plots. Soil characteristics such as depth, horizon designation, soil colors, and texture were recorded. In addition, any hydric soil indicators were noted for wetland soils.

Hydrology information collected included any recorded data, field observations of water, and primary and secondary indicators of hydrology such as soil inundation; saturation in the upper 12 inches; water marks; drift lines; sediment deposits; drainage patterns; oxidized root channels; water-stained leaves; and morphological plant adaptations such as elevated root systems, buttressed trees, adventitious roots, enlarged lenticels, or polymorphic leaves. Where hydrology and/or vegetation had been altered, additional investigation involved evaluation of historical records such as soils maps, NWI maps, NYSDEC maps, aerial photographs, or the TES report, as listed above.

Wetland delineations were conducted in the field by placing sequentially numbered flags at 25- to 50-foot intervals along the wetland boundary. These flags were pink and labeled in black with the words "Wetland Delineation." The sequential numbering of the flags consisted of the wetland identification number (i.e., 1 through 38) followed by the flag number within that particular wetland. In this manner, each flag placed on the Project site was given a unique identifier. In order to confirm and document the delineation, sample plots were located on both the upland and wetland side of the wetland boundary, as previously described. Sample plots were associated with and completed for each wetland area.

Following on-site delineation, survey crews from C.T. Male from North Syracuse, New York located the flags in the field using global positioning system (GPS) equipment. The location data were then transferred to a site plan and verified by Earth Tech. The locations of these wetland areas are presented in Figure 17-13 and Appendix R.


32 Field Delineated Wetland
Scale 1:7200
0
600

17.6.3 Characterization of Wetland Resources

Thirty-nine areas designated as Areas "1" through "39" were investigated at the site (Table 17-37). Of these 39 areas, three (i.e., Areas 1, 7, and 12) were documented as non-wetland. The remaining 36 wetland areas were delineated as described above, with the exception of Area 39 (the shore of Lake Ontario bordering the northwestern extent of the Project site). In addition, wetlands off-site within 200 feet of the proposed site were evaluated for possible hydraulic connections to wetlands located on the Project site, particularly for wetland areas to be disturbed. Several of the wetlands that were designated separately because of roads or other artificial divisions are actually contiguous to one another. Others are isolated depressions scattered within the deciduous and mixed forest uplands. These wetlands range in size from 0.1 acre to 11.2 acres.

Approximately 34.0 acres (18%) of the entire 190-acre site are comprised of wetlands. Because there will be no off-site work performed on roadways, power lines, gas lines, or water lines, no wetland delineations were performed in off-site locations.

As shown on the NYSDEC wetlands map (Figure 17-14), three state-regulated wetlands, OE-4 OE-6 and OE-58 are present on the site. Two of these wetlands (OE-4 and OE-6) are considered Class III wetlands, and the other (OE-58) is considered a Class I wetland. Wetland OE-58 is considered Class I because it contains four or more Class II criteria. The NWI map (Figure 17-15), although not an official regulatory map, indicates several palustrine wetlands on the site. All wetlands, regardless of size, were mapped under the current delineation criteria as outlined in Section 17.6.2.

Characteristics for each of the 36 wetland areas mapped on-site (as well as the three non-wetland areas reviewed) are as shown in Table 17-37. Detailed descriptions of each wetland area, including vegetation, soils, and hydrology, based on on-site observations, are provided below.

17.6.3.1 Area 1

This area was previously reported in the TES report in 1991 as a federal jurisdictional wetland. The area is a small depression located within a natural gas pipeline right-of-way. Although wetland vegetation is dominant in this isolated depression, the area lacks hydric soils and wetland hydrology and, therefore, it is not considered a wetland.

Table 17-37: Summary of Wetland Areas (Page 1 of 2)

	NWI Classification(2)	NWI Mapping(3)	DEC Mapping(4)	Hydrological Regime(5)	Mapped Soil Unit(6)	Wetland Size (Acres)
1(1)	Non-wetland	N/A	N/A	N/A	IUD	N/A
2	PFO	Not mapped	Not mapped	SF	IUD	0.3
3	PFO	Not mapped	Not mapped	SF	ScB	0.1
4	PFO/POW	Not mapped	Not mapped	SF	IUD	0.2
5	PSS	Not mapped	Not mapped	SF	IUD	0.1
6	PSS	Not mapped	Not mapped	SF	IUD	0.1
7(1)	Non-wetland	N/A	N/A	N/A	IUD	N/A
8	PFO	Not mapped	Not mapped	SF	ScB	0.2
9	PFO	PFO1E	OE-58	SF	IUD	1.4
10	PSS	Not mapped	Not mapped	SF	IUD	0.1
11	PFO	PFO1E	OE-4	SF	IUD	0.1
12(1)	Non-wetland	N/A	N/A	N/A	IUD	N/A
13	PFO	PFO1E	OE-58	SF	IUD	0.9
14	PFO/PSS/PEM	PSS1E/PFO1E	OE-6	PF	IUD	11.2
15	PFO/PSS	PFO1E	OE-4	SPF/PF	IUD	4.5
16	PFO/PSS/PEM	PFO1E	OE-4	SPF	IUD	1.9
17	PFO	PFO1E	OE-4	SF	IUD	0.1
18	PFO	PFO1E	OE-4	SPF	IUD	1.0
19	PFO	Not mapped	Not mapped	SF	IUD	0.5
20	PFO/PSS	Not mapped	Not mapped	SPF	ScB	1.1
21	PFO	Not mapped	Not mapped	SF	ScB	0.1
22	PFO	Not mapped	Not mapped	SF	ScB	0.2
23	PEM/POW	Not mapped	Not mapped	SF	ScB	0.3
24	PEM	Not mapped	Not mapped	SF	ScB	0.2
25	PFO/PSS	Not mapped	Not mapped	SF	ScB	0.3
26	PSS	Not mapped	Not mapped	SF	IUD	0.3
27	PFO	PFO1E	OE-58	SPF	IUD	1.4
28	PFO	PFO1E	OE-58	SPF	IUD	0.1
29	PFO	PFO1E	OE-58	SPF	IUD	1.7
30	PFO	Not mapped	Not mapped	SF	IUD	0.1
31	PFO/PSS	PFO1E	OE-58	SPF	IUD	Off-site
32	PFO	P(FO1/EM5)E	Not mapped	SPF	IUD	0.1
33	PFO	P(FO1/EM5)E	Not mapped	SPF	Pa/IUD	2.8
34	PFO	Not mapped	OE-6	SF	ScB	0.8

Table 17-37: Summary of Wetland Areas (Page 2 of 2)

	NWI Classification[2]	NWI Mapping[3]	DEC Mapping[4]	Hydrological Regime[5]	Mapped Soil Unit[6]	Wetland Size (Acres)
35	PFO	Not mapped	Not mapped	SF	ScB	0.1
36	PFO/PEM	POWZ	Not mapped	SPF	IrB	1.1
37	PFO	Not mapped	Not mapped	SF	ScB	0.1
38	PSS	Not mapped	Not mapped	SF	ScB	0.5
39	L2OW	L2OWH	N/A	PF	N/A	N/A
Total						**34.0**

Notes:

(1) Areas determined to be non-wetlands due to lack of either hydrophytic vegetation, hydric soils, or signs of hydrology.

(2) Taken in part from Cowardin et al. (1979) U.S. Fish and Wildlife Service publication "Classification of Wetlands and Deepwater Habitats of the United States" where:

L2OW = Lacustrine Littoral Open Water Wetland;
PEM = Palustrine Emergent Wetland;
PFO = Palustrine Forested Wetland;
POW = Palustrine Open Water; and
PSS = Palustrine Scrub-shrub Wetland.

(3) Taken in part from U.S. Fish and Wildlife Service Natural Wetlands Inventory Maps for the area (i.e., Oswego East and West of Texas USGS Quads) where:

L2OWH = Lacustrine Littoral Open Water area with a permanently flooded water regime;
PFO1E = Palustrine Forested Broad-leaved Deciduous Wetland with a seasonally flooded/saturated water regime;
P(FO1/EM5)E = Palustrine Forested/Emergent Broad-leaved Deciduous Wetland with a seasonally flooded/saturated water regime;
POWZ = Palustrine Open Water area which is intermittently exposed; and
PSS1E = Palustrine Scrub-shrub Broad-leaved Deciduous Wetland with a seasonally flooded/saturated water regime.

(4) Taken in part from New York State Department of Environmental Conservation Wetlands Maps for the area (i.e., Oswego East and West of Texas USGS Quads) where:

OE-4 = New York State Department of Environmental Conservation Wetland in Oswego County #4;
OE-6 = New York State Department of Environmental Conservation Wetland in Oswego County #6; and
OE-58= New York State Department of Environmental Conservation Wetland in Oswego County #58.

(5) Taken in part from Cowardin et al. (1979) U.S. Fish and Wildlife Service publication "Classification of Wetlands and Deepwater Habitats of the United States" Water Regime Modifiers, Nontidal, where:

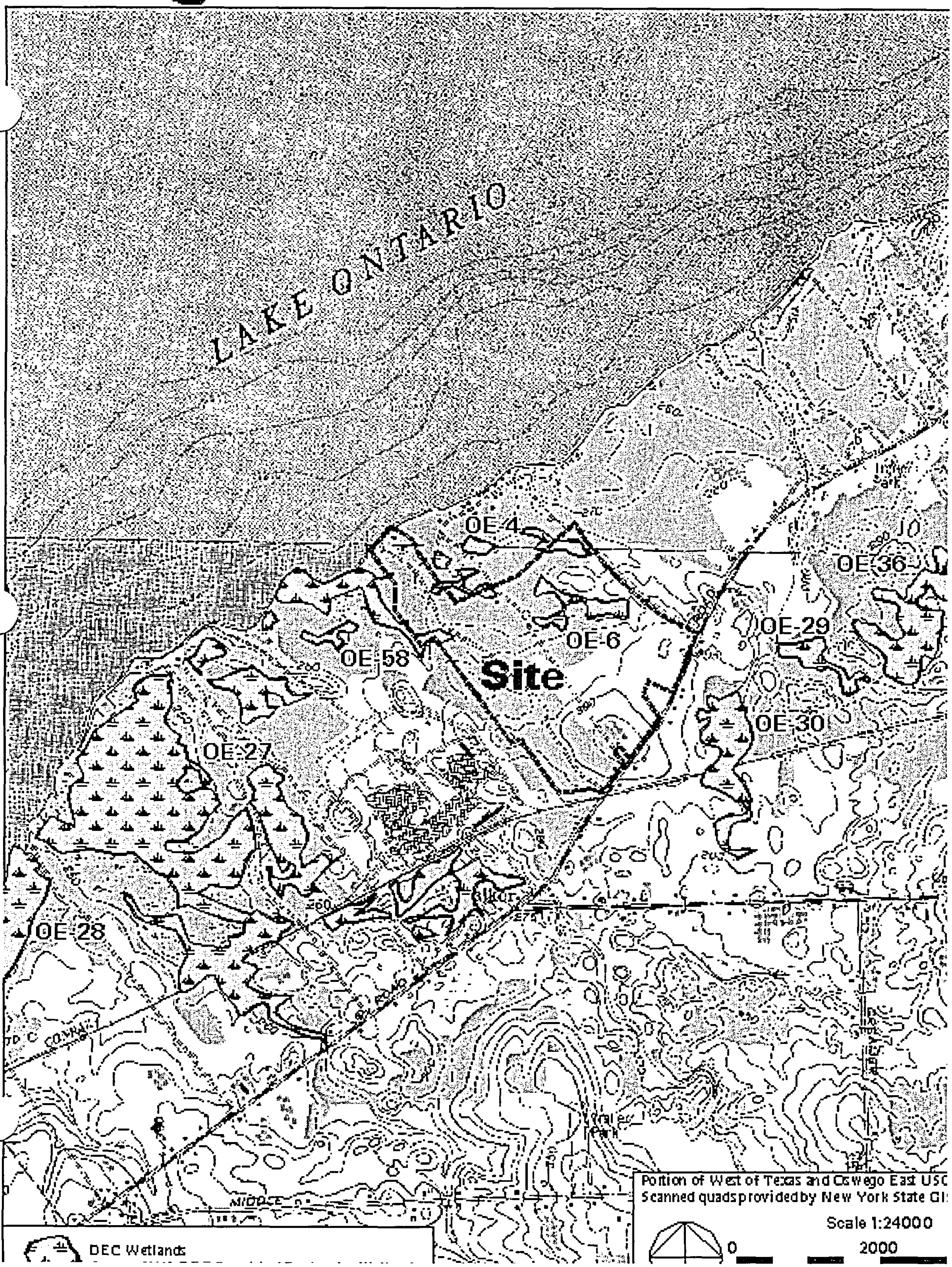
PF = Permanently flooded;
SF = Seasonally flooded/saturated; and
SPF = Semi-permanently flooded.

(6) Taken in part from USDA Soil Conservation Service Soil Survey of Oswego County, New York (1981) where:

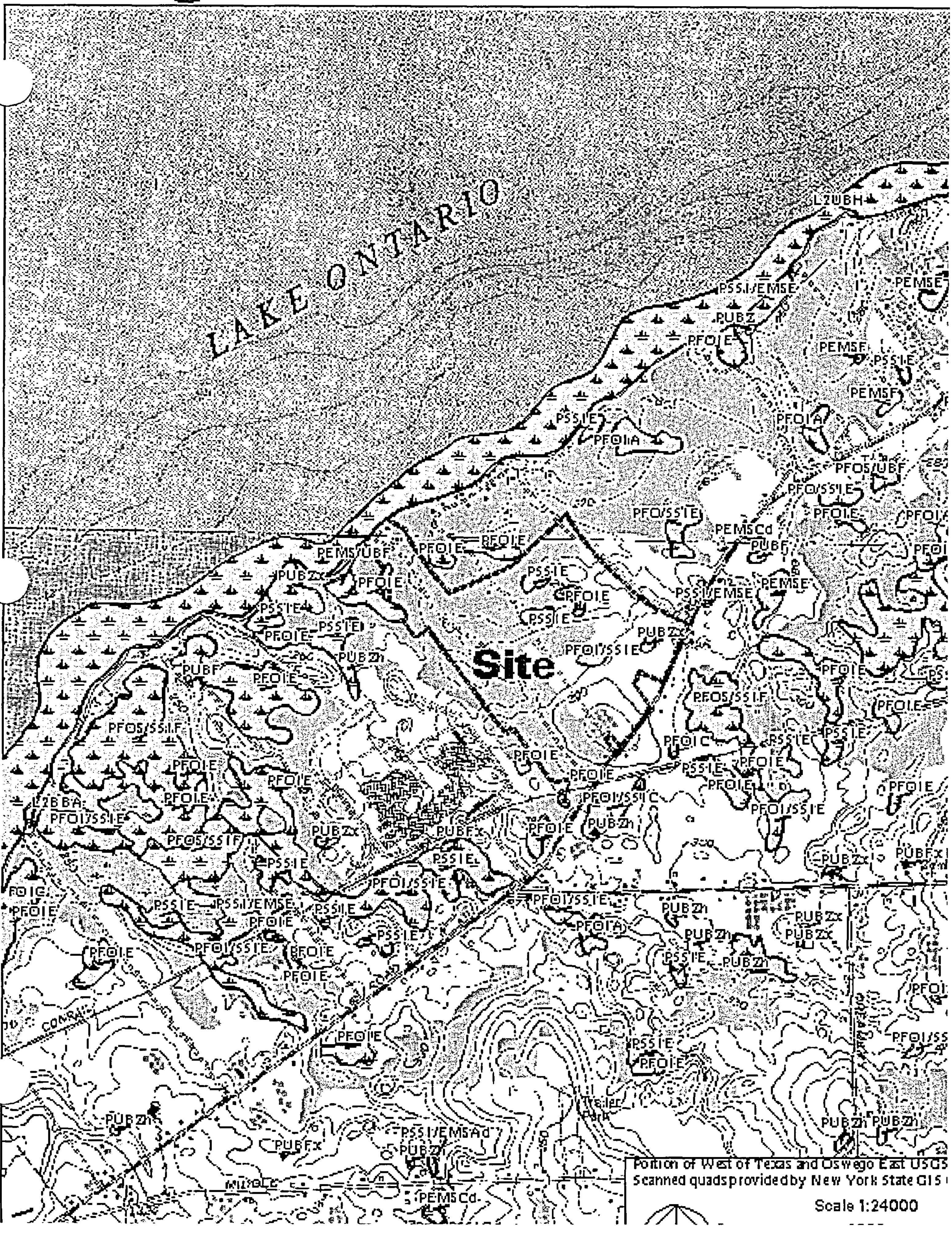
IrB = Ira gravelly fine sandy loam;
IUD = Ira and Sodus very stony soils;
Pa = Palms muck; and
ScB = Scriba gravelly fine sandy loam.

17.6.3.2 Area 2

This isolated area is a palustrine forested wetland (PFO) dominated in the overstory by red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), and yellow birch (*Betula lutea*). The understory is dominated by spicebush (*Lindera benzoin*). The herbaceous vegetation consists of false nettle (*Boehmeria cylindrica*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), nodding smartweed (*Polygonum lapathifolium*), and beggar-ticks (*Bidens frondosa*).


LAKE ONTARIO
OE 4
OE 36
OE 29
OE 6
OE 58
Site
OE 30
OE 27
OE 28
DEC Wetlands
Portion of West of Texas and Oswego East USG
Scanned quads provided by New York State GI
Scale 1:24000
0
2000

E A R T H T E C H


LAKE ONTARIO
Site
L2UBH
PSS1/EM5E
PEM5E
PUBZ
PFO1E
PEM5F
PSS1E
PFO1A
PFO5/UBF
PFO/SS1E
PEM5Cd
PUBF
PEM5/UBF
PUBZx
PFO1/SS1E
PUBZh
PFO5/SS1F
PFO1C
L2BBA
PUBFx
CONRAIL
Trailer Park
PSS1/EM5Ad
PEM5Cd
Portion of West of Texas and Oswego East USGS
Scanned quads provided by New York State GIS
Scale 1:24000

Soils in this area are classified as Aeric Haplaquepts with a profile description including a 12-inch (0-12) surface or A horizon with color of 10YR 2/1 and sandy loam texture. The subsoil or B horizon, extending beyond 18 inches (12-18 inches or more), has color of 2.5Y 6/1 with many fine prominent 10YR 5/6 redoximorphic features and sandy loam texture. Wetland hydrological indicators associated with this wetland include watermarks, sediment deposits, and water stained leaves.

17.6.3.3 Area 3

This isolated area is a PFO dominated in the overstory by slippery elm (*Ulmus rubra*) and green ash. The understory is dominated by spicebush. The herbaceous vegetation consists of hop sedge (*Carex lupulina*), white snakeroot (*Ageratina altissima*), sensitive fern, cinnamon fern, and false nettle.

Soils in this area are classified as Aeric Haplaquepts with a profile description including a 6-inch (0-6) surface or A horizon with color of 10YR 3/2 and sandy loam texture. The subsoil or Bg horizon, extending beyond 18 inches (6-12 inches or more), has color of 2.5Y 7/2 with many fine prominent 2.5Y 6/6 redoximorphic features and sandy loam texture. Wetland hydrological indicators associated with this wetland include watermarks, saturation in the upper 12 inches, and water stained leaves.

17.6.3.4 Area 4

This isolated area is a PFO containing a small ponded area. Overstory vegetation in this wetland includes gray birch (*Betula populifolia*), green ash and slippery elm. Slippery elm dominates the understory along with sugar maple (*Acer saccharum*) and beech (*Fagus grandifolia*). Herbaceous vegetation consists of jewelweed (*Impatiens capensis*), horsetail (*Equisetum fluviatile*), sensitive fern, white snakeroot, beggar-ticks, and false nettles. Virginia creeper (*Parthenocissus quinquefolia*) vines occur in this wetland.

Soils in this area are classified as Histic Humaquepts including a 12-inch (0-12) surface Oa horizon with color of N 2.5/0 and muck texture. The substratum or Cg horizon, extending beyond 18 inches (12-18 inches or more), has color of 5G 5/1 and loamy sand texture. Wetland hydrological indicators with this wetland include soil inundation, watermarks, and water-stained leaves.

17.6.3.5 Area 5

This isolated area is a palustrine scrub-shrub wetland (PSS). Dominant overstory vegetation includes sugar maple growing in the adjacent upland. The shrub layer is dominated by red-panicled dogwood (*Cornus racemosa*), shortstalk arrow-wood (*Viburnum rafinesquianum*), and green ash. Herbaceous vegetation includes marsh fern (*Thelypteris thelypteroides*), rice cutgrass (*Leersia oryzoides*) nodding smartweed, cinnamon fern, false nettles, sensitive fern, hop sedge, and beggar-ticks.

Soils in this area are classified as Aeric Haplaquepts with a profile description including a 3-inch (0-3) surface or A horizon with color of 10YR 2/1 and mucky silt loam texture. The subsoil or Bw horizon, extending beyond 18 inches (3-18 inches or more), has color of 2.5Y 6/1 with few fine prominent 10YR 5/6 redoximorphic features and a sandy loam texture. Wetland hydrological indicators associated with this wetland include watermarks, saturation in the upper 12 inches, and water-stained leaves.

17.6.3.6 Area 6

This isolated area is a PSS. Dominant overstory vegetation includes sugar maple growing in adjacent upland. The shrub layer is dominated by common elder (*Sambucus canadensis*) and spicebush. Herbaceous vegetation consists of deer-tongue grass (*Dichanthelium clandestinum*), sensitive fern, white snakeroot, jewelweed, and false nettle.

Soils in this area are Aeric Haplaquepts with a profile description including an 8-inch (0-8) surface or A horizon with color 10YR 2/1 and mucky silt loam texture. The subsoil or Bw horizon, extending beyond 18 inches (8-18 inches or more), has color of 2.5Y 6/2 with common fine prominent 10YR 5/6 redoximorphic features and a sandy loam texture. Wetland hydrological indicators documented with this wetland include watermarks.

17.6.3.7 Area 7

This small isolated depression contains some areas where wetland vegetation is dominant, however, hydric soils are lacking throughout. Therefore, the area is documented as upland.

17.6.3.8 Area 8

This PFO area is hydrologically connected to Wetland Area 20 via an 18-inch culvert. These areas are separated by a gravel road accessing the Project site. A drainage channel from an open field was noted along the western edge of this area.

Dominant overstory vegetation includes slippery elm and green ash. Understory vegetation consists of silky dogwood (*Cornus amomum*) and green ash. Herbaceous vegetation is dominated by sensitive fern, and vines (*Vitis* sp.) are present in this wetland.

Soils are Aeric Haplaquepts. The profile description includes a 6-inch (0-6) surface or A horizon with color 10YR 3/1 with common fine prominent 10YR 5/6 redoximorphic features and a fine sandy loam texture. The subsoil or Bw horizon, extending beyond 18 inches (6-18 inches or more), has color of 10YR 5/2 with many fine and medium prominent 10YR 5/2 redoximorphic features and a loamy sand texture. Hydrological indicators in this wetland include watermarks, drift lines, drainage patterns, oxidized root channels in the upper 12 inches, and water-stained leaves.

17.6.3.9 Area 9

This PFO area is hydrologically connected to Wetland Area 31 via culverts beneath an abandoned road. This hydrologic connection links it to a mapped NYSDEC Wetland OE-58 and NWI wetland PFO1E. This wetland extends off the Project site to the west.

Dominant overstory vegetation includes sugar maple and green ash. Understory vegetation includes spicebush. The herbaceous vegetation consists of false nettles and white snakeroot. Vines in this wetland area include poison ivy (*Toxicodendron radicans*) and grapes.

Soils in this area consist of an 8-inch (0-8) surface or A horizon with color 10YR 3/2 and fine sandy loam texture. The subsoil or B horizon extends below 18 inches (8-18 inches or more), has color of 10YR 5/2 with many medium prominent 7.5YR 6/6 redoximorphic features, and fine sandy loam texture. Soils in this area are classified as Aeric Haplaquepts. Hydrological indicators include soil saturation in the upper 12 inches and water-stained leaves.

17.6.3.10 Area 10

This isolated area is a PSS wetland dominated by green ash and spicebush is the shrub layer. The herbaceous vegetation consists of sensitive fern and white snakeroot.

The soil profile description in this area includes an 8-inch (0-8) surface or A horizon with color 10YR 4/1 with few fine prominent 10YR 5/6 redoximorphic features and a fine sandy loam texture. The subsoil or Bw horizon extends beyond 18 inches (8-18 inches or more) and has color 10YR 5/3 with many medium distinct 10YR 4/4 redoximorphic features and a sand texture. The soils in Area 10 are classified as Aeric Haplaquepts. Hydrological indicators in this wetland include soil saturation in the upper 12 inches and water-stained leaves.

17.6.3.11 Area 11

This PFO extends off the Project site to the east, and is hydrologically connected to NYSDEC Wetland OE-4 and NWI Wetland PFO1E. Dominant overstory vegetation includes sugar maple and green ash. The understory is dominated by spicebush and the herbaceous layer is dominated by sensitive fern.

Soils in this area are Aeric Haplaquepts with a profile description including a 8-inch (0-8) surface or A horizon with color of 10YR 2/2 and fine sandy loam texture. The subsoil or B horizon, extending beyond 18 inches (8-18 inches or more), has color of 10YR 6/1 with many medium prominent redoximorphic features and silty clay loam texture. Hydrological indicators associated with this wetland include watermarks, drift lines, and water-stained leaves.

17.6.3.12 Area 12

This area was previously reported in the TES report in 1991 as a federal jurisdictional wetland. However, based on the most recent field observations, this area is not considered a wetland because of lack of wetland hydrology and hydric soils.

17.6.3.13 Area 13

This wetland extends off the Project site to the west, and is hydrologically connected to NYSDEC Wetland OE-58 and NWI Wetland PFO1E. The area is classified as a PFO. Dominant overstory vegetation includes sugar maple and green ash. Understory vegetation includes hornbeam (*Ostrya virginiana*) and spicebush. Herbaceous vegetation includes sensitive fern and false nettles.

Soils in this area are Aeric Haplaquepts with profile descriptions including an 8-inch (0-8) surface or A horizon with color of 10YR 4/1 and fine sandy loam texture. The subsoil or Bw horizon extending beyond 18 inches (8-18 inches or more), has color of 10YR 5/3 with many medium distinct 10YR 4/4 redoximorphic features and sand texture. Wetland hydrological indicators associated with this wetland include soil saturation in the upper 12 inches, watermarks, and water-stained leaves.

17.6.3.14 Area 14

This palustrine wetland has forested, emergent (PEM), and scrub shrub components. This wetland is hydrologically connected to both Wetlands 15 and 34 via culverts beneath existing roads that cross the Project site. These wetlands are hydrologically connected to NYSDEC Wetland OE-6 and NWI Wetlands PSS1E and PFO1E.

Vegetation dominating this wetland includes ironwood (*Carpinus caroliniana*), slippery elm and red maple in the overstory; black willow (*Salix nigra*), winterberry (*Ilex verticillata*), speckled alder (*Alnus rugosa*), ironwood, yellow birch, shortstalk arrowwood, and silky dogwood in the understory; and water horehound (*Lycopus americanus*), sensitive fern, white snakeroot, poison ivy, and beggar-ticks in the herbaceous layer.

Soils in this area are primarily Aeric Haplaquepts, but due to the presence of ledge in this area, one profile was documented as a Lithic Endoaquept (i.e., a soil less than 20 inches deep). A typical soil profile for this wetland includes a 6-inch (0-6) surface or A horizon with color of 10YR 3/1 and sandy loam texture. The subsoil, extending below 18 inches (6-18 inches or more), or Bw has color of 2.5Y 6/2 with many medium prominent 10YR 5/6 redoximorphic features and a sandy loam texture. Wetland hydrological indicators associated with this wetland include soil inundation, watermarks, and water-stained leaves.

17.6.3.15 Area 15

This palustrine wetland has both forested and scrub shrub components. This wetland is hydrologically connected to Wetlands 14 and 29 via culverts under site roads. This wetland extends off site to the east. This wetland is hydrologically connected to NYSDEC Wetland OE-4 and NWI Wetland PFO1E.

Dominant wetland vegetation includes eastern hemlock (*Tsuga canadensis*), red maple, and green ash in the overstory; spicebush and speckled alder in the understory; and ostrich fern (*Matteuccia struthiopteris*), false nettles, black willow, shortstalk arrowwood, jewelweed, and sensitive fern in the herbaceous layer.

Soils in this wetland area are Aeric Haplaquepts with a profile description including a 6-inch (0-6) surface or A horizon with color 10YR 2/1 and sandy loam texture. The B horizon or subsoil, extending below 18 inches (6-18 inches or more), has color 10YR 5/1 and sandy loam texture. Wetland hydrological indicators include soil inundation, watermarks, sediment deposits, drainage patterns, and water-stained leaves.

17.6.3.16 Area 16

This palustrine wetland has both forested and emergent (PEM) components. This wetland is hydrologically connected to Wetlands 17 and 18 via culverts under existing site roads. This wetland is hydrologically connected to NYSDEC Wetland OE-4 and NWI Wetland PFO1E.

Dominant wetland vegetation includes red maple and green ash in the overstory of the forested portion of this wetland. The understory vegetation includes pepper bush (*Clethra alnifolia*), multiflora rose (*Rosa multiflora*), black willow, elderberry, and shortstalk arrowwood. The herbaceous vegetation includes cattails (*Typha latifolia*), purple loosestrife (*Lythrum salicaria*), sensitive fern, false nettles, white snakeroot, and horsetail.

Soils associated with this wetland area are Aeric Haplaquepts with a profile description including a 10-inch (0-10) surface or A horizon with color 10YR 3/2 and fine sandy loam texture. The subsoil or Bw horizon extends below 18 inches (10-18 inches), has color 10YR 6/1, many medium prominent 10YR 5/4 redoximorphic features, and sandy loam texture. Wetland hydrological indicators include soil inundation, sediment deposits, and water-stained leaves.

17.6.3.17 Area 17

This PFO is hydrologically connected to Wetlands 16 and 18. This wetland extends to the north off site. This wetland is connected to NYSDEC Wetland OE-4 and NWI Wetland PFO1E.

Vegetation dominating this wetland includes red maple, green ash, and eastern hemlock in the overstory. Spicebush, red maple, green ash, and beech dominate the understory vegetation. Cinnamon fern, sensitive fern, and jewelweed dominate the herbaceous vegetation. Vines associated with this wetland include poison ivy and Virginia creeper.

Soils in this area are Aeric Haplaquepts with a profile description including an 8-inch (0-8) surface or A horizon with color 10YR 3/2 and sandy loam texture. The subsoil or Bw horizon extends below 18 inches (8-18 inches or more), has color of 10YR 6/1, many fine prominent 10YR 5/4 redoximorphic features, and a sandy loam texture.

17.6.3.18 Area 18

This PFO is hydrologically connected to Wetlands 16 and 17, as well as NYSDEC Wetland OE-4 and NWI Wetland PFO1E. This wetland extends off site to the north.

Dominant vegetative species in this wetland includes red maple and eastern hemlock in the overstory and understory. The understory is also dominated by spicebush. The herbaceous dominants include cinnamon fern and sensitive fern.

Soils in this wetland area are Aeric Haplaquepts with a profile description including a 6-inch (0-6) surface or A horizon with color 10YR 2/1 and sandy loam texture. The subsoil or Bw horizon extends below 18 inches (6-18 inches or more), has color 10YR 6/1, few fine prominent 10YR 5/4 redoximorphic features, and sandy texture. Watermarks occur as hydrologic indicators in this wetland.

17.6.3.19 Area 19

This isolated area is a PFO dominated in the overstory by red maple, slippery elm, and green ash. The dominant vine present is Virginia creeper. No herbaceous species were present at the time of survey.

Soils in this wetland are Lithic Endoaquept with a profile description including a 4-inch (0-4) surface or A horizon with color 10YR 2/1 and sandy loam texture. The subsurface or Bw horizon terminates at a depth of 12 inches (4-12) by refusal on ledge. The Bw horizon has a color of 10YR 5/1, many fine prominent 10YR 5/4 redoximorphic features, and sandy loam texture. Watermarks and drainage patterns are hydrological indicators present in this wetland.

17.6.3.20 Area 20

This PFO is hydrologically connected to Wetland Area 8 via a culvert beneath an existing dirt road. Dominant overstory vegetation includes red maple. Understory vegetation includes slippery elm, silky dogwood, and black willow. Herbaceous vegetative species include sedges (*Carex sp.*) and beggar ticks.

Lithic Endoaquepts represent the wetland soils in this area. The representative profile description includes a 2-inch (0-2) surface or A horizon with color 10YR 3/2 and sandy loam texture. The subsoil or Bw horizon terminates at a depth of 15 inches (2-15) by refusal on ledge. The Bw horizon has a color of 2.5Y 6/2, many medium prominent 10YR 5/6 redoximorphic features, and sandy loam texture. Hydrological indicators include watermarks, sediment deposits, and water-stained leaves.

17.6.3.21 Area 21

This isolated PFO is dominated in the overstory by green ash. The understory is dominated by green ash, slippery elm, silky dogwood, and shortstalk arrowwood. The herbaceous vegetation species includes false nettles, woolgrass, (*Scirpus cyperinus*), tearthumb (*Polygonum sagittatum*), and jewelweed.

Aeric Haplaquepts represent the dominant wetlands, and include a representative profile description of a 6-inch (0-6) surface or A horizon with color of 10YR 3/2 and sandy loam texture and a 12-inch plus (6-18 inches or more) Bw horizon with color of 2.5Y 6/1, many fine prominent 2.5Y 5/4 redoximorphic features, and sand texture. Watermarks and water-stained leaves characterize the wetland hydrological indicators.

17.6.3.22 Area 22

This isolated PFO is dominated by green ash and slippery elm in the overstory; green ash and silky dogwood in the understory; sedges and white snakeroot in the herbaceous layer; and poison ivy vines.

Soils in this area have a 10-inch (0-10) surface or A horizon, color of 10YR 3/2, and a fine sandy loam texture. The Bw horizon or subsoil extends below 18 inches (10-18 inches or more), has a silty clay loam texture, matrix color of 10YR 6/1, and many fine prominent 10YR 4/4 redoximorphic features. The wetland soils are classified as Aeric Haplaquepts. Watermarks characterize the wetland hydrological indicators.

17.6.3.23 Area 23

This isolated palustrine emergent/open water wetland (PEM/OW) is dominated in the herbaceous community by purple loosestrife, cattails, and phalaris (*Phalaris arundinacea*).

Soils in this wetland are Aeric Haplaquepts with a profile description including a 6-inch (0-6) surface or A horizon with mucky silt loam texture and 10YR 4/1 color. The Bw horizon or subsoil extends below 18 inches (6-18 inches or more) and has a silty clay loam texture, 10YR 2/1 color, and many fine and medium prominent 10YR 4/4 and common medium prominent 10YR 5/2 redoximorphic features. Watermarks are present as representative hydrological indicators in this area.

17.6.3.24 Area 24

This isolated PEM is dominated by Phalaris, cattails, and New England aster (*Aster novae-angliae*) in the herbaceous vegetative layer.

Soils in this wetland are Aeric Haplaquepts with a profile description including a 10-inch (0-10) surface or A horizon with a color of 10YR 2/1 and sandy loam texture. The subsoil or Bw horizon extends below 18 inches (10-18 inches or more), has a color of 10YR 6/2, many fine and medium 10YR 5/4 distinct redoximorphic features, and sand/loamy sand texture. Wetland hydrological indicators in this area include watermarks.

17.6.3.25 Area 25

This isolated PFO/PSS is dominated by green ash in the overstory; silky dogwood, shortstalked arrow-wood, and speckled alder, in the understory; and purple loosestrife, phalaris, and late goldenrod (*Solidago gigantea*) in the herbaceous layer.

Soils in this area are Aeric Haplaquepts with a profile description including a 6-inch (0-6) surface or A horizon with color of 2.5Y 5/1 and silty clay loam texture. The Bw horizon or subsoil extends below 18 inches (6-18 inches plus), has a color of 2.5Y 6/2, many fine distinct 10YR 4/4 redoximorphic features, and silty clay loam texture. Wetland hydrology in this area is evidenced by soil saturation in the upper 12 inches, watermarks, oxidized root channels, and water-stained leaves.

17.6.3.26 Area 26

Green ash and red maple in the overstory and shrub layer dominate this isolated PSS. The understory also contains elderberry. Herbaceous vegetation consists of white snakeroot, sedges, sensitive fern and staghorn sumac (*Rhus typhina*).

The soils in this wetland are classified as Aeric Haplaquepts. The typical soil profile features a 5-inch (0-5) surface or A horizon with color of 10YR 2/1 and sandy loam texture. The subsoil or Bw extends below 18 inches (5-18 inches or more), has color of 10YR 6/2, many fine medium distinct 10YR 4/4 redoximorphic features, and loamy sand/coarse sandy loam texture. Watermarks, sediment deposits, and water-stained leaves are the wetland hydrological indicators observed in this area.

17.6.3.27 Area 27

This PFO is hydrologically connected to Wetlands 28 and 31, as well as to NYSDEC Wetland OE-58 and NWI Wetland PFO1E. Dominant wetland vegetative species include green ash and red maple in the overstory. The understory consists of elderberry and spicebush. The herbaceous species include white snakeroot, false nettles, and jewelweed.

Aeric Haplaquepts soils in this area include a 10-inch (0-10) surface or A horizon with color of 10YR 2/1 and sandy loam texture. The subsoil or Bw horizon extends below 18 inches (10-18 inches or more), has a color of 10YR 5/3, many fine and medium prominent 10YR 5/6 redoximorphic features, and a loamy sand/sand texture. Wetland hydrological indicators include watermarks, soils saturation in the upper 12 inches, sediment deposits, and water-stained leaves.

17.6.3.28 Area 28

This PFO is hydrologically connected to Wetlands 27 and 31, as well as NYSDEC Wetland OE-58 and NWI Wetland PFO1E.

Dominant wetland vegetative species include red maple and green ash in the overstory; spicebush in the understory; and false nettles, white snakeroot, jewelweed, sensitive fern, and staghorn sumac in the herbaceous layer.

Lithic Endoaquepts are characteristic in the area. The profile descriptions include a 7-inch (0-7) surface or A horizon of color 10YR 2/1 and fine sandy loam texture. A 3-inch (7-10) subsoil or B horizon of color 10YR 5/2, many fine prominent 7.5YR 4/4 redoximorphic features, and fine sandy loam texture. The soil investigation terminates at refusal on ledge at 10 inches. Soil inundation, watermarks, and water-stained leaves characterize the hydrological indicators in this wetland area.

17.6.3.29 Area 29

This PFO is hydrologically connected to Wetlands 15 and 31, as well as NYSDEC Wetland OE-58 and NWI Wetland PFO1E. Dominant wetland vegetative species include sugar maple, green ash, and hemlock in the overstory. The understory vegetative species consist of slippery elm and spicebush. Herbaceous vegetation includes false nettles, white snakeroot, and sensitive fern.

Soils in this wetland area are Aeric Haplaquepts with a profile description including a 12-inch (0-12) A or surface horizon with color of 10YR 2/1 and mucky fine sandy loam texture. The Bw horizon or subsoil extends below 18 inches (12-18 inches or more), has color of 5Y 5/2, common fine prominent redoximorphic features, and silty clay loam texture. Wetland hydrology is characterized by soil inundation, watermarks, sediment deposits, drainage patterns, and water-stained leaves.

17.6.3.30 Area 30

This isolated PFO is characterized by soil inundation and watermarks as evidence of wetland hydrology. The vegetation in this area is dominated by sugar maple, yellow birch, slippery elm, and green ash in the overstory. The understory consists of eastern hemlock and spicebush. Herbaceous vegetative species include false nettles and sensitive fern.

The representative soil profile for these Aeric Haplaquepts include a 12-inch (0-12) A or surface horizon with color of 10YR 2/1 with sandy loam texture. The Bw or subsoil extends below 18 inches (12-18 inches or more), has color of 5Y 6/2, many fine and medium prominent 10YR 5/4 redoximorphic features, and loamy sand texture.

17.6.3.31 Area 31

This PFO/PSS is primarily off-site but hydrologically connected to Wetland Areas 9, 27, 28, and 29, as well as NYSDEC Wetland OE-58 and NWI Wetland PFO1E.

Vegetative species in this wetland include sugar maple, green ash, red maple, and quaking aspen (*Populus tremula*) in the overstory. The understory includes green ash. The herbaceous layer consists of sensitive fern, white snakeroot, spicebush, and poison ivy.

The Aeric Haplaquepts in this wetland consists of a 10-inch (0-10) surface or A horizon with color of 10YR 2/1 and sandy loam texture. The Bw or subsoil horizon extends below 18 inches (10-18 inches or more), has color of 5Y 5/2, many fine prominent redoximorphic features, and sandy loam texture. Watermarks, drainage patterns, and water-stained leaves characterize hydrological indicators for this wetland.

17.6.3.32 Area 32

This isolated PFO is mapped and classified as NWI wetland PFO1/EMS.

The overstory vegetation in this wetland consists of green ash; the understory consists of red-panicled dogwood; the herbaceous vegetation consists of horsetail and sensitive fern; and poison ivy was growing as a vine in this area.

Aeric Haplaquepts characterize this area with a profile description including a 4-inch (0-4) surface or A horizon of color 10YR 2/1 and sandy loam texture. The subsoil or Bw horizon extends below 18 inches (4-18 inches or more), has color of 2.5Y 6/2, many fine prominent redoximorphic features, and loamy sand/sand texture. Watermarks and water-stained leaves characterize the hydrological indicators in this wetland.

17.6.3.33 Area 33

This isolated PFO is mapped and classified as NWI wetland PFO1/EMS and is dominated by red maple and green ash in the overstory, speckled alder in the understory, and sensitive fern in the herbaceous layer.

The soil profile of a 10-inch (0-10) surface or A horizon, texture of sandy loam, color of 10YR 2/1 and an 8-inch plus (10-18 inches or more) subsoil or B horizon with a texture of loamy sand/sand, color of 10YR 6/1, and few fine prominent 10YR 4/4 redoximorphic features is characteristic of the Aeric Haplaquepts described with this wetland. However, information from the Oswego County Soil Survey shows Palms muck as mapped in this area. The Palms soil is a Terric Medisaprist soil. Watermarks and water-stained leaves characterize the hydrological indicators in this wetland.

17.6.3.34 Area 34

This PFO area is hydrologically connected to Wetland 14 and NYSDEC Wetland OE-6. This wetland is dominated by red maple and green ash in the overstory; shortstalk arrowwood in the understory; and lurid sedge (*Carex lurida*), water horehound, and sensitive fern in the herbaceous layer. Poison ivy is growing as a vine in this area.

The soils of this area consist of Aeric Haplaquepts with a surface or A horizon 10 inches thick (0-10), color of 10YR 2/1, and fine sandy loam texture. The subsoil or Bw horizon extends below 18 inches (10-18 inches or more), has sandy loam texture, color of 5Y 6/2, and many medium prominent 10YR 5/6 redoximorphic features. Hydrological indicators include watermarks and water-stained leaves.

17.6.3.35 Area 35

This isolated PFO is characterized by green ash dominant in the overstory, speckled alder and silky dogwood dominant in the understory, sensitive fern dominant in the herbaceous layer, and nightshade dominant in the liana layer.

Soils in this area are Aeric Haplaquepts with a representative profile description consisting of a 12-inch (0-12) surface or A horizon with color of 10YR 3/2 and sandy loam texture. The subsoil or B horizon extends below 18 inches (12-18 inches or more), has color of 2.5Y 6/2, many fine prominent 2.5Y 5/4 redoximorphic features, and sand texture. Watermarks and water-stained leaves are characteristic hydrological indicators in this wetland.

17.6.3.36 Area 36

This isolated PFO/PEM is mapped as NWI Wetland POWZ and is dominated by sugar maple in the overstory; silky dogwood in the understory; night shade, false nettles, and cattails in the herbaceous layer.

Soils in this area are Terric Medisaprists with organic soil materials extending below 18 inches (0-18 inches or more), matrix color of N 2/0, and muck texture. Watermarks and water-stained leaves characterize the hydrological indicators in this area.

17.6.3.37 Area 37

This isolated PFO is characterized by Aeric Haplaquepts soil. The representative profile description consists of a 10-inch (0-10) surface layer or A horizon of color 10YR 2/1 and sandy loam texture. The subsoil or B horizon extends below 18 inches (10-18 inches or more), with color of 2.5Y 6/2 loamy sand texture, and many medium prominent 10YR 5/6 redoximorphic features. Watermarks and water-stained leaves characterize the hydrological indicators in this wetland.

Vegetation in this wetland consists of green ash in the overstory; silky dogwood and black willow in the understory; and meadowsweet (*Spirea latifolia*), sedges, sensitive fern, and poison ivy in the herbaceous layer.

17.6.3.38 Area 38

This isolated PSS is dominated by green ash, speckled alder, silky dogwood, and eastern cottonwood (*Populus deltoides*) in the shrub layer. The herbaceous layer is dominated by purple loosestrife, late goldenrod, rough stemmed goldenrod (*Solidago rugosa*), and New England aster.

Soils dominant in this area are Aeric Haplaquepts with a profile description consisting of a 6-inch (0-6) surface or A horizon with color of 2.5Y 5/1 and silty clay loam texture. The B horizon or subsoil extends below 18 inches (6-18 inches or more), has color of 2.5Y 6/2, many fine prominent 10YR 4/4 redoximorphic features, and silty clay loam texture. Watermarks, oxidized root channels, and water-stained leaves characterize the hydrological indicators in this area.

17.6.3.39 Area 39

This area consists of the shore of Lake Ontario that borders the northwestern portion of the Project site. The shoreline is rocky with about a 4-foot in height fluctuation zone devoid of vegetation. The fluctuation zone ranges in width from 10 to 80 feet, depending on lake-water levels. There is a 4-foot bank at the high water elevation that transitions directly into upland mixed forest.

17.6.3.40 Area Summary

Most of the wetlands on the Project site are deciduous forest and scrub-shrub types. Deciduous and mixed forested wetlands comprise 22.9 acres, or 12 percent, of the total site acreage. This cover type is generally an elm-ash-soft maple association. Trees are usually 6 to 12 inches in diameter at breast height and 40 to 60 feet in height.

Scrub-shrub wetlands represent about 9.6 acres, or 5 percent, of the total site acreage. Most of the scrub-shrub wetland areas are characterized by dense, tall (6 feet to 15 feet in height) shrubs, with a few scattered trees.

Emergent and open water wetlands represent only a small area (1.5 acres, or 1% of the total site acreage), as shown in Table 17-38.

Table 17-38: Wetland Types

Vegetation Cover Types	Acres	Percent of Total Site Acreage
Emergent Wetland	1.5	1
Scrub-shrub Wetland	9.6	5
Deciduous Forest Wetland	17.3	9
Mixed Forest Wetland	5.6	3
Total	**34.0**	**18**

17.6.4 Functional Assessment

A qualitative analysis of wetland functions and values was completed for each wetland resource area documented on the Project site. The evaluation criteria established in "The Highway Methodology Workbook Supplement, Wetland

Functions and Values, A Descriptive Approach" (November 1995) were applied in assessing the functions and values of each wetland area. The results of this analysis are provided in Table 17-39.

17.6.4.1 Groundwater Recharge

Certain wetlands, as a result of their landscape position, their underlying soils and watershed characteristics provide an opportunity for groundwater recharge. In general, isolated depressions tend to provide groundwater recharge opportunities, while wetlands along streams or other waterbodies are likely to function as groundwater discharge sites. Many of the wetlands on the site appear to be isolated depressions, and are, therefore, assumed to provide for groundwater recharge. However, the smallest of these are not expected to provide significant groundwater recharge simply because of their small storage volumes.

17.6.4.2 Floodflow Alteration

Wetlands can help to reduce flood damage by providing areas where floodwaters can be temporarily stored, then released slowly downstream. For example, a river or stream may overtop its banks during a flood event, and significant amounts of floodwaters may be released into the adjacent floodplain. In this manner, damage to downstream properties may be avoided.

Most of the wetlands observed on the Project site likely provide some limited flood storage within their individual watershed sub-basins. However, the flood storage capacities of the smaller wetlands is limited, and there are few downgradient properties that could benefit from displaced floodwaters. Nevertheless, floodflow alteration has been identified as an important function of many of the larger wetlands identified on the site.

17.6.4.3 Fish and Shellfish Habitat

Wetlands that are associated with perennial surface waters may provide habitat for fish and shellfish. This habitat may include open water areas, vegetated shallows and shores. The only perennial surface water located on the site is Lake Ontario. Since the Project will use existing water supply and wastewater discharge lines, no disturbance to this aquatic habitat is proposed. There are no other wetland areas within the Project site which provide fish and/or shellfish habitat, and therefore, this function is not regarded as significant to any of the other wetlands on the site.

Table 17-39: Summary of Wetland Functions and Values

Wetland No.	Wetland Functions and Values												
	GW	FF	FS	ST	NR	SS	WH	RE	ED	UH	PE	VQ	RS
2							■						
3							■						
4							■						
5							■						
6							■						
8	■			■			■						
9	■	■		■						■			
10	■			■			■			■			
11	■						■	■	■	■		■	
13	■	■		■			■			■			
14	■	■		■			■			■		■	
15	■	■		■				■	■	■		■	
16	■	■		■						■		■	
17	■	■		■			■	■	■	■		■	
18	■	■		■			■	■	■	■		■	
19	■	■		■			■	■	■				
20	■	■		■			■						
21							■						
22							■						
23							■						
24							■						
25	■			■			■						
26	■	■											
27	■	■								■			
28							■			■			
29	■	■					■			■			
30							■						
31	■	■					■			■			
32	■	■					■			■			
33	■	■					■			■			
34	■	■		■			■			■		■	
35							■						
36	■	■					■			■			
37							■						
38							■						
39			■			■	■	■	■	■		■	

Note: GW = Groundwater Recharge, FF = Floodflow Alteration, FS = Fish and Shellfish Habitat, ST = Sediment/Toxicant Retention, NR = Nutrient Removal, SS = Sediment/Shoreline Stabilization, WH = Wildlife Habitat, RE = Recreation, ED = Education, UH = Uniqueness/Heritage, PE = Production/Export, VQ = Visual Quality/Aesthetics, RS = Endangered Species Habitat

17.6.4.4 Sediment/Toxicant Retention

Wetlands function to trap sediments and toxicants by receiving runoff from adjacent uplands and reducing the velocity of these waters upon entry into the wetland. As the suspended sediments are allowed to settle, so too are the attached toxicants such as heavy metals and pesticides, which may then be removed by burial, chemical breakdown or plant tissue assimilation. Wetlands located along roadsides or other sediment sources such as disturbed upland fields are likely to provide this function. For the purposes of this analysis, all wetland areas located along roadsides or disturbed uplands are presumed to provide this function.

17.6.4.5 Nutrient Removal

Wetlands can provide an environment where nutrients from adjacent upland areas are retained and removed from the system. Both nitrates and phosphates can be taken up by wetland vegetation and released to the atmosphere as gases. Wetlands that are located downgradient of cultivated farm fields or wastewater discharges can function in this manner, if the proper vegetative communities are present.

Many of the wetlands present on the site may have served to remove these compounds in the past, when the site was used for agricultural purposes. However, the absence of agriculture at the site precludes the wetlands from providing this function in an appreciable manner. The only wetlands on the site that are expected to provide this function are those closest to the plant facilities and landscaped roadsides, where some runoff containing small amounts of these compounds might be expected.

17.6.4.6 Sediment/Shoreline Stabilization

The sediment/shoreline stabilization function refers to the ability of a wetland to bind soils by vegetation at the waters edge, thereby protecting the shore or bank from erosive forces resulting from wave and current energies. None of the wetlands present on the site present an opportunity for this function to occur. The only area subject to wave action is the unconsolidated shore along Lake Ontario. This area of the site is relatively devoid of vegetation, but the forested upland above the beach appears to provide some anchoring of the shore during extreme wave-height situations.

17.6.4.7 Wildlife Habitat

Wetlands that provide cover, water and food sources can be valuable habitat to wildlife, but other factors are also important in determining how significant the area is to wildlife. The adjacent uplands and corridors to other habitat blocks must also be considered to evaluate the ability of a wetland to provide wildlife habitat. Most of the wetlands on the site are believed to provide some useful wildlife habitat. However, those closest to the existing energy facilities are not considered valuable in terms of wildlife habitat.

17.6.4.8 Recreation

Wetlands can provide opportunities for both consumptive and non-consumptive recreation. Fishing and hunting are forms of consumptive recreation that may take place in wetlands. Hiking, boating and bird watching represent some non-consumptive forms of recreation that may take place in wetlands. At the Project site, only the wetlands located adjacent to the Independence Park (owned by Oswego County) are considered to have recreational value, as they provide some buffer and contribute to the overall quality of the area. Recreational use of the other wetland areas is limited, since the property is posted throughout to prohibit trespassing.

17.6.4.9 Education

Certain wetlands can provide an opportunity for an "outdoor classroom" or as a location for scientific study or research. Such wetlands include those containing threatened, rare, or endangered species or those wetlands that are valuable wildlife habitat. A wetland readily accessible to the public with little or no disturbance has educational/scientific value. At the Project site, those wetlands located within Independence Park are considered to provide educational opportunities.

17.6.4.10 Uniqueness/Heritage

Certain wetlands have been afforded special designations by regulatory agencies. Others may represent unusual or rare wetland communities. The uniqueness/heritage value relates to the unusual characteristics of a wetland. For the wetlands present on this site, two regulatory designations are relevant. Under Section 24 of the Environmental Conservation Law freshwater wetlands in New York that are 12.4 acres in size and larger are mapped by the NYSDEC and are designated as NYSDEC Wetlands. The USFWS also has a system of mapping and designating significant wetland areas through the NWI. For the purposes of this analysis, all wetlands that are mapped by either the NYSDEC or the NWI are assumed to provide this value. None of the wetlands observed contain rare or unusual communities.

17.6.4.11 Production Export

Wetlands can function to produce food or useable products for man or other living organisms. Wetland areas offering the opportunity for consumptive berry picking provide this function. Fish or shellfish can occur in wetlands and be harvested. Other forms of production export include nutrient flushing, organic matter flushing, heavy wildlife foraging, and high species diversity. Given that the Project site is currently developed in part, this function was not considered to be prevalent.

17.6.4.12 Visual Quality/Aesthetics

Wetland areas can contribute to visual quality and aesthetics by providing scenic vistas, or by screening other areas. For the wetlands within the Project site, screening is the more important function. The wetlands located along Riker's Beach Road provide some beneficial screening of the NMPC switchyard, and the existing Independence Station. The screening function is seasonally dependent, as most of the vegetation located in these wetlands is deciduous. The other wetlands on the site are removed from public roadways, and therefore, do not contribute to public vistas.

17.6.4.13 Endangered Species Habitat

The life histories of many rare species require that they have access to certain wetland habitats. For example, mole salamanders generally require vernal pool habitat for their breeding rituals. Many rare avian species require reedy habitats for nesting and foraging. Although the wetlands on the site contain a number of these types of wetland habitats, there is no record of any rare species occurring at the site, the areas are small, and no such species were observed during the course of these investigations. For these reasons, none of the wetlands present at the site are presumed to provide endangered species habitat.

17.6.5 Project Impacts on Wetlands

All wetlands on the site were delineated and located by ground survey prior to siting Project facilities. As a result, impacts on wetlands at the site have been largely avoided. A total of 1.17 acres of jurisdictional wetlands will be altered as a result of construction, as discussed below. Of this total, only 0.36 acres represents permanent loss of wetland habitat resulting from fill in wetlands. The remaining acreage represents clearing impacts. A plan depicting the locations of all wetland disturbances is provided as Figure 17-16.

17.6.5.1 Construction Impacts

Direct impacts on wetlands resulting from the construction of the Project include both filling (wetland loss) and clearing (alteration of habitat). The Project requires some filling of approximately 0.26 acres of Wetland Area 14 to allow for the construction of a new plant access road. Both the ACOE and NYSDEC regulate the wetland to be filled. Wetland Area 32, which is 0.10 acres in size and is not regulated by the NYSDEC, will be filled to accommodate a construction laydown area. All other proposed facilities have been sited outside of wetlands, and, therefore, no other wetland filling is proposed.

EARTH TECH

0 15:34:47 Tuesday
oswego/wetimpact.mxd

Clearing within wetlands will be required beneath the proposed new electric interconnection lines between the Project powerhouse and the new switchyard. A portion of this wetland is forested, but most of it is shrub swamp, which will not require clearing. Approximately 0.81 acres of the forested portion of this wetland will be selectively cleared of trees that can grow greater than 20 feet high. All other vegetation will be left in place in the affected wetland. Both the ACOE and NYSDEC regulate the wetland to be cleared. No other clearing of wetland habitat is required for the proposed facilities.

Alteration of the NYSDEC 100-foot buffer zone of the wetlands on the site will occur as a result of construction of the proposed Project facilities, construction laydown areas and parking. Approximately 3.11 acres of these "adjacent areas" will be affected. These areas are not regulated by the ACOE.

17.6.5.2 Operational Impacts

The primary operational impacts to wetlands are those related to stormwater discharges, as they could potentially affect the water regime and water quality present in the adjacent wetlands. Stormwater management for the Project is discussed in detail in Section 17.7

All stormwater runoff from buildings and parking lots will be controlled and directed to an existing stormwater detention pond located to the northeast of the existing cooling towers. The stormwater detention pond has a controlled outlet that is compatible with the natural site drainage. Discharge from parking lots will be routed through oil/water separators. The proposed switchyard will not be paved, and water will be allowed to infiltrate into the ground.

The extent to which wetland values are affected as a result of changes in stormwater flows is not expected to be significant. The proposed stormwater drainage system for the Project will help to minimize impacts to wetlands from these changes. Nevertheless, some minor impacts to wetland values could be expected to occur at wetlands, where existing stormwater runoff will be redirected to the stormwater detention pond. This redirection of flow may result in some minor reduction of wetland values (sediment/toxicant reduction, nutrient removal) in these areas. However, these affected wetlands will continue to provide these values for other areas within its sub-basin, and the stormwater system and detention pond is designed to perform these same values on the redirected stormwater.

17.6.6 Proposed Mitigation for Wetlands Impacts

Wetland impacts resulting from the Project have been effectively minimized by siting the proposed facilities outside of wetlands as much as possible. Undisturbed buffers around wetlands have been maintained as much as possible. Accordingly, a degree of wetland mitigation has been provided in the design process through avoidance.

The greatest amount of wetland alteration results from the construction of the proposed electric transmission line from the Project powerhouse to the expanded switchyard. Selective clearing of forested wetlands necessary to accommodate the transmission line will result in community type conversion from forested wetland to scrub-shrub wetland, but no wetland area will be lost. Wetland fills associated with the Project powerhouse, laydown areas and switchyard total approximately 0.36 acre. Finally, disturbances to the 100-foot adjacent areas to wetlands for various facilities total approximately 3.11 acres. This buffer zone impact will be variable and some areas will only be temporarily used and then allowed to be revegetated.

The following sections describe proposed mitigation for wetland impact, both for the short term construction impacts, and for the long term replacement of altered wetland habitats.

17.6.6.1 Construction Mitigation

The construction period for the Project is expected to last 34 months. During the entire construction period, strict erosion and sedimentation control measures will be instituted to minimize impact to wetlands. Siltation barriers will be installed along the perimeter of significant areas of disturbance located within 100 feet of all wetland areas. In addition, existing drainage structures, such as the inlets of all culverts, catch basins and drainage ditches will be protected by sediment filters or traps. Stormwater runoff from undisturbed areas of the site, which would otherwise drain into construction areas, will be diverted around the construction zone. The sediment control measures will be monitored regularly, and repaired as necessary throughout the construction phase.

The extent of the areas of disturbance will be limited, and clearly marked on the ground prior to the commencement of earth moving activities. The areas of temporary disturbances, such as the construction laydown areas, will be reclaimed as soon as possible. Stockpiled topsoil will be replaced over these areas, which will then be seeded, fertilized and mulched to re-establish a permanent vegetative cover.

An Environmental Control Supervisor will be assigned to monitor all contractor/subcontractor performance with regard to the proposed construction mitigation. The Environmental Control Supervisor will evaluate and enforce compliance with mitigation measures proposed to minimize impacts to terrestrial and aquatic resources, including wetlands.

17.6.6.2 Long-term Mitigation

A wetland replication area, approximately 1.0 acre in size, will be created. This creation area represents approximately a 3:1 replacement for the 0.36 acres to be filled. The additional replication is to compensate for the 0.81 acres in which selective clearing will occur. The location of this replication area is proximate to the proposed disturbances and within the same wetland system (see Figure 17-17).

Mitigation Goals and Objectives

The main goal of the wetland mitigation effort will be to create in-kind wetland habitat similar to that which will be filled and/or altered as a result of construction, thereby replacing lost wetland functions and/or values.

An assessment was made of the Project site for areas that could serve as potential wetland creation areas. Investigations focused on efforts to assess potential areas containing the following factors:

- Adequate hydrology;
- Adjacent wetland conditions;
- Construction access;
- Minimal risk of future disturbance; and
- Minimal excavation required.

The area located adjacent to wetland 14 is the most attractive since it is large enough to provide more than a 2:1 ratio (i.e., 0.80 acres), requires a minimal amount of excavation, has a reliable hydrological source associated with the adjacent wetlands, is located in the same system as the impacted wetlands, and the area is easily accessible without impacting additional wetland areas.

Hydrological Considerations

The hydrological source of the proposed wetland mitigation site will be groundwater. Using elevational contours for the adjacent wetland areas, the design bottom for the replication area will be properly established. Elevations in the adjacent wetland areas range from 259.1 to 262.5 feet above msl. The design elevation of the creation area is estimated to be approximately 259 feet msl. This elevation would establish a seasonally flooded water regime.

Figure 17-17: Wetland Mitigation Area

Substrate Conditions

The wetland creation area will be excavated to 12 inches below the finished grade. A 12-inch layer of topsoil will be placed within the excavated basin. This topsoil layer will provide the necessary substrate in which to grow the wetland species. The topsoil will be required to satisfy the specified criteria including a texture of sandy loam, a pH value between 5 and 8, and an organic content between 4 to 10 percent. In addition, topsoil required to complete the earthwork should be relatively free from large roots, sticks, weeds, brush, or stones larger than 1-inch diameter. Existing areas selected for use as topsoil must not exhibit any evidence or growth of invasive species (e.g., *Phragmites sp.*). Use of these areas for topsoil is prohibited in an attempt to reduce the potential spread of this vegetation.

If suitable, topsoil will be obtained from the impacted wetland areas during the construction of the access roadway. It will be amended with organic matter and other soil amendments as required to satisfy the topsoil criteria. Soil amendments that may be used to improve topsoil quality for growing and satisfy topsoil criteria may include organic matter, limestone, bone meal, and fertilizer.

Planting Details

The plant materials selected for the wetland creation areas will have wetland and wildlife values. The shrub and tree plantings will be species that are tolerant of yearly changes in hydrology. These plant species will provide cover for wildlife as well as supply a food source. Similar species found within the wetland areas being impacted are available from commercial sources within New York. The project will be coordinated so that planting will occur in the spring between April 15 and June 1 or in the fall between September 1 and October 15. Shrubs will be planted in a random manner (not in rows) of small clusters. This approach simulates natural patterns of shrub growth and avoids the "nursery look." The wetland creation areas will be watered during the planting period to a point of soil saturation. If sufficient soil saturation is present (within 6 inches of the surface), the watering will not be required.

The proposed planting plan for the wetland creation area is based on replicating wetlands similar to what will be lost from the impacted wetland areas. By excavation between the two adjacent wetland areas, the primary focus is to create one large contiguous wetland system on this portion of the Project site. As part of this creation plan, shrub and herbaceous vegetative strata will be planted. Shrub and herbaceous species to be planted will be similar to those presently growing in the adjacent wetland areas on the site.

Post-Construction Monitoring

A monitoring plan will be implemented to document the status of the wetland creation area for five growing seasons following completion of construction and planting activities. The post-construction monitoring will provide documentation to evaluate the success of the wetland creation area, to identify potential problematic issues, and to discuss remedial measures to correct these problems. A qualified wetland specialist will conduct inspection of the creation area during the growing season. Sample plots will be established within the wetland creation area to collect information on vegetative cover, hydrology, and soil moisture. Photographs will be taken at each sample plot during each investigation. The ultimate success of the area will be measured with respect to achieving 75 percent vegetative cover by wetland species and to developing of a reliable water regime.

Maintenance of the wetland creation area will include replacing dead shrub plantings or re-seeding areas which did not germinate. The Applicant will be required to provide supplemental plantings as needed to establish the wetland creation area as specified. The erosion control barriers will be removed once the areas have revegetated adequately and the underlying soils have stabilized. Any invasive plant species such as common reed (*Phragmites australis*) which invades the mitigation area will be eradicated by hand. It is not expected that these species will become a problem since they are not present in the adjacent wetland areas.

17.7 Stormwater Runoff and Erosion Control

This section addresses requirements of Stipulation No. 12, Clauses 42 and 43.

17.7.1 Applicable Regulatory Requirements

The Clean Water Act provides that stormwater discharges associated with industrial activity from a point source (including discharges through a municipal separate stormwater system) to waters of the United States are unlawful, unless authorized by a NPDES permit. In New York (an NPDES-delegated state), this is accomplished through the administration of the SPDES program by NYSDEC. For the Project site, stormwater will be directed to the existing Independence Station detention basin. The SPDES permit for Independence Station will be modified accordingly.

A discharger that is subject to the federal stormwater (NPDES) regulations may be eligible to obtain authority to discharge during construction under a general permit by submitting a General Construction Activity Stormwater Permit. The General Construction Activity Stormwater Permit process begins with the filing of a Notice of Intent, Transfer or Termination, which must be filed prior to commencement of clearing, grading, or excavation at a new construction site.

The General Construction Activity Stormwater Permit prohibits the discharge of materials other than stormwater and all discharges which contain a hazardous substance in excess of reportable quantities established by 40 CFR 117.3 of 40 CFR 302.4, unless a separate NPDES permit has been issued to regulate those discharges. Permits for stormwater discharges associated with construction activity must also meet all applicable provisions of Sections 301 and 402 of the Clean Water Act. In addition, no discharge shall contribute to a violation of water quality standards as contained in 6 NYCRR 700 though 705.

After submitting a Notice of Intent and receiving notification of coverage under the General Construction Activity Stormwater Permit, an owner must do the following:

- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP).
- Develop and implement a Monitoring and Maintenance Program.
- Retain all records for a period of at least 3 years after construction is completed.

Several New York State stormwater and erosion and sediment control design guidelines also apply to this Project:

- Runoff from the 2-year, 10-year, and 25-year, 24-hour storms must be managed so that that the post-development peak runoff rates are equal to or less than those during pre-development conditions. The 25-year storm was the criterion used, consistent with guidance from the Oswego County Soil and Water Conservation District.

- Runoff from the 100-year storm must be routed to minimize downstream impacts.

- The stormwater management system must be designed so that the first ½ inch of runoff from areas where the perviousness of the soil has been changed over pre-development conditions is stored and infiltrated.

- Stormwater discharges should be consistent with the thermal criteria found in 6 NYCRR Part 704.

- The New York State Erosion and Sedimentation Control Guidelines shall be adhered to.

- Erosion and Sediment Control Measures used during construction should comply with the specifications contained in the New York Guidelines for Urban Erosion and Sediment Control.

17.7.2 Stormwater Runoff from the Existing Site

Stormwater runoff from a portion of the developed Project site associated with Independence Station currently discharges into a runoff collection basin (see Figure 17-18). The capacity of the existing basin is 142,491 cubic feet from the bottom of the pond to the invert of the "V" weir in the overflow riser, and 170,310 cubic feet from the bottom of the pond to the invert of the spillway.

The watershed area draining to the basin is 16.2 acres. The Natural Resource Conservation Service (NRCS) runoff curve number (RCN) was generated for the site based on soil types, cover and hydraulic condition. The composite RCN used for the calculations was 93. Calculations are provided in Appendix V.

New York State requires that the peak volumes of runoff be controlled for design storms up to and including the 25-year, 24-hour storm. Using the NRCS Type II 25-year rainfall amount (0.35 feet) and solving for runoff volume using the NRCS runoff equation:

$$Q = \frac{(P - .2(S))^2}{(P + .8(S))}$$

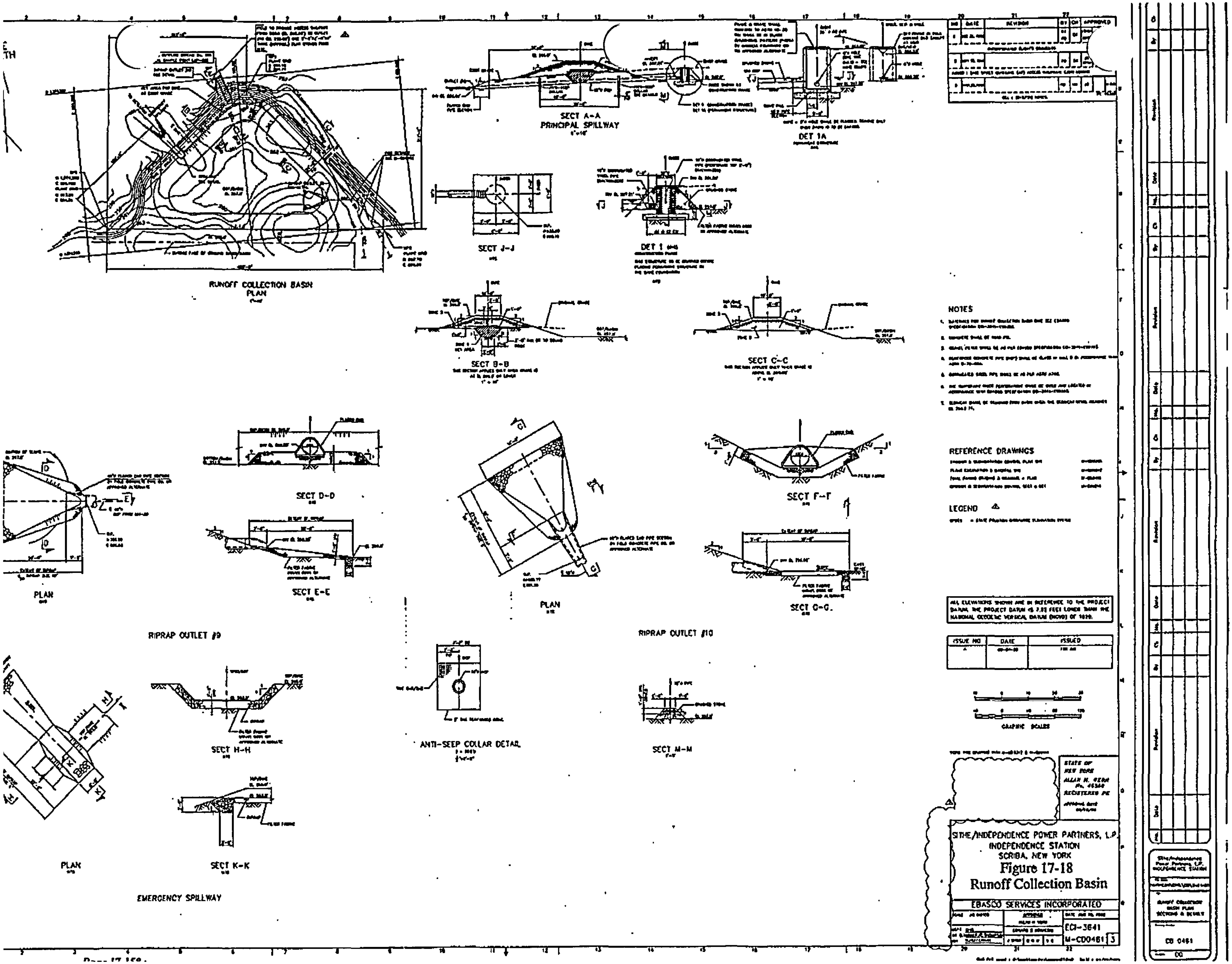
$Q(ft^3) = (.24\ ft) \times (16.2 \times 43{,}560\ ft^2) = 169{,}361\ ft^3$

Where:

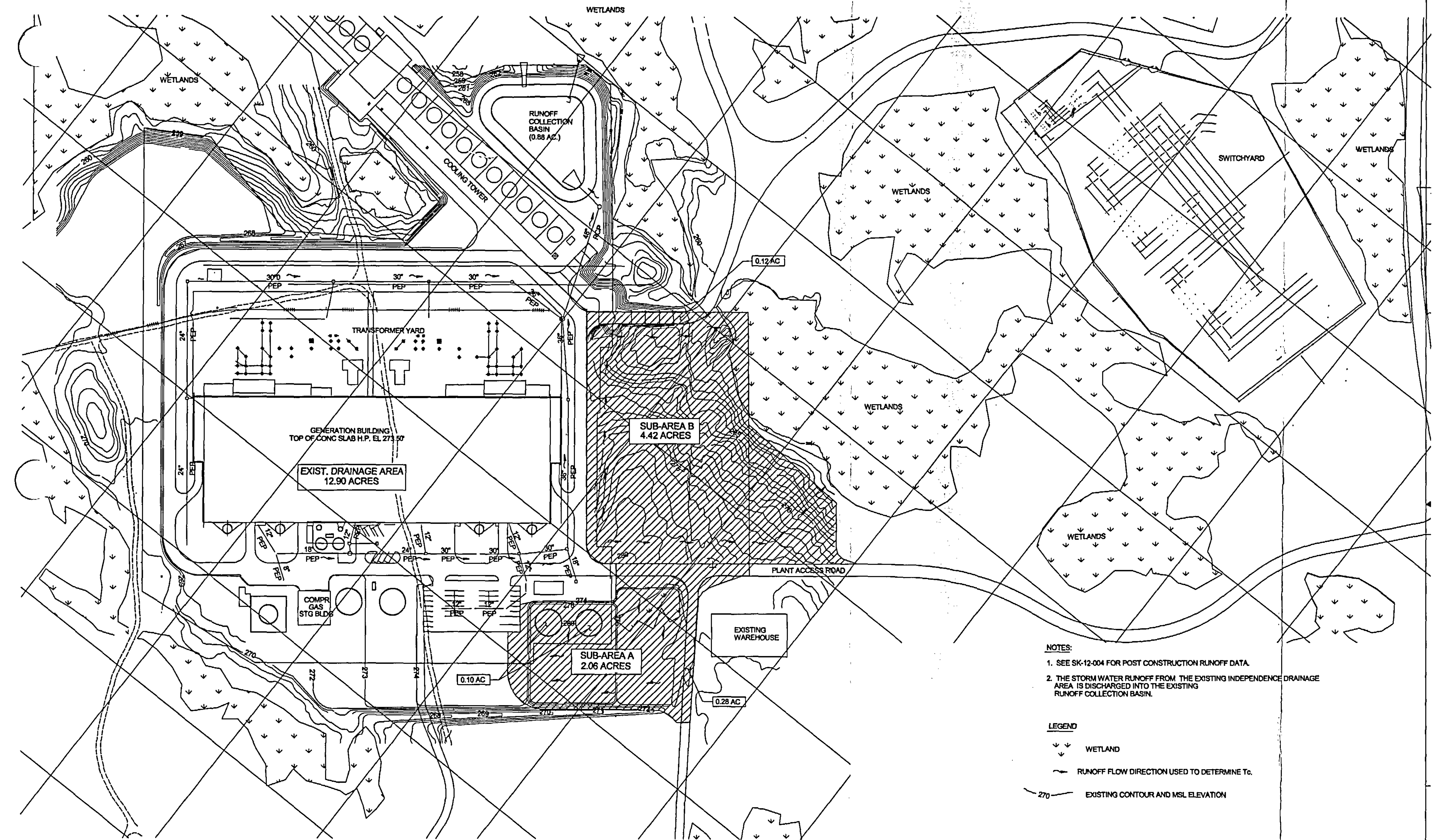
Q = volume (cubic feet)
P = Precipitation (inches)
S = Maximum Storage (based on dimensionless RCN)

This runoff volume is, therefore, less than the designed capacity of the basin.

The remainder of the runoff drains off-site from one of the two sub areas shown in Figure 17-19. Volume calculations for the watershed discharging to the basin and peak discharge calculations for Sub Areas A and B are provided in Appendix V. The corresponding hydrographs for each of the design storms are also provided with the calculations.



RUNOFF COLLECTION BASIN
PLAN
SECT A-A
PRINCIPAL SPILLWAY
DET 1A
SECT J-J
DET 1
SECT B-B
SECT C-C
NOTES
REFERENCE DRAWINGS
LEGEND
SECT D-D
SECT F-F
PLAN
SECT E-E
PLAN
SECT G-G
RIPRAP OUTLET #9
RIPRAP OUTLET #10
ISSUE NO
DATE
ISSUED
GRAPHIC SCALES
SECT H-H
ANTI-SEEP COLLAR DETAIL
SECT M-M
PLAN
SECT K-K
EMERGENCY SPILLWAY
SITHE/INDEPENDENCE POWER PARTNERS, L.P.
INDEPENDENCE STATION
SCRIBA, NEW YORK
Figure 17-18
Runoff Collection Basin
EBASCO SERVICES INCORPORATED
ECI-3641
M-CD0461 3



NOTES:

1. SEE SK-12-004 FOR POST CONSTRUCTION RUNOFF DATA.
2. THE STORM WATER RUNOFF FROM THE EXISTING INDEPENDENCE DRAINAGE AREA IS DISCHARGED INTO THE EXISTING RUNOFF COLLECTION BASIN.

LEGEND

WETLAND

RUNOFF FLOW DIRECTION USED TO DETERMINE Tc.

270 EXISTING CONTOUR AND MSL ELEVATION

REVISIONS	DSNR	CHD
IS… …INARY FOR PERMIT SUPPORT	GAF	
ISSUED PRELIMINARY FOR PERMIT SUPPORT ADDED ADMIN. BLDG. & PARKING LOT AREA	GAF	
ISSUED PRELIMINARY FOR PERMIT SUPPORT ADDED FLOW DIRECTION	GAF	

REVISION APPROVAL RECORD				REV		DRAWING RECORD
DISCIPLINE	REVIEWED	DATE	DISCIPLINE	REVIEWED	DATE	DESIGNER
CIVIL			PIPING			CHECKER
STRUCTURAL			ELECTRICAL			CADD FILE DATA
HVAC			ARCHITECTURAL			TYPE: VERS:
MECHANICAL			INST & CONTROL			NODE:
PROCESS			ENVIRONMENTAL			PATH:
NUCLEAR			GEN. ARRANG.			FILE:

PRINT DISTRIBUTION RECORD	DRAWING STATUS ISSUED	REV	DATE	SDE	PEM
DATE	PRELIMINARY	P2			
FOR	FOR COMMENTS AND/OR APPROVAL				
REV. NO.	APPROVED FOR CONSTRUCTION				
CLIENT					
FIELD					
INTRA CO.	REVISED & APPROVED FOR CONSTRUCTION				

FIGURE 17-19

DRAINAGE AREA MAP PREDEVELOPMENT

SCALE: 1" = 100'

HERITAGE POWER LLC
H PROJECT

Raytheon Engineers &

DWG. NO. SK-12-003

ORDER NO.

17.7.3 Runoff from the Proposed Site

A majority of the proposed Project will use the existing runoff collection basin at the Independence Station site (see Figure 17-20 for post-development drainage areas). The post-construction watershed area draining to the basin is 19.9 acres. The composite RCN for the site is 85. Using the same methodology as that used to calculate the volume of runoff from the Independence site during the 25-year storm, the volume of runoff from the Project for the 25-year storm is 158,199 cubic feet.

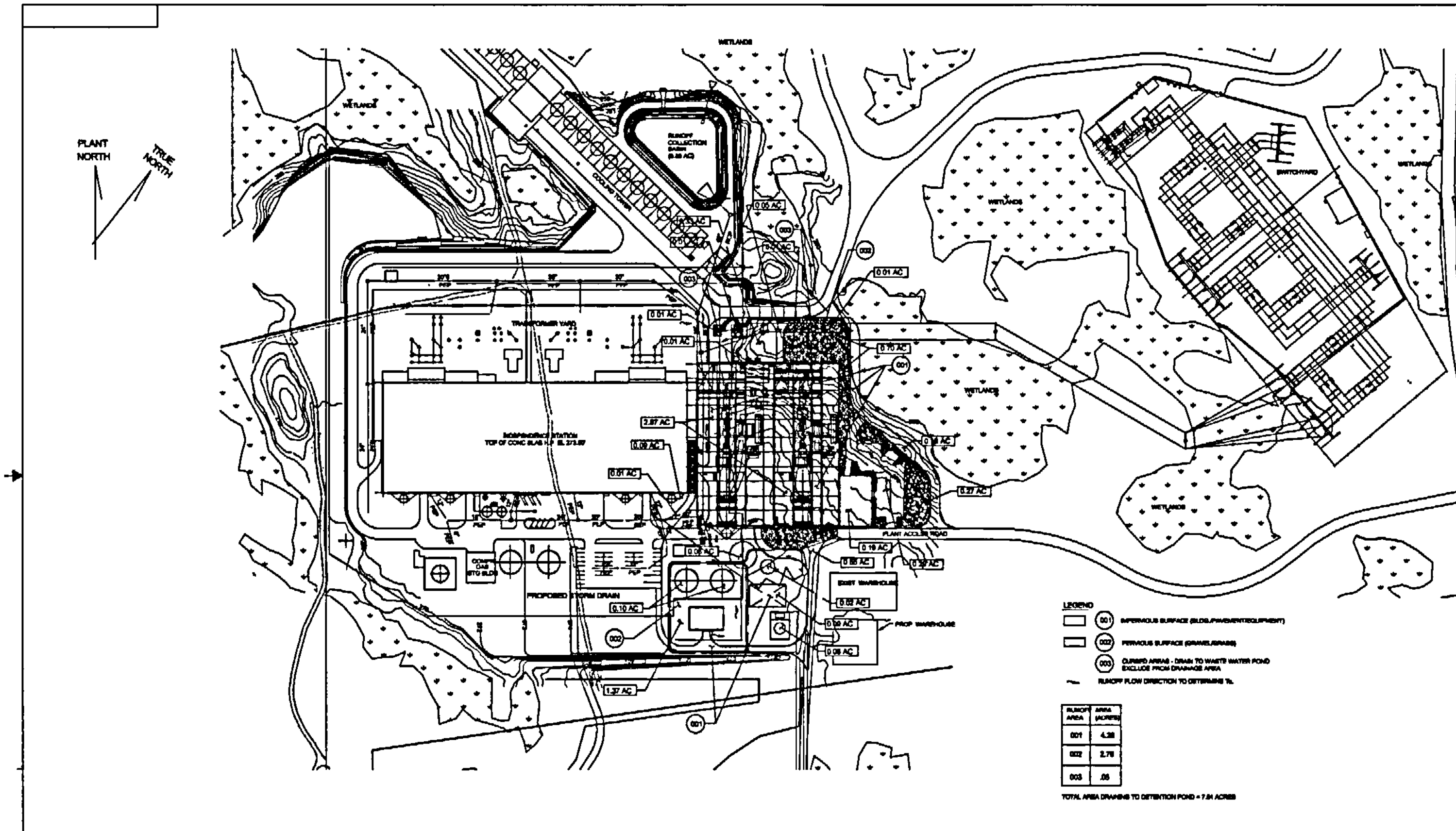
Given the design capacity of the basin, the 25-year storm volumes will be captured from both sites. The existing primary outlet structure will need to be modified in order to reduce post-development peak discharges from the 2-, 10- and 25-year 24-hour storms to predevelopment levels. The existing overflow riser will need to be modified in order to ensure that the outflow velocity from the 100-year, 24-hour storm is adequately managed. A second 6-inch opening at elevation 258.33 feet will manage the volumes from both sites during this storm event.

Stormwater from the proposed switchyard, cooling tower, construction parking, construction laydown, and wastewater holding pond will not drain to the detention pond. Volume calculations for the drainage area discharging to the basin and peak discharge calculations for area draining off site are provided in Appendix V. Hydrographs for each of the design storms are also provided with the calculations.

17.7.4 Impact Evaluation

The release of stormwater runoff from development is not expected to exceed pre-development (natural) conditions. To accomplish this, stormwater runoff will be controlled so that during and after development, the site will generate no greater peak than prior to development for the 2-year, 10-year, and 25-year, 24-hour storms. A stormwater runoff system has been designed to ensure that no downstream impacts will result from the 100-year, 24-hour storm.

Most runoff-related water quality contaminants are transported from land, particularly impervious surfaces, during the initial stages of a storm event. Control of this "first flush" is, therefore, important in stormwater management. The existing stormwater detention basin is properly sized to effectively treat the first ½ inch of runoff.



RUNOFF AREA	AREA (ACRES)
001	4.38
002	2.78
003	.06

REV	REVISIONS	DRWN
P	ISSUED PRELIMINARY FOR PERMIT SUPPORT	GAF
P1		GAF
P2		GAF

DRAWING STATUS: PRELIMINARY — REV P2

DRAWN: GAF

FIGURE 17-20
DRAINAGE AREA MAP POSTDEVELOPMENT

SCALE: 1"=100'

HERITAGE POWER LLC
H PROJECT

Raytheon Engineers &

DWG. NO. SK-12-004

Control of thermal energy in stormwater runoff in watersheds having streams that support cold water fisheries is essential. Impervious surfaces (i.e., asphalt parking areas and roofs) store large quantities of heat during hot weather in summer. The heat from such surfaces is released to stormwater through conduction during storm events. Stormwater runoff having elevated temperatures can, in turn, increase stream temperatures during storm events and adversely impact cold water fisheries. Runoff from impervious surfaces will be collected and routed to the stormwater detention basin where any elevated temperatures would be moderated before discharge.

Sediment in runoff from construction sites can have a significant effect on the quality of downstream waters. Sediment may destroy fish habitat through blanketing of spawning and feeding areas and eliminate certain food organisms. It can also directly impact fish through gill abrasion and fin rot, and reduce sunlight penetration necessary for the photosynthesis for aquatic plants. Suspended sediment can also impair recreational uses, clog water intakes, and add to treatment costs for water suppliers. Nutrients such as phosphorus and nitrogen have an affinity for sediment particles and have the potential to impact fishery habitat, cause eutrophication, and impair recreational uses. Proper sediment controls and best management practices will minimize these potential impacts.

The sediment and nutrient loadings in the stormwater runoff from the post-development Project site are based on published stormwater runoff pollutant concentration values and calculated stormwater runoff volumes for average storm events. The concentration values, as reported in the September 29, 1995 Federal Register, include the results for all electric facilities. Because this includes facilities that maintain coal and/or piles, it is presumed to be an extremely conservative estimate for this Project. Expected runoff pollutant concentrations are presented in Table 17-40.

Table 17-40: Statistical Stormwater Runoff Pollutant Concentrations

Parameter	Steam/Electric Industry Category, Composite Median (mg/l)
Total Nitrogen (TN)	1.40
Total Phosphorus (TP)	0.28
Total Suspended Solids (TSS)	40

Stormwater pollutant export under post-development conditions was calculated using the *simple method* (as described in *Reducing the Impacts of Stormwater Runoff from New Development*). The simple method equation is:

$$L = [(p)(Pj)(Rv)/12](c)(A)(2.72)$$

Where: L = Pollutant load (lbs/year)

p = Rainfall depth (inches/year)

Pj = Correction factor for rainfall events that do not produce runoff (dimensionless)

Rv = Runoff coefficient (dimensionless)

c = Median pollutant concentration (mg/l)

A = Area of site (acres)

12 and 2.72 are unit conversion factors.

Table 17-41 lists the model inputs.

Table 17-41: Pollutant Loading Model Inputs

Parameter	Value
P	40.
Pj	0.9
Rv	0.58
c	From Table 17-40
A	19.9

The annual post-development loads of TSS, TN, and TP are expected to be 3,767, 131, and 26 lbs, respectively.

According to the NYSDEC stormwater management guidelines, 70-95 percent of pollutant loads will be removed from stormwater if the stormwater management system is designed to treat the first ½-inch of runoff assuming 95 percent removal, the post-development loads of TSS, TN, and TP discharged from the runoff collection basin will be 188, 7, and 1 lbs, respectively.

Mitigation measures designed to reduce post-development loads of TSS, TN, and TP are discussed in the following section.

17.7.5 Mitigation Measures

The primary stormwater management feature to be employed for the Project is the existing stormwater runoff collection basin currently being used to treat stormwater from Independence Station. The basin is currently sized to treat the first ½ inch of runoff from both sites and will be able to reduce the peak flows from the 25-year storm to existing levels. Downstream impacts during the 100-year storm event are expected to be negligible once the overflow riser is modified.

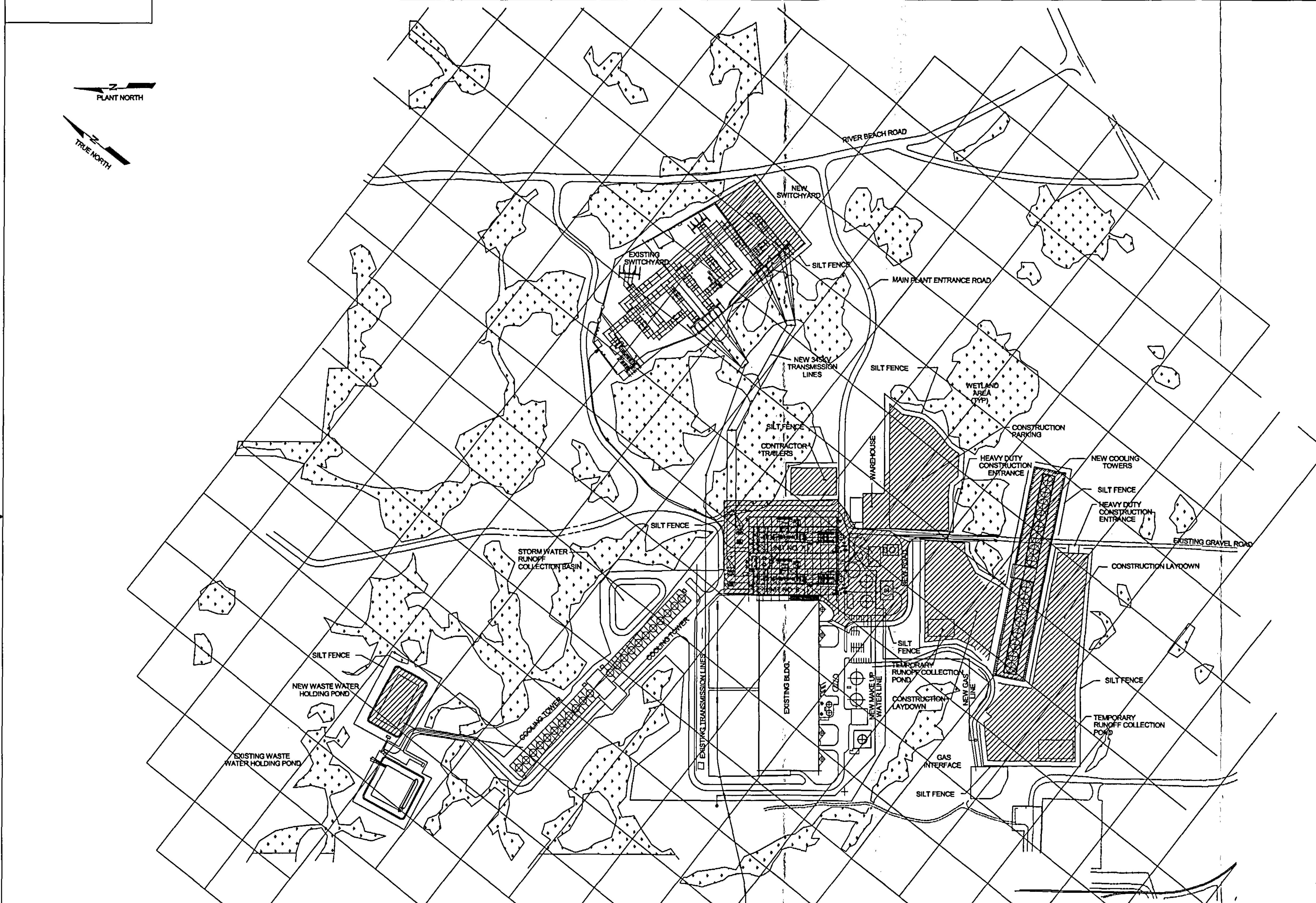
Approximately 70 percent to 95 percent of the contaminants in stormwater can be removed by capturing the first flush of runoff through infiltration practices. The NYSDEC prefers treatment infiltration measures to other methods of treating the first flush. Approximately 41 percent of the proposed Project footprint is pervious area. This will serve to provide water quality treatment for a portion of the first ½ inch of runoff being routed towards the runoff basin. The remainder will be infiltrated in the basin. Pervious areas will also provide the water quality treatment for runoff draining off-site from the proposed switchyard, cooling tower, construction parking, construction laydown, and wastewater holding pond. Runoff coming in contact with pervious areas will help reduce the variability of water temperatures before being discharged offsite.

During construction, the amount of unprotected soil exposed at any one time will be minimized to the extent practical. Surface runoff that is relatively clean and sediment free will be diverted or otherwise prevented from flowing through areas of construction activity on the Project site via a system of temporary swales. The swales shall route flow to temporary runoff collection ponds. Straw bale dikes will be placed within the temporary swales in order to slow runoff to a non-erosive velocity. Silt fence and hay bales shall be placed along the Project perimeter in order to contain any sediment mobilized by construction on site and away from adjacent wetland areas and existing storm drains.

All disturbed areas will be seeded and stabilized with erosion control materials, such as straw mulch, jute mesh, or excelsior within 15 days of final grading. If construction has been suspended, or sections completed, areas will be seeded immediately and stabilized with erosion control materials. Maintenance will be performed as necessary to ensure continued stabilization.

All points of construction ingress and egress will be protected to prevent the deposition of materials onto traversed public thoroughfare(s) by installing and maintaining a stabilized construction entrance. Accumulated sediment will be removed when 60 percent of the storage capacity of the retention structure is filled with sediment.

Figure 17-21 illustrates the location of erosion and sediment controls planned during construction. All proposed best management practices (including specifications for temporary and permanent seeding) shall be designed and maintained in accordance with the New York Guidelines for Urban Erosion and Sediment Control. These measures will be submitted as part of the Compliance Filing for this case.



NOTES

1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHOWN ON THIS DRAWING SHALL BE IMPLEMENTED IMMEDIATELY AFTER SITE CLEARING AND GRUBBING, AND COORDINATED WITH SITE PREPARATION EARTHWORK OPERATIONS. ALL DEVICES SHALL BE MAINTAINED AND PROTECTED THROUGHOUT CONSTRUCTION ACTIVITIES.
2. HAY BALES SHALL BE PLACED IN DITCHES AND SWALES AS REQUIRED TO PREVENT EROSION.
3. PLACE SILT FENCE A MINIMUM OF 2' OUTSIDE THE LIMITS OF CLEARING AND GRUBBING.
4. ALL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE MAINTAINED AND PROTECTED THROUGHOUT CONSTRUCTION ACTIVITIES.
5. INSTALL HEAVY DUTY STABILIZED CONSTRUCTION ENTRANCES AS DIRECTED.
6. SEE DWG. SK-12-008 FOR EROSION AND SEDIMENTATION CONTROL DETAILS.

MICRO	REV NO	DATE	REVISIONS	DSNR	CHD
	P		ISSUED PRELIMINARY FOR PERMIT SUPPORT	GAF	

REVISION APPROVAL RECORD						REV P	
DISCIPLINE	REVIEWED	DATE	DISCIPLINE			REVIEWED	DATE
CIVIL			PIPING				
STRUCTURAL			ELECTRICAL				
HVAC			ARCHITECTURAL				
MECHANICAL			INST & CONTROL				
PROCESS			ENVIRONMENTAL				
NUCLEAR			GEN. ARRANG.				

DRAWING RECORD	
DESIGNER	GAF
CHECKER	
CADD FILE DATA	
TYPE: MS	VERS: 95
NODE:	
PATH: /POWER/INDEPEND/	
FILE: SK12007.DGN	
UPDATED:	BY: GAF

PRINT DISTRIBUTION RECORD
DATE
FOR
REV. NO.
CLIENT
FIELD
INTRA CO.

DRAWING STATUS				
ISSUED	REV	DATE	SDE	PEM
PRELIMINARY	P			
FOR COMMENTS AND/OR APPROVAL				
APPROVED FOR CONSTRUCTION				
REVISED & APPROVED FOR CONSTRUCTION				

NOT APPROVED FOR CONSTRUCTION UNLESS SIGNED & DATED. DESTROY ALL PRINTS BEARING EARLIER DATE &/OR REV. NO.

FIGURE 17-21

EROSION AND SEDIMENTATION CONTROL PLAN

SCALE: 1" = 200'

HERITAGE POWER LLC
H PROJECT

Raytheon Engineers & Constructors

DWG. NO. SK-12-007

ORDER NO. 45000.845 REV P